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State Innovation Models (SIM) Initiative Evaluation

Model Test Year Five Annual Report

Prepared for

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SIM Initiative Evaluation Model Test Year 5 Annual Report

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Acronym	Definition
AC	Accountable Communities
ACH	Accountable Community for Health
ACO	accountable care organization
AHCPII	Arkansas Health Care Payment Improvement Initiative
AHRQ	Agency for Healthcare Research and Quality
APCD	all-payer claims database
BCBS	Blue Cross Blue Shield
BHH	behavioral health home
CCM	Coordinated Care Model
CCO	Coordinated Care Organizations
CFR	Code of Federal Regulations
CHIP	Children's Health Insurance Program
CMS	Centers for Medicare & Medicaid Services
DD	developmental disabilities
DHS	Department of Human Services
D-in-D	difference-in-differences
D-SNPs	Dual Eligible Special Needs Plans
DSRIP	Delivery System Reform Incentive Payment
EDIE	Emergency Department Information Exchange
EHR	electronic health record
ENS	event notification system or service
EOC	episode of care
ER	emergency room
ERISA	Employee Retirement Income Security Act
FFS	fee for service or fee-for-service (*adj*.)
FQHC	federally qualified health centers
GMCB	Green Mountain Care Board
HCBS	home and community-based services
HCH	health care home
health IT	health information technology
HIE	health information exchange
HPC	Health Policy Commission
I/DD	intellectual or developmental disabilities
IHP	Integrated Health Partnership
LTSS	long-term services and supports

Acronym	Definition
MCO	managed care organization
MCPAP	Massachusetts Child Access and Psychiatry Project
MMIS	Medicaid Management Information System
NCQA	National Committee for Quality Assurance
OEBB	Oregon Educators Benefit Board
PAP	principal accountable provider
PCC	Primary Care Clinicians
PCMH	patient-centered medical home
PCPCH	patient-centered primary care home
PCPRI	Primary Care Payment Reform Initiative
PEBB	Public Employees Benefit Board
PMPM	per member per month
QHP	qualified health plan
SIM	State Innovation Models
SPA	state plan amendment
SSP	Shared Savings Program
VHIE	Vermont Health Information Exchange
VPM	value-based payment model

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Executive Summary

In the State Innovation Models (SIM) Initiative, the Centers for Medicare & Medicaid Services (CMS) is testing the ability of state governments to use their policy and regulatory levers to accelerate statewide health care system transformation. For Round 1 (in 2013), the Center for Medicare and Medicaid Innovation (the Innovation Center) awarded between $33 and $45 million to each of the six Model Test states: **Arkansas, Maine, Massachusetts, Minnesota, Oregon, and Vermont**. Within periods of performance ranging from 3.5 to 5 years, these six states:

SIM Initiative Fast Facts

- By 2018, all states implemented alternative care delivery and payment models that offered primary care and behavioral health providers incentives to integrate care.
- The six states tested nine alternative payment and delivery models.[1]
- One payment model, the Vermont ACO SSP, yielded $97 million in Medicaid savings over 3 years relative to spending for an in-state comparison group.[2]

- Designed, implemented, and expanded alternative care delivery and value-based payment models[3] in Medicaid (all states) or across Medicaid and commercial payers (Arkansas, Oregon, Vermont).
- Enhanced electronic health information exchange between providers caring for the same patient, using SIM funds in some states (Maine, Massachusetts, Minnesota, Oregon, Vermont) and changes to laws and policies in others (Arkansas, Massachusetts).
- Engaged health care and community-based social service providers in improving or testing new forms of care delivery through structured educational efforts and technical assistance, performance feedback reports, or direct grants. Implementation of accountable care organization (ACO)- and patient-centered medical home (PCMH)-type models was common, with most states supporting more than one delivery model.
- Built performance data infrastructure and capacity (all states), integrated behavioral and physical health (all states), expanded new workforce roles that support team-

[1] Nine models were supported by the SIM Initiative and evaluated here: PCMH models in three states (Arkansas, Massachusetts, Oregon), ACO models in three states (Maine, Minnesota, Vermont), the behavioral health home model in Maine, the episode of care model in Arkansas, and the Coordinated Care Model in state employee health plans in Oregon.

[2] The aggregated savings estimate was obtained by multiplying the per beneficiary per month change by the total number of person months for Vermont's Medicaid Shared Savings Program (SSP) Accountable Care Organization (ACO)-attributed beneficiaries in the implementation period (2014–2016), N = 2,427,456.

[3] Alternative payment models offer health care providers the opportunity to have at least some portion of their payment rest on quality or value of health care outcomes for their patients, rather than payments that are entirely volume based (e.g., traditional fee-for-service).

based clinical care (Maine, Minnesota, Oregon), and addressed social determinants of health (Minnesota, Oregon).

Impact of specific alternative payment models in states' Medicaid programs. To assess the impact of specific alternative payment models, this evaluation measured per beneficiary per month expenditures, annual inpatient hospital and outpatient emergency department (ED) utilization, and quality outcomes after 1, 2, 3, or 4 years of implementation (depending on the state) relative to a comparison group. Key findings are:

- Only **Vermont's ACO Shared Savings Program (SSP)** model, which was implemented to align with Medicare, Medicaid, and the largest commercial insurer in the state, had a **statistically significant slower increase in total Medicaid expenditures** after 2 and 3 years of implementation. The SSP layered upon a multi-payer PCMH model that had been in place for 8 years prior to the SIM Initiative. Even so, Minnesota's ACO model had slower growth in expenditures in its third year of operation and Maine's ACO model had nonsignificant relative decreases in expenditures in its second year. These findings suggest that models may need a ramp-up period before seeing any cost savings.

For further information on the impact of Vermont's Medicaid ACO SSP see ***Appendix F.***

- **All ACO models** operational since at least 2014 (Maine, Minnesota, and Vermont) **and one episode of care model** (in Arkansas) showed comparatively **lower rates of ED visits**, and two ACO models (Maine, Vermont) showed comparatively lower rates of inpatient admissions. Providers in arrangements like these—with the potential for shared savings—may have more incentive to change relationships between providers, and therefore patterns of care delivery in both inpatient and outpatient settings.

A comparison of outcomes across different models is presented in ***Chapter 3.***

- The **two Arkansas episode of care models** analyzed (perinatal and upper respiratory infection) demonstrated **significant improvements in quality** across multiple outcomes. The nature of the defined episodes may have enabled providers to more effectively focus on clinical protocols which were directly tied to quality measures. This is in contrast to other payment models (e.g., ACOs) whose performance is assessed against a more wide-ranging set of metrics, where few quality measures improved (although there was no decline in quality).

  However, the two EOC models in Arkansas, in which providers were held accountable for cost outcomes, and at risk for financial penalties for high costs (two-sided risk), did not achieve better outcomes for utilization.

For further information on the impact of Arkansas's EOCs in the Medicaid population see ***Appendix A.***

- **PCMH models** in Arkansas, Massachusetts, and Oregon showed **greater use of physician visits** relative to their comparison groups, as would be expected from models that emphasize greater physician access. PCMH models across these three states did not have a clear pattern of impact on utilization, expenditures, or quality.

The impact evaluation of these PCMH-type models was presented in the Year Four Annual Report (RTI International, 2018).

Table ES-1 summarizes the results for health care utilization, cost, and quality for Medicaid beneficiaries reached by SIM-supported payment and delivery models during the SIM Initiative period. The models, and details regarding their analysis, appear in the order from greatest to least number of positive, expected differences relative to their comparison groups, for all analyses that had at least 2 years of post-implementation data.

Implementation of strategies for statewide health system transformation. This report describes the implementation successes, challenges, and lessons learned from the SIM Initiative between 2013 and 2018 as reported by providers, health systems, consumers, payers, and state officials. ***Table ES-2*** describes common SIM-supported strategies to transform states' health care delivery systems, the overall progress states made in implementing those strategies, and remaining challenges still to address.

Sustaining changes begun under the SIM Initiative. As of 2018, states intended to sustain both Medicaid-only and multi-payer delivery and payment reform models begun under the SIM Initiative. Most states committed their Medicaid programs—through state plan amendments or Section 1115 waivers—to continue payment models that the SIM Initiative accelerated or helped develop. Arkansas incorporated funding into its Medicaid operations budget to continue the payment model, and Massachusetts and Vermont have entered agreements with CMS that will offer funding to support new components of their respective ACO models. At the end of the SIM Initiative, four states (Maine, Massachusetts, Oregon, Vermont) were planning to invest in the infrastructure for providing technical assistance after the SIM Initiative period; two states (Maine, Massachusetts) had plans to continue supporting their state health information exchange. One of the most significant legacies of the SIM Initiative was that planning and implementing health system transformation strategies resulted in networks and relationships—across state agencies and providers—that can serve as a foundation for future reform efforts in the Test states.

Table ES-1. Summary of outcomes for payment and delivery models reaching Medicaid beneficiaries during the SIM Initiative

Model name (in order of greatest to fewest positive outcomes)	Years of post-period data used for analysis	Utilization measures	Expenditure measures	Quality measures
 Vermont SSP (ACO model)	3	+	+	+
 Maine Accountable Communities (ACO model)	2	+	NS	NS
 IHPs (Minnesota-specific Medicaid ACO model)	3 (expenditures) 4 (utilization)	+ and -	NS	+ and -
 Arkansas Upper Respiratory Infection Episodes of Care	2	-	[No data]	+
 Arkansas Perinatal Episodes of Care	2	+ and -	[No data]	Most +
 Oregon PCPCH (PCMH model) [a, b]	>2 for majority of practices	NS	NS	Few +
 Massachusetts PCPRI (PCMH model) [a,c]	2	-	-	NS

ACO = accountable care organization; AR = Arkansas; IHP = Integrated Health Partnership; MA = Massachusetts; ME = Maine; MN = Minnesota; OR = Oregon; PCMH = patient-centered medical home; PCPCH = Patient-Centered Primary Care Home; PCPRI = Primary Care Payment Reform Initiative; SSP = Shared Savings Program; VT = Vermont.

+ / green box = Changes were statistically significant in the expected direction (relatively lower emergency department and inpatient utilization and total expenditures, relatively better performance on quality of care measures).

- / light red box = Changes were statistically significant in the unexpected direction (relatively higher emergency department or inpatient utilization and total expenditures, relatively worse performance on quality of care measures).

+ and - / yellow box = Statistically significant changes, some in expected direction and some in unexpected direction.

NS / gray box = Nonsignificant changes.

[a] The analyses in Massachusetts and Oregon were presented in the Year Four Annual Report (RTI International, 2018).

[b] Although the Oregon analysis includes four payers, we focus on the Medicaid results in this table because more than half of Medicaid Coordinated Care Organizations made incentive payments to PCPCHs during the period of analysis for this report.

[c] We classify the PCPRI model as a PCMH model because it is a primary care–based model. However, the model does have aspects of an ACO model also because it holds providers accountable for total cost of care (one-sided risk) and non–primary care services (two-sided risk).

Table ES-2. SIM-supported strategies, progress, and remaining challenges in health care system transformation

SIM-supported strategy	Progress during the SIM Initiative	Remaining challenges
• Statewide adoption of value-based payment models	• Medicaid providers in five states gained new experience in being held accountable for patient expenditures (Oregon's Coordinated Care Organizations were implemented prior to the SIM Initiative).	• Providers reported concerns about managing financial risk. • SIM-related activities promoted payment model alignment across multiple payers in just three states (Arkansas, Oregon, Vermont).
• Electronic health information exchange	• Providers reported use of, and perceived value from, admission, discharge, and transfer notifications. • Patients reported greater provider follow-up after hospitalization.	• Providers reported concerns about high cost of health IT implementation and lack of full interoperability with all providers for all types of health data.
• Quality measurement	• Improvement in a few quality of care measures that were included in new payment models. • Some improved alignment of quality measures collected across payers in two states (Arkansas, Vermont).	• Providers still experience burden from different reporting systems and in some cases, slightly different measure definitions (even with alignment in measure concepts).
• Data analytics	• States developed systems to analyze Medicaid claims to support new alternative payment models. • Providers participating in new models received performance feedback reports on cost and quality of care for their patients.	• Providers reported concerns about performance reports that were not timely enough to be actionable.
• Workforce	• Some states tested integration of new workforce roles like community health workers (Maine, Minnesota, Oregon).	• Some providers requested more help in defining and integrating these new roles into their practice.
• Technical assistance	• Providers cited one-on-one and peer-to-peer technical assistance as helpful.	• Two states did not identify a funding source to continue technical assistance after the end of the SIM Initiative.

Policy implications of SIM Initiative outcomes. The SIM Initiative enabled significant advances in delivery system and payment model development across states. The key lessons from implementing these new alternative care delivery and payment models—and strategies to support providers in participating in them—are as follows:

1. **Federal policy is critical in giving new options and levers to states.** The federal government influences the trajectory of state health policy through its policies (e.g., passage of the Patient Protection and Affordable Care Act and Medicare Access and CHIP Reauthorization Act of 2015), organization of technical assistance, and funding opportunities.

2. **State legislation is powerful in accelerating change.** States with enabling legislation (i.e., legislation that mandated Medicaid's implementation of alternative payment models or other payers' financial support for similar models) achieved certain milestones consistent with their state transformation goals. Work developed under the SIM Initiative led to passage of new state legislation to shape future health care transformation in Arkansas, Massachusetts, and Oregon.
3. **Providers need good, timely data, and the resources to use and understand those data, to participate in new payment models.** Complaints about delay and inaccuracy of performance feedback reports contributed to provider dissatisfaction and skepticism about participating in alternative payment models. Medicaid and other payers need to improve reports to help providers feel comfortable being held accountable for quality of care and patients' expenditures.
4. **Providers are concerned about assuming financial risk for patients' cost of care, and Medicaid can structure opportunities to build provider confidence.** Providers in some states indicated concern over taking on risk for their attributed patients' cost of care. Medicaid agencies can adopt incremental changes in payment model over time—and other supports like technical assistance—to develop providers' ability to manage cost and quality.
5. **Providers view consumer behavior and choices as complicating factors in the health system's ability to achieve expected cost and quality outcomes.** Consumer engagement may be an area where all stakeholders in new payment and delivery model development—including state government, payers, and providers—focus more to meet or exceed expectations for overall cost and quality.

The SIM Initiative helped states implement value-based payment models in Medicaid and leverage commercial payer participation in some states. It funded supportive infrastructure in the areas of health IT, data analytics, technical assistance, and workforce development. States are sustaining much of this infrastructure along with SIM-related payment models after the end of the SIM Initiative. Together with existing and new state and federal policies, the SIM Initiative broadened opportunities for more providers to transform health care delivery. Participation in Medicaid-focused models gave a significant proportion of providers experience with value-based payment models, and other investments may have removed barriers to participation in future payment models. States participating in the SIM Initiative demonstrated that the flexibility to pursue payment models that work within a specific state context has yielded positive results for health care quality and utilization and expenditure outcomes or led to changes in the models themselves. Data available from the five reports produced under the federal SIM Initiative Round 1 evaluation offer a strong foundation on which to compare future trajectories in policy development, programmatic investment, health care outcomes, and ultimately statewide health.

Reference

RTI International. (2018). *State Innovation Models (SIM) Initiative evaluation: Model Test year four annual report*. Prepared for the Centers for Medicare & Medicaid Services (CMS). Research Triangle Park, NC: RTI International.

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1. Introduction

This report presents the final summary findings from the six states that received Round 1 State Innovation Models (SIM) Initiative awards in 2013—**Arkansas, Maine, Massachusetts, Minnesota, Oregon,** and **Vermont**. The SIM Initiative awarded between $33 and $45 million to each state over a 3.5- to 5-year period, with the goal of testing ways that state governments could accelerate statewide health care system transformation. State governments engaged in such transformation by using their policy and regulatory levers and by convening public and private stakeholders whose organizational priorities influence health care delivery and population health outcomes. These six states used SIM funds to complement or build upon existing efforts to transform the health care system into one that promotes coordination across provider types, integration of primary care and behavioral health care, and attention to social determinants of health.

To obtain an independent federal evaluation of the SIM Initiative, the Center for Medicare and Medicaid Innovation (the Innovation Center) contracted with a team led by RTI International that includes The Urban Institute, the National Academy for State Health Policy, and The Henne Group. The evaluation design reflected the variation in approaches taken by each awardee, and state-by-state differences in care delivery models implemented prior to the SIM Initiative; payers' and providers' interests in alternative payment methods; and states' health information technology (health IT) and data analytic infrastructures. The evaluation design does not measure the effect of a single, defined intervention but rather offers insight into the following:

- Lessons for other states on implementing health care system transformation strategies including (1) value-based Medicaid payment models, (2) integration of behavioral health and primary care, (3) alignment of quality measures across payers in the state, (4) technical assistance and performance feedback data to providers and other areas of workforce development, (5) infrastructure to facilitate electronic health information exchange, and (6) attention to population health.
- The effects of delivery system and payment models in Medicaid on health care utilization, cost, and quality for beneficiaries receiving care from providers participating in those models, as compared to an in-state group of beneficiaries receiving care from nonparticipating providers.[4]
- The potential spillover effects of Medicaid payment models in Arkansas and Minnesota, where data were available to measure outcomes for the commercially insured population served by providers participating in Medicaid payment models.

[4] All models were Medicaid payment models. Additionally, Oregon engaged health plans for state employees in adopting elements of its Medicaid Coordinated Care Model; these analyses examined outcomes for state employees. The Arkansas episodes of care (EOC) analysis used an out-of-state comparison group because the EOC models were implemented statewide.

1.1 Purpose of the Year 5 Annual Report

As the final report for the Round 1 SIM Initiative federal evaluation, the implementation analyses take a cumulative view of how states' activities evolved from the start of the Initiative to the end of the award period: how the pre-SIM Initiative context set initial strategies and how successes and challenges throughout the SIM test period shaped states' directions along the way. The report also contains the final impact results of payment models implemented or expanded during the SIM Initiative. These impact results demonstrate changes in outcomes after 2, 3, or 4 years of payment model adoption, depending on the number of implementation years and data available in each state. We are able to present findings from a longer time window than the last annual report, yet this window may still not be long enough to observe all changes expected from the models given that changes in clinical protocols and payment incentives are likely to need a much longer time period to yield observable impacts on high-level outcomes, such as population health and total spending. The research questions addressed in this report fall into two categories:

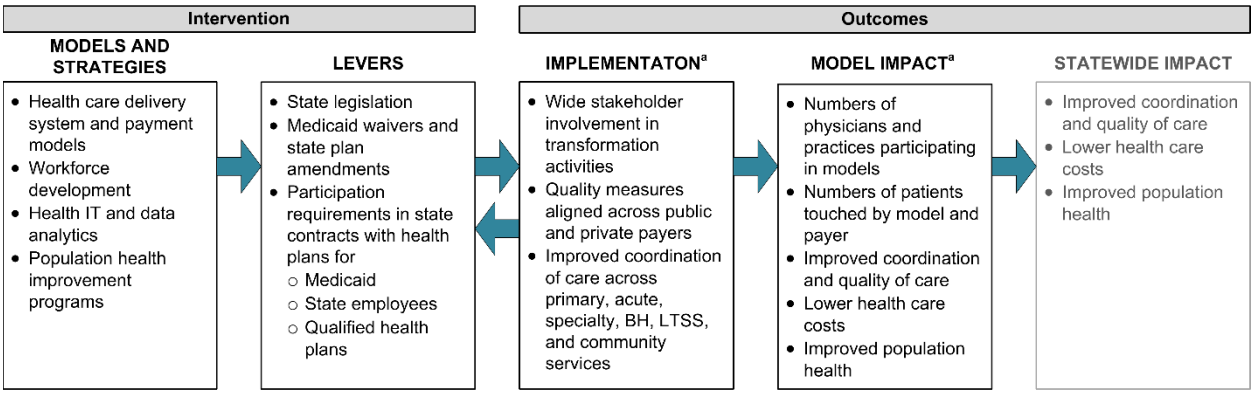
Transformation under the SIM Initiative

- What progress did states make in transforming the health care system? What were states able to accomplish in
  - building and establishing new payment and delivery system models;
  - integrating behavioral health and primary care;
  - identifying key clinical or public health strategies to improve population health within new payment and delivery system models and more broadly across the state;
  - aligning quality measures across multiple payers;
  - enhancing health IT; and
  - engaging with payers, communities, providers, and target populations to facilitate health system transformation?
- Which policy and regulatory levers did states use to transform health care delivery systems?
- How did providers working within SIM Initiative-related health care delivery and payment models describe changes in care delivery, and did their perceptions change over time?
- How did consumers, who were patients of providers working within SIM Initiative-related health care delivery and payment models, describe changes in the care they received? Did their perceptions change over time?
- What were the key successes, challenges, and lessons learned through the SIM implementation and testing process?
- What activities will states sustain after the SIM Initiative, how, and why?
- What were the impacts on care coordination, health care utilization, expenditures, and quality of care?

1.2 Methods and Data Sources for the SIM Initiative Model Test Evaluation

The federal SIM Initiative evaluation was designed to collect and analyze data to understand *what* health care delivery system models and health care transformation strategies states implemented, *how* states implemented them, and *whether* any impact occurred that would be predicted from SIM implementation activities. ***Chapter 2*** and ***Chapter 3*** offer a cross-state answer to these questions; ***Appendixes A–F*** offer findings for each state. ***Figure 1-1***, which depicts the framework for how the SIM Initiative could affect key outcomes of health and health care, guided our approach to the evaluation. As the examples in ***Figure 1-1*** illustrate, each state's SIM Initiative consisted of one or more health care delivery and payment reform models; strategies to enable the operation of these models, such as health IT and data analytics investment and workforce development; plans for integrating population health activities; and policy levers to facilitate the spread of these models and strategies throughout the state.

Figure 1-1 Framework for understanding the implementation and impact of the SIM Initiative



BH = behavioral health; health IT = health information technology; LTSS = long-term services and supports.

[a] Implementation and model impact outcomes are reported in this Year 4 Annual Report.

The implementation analysis, on a cross-state and state-by-state basis, offers findings based on qualitative data collection and analysis. Five states also include a quantitative analysis of the impact on people receiving care from providers participating in SIM Initiative-supported care delivery and payment models (***model impact***) using the most recent data available (varies by state, generally ranging from 2013 or 2014 to 2016).[5] By the end of the SIM Initiative, no state implemented a policy, strategy, or payment model that reached enough of the statewide population to influence outcomes in a way that could be detected in an analysis of differences in health and health care for the entire state population between the SIM states and non-SIM comparison group states (***statewide impact***; shaded grey in ***Figure 1-1***). Instead, these differences are summarized in ***Sub-appendixes A-1*** through ***F-1: Supplementary Results*** to

[5] The only exception is Massachusetts, which ended one model and began another during the SIM Initiative period. Impact findings for the first model are available in the Year 4 Annual Report (RTI International, 2018).

demonstrate trends in SIM states that could serve as context for understanding the SIM Initiative and the starting point for future efforts.

The analysis of SIM Initiative implementation (examining models and strategies, policy levers, and implementation activities, as described in ***Figure 1-1***) draws from site visit interviews with key informants, focus groups, evaluation calls with state officials, and reviews of documents, such as states' annual and quarterly reports, operational plans, and relevant news articles. The analysis from current and past years also helped guide interpretation of the model impact analysis on care coordination, utilization, expenditure, and quality outcomes for individuals served by providers participating in SIM Initiative-related delivery and payment models. More detail on each state's SIM Initiative implementation can be found in other reports (see ***Table 1-1*** for descriptions of reports and the time periods they cover following the October 1, 2013, implementation start date).

Table 1-1. Prior reports, contents, and time periods covered

Report	Contents	Calendar dates
Baseline report (Gavin et al., 2014)	Description of Test states' plans and initial implementation progress	Mid-2014 (3–6 months after implementation)
Year 2 Annual Report (Gavin et al., 2016)	Analysis of progress, challenges, and lessons learned	Spring 2015 (1.5 years after implementation)
Year 3 Annual Report (RTI International, 2017)	Updated the analysis of SIM Initiative implementation	Spring 2016 (2.5 years after implementation)
Year 4 Annual Report (RTI International, 2018)	Updated the analysis of SIM Initiative implementation and interim impact analyses	Spring 2017 (3.5 years after implementation)

We use model-specific analyses to capture the impact of the discrete populations touched by payment or delivery system models, comparing outcomes for people receiving care from providers participating in SIM Initiative-supported models with outcomes from a within-state comparison group of populations receiving care from nonparticipating providers (Gavin et al., 2016).[6] Each model-specific analyses used a difference-in-differences design,[7] comparing changes in trends from a baseline period to the first 2 to 4 years after model implementation within the SIM Initiative test period for relevant measures of care coordination, health care utilization, total per person expenditures, and quality of care for the intervention (receiving care under SIM Initiative-supported models) and comparison ("usual care") groups. Following

[6] The evaluation of episodes of care in the Arkansas Medicaid population used a comparison to the same episodes in an out-of-state comparison group because this payment model was implemented statewide.
[7] Except for the analysis of behavioral health homes in Maine, which used a pre-post design because we could not replicate the state's method of selection into the intervention group to select an appropriate comparison group using claims data.

comparison group selection for each state, we constructed annual person-level propensity score weights to balance model and comparison group residents on individual and county characteristics. We used Medicaid claims data for each state to derive outcomes for populations that were the direct focus of each model. In Oregon, where the focus of the model was broader than Medicaid, we used data on the state employee population from the state's All Payer All Claims reporting program. Lastly, data from all-payer claims databases in Arkansas and Minnesota were used to detect any spillover effects in the commercially insured populations. Data availability varied by state, and the data period ranged from 2010 through 2016 (methods, including data, measures, comparison group selection and weighting, and statistical methods, are available in ***Sub-appendix 2*** of each state appendix).

1.3 Year 5 Annual Report Overview

Chapter 2 of this report offers a cross-state analysis of SIM Initiative implementation 2013 to 2018. ***Chapter 3*** describes results from model-specific analyses of measures of care coordination, utilization and expenditures, and quality of care and reports any significant differences for the patient populations served by providers participating in SIM Initiative-related delivery and payment models. ***Chapter 4*** summarizes overall conclusions from the evaluation.

Evaluation findings from each of the six Round 1 Model Test states are presented in ***Appendixes A–F***, with accompanying state-specific methods in sub-appendixes to each appendix. Each state-specific appendix offers an overview of the pre-SIM Initiative context in that state; a description of strategies the state applied during the SIM Initiative; successes, challenges, and lessons learned from the implementation of SIM Initiative-related strategies; a summary of SIM Initiative accomplishments; and (except for Massachusetts) the impact results based on quantitative analyses.

1.4 References

Gavin, N., et al. (2014). *State Innovation Models (SIM) Initiative evaluation: Model Test base year annual report.* Prepared for CMS. Available at https://downloads.cms.gov/files/cmmi/SIM-Round1-ModelTest-FirstAnnualRpt_5_6_15.pdf

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2. Cross-State Findings From SIM Initiative Implementation, 2013–2018

The broad parameters for the SIM Initiative awards allowed states to think creatively about how to take on the enormous task of statewide health care system transformation. All states began the SIM Initiative with a 6-month period to devise a plan for meeting state-specific targets in light of present priorities and past investments. Ultimately, states adopted strategies to improve payment models, health care delivery, health information technology (health IT), data infrastructure, workforce, and population health—all with the involvement of Medicaid, and in some states also the involvement of commercial insurers, either voluntarily or under state contracting. In most states, a diverse set of physical health, behavioral health, and community providers participated in some aspect of the SIM Initiative. This chapter presents findings and lessons from across the six Round 1 states—**Arkansas, Maine, Massachusetts, Minnesota, Oregon,** and **Vermont**—from efforts across the domains touched by SIM Initiative funds, from the start of the initiative in April 2013 throughout the award implementation.

End dates of the SIM Initiative
Arkansas: September 2016
Oregon: May 2017
Vermont: June 2017
Maine: September 2017
Minnesota: December 2017
Massachusetts: April 2018

Prior to the Innovation Center and the SIM Initiative, states nationwide had some experience supporting transformation through new care delivery and payment models and health IT, although on a smaller scale or without a comprehensive plan. More than half of states had initiated work on medical home models, while more than one-third had taken some sort of action toward exploration or implementation of accountable care models, often with foundation or state funds. States were also engaged in building and regulating infrastructure needed to support enhanced delivery and payment models such as advanced health IT systems, supported by the American Recovery and Reinvestment Act of 2009, inclusive of the Health Information Technology for Economic and Clinical Health (HITECH) Act. The HITECH Act provided some types of providers with an infusion of funds to support adoption of electronic health records (EHRs) and states with funds for health information exchange (HIE) (Gold & McLaughlin, 2016). However, efforts around delivery system change and infrastructure development largely existed in parallel within states or were disparately implemented across states. In some cases, states and stakeholders lacked sufficient resources to scale projects or make concerted efforts to draw connections between projects. As states' budgets recovered from the Great Recession of the late 2000s, few opportunities emerged to implement robust and cohesive systemwide transformation.

All six states pre-SIM were rooted in a movement away from fee-for-service toward value-based payment models and continued to adjust their priorities during the SIM Initiative in response to a changing landscape. The SIM Initiative offered funds and technical assistance to states to plan and implement activities to meet their needs for improving health and health care. Even with a comprehensive initial plan for each state, states and the Innovation Center continuously adjusted their efforts and priorities based on early lessons learned and in light of a changing health care landscape. Evolving developments external to states' plans during the SIM Initiative period included the following:

- coverage expansions through Medicaid (in Arkansas, Massachusetts, Minnesota, Oregon, and Vermont) and the health insurance marketplace beginning in 2014;
- heightened awareness of social determinants of health, given the issues facing low-income and vulnerable Medicaid-covered populations who were now the center of most value-based payment models tested under the SIM Initiative;
- growing public concern over opioid overuse, addiction treatment challenges, and deaths;
- questions about the cost implications of provider consolidation driven by new payment models, potentially limiting will to adopt these models; and
- passage of the Medicare Access and CHIP Reauthorization Act of 2015 (MACRA), signed into law on April 16, 2015, which phased in new formulas for adjusting Medicare payments for most Medicare Part B–participating providers. By late 2017, new federal rules clarified that providers had the option for incentive payments through participation in Medicare advanced alternative payment models meeting certain criteria and, starting in 2019, for approved Medicaid or multi-payer models (CMS, n.d.).

States need evidence for what policy changes work in what context. One SIM Initiative goal was to achieve a significant shift across all payers in a state to value-based purchasing or alternative payment models; the Innovation Center suggested 80 percent of payments under these models as the target (Hughes, Peltz, & Conway, 2015). At the same time, states had significant flexibility to decide which policy levers and health system components to address under the SIM Initiative to test what works best to support providers' ability to participate in value-based purchasing arrangements and multiple payers' participation in these arrangements. Additionally, with different starting points across the states, progress toward the goal of shifting toward value-based purchasing would necessarily look different. As a result, the evaluation of the SIM Initiative does not have a single standardized measure of successful implementation. This report offers descriptive analysis of what states tested and observations from those tests: key themes from each state's implementation (***Sections 2.1–2.10***) and lessons for next steps (***Section 2.11***) to assist other states considering large-scale, coordinated health system transformation.

2.1 How Did States Use the SIM Initiative to Change Their Health Policy Environment?

KEY INSIGHTS

- All states used the SIM Initiative to test alternative payment models in Medicaid and in some cases also among commercial payers, including health plans for state employees.
- Nearly all states used SIM funding to expand, test, and leverage health IT investments to advance care coordination.
- Some states passed new legislation that signaled their ongoing commitment toward health care system transformation after the SIM Initiative experience helped to identify health policy goals.

To transform health care delivery systems in their states, SIM awardees had many choices to make in where to invest their resources, leadership, and energy. With complex, interlocking health system components (e.g., payment, regulation, and infrastructure to support health information exchange, technical assistance to providers, data analytics, and quality measurement), a change in one area has consequences—intended or not—in other areas. The Innovation Center charged SIM-funded state leaders to take the balance of all changes into account when implementing their SIM Initiatives.

Two primary pathways to transform states' health policy environments emerged. On one path, states concentrated most (but not all) resources on working with payers, mostly with a focus on Medicaid, to implement new specific care delivery and payment models (see ***Addendum Table 2.1*** for a description of models in each of the states). The SIM Initiative in Arkansas, Maine, and Massachusetts had this focus on developing and implementing new payment models. In Maine and Massachusetts, these efforts were focused within Medicaid. However, in the case of Arkansas, Medicaid and other commercial payers were involved in the Arkansas Health Care Payment Improvement Initiative. With a few exceptions,[8] the investments in technical assistance, health IT, data analytics, and quality measurement accrued only to providers participating in new Medicaid-focused payment models.

On the other path, Minnesota, Oregon, and Vermont balanced their SIM award across the state to support both new payment models and investments in infrastructure that benefited other areas of the health care system. The SIM Initiative in these states had significant emphasis on building or enhancing statewide resources that would benefit both providers participating in SIM-related payment models *and* enable other providers to participate in future payment models.

[8] Notable exceptions include the following: In Arkansas, planning for changes in Medicaid payment models for behavioral health and LTSS providers; in Maine, training in diabetes care management and working with people with developmental disabilities, and a community health worker pilot; and in Massachusetts, the MCPAP and MCPAP for Moms initiatives to connect primary care providers with psychiatrists, and the eReferral- systems to connect primary care and social services.

Examples of investments (outside of a specific payment model) to providers throughout the state included toolkits and training opportunities (all three states) on new workforce roles and specific issues like dental health integration. Minnesota and Vermont focused on integrating providers across care settings, including social services, behavioral health, long-term services and supports (LTSS), or public health in health care delivery. Oregon established a Transformation Center offering consultation and technical assistance to providers and Medicaid coordinated care organizations (CCOs) on a variety of topics. Lastly, Minnesota and Vermont distributed practice transformation grants to a diverse range of providers, regardless of their participation in a SIM-related payment model.

An analysis of SIM Initiative award spending by state reflects the different approaches states took. ***Figure 2-1*** compares states' relative investments in specific areas of health care transformation. Arkansas, Massachusetts, and Maine each had more concentrated spending (over 50 percent) on payment models and delivery system transformation. Massachusetts had the largest investment in developing its payment models, with 77 percent of its funds going to that effort. In contrast, Minnesota invested 42 percent of its funding into health IT and data analytics and a lower portion on payment models and delivery system transformation (5 and 13 percent, respectively) or population health (16 percent to ACH awards). Oregon's spending was mostly on delivery transformation supports, such as to Patient-Centered Primary Care Homes (PCPCHs), and also included population health. Vermont spread its investments across areas, with similar portions going to payment models, health IT and data analytics, project management or operations, and delivery system transformation. Regardless of where states concentrated their SIM resources, all states advanced their health care system transformation in the areas of delivery system reform and payment models, behavioral health integration with primary care, quality measurement and reporting, and health IT and data analytics (see ***Table 2-1***).

We use this chapter to highlight the most visible ways that states used the SIM Initiative to change their health policy environments through the implementation and expansion of new payment models to an increasing pool of health care providers. We also describe the less obvious, but still high-impact, strategies of SIM investments in infrastructure that indirectly supported health policy change by preparing health care providers to participate in health care transformation.

Figure 2-1. SIM states' relative investments in key areas of health systems transformation

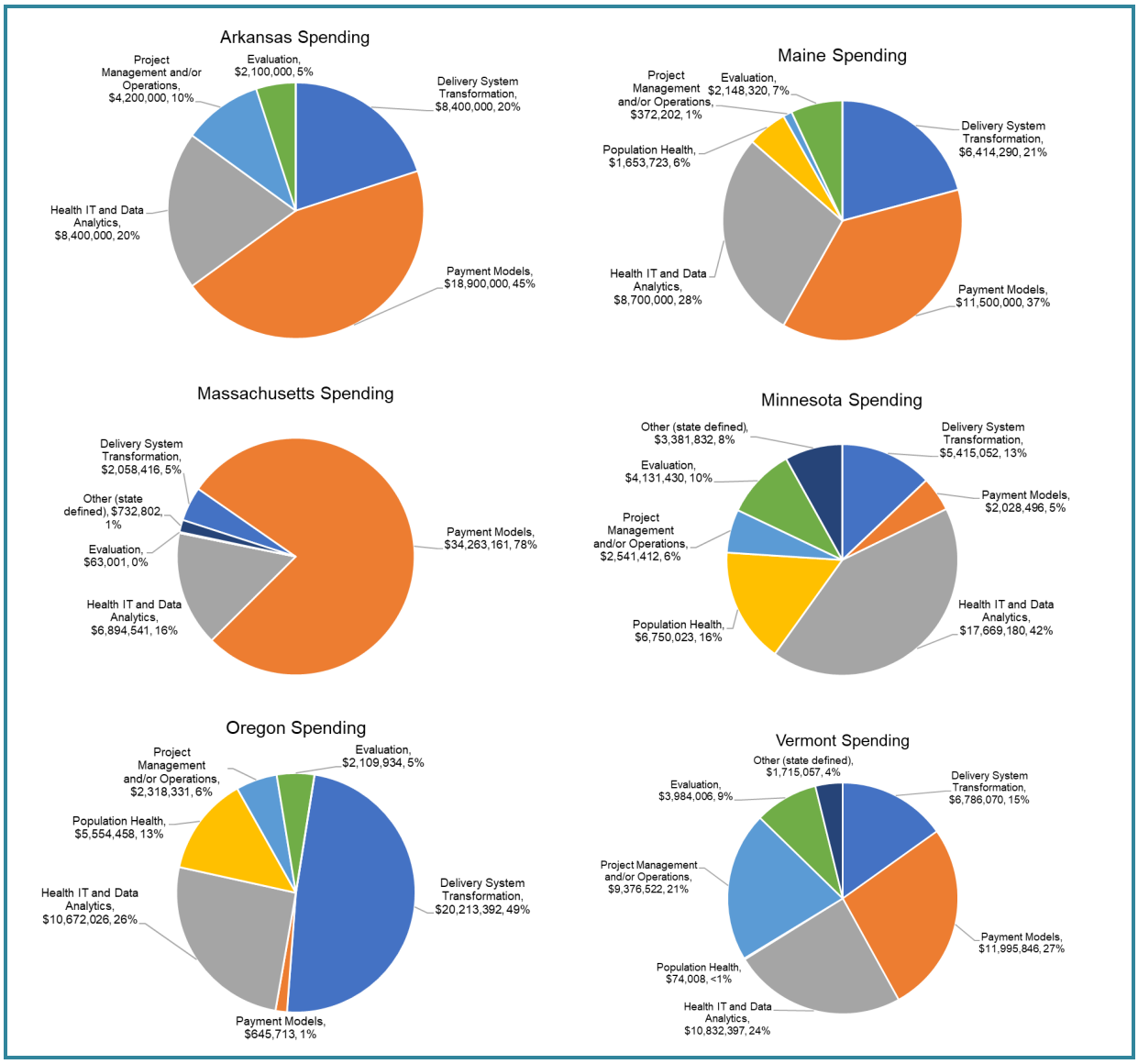


Table 2-1. Summary of key activities in common domains across states, 2013–2018

State	Delivery system reform & payment models	Integration of behavioral health and primary care	Quality measurement and reporting	Health IT & data analytics
Arkansas	• Multi-payer PCMH & EOC	• Changes to Medicaid rates and other policies • BH-related EOCs	• Quality measurement & reporting for PCMHs and providers in EOC	• Multi-payer portal for performance reports • Policies to encourage real-time alerts of hospital and ED use
Maine	• Medicaid HH & BHH • Medicaid ACO	• Technical assistance to BHHs to improve care coordination, including coordinating with a patient's primary care provider • HIE for BHHs	• Shifted focus away from alignment across payers toward improving diabetes quality of care • Expanded voluntary public reporting of quality data	• Technical assistance to providers on how to use HIE connections, hospital and ED notifications, and clinical data to manage care • Piloted a risk prediction tool for MaineCare care managers • HIE for BHHs
Massachusetts	• PCPRI, a Medicaid PCMH with BH integration, shared savings (ended) • Pilot Medicaid ACOs • Full Medicaid ACO launch, with 3 ACO models and BH and LTSS Community Partners	• Massachusetts Child Psychiatry Access Program expansion • Formal relationships between ACOs and BH partners • Co-location of BH in PCPRI	• Quality measure reporting by PCPRI and ACO providers • To be certified, ACOs must submit information on their procedures for responding to consumer requests for price transparency	• HIE policy and regulations to increase use • Created data analytic reports to ACO providers for use in managing attributed patients • E-Referral to facilitate referrals from primary care to community resources who then send feedback to primary care
Minnesota	• Medicaid ACO • Medicaid BHH • Practice transformation support to HCHs • Grants to ACHs	• BH was the focus of some ACHs • Practice transformation assistance	• Leveraged existing statewide quality measurement system • Grants for quality improvement	• Grant program for providers to use health IT, data analytics, and exchange health information • E-Health Roadmap

(continued)

Table 2-1. Summary of key activities in common domains across states, 2013–2018 (continued)

State	Delivery system reform & payment models	Integration of behavioral health and primary care	Quality measurement and reporting	Health IT & data analytics
Oregon	• Multi-payer participation in coordinated care model • Multi-payer PCMH	• Technical assistance to PCMH model participants • Incorporation of BH metrics for CCO-contracted providers	• Performance metrics by which all CCOs are evaluated	• System to offer real-time alerts of ED and inpatient use • Telehealth pilots to increase specialty care in rural areas
Vermont	• Multi-payer ACO & PCMH • All-Payer ACO model	• Incorporation of BH metrics in ACO efforts • Regional collaborations	• Alignment of ACO SSP quality measures with PCMH pay-for-performance • Selection of quality measures for use in All-Payer ACO model	• System to offer real-time alerts of ED and inpatient use • Data repository for BH data • Telehealth pilots to improve access to care

ACH = Accountable Communities for Health; ACO = accountable care organization; BH = behavioral health; BHH = behavioral health home; CCO = Coordinated Care Organization; ED = emergency department; EOC = Episode of Care; HCH = health care home; health IT = health information technology; HH = health home; HIE = health information exchange; LTSS = long-term services and supports; PCMH = patient-centered medical home; PCPRI = Primary Care Payment Reform Initiative; SSP = Shared Savings Program.

2.2 What Policies Before and During the SIM Initiative Were Critical to Implementing Health Care Delivery System and Payment Models?

KEY INSIGHTS	
	• Prior to the SIM Initiative, federal and state policies provided some foundation for states to engage in implementation of new payment and delivery models. • Flexibility and authority granted through federal policies and waivers were especially important to catalyze changes made to the jointly run Medicaid program. States enacted policies in tandem to support these changes. • Medicaid expansion provided the SIM Initiative with a broader reach and larger potential for impact in Arkansas, Massachusetts, Minnesota, Oregon, and Vermont, the five SIM states that expanded their Medicaid program. • One state (Arkansas) effectively leveraged the newly defined qualified health plans (QHPs) sold through the insurance exchanges to advance reforms. • Four states used legislation or agency rulemaking to codify new payment or delivery models during the test period, and two states mandated further exploration of and investment in models fortifying sustainability of these efforts in states.

Federal policies prior to the SIM Initiative enabled Medicaid-based health care reforms during the SIM Initiative. The Patient Protection and Affordable Care Act (ACA), enacted in 2010, ushered in policy changes—specifically the expansion of Medicaid eligibility, significant changes to the individual insurance market, and new Medicaid Section 1115 waiver opportunities—that proved important for states' SIM efforts to promote coordinated care for Medicaid beneficiaries. ***Table 2-2*** illustrates the timeline of the most significant state and federal policy changes—before, during, and after the SIM Initiative—that enabled states to leverage policy to transform payment models available to providers in their states.

Additionally, before and during the SIM Initiative, several states took advantage of Medicaid Section 1115 demonstration waiver authority that allows states to waive certain Medicaid requirements giving them flexibility to test innovations. Prior to the SIM Initiative, 1115 waivers were used to establish Oregon's CCO model and to authorize Vermont to function as the managed care entity for its Medicaid enrollees. During the SIM Initiative, Massachusetts worked with CMS to gain approval for federal funding and support of Massachusetts' Accountable Care Strategy (ACS).

Table 2-2. State and federal policy changes to support new delivery system and payment models before, during, and after the SIM Initiative

Year	Changes enabled by federal policy	Supportive state legislation
2010	Patient Protection and Affordable Care Act (ACA): • Expanded Medicaid starting in 2014 • Established QHP requirements • Established Section 2703 HH model available to states under SPA	MN: State law (First Special Session Article 16 Section 19) amended the 2008 Health Reform Act to mandate the Department of Health to test delivery systems VT: Act 128 established goals for health reform and expanded the Blueprint for Health
2011		VT: Act 48 established Green Mountain Care Board to test new care and payment models, oversee cost containment
2012	AR: Medicaid SPA for EOCs OR: Medicaid 1115 waiver for CCOs Comprehensive Primary Care Initiative – in select regions, including AR and OR Federal ACO programs, including Medicare Shared Savings Program	MA: Chapter 224 required alternative payment models in Medicaid, state employee health plans, and health insurance marketplace health plans VT: Act 107 set requirements for telemedicine coverage; Act 135 established a regional system of opioid addiction treatment
SIM Initiative begins April 2013		
2013	AR: Medicaid 1115 waiver to enroll "Medicaid expansion" adults in QHPs ME and VT: Medicaid SPA for HHs VT: Medicaid 1115 waiver renewed	AR: Health Care Independence Act required QHPs to participate in Medicaid PCMH program
2014	Medicaid expansion begins in AR, MA, MN, OR, and VT AR: Medicaid SPA for PCMHs ME: Medicaid SPA for BHHs	
2015	Medicare Access and CHIP Reauthorization Act of 2015 (MACRA) VT: Medicaid SPA for ACO SSP	AR: State law authorized the Health Care Reform Task Force OR: Senate Bill 231 mandated the Primary Care Payment Reform Collaborative OR: Senate Bill 440 aligned some quality measures OR: House Bill 2024 enabled certification and reimbursement for traditional health workers to provide preventive oral health VT: Act 54 authorized exploration of an all-payer model

(continued)

Table 2-2. State and federal policy changes to support new delivery system and payment models before, during, and after the SIM Initiative (continued)

Year	Changes enabled by federal policy	Supportive state legislation
2016	MA: Medicaid 1115 waiver for ACO pilot MN: Medicaid SPA for BHH services VT: Medicaid SPA for ACO SSP VT: All-Payer ACO Model agreement with CMS	VT: Act 113 created a regulatory and certification system for ACOs
2017	MA: Medicaid 1115 waiver amended for ACO models and DSRIP protocol OR: Medicaid 1115 waiver for CCOs renewed CPC+ – in select regions, including AR and OR	AR: Act 775 authorizes new care model for providers serving people with behavioral health needs and developmental disabilities. OR: Senate Bill 934 required primary care spending by state-funded health plans; authorized similar rules to be placed on commercial plans; required payments from CCOs participating in CPC+ to all PCPCHs in their networks.

ACO = accountable care organization; AR = Arkansas; BHH = behavioral health home; CCO = coordinated care organization; CPC+ = Federal Comprehensive Primary Care Initiative starting in 2017; DSRIP = Delivery System Reform Incentive Program; EOC = Episode of Care; HH = health home; MA = Massachusetts; ME = Maine; MN = Minnesota; OR = Oregon; PCMH = patient-centered medical home; PCPCH = Oregon's Patient-Centered Primary Care Home; QHP = qualified health plan (sold on health insurance marketplace); SPA = state plan amendment; SSP = Shared Savings Program; VT = Vermont.

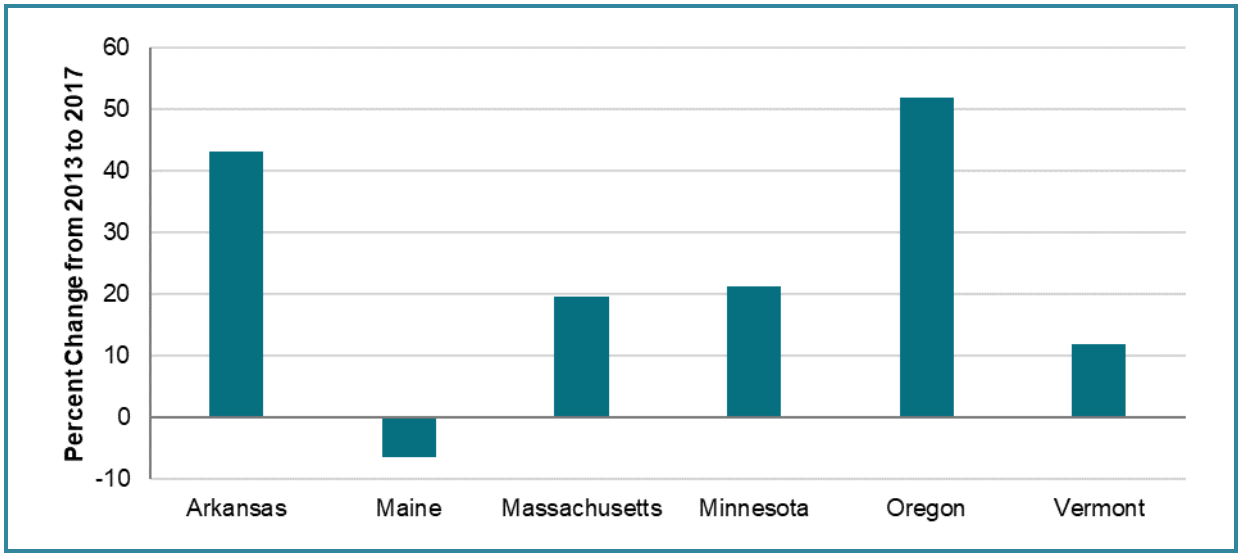
Massachusetts, Minnesota, Oregon, and Vermont enacted enabling state legislation prior to the SIM Initiative start in 2013 to provide direction to health care transformation. The Oregon Health Authority was created by legislation in 2009 (HB 2009) (State of Oregon, 2012), bringing under one state agency Medicaid, the Public Employees Benefit Board, and the Oregon Educators Benefit Board. This move facilitated the spread of the Coordinated Care Model (CCM) from Medicaid to these large groups of employees. State laws in Minnesota and Vermont in 2010 and 2011, as described in ***Table 2-2***, also laid the groundwork for later payment models by mandating testing of payment models and establishing goals for state health transformation. In 2012 the Massachusetts state legislature enacted Chapter 224 that was intended to provide a framework to control health care spending by setting spending benchmarks, requiring alternative payment models, expanding use of health IT, and improving population health. Chapter 224 also added new policy levers to help encourage the delivery of more value-based care, including the establishment of new state agencies, the Health Policy Commission and the Center for Health Information and Analysis that are charged with scrutinizing health care market power and monitoring health care costs trends, price variation, cost growth at individual health care entities (Gosline & Rodman, 2012).

Paired together, federal policy and state legislation established necessary infrastructure and finances needed for changes to Medicaid-led delivery system and payment models. These

policies also provided a solid foundation from which states could support their SIM-related efforts to transform the health care delivery system and supporting infrastructure.

Expansion of eligibility under the ACA to non-aged, nondisabled low-income adults, starting in 2014 for five states, meant that Medicaid's payment models covered more of the state population. The ACA's Medicaid expansion provision gave states an enhanced Medicaid federal matching rate for previously ineligible adults with incomes up to 133 percent of the federal poverty level (FPL). Five of the six states that participated in the first round of the SIM model test awards (all except Maine) opted to expand Medicaid. Vermont, Massachusetts, and Minnesota had already expanded their coverage in the decade preceding the SIM Initiative. As a result, these states could influence the care of a larger population and engage with more providers than they otherwise would have (pre-expansion) through Medicaid-focused payment and delivery system reforms (see ***Figure 2-2***).

Figure 2-2. Percent Change in Medicaid/CHIP Enrollment, 2013 vs. 2017



Sources: December 2013 data—http://files.kff.org/attachment/medicaid-enrollment-snapshot-december-2013-issue-brief-download
December 2017 data—https://www.kff.org/health-reform/state-indicator/total-monthly-medicaid-and-chip-enrollment/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D
Data Source: Kaiser Family Foundation

The introduction of QHPs offered states another potential lever to increase the spread of new delivery system and payment models, used successfully in Arkansas. Arkansas chose to use an 1115 Demonstration waiver to expand coverage for adults with income up to 133 percent of the FPL by using Medicaid funds to purchase their coverage through the health insurance marketplace established under the ACA. Therefore, Arkansas's Medicaid expansion population would enroll in QHPs, which must meet benefit design and other criteria

established for private market plans. The state was able to leverage its influence as a payer of coverage for this population and—in the passage of the Health Care Independence Act of 2013, which created this so-called "Private Option"—also required QHPs to participate in the state's patient-centered medical home (PCMH) initiative. As a result, Arkansas's PCMH model involves both Medicaid and commercial health plans. Oregon also planned to leverage QHPs, but abandoned those plans after its first year of open enrollment posed challenges that hindered the state's exploration of further reforms affecting its QHPs.

During the SIM Initiative, Arkansas, Oregon, and Vermont passed legislation to make further investments in new payment models. New state laws are expected to sustain changes under the SIM Initiative. As noted in ***Table 2-2***, Oregon's legislature enacted multi-payer primary care spending requirements for Medicaid CCOs and state employee health plans,[9] and that commercial insurers spend at least 12 percent of total expenditures on primary care by 2023. The law also attempted to infuse additional spending into the primary care system by requiring CCOs participating in the Comprehensive Primary Care Plus Initiative to offer similar performance-based incentive payments to all PCPCH-certified practices in their networks. In 2016, Vermont's legislature authorized the existing Green Mountain Care Board to create a regulatory and certification system for ACOs. After the SIM Initiative ended in Arkansas, the state legislature passed an act in 2017 authorizing the state's new care and payment model for behavioral health and developmentally disabled populations.

After the SIM Initiative, MACRA provided another point of leverage to increase physician participation in alternative payment models. MACRA, a federal law signed in April 2015—2 years after the start of the SIM Initiative awards—may not have been immediately significant in the eyes of all SIM Initiative stakeholders. Even during the final stakeholder interviews conducted in fall 2016 and spring 2017, few providers or payers mentioned it as a motivator for participating in SIM-related delivery or payment models. However, at the end of 2017, the Quality Payment Program Year 2 Final Rule for Calendar Year 2018 allowed Medicaid, Medicare Advantage, or a CMS multi-payer arrangement to seek qualification as an "Other Payer" advanced alternative payment model that could meet requirements to earn financial incentives on Medicare Part B payment rates, shifting the onus for obtaining this qualification from individual clinicians to these payers (CMS, n.d.). A consequence of this shift may be greater interest from providers in participating in the Medicaid-focused payment models expanded or begun under the SIM Initiative, described in ***Section 2.3***.

[9] Public Employee Benefits Board and Oregon Educator Benefits Board.

2.3 What Changes Did States Achieve in Care Delivery System and Payment Models?

KEY INSIGHTS

- States developed Medicaid capacity to involve a more varied set of providers in alternative payment models than would be involved in Medicare or commercial payer-only programs.
- In most states, providers of LTSS were involved in stakeholder discussions about delivery system changes; they became involved in alternative payment models after the SIM Initiative period. Two states involved dental health providers in their state SIM efforts.
- As a result of their participation in care delivery and payment models, providers changed the way they delivered care, especially the enhanced connection between primary care and behavioral health.
- Consumers were aware of changes in care delivery systems and payment models yet their reactions to these changes varied.

States' primary mechanism for accelerating statewide health care system transformation was changing the model under which health care providers received payment for delivering health care services (i.e., away from a solely fee-for-service model). This section describes how state officials either launched new delivery system and payment models, expanded existing delivery system and payment models to new providers and payers, or tested new models of provider collaboration. This section then describes the impact of new models on ***providers*** and ***consumers***.

Medicaid and multi-payer payment models expanded during the SIM Initiative. States used one or more strategies to involve more providers in new alternative payment models during the SIM Initiative:

- launched a new Medicaid-only model;
- increased provider participation in a Medicaid-only model that predated the SIM Initiative;
- expanded a payment model to include more than one payer (for example, spread adoption of a model originating with Medicaid to commercial payers);
- expanded multi-payer model that predated the SIM Initiative to include more providers; and
- launched or expanded delivery system models that did not yet have an associated payment model.

The SIM Initiative offered states both a reason and resources to convene providers and payers to test new delivery and payment models. ***Table 2-3*** summarizes the types of activities states directed at providers participating in new delivery and payment models. Few states used direct grants to providers to promote model participation. Instead, SIM resources focused on implementing the infrastructure meant to optimize providers' performance under the model, such as health IT (see more detail in ***Section 2.6***), data analytics (more detail in ***Section 2.7***), and technical assistance (more detail in ***Section 2.8***).

Table 2-3. How Round 1 SIM Initiative Model Test states offered support to providers to participate in value-based payment models

	SIM-funded support				
SIM Initiative strategy	**Technical assistance**	**Data or performance feedback reports**	**Grants to providers**	**Type of value-based payment offered to providers**	**Reach at end of state's SIM Initiative[3]**
Launched new Medicaid-only payment model					
Maine ACs	✓[1]	✓		Shared savings	20% (Medicaid)
Maine BHHs	✓	✓		PMPM	4% (Medicaid)
Massachusetts PCPRI	✓	✓	✓	PMPM with shared savings	N/A—discontinued
Massachusetts ACOs		✓	✓	Capitation or shared savings	56% (Medicaid)[4]
Minnesota BHH	✓		✓	PMPM	0.2% (Medicaid)
Expanded Medicaid-only payment models					
Maine HHs	✓	✓		PMPM	18% (Medicaid)
Minnesota IHPs	✓	✓	✓	Shared savings	58% (Medicaid) [5]
Expanded payment models beyond one payer					
Arkansas PCMH	✓	✓		PMPM with shared savings[2]	51% (Medicaid)[6]
Oregon CCM	✓	✓		Varied	85% (Medicaid)
Vermont ACO	✓	✓	✓	Shared savings	46% (Medicaid)
Expanded existing multi-payer payment models					
Arkansas EOC	✓[1]	✓		Shared savings	15% (Medicaid)
Minnesota HCH	✓	✓	✓	PMPM	70% (Participating Payers)
Vermont PCMH	✓	✓		PMPM	70% (Medicaid)

(continued)

Table 2-3. How Round 1 SIM Initiative Model Test states offered support to providers to participate in value-based payment models (continued)

SIM Initiative strategy	SIM-funded support: Technical assistance	SIM-funded support: Data or performance feedback reports	SIM-funded support: Grants to providers	Type of value-based payment offered to providers	Reach at end of state's SIM Initiative[3]
Launched or expanded delivery system models					
Minnesota ACH	✓		✓	N/A	Not available
Oregon PCPCH	✓	✓	✓	N/A	75% (Medicaid)

AC = Accountable Community; ACH = Accountable Communities for Health; ACO = accountable care organization; BHH = behavioral health home; CCM = Coordinated Care Model; EOC = Episode of Care; HCH = health care home; HH = health home; IHP = Integrated Health Partnership; N/A = not applicable; PCMH = patient-centered medical home; PCPCH = patient-centered primary care home; PCPRI = Primary Care Payment Reform Initiative; PMPM = per member per month

Notes: (1) Indicates limited level of support (e.g., on interpreting feedback reports); (2) shared savings opportunities in Medicaid only; (3) the percentage of Medicaid beneficiaries whose providers participated in a given model is the same as reported in the Year Four Annual Report for Arkansas, Oregon, and Vermont (see that report for details and methods); the percentage has been updated with more recent data for Maine (2017 data; see ***Sub-appendix B-2.3*** for sources), Massachusetts (2018 data; see ***Sub-appendix C-2*** for sources), and Minnesota (2017 data; see ***Sub-appendix D-2.3*** for sources); (4) 56% represents the percentage of the total Medicaid population reached under the full ACO model launched March 1, 2018, including individuals eligible for Medicare and Medicaid; however, only individuals under age 65 and not also with Medicare coverage can be attributed to an ACO; (5) 58% represents the percentage of the total Medicaid population reached; however, only individuals under age 65 and not also with Medicare coverage can be attributed to an IHP; (6) of Medicaid beneficiaries eligible to participate, 83% were served by PCMHs.

States designed complementary delivery system and payment reform models. Five states supported implementation of complementary delivery system and payment models: Arkansas, Maine, Minnesota, Oregon, and Vermont. Arkansas's Episode of Care (EOC) and PCMH models, both supported by multiple payers, were designed to complement one another, with PCMHs focused on care management in the primary care setting and EOCs focused on value-based purchasing for primary and specialty care. Oregon placed high priority on expanding the PCPCH program via technical assistance and certification support for eligible primary care providers (PCPs), and at the same time promoted CCM adoption—including support for PCPCHs—to commercial plans that serve state employees and public educators.

Some states put forth incentives for providers to participate in more than one model. In Vermont, provider stakeholders voiced concerns early in the SIM Initiative about alignment between the preexisting Blueprint for Health model and the newly implemented Shared Saving Program (SSP) ACOs, because both focused on care management and population health. In response, Vermont leadership focused on aligning the two models' goals, definitions, and regulatory requirements; for example, the state aligned Blueprint for Health pay for performance

quality measures with its Medicaid and commercial ACO SSP measures. In Maine, health homes (HHs) received an extra per member per month (PMPM) payment for coordinating with a behavioral health home (BHH) for the same patients, and some HHs and BHHs participate in the MaineCare Accountable Communities (AC) program. Minnesota, which expanded a Medicaid ACO model that was expressly designed to mirror the Medicare SSP, also offered grants to communities to develop ACHs, which involved ACO-like entities to set population health goals and develop collaboratives to achieve those goals.

Two states discontinued models that were not complementary to other new or existing models. Massachusetts tested, ended, and learned from a primary care-based model, the Primary Care Payment Reform Initiative (PCPRI), then launched an ACO-based model later in its SIM Initiative. Vermont also decided to revise its initial plans to use SIM funds to develop an EOC model, given uncertainty on how the EOCs would affect providers participating in the other two existing models (Blueprint for Health and SSP ACOs).

Efforts to transform delivery system and payment models engaged many provider types. States generally offered new payment models, technical assistance, grants, or data to PCPs (in PCMH-type models), behavioral health care providers (in Medicaid-only BHH models), or integrated delivery systems inclusive of primary care, behavioral health, and acute care (in ACO-type models). Two states addressed dental providers in transformation efforts:

- Minnesota developed a toolkit for dental health care providers on integrating dental therapists into health care delivery.
- Oregon also a created a toolkit on dental health integration and offered physical health care providers up to 10 hours of targeted technical assistance on integrating dental care.

Models developed under the SIM Initiative offered providers experience with varying types of ACO-like arrangements under Medicaid. Two states launched new ACO-type arrangements within Medicaid only during the SIM Initiative—Maine in 2014 and Massachusetts in 2016 (pilot) and 2018 (full launch). A third state significantly expanded its Medicaid ACO program (Minnesota's Integrated Care Partnerships), while a fourth state aligned Medicare, Medicaid, and a commercial payer around a single ACO model type (Vermont's ACO SSPs), eventually leading to an All-Payer ACO model. In all cases, the Medicaid program developed the capacity to offer more data and performance reports to providers and to calculate actual versus expected expenditures for a given population to pay out retrospective savings (if any). The ACO models that states offered varied considerably in the timing and amount of payment and level of financial risk to which providers were exposed.

> The SIM Initiative gave providers the opportunity to participate in alternative payment models under the Medicaid program.

Table 2-4 displays some key dimensions on which the ACO models (and in some states, type of ACO) tested in each of these states differ, both across states and across time. Design variations in ACO implementation include the following:

- **How beneficiaries are attributed to ACOs.** The premise behind the ACO model generally is that once ACOs are accountable for the cost and quality of care for a group of beneficiaries, providers have more incentives to coordinate care, and with shared savings, they have more resources to invest in services that are most cost-effective. States have chosen to either retrospectively attribute beneficiaries (but still give ACOs some "real time" sense of who would be attributed, either before a performance year or with a month or quarter lag) or prospectively assign beneficiaries. Massachusetts chose the latter because its model has PCP choice determine ACO participation, as did Vermont for its Medicaid Next Generation Model starting in 2017.
- **What services are included in total cost of care calculations.** LTSS and behavioral health services can be high-cost, and therefore offer great risk or great reward to providers in shared savings or shared loss arrangements. With regard to LTSS costs, only Maine offered ACs the choice to include LTSS costs in total cost of care calculations. Still, Vermont ACOs reported sharing savings with informal LTSS partners, and the state will propose a plan for including home and community-based services (HCBS) in Medicaid total cost of care in 2020. Although Minnesota's IHPs expressed interest in eventually including LTSS costs, they did not feel they could more meaningfully impact other areas, so LTSS costs have not been included in the model to date. Massachusetts offers an example for the greatest degree of integration across services; the state added LTSS costs to the total cost of care to happen in Year 2 of ACO implementation and outlined specific requirements for coordination that ACOs and LTSS community partners need to establish through formal contracts. Behavioral health services are included in all ACOs' total cost of care calculations except in Vermont, which has plans to propose inclusion for Medicaid by 2020.
- **Type of payment model.** At the beginning of the SIM Initiative, most ACO models offered one-sided financial risk (traditional fee-for-service [FFS] payments with potential for shared savings only, no risk of loss) or the choice of one- or two-sided risk. Payment models have evolved over time. ACO models implemented in 2017 or 2018 (Massachusetts Partnership Plan ACO and Vermont Medicaid Next Generation ACO) offer prospective, capitated payments. In its ACO model beginning in 2018, Minnesota still offers options for the payment model: the Track 1 model is a retrospective quarterly PMPM in addition to traditional FFS payments for all, and accountability for quality only (including health equity measures); Track 2 imposes accountability for both quality and cost. Track 1 provides an opportunity for ACOs that do not have a large enough patient population to meaningfully accept financial risk to participate in the model.

Table 2-4. Features of Medicaid accountable care organizations in four states

State	Model version	Implementation period (dates)	Who is covered?[1]	Are beneficiaries attributed to the ACO before or after measurement period?[2]	Payment type	Risk	Provider types leading ACO	BH in TCOC? (Y/N)	LTSS in TCOC? (Y/N)	Number of quality measures	Number of ACOs involved
Maine	Model I	2014 to date	Full Medicaid benefits (non-Medicare); meet continuous enrollment requirements[3]	Predicted attribution given to ACO before, actual attribution occurs after	Retrospective Shared Savings	One-sided[4]	Health system- and primary care-led	Y	Y (Optional)[5]	21 (14 required measures and ACs choose 3 of 7 elective measures)	4
Massachusetts	Partnership Plan ACO (Model A)	2018 to date	Full Medicaid benefits (non-Medicare); under 65	Before	Prospective Capitation	Two-sided	Hospital-, system-, or other provider-led	Y	After 2 years	22	13
	Primary Care ACO [provider-led] (Model B):	2018 to date	Same as above	Before	Retrospective Shared Savings	Two-sided	Hospital-, system-, and primary care-led	Y	After 2 years	22	3
	MCO-Administered ACO (Model C)	2018 to date	Same as above	Before	Retrospective Shared Savings	Two-sided	Hospital-, system-led	Y	After 2 years	22	1
Minnesota	IHP, Integrated Model	2013 to 2019	Full Medicaid benefits (non-Medicare); under 65; meet continuous enrollment requirements[3]	Predicted attribution given to ACO before, actual attribution occurs after	Retrospective Shared Savings	Two-sided[6]	Hospital-, system-led	Y[7]	N	10–12	13
	IHP, Virtual Model	2016 to 2019	Same as above	Same as above	Retrospective Shared Savings	One-sided	CHC-, primary care-, or other provider-led	Y[7]	N	10–12	8

(continued)

Table 2-4. Features of Medicaid accountable care organizations in four states (continued)

State	Model version	Implementation period (dates)	Who is covered?[1]	Are beneficiaries attributed to the ACO before or after measurement period?[2]	Payment type	Risk	Provider types leading ACO	BH in TCOC? (Y/N)	LTSS in TCOC? (Y/N)	Number of quality measures	Number of ACOs involved
Minnesota (continued)	IHP, Version 2.0—Track 1	2018 to date	Same as above	Same as above	Retrospective PMPM[8]	One-sided	CHC-, primary care-, or other provider-led	Y	N	9–11[9]	9 (5 former IHPs)
	IHP, Version 2.0—Track 2	2018 to date	Same as above	Same as above	Retrospective PMPM and Retrospective Shared Savings	Two-sided[10]	Hospital-, system-, or other provider-led	Y	N	25–39[11]	4 (all prior IHPs)
Vermont	Medicaid Shared Savings Program	2014 to 2016	Full Medicaid benefits (non-Medicare); meet continuous enrollment requirements[12]	After	Retrospective Shared Savings	One-sided[4]	Hospital-, system-, or FQHC-led	N	N	30; 8–10 of which were used for payment	2
	All-Payer: Vermont Medicaid Next Generation	scheduled 2017 to 2022; 2017 pilot; 2018 full implementation	Full Medicaid benefits (non-Medicare)	Before	Prospective capitated	Two-sided[13]	Hospital- or system-led	N[14]	N[15]	20/13[16]	1

AC = Accountable Community; ACO = accountable care organization; BH = behavioral health; CHC = community health center; health IT = health information technology; IHP = Integrated Health Partnership; LTSS = long-term services and supports; MCO = managed care organization; PCP = primary care provider; PMPM = per member per month; TCOC = total cost of care.

Notes:

[1] Given the different reasons for Medicaid and CHIP eligibility (income-based and disability-based), with potentially different patterns of health care utilization and cost, states may exclude some types of beneficiaries from coverage under a payment model. Additionally, states with Medicaid MCOs may or may not include MCO enrollees in additional Medicaid payment models; Maine and Vermont do not have Medicaid MCOs with which to coordinate, whereas Massachusetts and Minnesota both include MCO enrollees in their ACO models.

(continued)

Table 2-4. Features of Medicaid accountable care organizations in four states (continued)

[2] Some states prospectively assign beneficiaries for whom ACOs will be held accountable for quality and cost; other states rely on a retrospective attribution of beneficiaries based on actual patterns of beneficiary utilization. Beneficiaries in Massachusetts are attributed to an ACO based on their choice of PCP and that PCP's affiliation with an ACO. Other states have a hybrid approach in which the state informs them of who could be attributed and then who was actually attributed for the purposes of calculating shared savings. For example, MaineCare initially assigns members prior to each performance year so that the AC can target activities to an assigned population. At the end of a performance year, the population is redetermined based on actual utilization during the performance year. This redetermined population is the one used to calculate TCOC. Similarly, Minnesota notifies IHPs of attribution lists on a monthly or quarterly basis, but attribution used to calculate TCOC is done retrospectively after the first quarter of the next performance year.

[3] Maine and Minnesota require at least 6 months continuous enrollment or 9 months noncontinuous enrollment.

[4] ACs in Maine and ACOs in Vermont had the option of electing one-sided or two-sided risk. In Maine, all ACs to date have elected one-sided risk for each year of the program (becoming Model I ACs), and none chose two-sided risk (under Model II ACs). In Vermont, both ACOs chose one-sided risk for the full 3-year model when given the option at the onset.

[5] LTSS is optional. Even if ACs elect to include LTSS, some HCBS and targeted case management services are still excluded.

[6] IHPs have two-sided risk, which is nonreciprocal for the first agreement period (i.e., greater proportion of savings than loss would be shared), and, in most cases, transition to reciprocal risk at the start of the second agreement period. See the Year Four Annual Report for additional details.

[7] Mental health and chemical dependency services that are primarily intensive and residential are excluded.

[8] IHPs must successfully improve quality, specifically with respect health equity, to have their agreement renewed and receive the PMPM for attributed members retrospectively. The PMPM replaces what IHPs would have received under Medicaid HCH payments. Additional information can be found here: https://mn.gov/dhs/assets/2017-ihp-payment-and-risk_tcm1053-307209.pdf and here: https://mn.gov/dhs/assets/2017-ihp-quality-methodology_tcm1053-307208.pdf

[9] Four clinical and utilization measures, plus 5–7 process measures related to their proposed intervention to address social determinants of health.

[10] Track 2 receives a quarterly PMPM, which is considered a "cost" when calculating shared savings/losses. The risk is reciprocal, although risk can be nonreciprocal in cases where the IHP demonstrated a substantive community partnership. Additional information can be found here: https://mn.gov/dhs/assets/2017-ihp-payment-and-risk_tcm1053-307209.pdf

[11] Between 20 and 25 measures for prevention and screening, care for at-risk populations, behavioral health, access to care, patient-centered care, and health IT. Also, 5–7 process measures related to each proposed intervention to address social determinants of health. Some IHPs have two proposed interventions.

[12] Must have at least 10 months continuous enrollment.

[13] Risk corridor of 3%. Within 3 percentage points of the Medicaid benchmark, the ACO is responsible for 100% of any losses and realizes 100% of any savings.

[14] By end of Payment Year 3 (2020), the state will submit a plan to CMS for inclusion of behavioral health services in future reform efforts.

[15] By end of Payment Year 3 (2020), the state will submit a plan to CMS for inclusion of home and community-based services in future reform efforts.

[16] There are 20 required state-reported outcomes and quality measures. Additional state-reported outcomes and quality measures may be added to the Vermont All-Payer ACO Model. The Vermont Medicaid Next Generation program has 13 measures the ACO reports in 2018, including 10 that are used for payment. Additional information can be found here: http://dvha.vermont.gov/administration/onecare-32318-am2-final-signed.pdf

- **Providers involved.** Most states have agreements with hospital- and provider-led ACOs. These ACO networks usually involved behavioral health providers. Requirements for providers that comprised the ACOs differed slightly. For example, all ACOs in the SIM Initiative models included primary care providers, but Maine required the lead entity running the ACO to be an approved Medicaid primary care case management provider with primary care (e.g., internal medicine, family practice, FQHC) as its first specialty designation. Thus, by design, the Maine AC leads were health systems that had primary care providers; in some cases, the lead entity was a hospital that owned primary care practices to meet the "primary care" primary specialty designation. Massachusetts deliberately tied attribution of a beneficiary to an ACO to the beneficiary's PCP, thereby ensuring PCP involvement in the ACO.
- **Managed care organization (MCO) role.** Among states with Medicaid ACO models, only Minnesota and Massachusetts have Medicaid MCOs. Minnesota uses MCOs as pass-through entities, which are responsible for paying (or receiving) a portion of the shared savings (loss) accrued to an ACO proportional to their MCO membership attributed to that ACO. Massachusetts leveraged MCOs' experience in managing financial risk to encourage MCO/ACO partnerships under Partnership Plan ACOs. Because MCO enrollment is tied to a beneficiary's choice of PCP (and that PCP's choice of ACO affiliation), MCOs only gained enrollees for each ACO partner they had.

The SIM Initiative offered resources to help Medicaid focus on behavioral health care services and integration with other types of care. Given the high proportion of Medicaid spending on behavioral health services, it is not surprising that some states dedicated their SIM Initiative efforts toward transforming behavioral health service providers (see ***Section 2.5*** for a more detailed description of activities). Providers in most states praised this strategy. For example, behavioral health providers in Maine reported that they appreciated the funds to cover the capital costs of EHRs and connections to the state HIE. Furthermore, in Massachusetts' PCPRI, primary care practices were required to co-locate behavioral health providers within their clinics. Overall, providers were very satisfied with their states' efforts to enhance the connection between PCPs and behavioral health providers.

The SIM Initiative began as a multi-payer effort with participation envisioned from both public and commercial payers. But over time, half of the states focused primarily on Medicaid. All six states initially engaged private payers in SIM Initiative activities; however, with the exception of Arkansas, Oregon, and Vermont, private payers did not voluntarily implement SIM-related delivery system reform and payment models because of lack of alignment with their business goals and flexibility. Arkansas maintained multi-stakeholder participation in their EOCs by providing flexibility and allowing private payers to implement select EOCs based on the health care needs of their population. Maine, Massachusetts, and Minnesota initially engaged other payers to participate in the SIM Initiative through work groups and advisory committees, yet were unable to fully engage a high number of health plans and

purchasers. States later focused efforts to leverage Medicaid to make changes to payment and delivery system reform.

Oregon expanded its pre-SIM Medicaid health plan–focused CCM to commercial health plans serving its state employees. Oregon leveraged state purchasing authority and invested other technical assistance resources to create a consistent set of expectations for how health plans should promote coordinated care. The CCM Alignment Workgroup developed a model contract, toolkit, and resources to aid new payers adopting CCM, and its Transformation Center provided additional technical assistance to those payers.

Some multi-payer models that existed prior to the SIM Initiative were expanded through additional provider participation. Expanded multi-payer payment models included EOCs in Arkansas, health care homes (HCHs) in Minnesota, and Blueprint for Health PCMHs in Vermont, and prior delivery models included PCPCHs in Oregon (only Medicaid pays PCPCHs). These states used SIM Initiative resources to expand providers' participation, or in the case of EOCs in Arkansas, increase the number of conditions covered by the EOC model. Arkansas successfully expanded multi-payer participation by providing flexibility for commercial payers to implement specific EOCs addressing the needs of their populations. In Minnesota, two-thirds of SIM funding was invested as grants to support Integrated Health Partnerships (IHPs) and HCHs. HCHs were primary care clinics providing coordinated care in exchange for tiered flat payments per patient. Minnesota expanded HCH participation through practice transformation grants tailored to small and rural providers. These practice transformation grants provided health IT, quality improvement, and performance-based payment support. Vermont's Blueprint for Health PCMHs launched pre-SIM as a multi-payer delivery model. SIM investments did not directly fund Blueprint for Health, although state investments for practice transformation and health IT activities did support Blueprint for Health providers.

> The SIM Initiative encouraged expanded provider participation in multi-payer value-based initiatives.

Despite the large proportion of the Medicaid population using LTSS, most states did not make significant changes to payment models for LTSS during the SIM Initiative test period. Two states, Arkansas and Massachusetts, would ultimately launch new Medicaid-only payment models for LTSS providers after spending years of discussion and negotiation with these stakeholders during the SIM Initiative. In Arkansas, some LTSS providers advocated strongly to shape how an alternative payment model would look to them, resisting a Medicaid HH model in 2014. By 2017, a state law authorized a different model, the provider-led Arkansas Shared Savings Entity (PASSE) model of care, in which specialty managed care plans working with Medicaid providers will coordinate physical health care with

> Medicaid is the dominant payer to LTSS providers. Perhaps for this reason, a multi-payer approach to designing payment models for LTSS providers was not practical, leaving Medicaid as the only payer to advocate for alternative payment models for LTSS providers.

behavioral health and community services for people with developmental disabilities. In Massachusetts, after investing in some broad health IT initiatives to help facilitate referral and coordination for Medicaid beneficiaries served by HCBS, the state turned to a more focused inclusion of LTSS in its new Medicaid payment model, the ACS. Medicaid ACOs must establish contractual relationships with LTSS providers, called Community Partners, to provide care coordination for LTSS users.

Some states involved LTSS providers in care delivery transformation activities, but not through a payment model directly. The Minnesota IHP contracts offered incentives through the payment model to individual ACOs to involve "priority settings," including behavioral health and LTSS providers; additionally, most grants to providers required or strongly encouraged partnerships with these priority settings. Maine provided SIM funds to the Maine Developmental and Disabilities Council to develop provider trainings around several issues, such as pain management, diabetes, and antipsychotic usage among individuals with intellectual and developmental disabilities. Oregon used SIM funding to support long-term care innovator agents to work with CCOs on coordinating with LTSS. Vermont and Arkansas both had dedicated work groups to engage LTSS providers and advocates. In Vermont, among its many activities, the work group created Disability Awareness briefs and competency trainings, analyzed Medicaid SSP ACO quality results for the disability and LTSS (DLTSS) populations, and initiated the DLTSS IT Gap Remediation Project, which increased connectivity and access to client information for Home Health Agencies. Additionally, Vermont ACOs participating in the Medicaid SSP distributed a portion of their earned shared savings to affiliated LTSS providers.

2.3.1 Provider perspectives on SIM-related care delivery and payment models

As a result of their participation in care delivery and payment models, providers changed the way they delivered care. Across the states and throughout the SIM Initiative, providers involved in SIM-related models of care mentioned many strategies that they implemented to give better and more appropriate care to their patient panel. These included care coordination and greater access to primary care clinicians. For example, in Minnesota, the IHPs were successful in providing additional access to care managers and coordinators within the health systems. In Massachusetts' PCPRI, coordinators helped with language barriers and took on patient outreach and managing of complex patients. Moreover, providers reported responding to newly available alerts when patients were in the emergency department (ED) or admitted for an inpatient hospital stay through an event notification system that either became available to providers sharing an EHR system (Minnesota) or as a feature in a statewide system (Oregon, Vermont). Additionally, many models required expanded access to primary care, such as through extended hours; providers met this requirement, although primary care practices in Arkansas reported that the PCMH requirements to offer 24/7 access to patients is challenging, particularly for small practices where physicians may already feel overworked. Finally, providers in Maine

and Oregon mentioned doing more prevention-focused care and medication management, and in Massachusetts having newly co-located behavioral health providers.

In Arkansas, providers participating in the EOC model changed their behavior in ways that could reduce unnecessary costs. Under the EOC model, providers received aggregated reports about how their patients' costs compared to costs incurred by other providers' patients. As a result, some specialists paid under the perinatal EOC and tonsillectomy EOC learned that sending all tissue (placentas and tonsils, respectively) to pathology for analysis was costly, not always necessary, and not what other providers did. Specialists adjusted their practice accordingly so as to not be penalized financially for having higher than usual costs in the state.

Providers perceived changes in care delivery as generally positive, but also reported a few persistent challenges, both predating new payment models and resulting from new payment models. Some challenges represent features of the underlying health care system, regardless of implementation of new delivery and payment models. Challenges in this category included difficulty coordinating with providers outside of integrated health systems, either because of differences in EHR systems, competition, or both (Minnesota), and perceiving a shortage of some types of health professionals to fulfill the increase in demand for care generated by alternative payment models. For example, providers in Vermont in the early years of the Medicaid and commercial ACO SSPs noted the lack of professional mental health workers, substance abuse providers, and concerns around growing shortage of primary care physicians. In nearly all of the states, child psychiatry is a critical shortage area.

The cause of the challenges resulting from new payment models were not universal in all states. Providers in Massachusetts, Minnesota, and Vermont reported that their time with patients was restricted because of increased reporting burdens of a model. Despite the relative success of aligning quality measures in these states in particular, providers noted that they felt like they spent more time on systems and therefore had less time with patients since the model began.

In an entirely different kind of challenge, some providers in Arkansas participating in the EOC model were becoming wary of treating Medicaid patients, lest they risk financial penalties for doing so:

> *It makes you apprehensive about taking a Medicaid patient who's further along in a pregnancy. My concern is …with some of these programs is that I will be financially penalized for this mother's overuse of emergency services and what I fear that my only response is going to ultimately be… well I'm not going to be able to provide care for this patient. You're going to have to go to some other doctor's office and then therefore I can check that off as I'm not going to have to worry about being financially penalized because it's not my problem anymore.*—Arkansas Provider

Even in states with less direct financial consequences, providers across states were frustrated when payment models, as designed, penalized them for consumer behavior out of providers' control. For example, providers in Vermont expressed frustration that they cannot make patients go to recommended classes such as nutrition or exercise.

Finally, provider burnout and fatigue may have also resulted in unintended consequences regarding patient care. In later years of model implementation, providers in Oregon noted provider burnout occurred because of the cumulative demands of concurrent practice transformation activities. Providers in Vermont also noted fatigue regarding model implementation, which resulted in the state ending its exploratory episodes of care efforts and instead focusing more on alignment of its PCMH and ACO models.

> *Time-consuming processes resulting from Vermont's initiatives are causing some providers to see fewer patients in any day and provide less care to needy patients. Some even say they are burning out.*—Vermont Provider

Despite their positive responses to changes made to care delivery, providers across states and in all years of the Initiative said that the payments under SIM-related models did not always align with the level of effort required. In the early years, providers across all states expressed concerns regarding the upfront costs of hiring and supporting care coordination staff and purchasing EHR systems. Financing an EHR system was particularly a concern among behavioral health providers and among smaller practices, especially those not affiliated with a larger health care system as noted by providers in Maine, Oregon, and Minnesota. Smaller and independent practices in most states (all except Massachusetts) also noted the upfront costs of hiring a referral coordinator. In early years, providers in Maine noted that PMPM targeted case management payments for BHHs were not adequate for the level of case management BHHs needed to provide; later, in 2015 and 2016, the state changed the capitation amount, which encouraged more behavioral health organizations to participate in the BHH program.

In addition, some of the payment models provided financial incentives for the larger organizations, not the actual provider. For example, payments were provided to the ACOs in Maine and Minnesota and the primary clinics in Massachusetts under PCPRI. Under these models, the payment model itself does not motivate individual clinician change. For example, providers in Minnesota mentioned that any funding received by the delivery sites must have been reinvested back into the clinic because it was not paid out to providers. PCPs in Massachusetts also noted that the incentives for PCPRI went to the provider group and not the individual provider and that they felt like they are still being paid for volume of patients seen. Providers in Maine also noted that they were unaware of any financial incentives for changing their care patterns and they felt they were still being evaluated on the volume of patients seen.

2.3.2 Consumer perspectives on SIM-related care delivery and payment models

When compared to the start of the SIM Initiative (2014), more Medicaid consumers in focus groups in 2016 and 2017 reported that they could get same-day appointments at their primary care practice—a development they viewed positively. This finding is consistent with the intent of PCMH and ACO models of care, in which efforts to offer better access to primary care should substitute for non-urgent ED visits. In 2016, Medicaid beneficiaries in Arkansas who received care from Medicaid PCMHs reported that in fact they did use primary care instead of the ED, and in Maine, most HH patients reported same-day access to provider in both 2015 and 2017. In Massachusetts, we found regional variations among consumers. In Springfield, MA, beneficiaries reported high use of the ED compared to those in Boston despite being attributed to primary care practices participating in PCPRI.

> *The Health Center's really nice in that they also do walk-in visits and stuff like that, so if I have an emergency for something I can show up and generally I only have to wait half an hour to an hour to get in to see somebody same day.*—Consumer Vermont, 2017

Consumers appreciated receiving same-day appointments for PCPs, but disliked not being able to see the same provider over time. They also disliked being seen by providers who are not physicians. Consumers in PCMH and ACO models generally felt same-day access to PCPs improved during the SIM Initiative (Arkansas and Boston, Massachusetts). However, beneficiaries reported seeing a wider variety of practitioners as a result (Arkansas, Minnesota, Maine). Specifically, in later years of the SIM Initiative, consumers reported that primary care practices could offer same-day appointments by staffing with nurse practitioners, physician assistants, or medical residents, rather than physicians. More consumers in 2017 focus groups reported new frustrations with seeing a different provider during each appointment and seeing clinical staff other than their PCP, such as medical residents (Arkansas and Duluth, Minnesota). These negative patient perspectives on access to and quality of care were similarly voiced by parents of children enrolled in Medicaid (Arkansas).

> *In the 4 years that I've been going to [doctor's office], I've only seen her a handful of times. I usually see a PA, you know a physician's assistant or a nurse practitioner. I really would like to see my own doctor.*—Consumer Massachusetts, 2016

Medicaid beneficiaries in Arkansas, Maine, Massachusetts, Minnesota, and Vermont reported no improvement in gaining access to behavioral health and specialty care at the end of the SIM Initiative period as compared to the beginning. Consistent with the concern about behavioral health provider shortages noted by providers (see ***Section 2.3.2***), Medicaid beneficiaries served by an Arkansas PCMH and Minnesota IHP commented about challenges in accessing behavioral health care in all years. In Massachusetts, consumers in Springfield in 2016 struggled to find behavioral health providers that accepted Medicaid;

although co-location of behavioral health providers during PCPRI may have helped some beneficiaries, other beneficiaries still experienced a gap in access.

> *So that's where Duluth, Minnesota, is right now. Mental health, they need 500 more beds. They're shipping people to the cities, to Grant, to St. Cloud. You have to go through the emergency room to get to the psych ward.*—Consumer Minnesota, 2017

Access to specialty care providers remained a challenge reported by Medicaid beneficiaries in some states who noted they had long wait times to receive specialty and behavioral health services (Arkansas, Maine, Massachusetts, Minnesota). In Minnesota, several Medicaid beneficiaries served under the IHP (ACO) model noted difficulties receiving referrals and accessing psychiatrists, specialists, and dental care early in the SIM Initiative. Medicaid beneficiaries in Massachusetts struggled to find behavioral health providers that accepted Medicaid. These experiences contrasted with the goals of PCPRI to increase behavioral health access.

> *Once again, it all goes back to financially what I've had to deal with, because a lot of people that I tried to outreach to, do not take my MassHealth [for behavioral health care]. They do not. They say MassHealth and they laugh almost, and you're like, "Well, damn."*—Consumer Massachusetts, 2016

Consumers observed care coordination efforts positively under SIM-related models in Vermont and Minnesota, with more mixed reactions in Maine and Oregon. Consumer perspectives on care coordination remained positive in Vermont and improved in Minnesota over the period of the SIM Initiative. For example, at the end of the SIM Initiative in Minnesota, IHP-enrolled beneficiaries described receiving appropriate referrals and treatments that reduce cost. In Maine, by 2017, some BHH beneficiaries felt they experienced well-coordinated care and communication between therapists and PCPs, while others felt PCPs and behavioral providers functioned as separate entities. State employees in Oregon who received care from health plans that had adopted elements of the CCM had varied reactions. Some reported that their access to and experience of health care had not changed; some said it was better; and some said it was worse.

ACO-enrolled patient perspectives on providers' use of health IT for care coordination became more positive during the SIM Initiative. Increasingly positive perspectives on EHR use and patient portals were primarily voiced in states with ACO models during the SIM Initiative (Massachusetts, Minnesota). Across states, by 2016 or 2017, consumers generally perceived that PCPs knew more about their hospital admissions, compared to little awareness (Massachusetts), or mixed perspectives on awareness (Vermont) in earlier years of the SIM Initiative. These perceptions reflect increased consumer awareness of the benefits of event notification systems in EHRs and HIEs. Consumers perceived that medical information was

already all "within the system," reflecting positive feelings about EHRs, but little understanding of existing HIE challenges. Consumers noted that EHRs helped physicians become more familiar with patients and allowed more time for interaction during appointments (Minnesota). Also in Minnesota, consumers in 2017 commonly used a patient portal to schedule and confirm appointments, communicate with their provider, and view lab results. Similar sentiments were voiced in Massachusetts, where consumers felt that providers had better access to their treatment information via EHRs.

> *It's all one computer system. When they pull up your record, they see every doctor. Notes from every doctor that you've seen within the system.*—Consumer Minnesota, 2017

Consumers described providers' adherence to evidence-based care with some degree of dissatisfaction, because it conflicted with their understanding of the kind of care they should receive. Although SIM-related models promoted evidence-based care by monitoring certain quality measures (sometimes relevant for financial incentives under new models), consumers sometimes rejected evidence-based practices. Beneficiaries served by IHPs in Minnesota were upset that providers "don't do what you tell them to." Consumers in Arkansas expressed frustration their PCPs were cutting back on providing antibiotics for colds, despite the state's goal to use quality measures associated with the Upper Respiratory Infection Episode of Care to reduce inappropriate antibiotic use:

> *He won't give me antibiotics. I'll ask him, even the nurse is like, 'You sound like you've got bronchitis,' and the doctor's like, 'You're fine.' Wouldn't give me a prescription for a zpak, he wouldn't give it to me. He told me to take some Mucinex and cough medicine.*—Consumer Arkansas, 2016

2.4 How Did States Advance Behavioral Health Integration With Primary Care Under the SIM Initiative?

KEY INSIGHTS

- In the post-SIM period, all six states have a payment model in place that incentivizes or reimburses directly for coordinated care between behavioral health and PCPs.
- Beyond payment models, a key catalyst for change was facilitating relationships and opening lines of communication between behavioral health providers and primary care physicians.
- Infrastructure investments such as technical assistance, learning collaboratives, and peer-to-peer learning opportunities were also important in improving integration of behavioral health care.
- Two states, Maine and Vermont, made progress with information sharing, but legal and technical barriers continued to be a challenge in exchanging behavioral health information with PCPs.

Most states used more than one strategy to facilitate behavioral health with primary care. ***Table 2-5*** summarizes activities across the states that are also described in more detail below.

Table 2-5. Strategies in behavioral health integration

Strategy	AR	ME	MA	MN	OR	VT
BH-related alternative payment model components						
Had BHH model and supported BHHs or other implementation (not payment) through SIM funds		●		●		●
Included behavioral health performance measures in non-BHH value-based payment model	●	●	●	●	●	●
Mandated contractual relationships between ACO PCPs and BH providers		●	●			
Required BH provider participation in ACO/CCO governing body					●	●
Activities facilitating communication between BH and other providers						
Promoted initiatives that integrated BH into primary care clinics via telephone or telehealth			●		●	
Encouraged colocation of BH providers and PCPs			●		●	
Convened BH and physical health providers and agencies to the same table to increase relationship building and communication		●	●	●	●	●
Data sharing activities						
Used HIEs to promote sharing of information between physical health and BH providers		●				
Supported the data exchange of mental health and substance abuse data outside the HIE						●
Infrastructure-building activities						
Disseminated best practices through learning collaboratives, technical assistance, or other means		●	●	●	●	●
Quality measure reporting						
Agreed-upon a set of BH quality of care measures for voluntary public reporting, including an indicator of whether PCPs integrate BH services		●				

ACO = accountable care organization; AR = Arkansas; BH = behavioral health; BHH = behavioral health home; CCO = Coordinated Care Organization; HIE = health information exchange; MA = Massachusetts; ME = Maine; MN = Minnesota; OR = Oregon; PCP = primary care provider; VT = Vermont.

In the post-SIM period, all six states have a payment model in place that incentivizes or reimburses directly for coordinated care between behavioral health and PCPs. Prior to the start of the SIM Initiative, most SIM Test states had PCMH-like programs in place that focused on care delivered by PCPs. Several states used SIM funds to implement new or expand existing models that incorporate care delivered by other providers, including behavioral health

providers, into value-based payment models and improve coordination of care across the entire delivery system. Maine began with a primary care model, the HH model, and implemented a Medicaid BHH program where BHHs partner with HHs to integrate behavioral health services for adults with serious mental illness and children with serious emotional disturbances with primary care services.

In Vermont, prior to the SIM Initiative, the Blueprint for Health PCMH program primarily focused on PCPs while also encompassing the Hub-and-Spoke HH program for opioid use disorder treatment. During the SIM Initiative, Vermont implemented ACO programs that required greater coordination and integration across all providers, including behavioral health providers. When planning for the All-Payer ACO model, stakeholders in Vermont recognized the need to engage behavioral health providers in any coordinated care effort while also recognizing the challenges in fully integrating these providers in health care transformation. As an interim step, behavioral health measures and mandatory integration of certain behavioral health services are included in the quality framework for the All-Payer ACO Model that began January 1, 2017. Vermont also used SIM funds to indirectly enhance the state's existing Hub and Spoke health home program by supporting the Integrated Communities Care Management Learning Collaborative and ACO participation in regional collaborations, which in many health service areas involve teams working with a population with behavioral health needs.

Prior to the start of the SIM Initiative, Minnesota had a primary care model in place, HCHs, that paid certified primary care clinics to coordinate care for their patients. SIM funds were used to give grants to HCH and IHP (a Medicaid ACO) providers, in part to better integrate behavioral health services. Minnesota used SIM funds to support practice transformation efforts necessary for successful participation in the parallel BHH initiative in mid-2016.

Arkansas also initially planned to implement a Medicaid BHH; however, the state's plans were paused because of extensive provider pushback, primarily from large, private behavioral health providers who were concerned about the revenue implications of the proposed tier system and the PMPM payments to HHs. Instead, Arkansas focused on implementing its PCMH program and EOC, and some episodes included BH performance measures. In the post-SIM period, Arkansas enacted the provider-led Arkansas Shared Savings Entity (PASSE) model of care, which implements many of the behavioral health changes initially proposed under the SIM Initiative. Under this model, specialty managed care plans will coordinate physical health care with behavioral health and DD community services.

Massachusetts ran a PCMH model prior to the start of the SIM Initiative, but began a new model with support from the SIM Initiative called PCPRI. PCPRI aimed to better coordinate care across the delivery system by paying providers through risk-adjusted capitation payments for primary care services and care coordination, with the option of including behavioral health services in the capitation; it was one model the state used to move toward achieving the goals of

alternative payment model adoption set forth in Chapter 224, the 2012 law described in ***Section 2.2***. The PCPRI program included contractual milestones related to behavioral health integration that providers had to meet to participate in the program and receive incentive payments. Additionally, the newly implemented MassHealth ACOs in Massachusetts must formalize contractual relationships with behavioral health providers to receive enhanced funding.

Prior to the start of the SIM Initiative, Oregon implemented its CCM in 2012 with nearly all Medicaid beneficiaries enrolled in one of 16 CCOs made up of physical, behavioral, and dental providers. Each CCO operates under a global budget and, during the SIM Initiative, they were incentivized to meet 17 performance metrics, 4 of which were behavioral health metrics. These metrics were tied to payments from a quality incentive pool that was funded through withholding from the CCOs' global budgets.

Beyond payment models, states succeeded in implementing specific strategies to share information and integrate services between behavioral health and PCPs. States facilitated communication between providers through telehealth or telephonic initiatives (Oregon and Massachusetts). Massachusetts increased access to pediatric psychiatrists by allowing PCPs to have telephone consultations with pediatric psychiatrists under the Massachusetts Child Psychiatry Access Program (MCPAP). Because of the success of the program, it was expanded to include telephonic access for clinicians caring for mothers with depressive symptoms (MCPAP for Moms). Massachusetts and Oregon also encouraged integration through colocation of behavioral health providers and PCPs (formerly in Massachusetts under PCPRI and currently in Oregon through Medicaid's contracts with CCOs). Maine successfully connected behavioral health organizations to the HIE so that they could receive information on their patients; however, comprehensive sharing of behavioral health data with the HIE is limited because of federal privacy laws.[10]

States also encouraged behavioral health integration with practice transformation support through technical assistance, training, learning collaboratives, peer-to-peer learning opportunities, and access to consultants and experts. In Oregon, the state's Transformation Center (an innovation hub within the Oregon Health Authority funded by the SIM Initiative) operates a learning collaborative for behavioral health providers and convened a 1-day in-person learning event that attracted 124 behavioral health and primary care providers in early 2017 focused on behavioral health integration with primary care. Maine similarly facilitates learning collaboratives for its BHH providers and other relevant stakeholders and has held regular webinars and site visits with BHHs to provide learning opportunities and assess key areas for improvement.

[10] 42 CFR Part 2.

Providers stated that the SIM Initiative helped open lines of communication and facilitate relationship building. States promoted collaboration by using their convener status to encourage stakeholders to engage at the same table. Across several states, stakeholders indicated that this informal relationship building was key to making strides in integrating behavioral health and primary care services. For example, according to one behavioral health provider in Vermont, "…the SIM grant [leveled] that playing field a lot more than it was, giving voice to entire delivery systems as opposed to siloed care delivery." Likewise, in Oregon, one state official credited the state's SIM Initiative with helping to build the relationships necessary to coordinate behavioral health care required outside of the primary care setting, such as following up on referrals to specialists by helping providers connect "outside of practice walls."

2.5 How Did States Advance Quality Measurement and Reporting Under the SIM Initiative?

KEY INSIGHTS

- All states invested SIM resources in quality measurement and reporting, a large portion of which were used to support new payment models in which financial incentives were tied to quality.
- Providers viewed the increased use of quality metrics as useful in principle, but overly burdensome as implemented.
- Recognizing the added burden, all states expressed a goal of alignment of metrics and reporting requirements across payers and models. But with few exceptions, they were not successful in achieving alignment beyond a small number of state-controlled payers.
- Making health care cost and quality transparent to the public continued in states that initiated public reporting prior to the SIM Initiative (Maine, Minnesota, Oregon) and began in other states during the SIM Initiative (Massachusetts).
- Although some incentivized quality metrics demonstrated improvement as new models were implemented, this improvement was far from universal, at least during the period observed in this evaluation.

States used two strategies under the SIM Initiative to improve the quality of care delivered by providers. First, most new care delivery and payment models offered financial incentives for performance on quality metrics, and second, most states reported quality metrics to providers and in some cases publicly. As discussed further in ***Chapter 3***, at the end of the SIM Initiative payers and providers reported that their behavior changed in response to payment incentives and reporting systems, although the evidence for impact on patient-based measures of quality was mixed.

A common theme across states, expressed especially by providers, was the burden of submitting data to multiple quality reporting systems on multiple quality measures. All states' care delivery and payment models included, in some form, financial incentives tied to performance on quality metrics, although providers (especially in Medicaid ACO models) were not always aware of their participation in an ACO, as noted in ***Section 2.3***. Even if providers

were not aware of participation in a Medicaid ACO, they were aware of quality measure reporting requirements for Medicare and commercial insurer programs and found the volume of measures to be a burden. Medicare has a separate set of metrics and reporting requirements (e.g., PQRS, the precursor to MIPS). Each commercial payer may have its own set of metrics and reporting system. For example, providers in Maine noted that they tracked to a set of quality measures that were incorporated into commercial payer contracts independent of the SIM Initiative. In addition to the multiple submissions required and an enlarged set of measure constructs, providers found it especially burdensome to produce even slightly different versions of essentially the same metric based on the idiosyncratic requirements of individual payers.

Although the idea of incentivizing performance on quality did not meet with objection among stakeholders, the execution of this idea was often a source of complaint. For a given payment model, the number and range of performance metrics varied by state, by patient subpopulation, and sometimes by type of provider. In the early years of the SIM Initiative, providers across the states expressed concern about the amount of resources needed to implement data tracking, specifically for smaller practices or behavioral health providers. In later years, providers were concerned with the number of quality measures identified as critical to the model. For example, providers in Maine noted that the number of measures identified for reporting was overwhelming and unwieldy. Providers in Maine and Vermont also noted that smaller practices lacked the resources and infrastructure necessary to report certain quality measures. Vermont addressed this issue by offering practices additional resources for quality measure reporting through provider subgrants to ACOs.

The concern for the volume and amount of work imposed on individual providers to report quality measures may in part stem from the fact that many individual providers do not recognize any direct benefit from reporting, especially under shared savings models. Few SIM-supported models included pay-for-performance financial incentives based on quality measures; more SIM-supported models such as EOC and ACO models relied on shared savings calculated retrospectively and long after the data collection and reporting periods. In some cases, shared savings accrue to ACOs at an organizational level (or for EOCs, hospitals that employ Principal Accountable Providers [PAPs]), with those financial incentives being reinvested rather than distributed to individual providers. However, Vermont ACOs did distribute a substantial portion of earned shared savings to their providers.

Most states' attempts to align quality measures across payers were unsuccessful, with the exception of Vermont and with plans to do so in Massachusetts. In Vermont, the All-Payer ACO model successfully developed a single set of statewide outcomes and quality metrics the state will report to CMS, many of which will be used for ACO reporting by Medicare, Medicaid, and commercial payers. Because the All-Payer ACO Model has separate programs by payer within it, there is still some variation in required quality metrics (e.g., developmental screening for young children is in the Vermont Medicaid Next Generation

program set and will not be in Vermont Medicare ACO Initiative). Massachusetts' Performance Measurement Alignment Task Force also had a goal, as of 2018, to create multi-payer alignment on ACO measures across the new Medicaid ACO program and commercial payers' ACO contracts and informed internal state agency discussions intended to align quality measures for all Medicaid programs in the state.

Recognizing the excess burden created by multiple reporting schema, and the potential for conflicting incentives, other states made at least some attempt at measure alignment across payers and providers, with little success. In Maine and Oregon, the SIM Initiative has allowed states to convene multiple stakeholders to discuss the performance measures best suited for their tested delivery and payment models, but rather than producing alignment with preexisting models, this process has resulted in a proliferation rather than a consolidation of measures as individual payers each add their favored metrics to the model. Arkansas aligned Medicaid and commercial payers around measure constructs used in the EOC model, but left measure specifications to payers' discretion based on their existing systems and needs. In Minnesota, despite leveraging Minnesota's existing Statewide Quality Reporting and Measurement System established in the 2008 Health Reform Law and intended to "create a uniform approach to quality measurement in Minnesota," and limited multiple versions of the same measure construct, providers still felt burdened by quality reporting.

Despite attempts to align measures and data collection systems voluntarily across payers, providers still report significant burden.

Despite the successes in Vermont, for the most part, alignment efforts that extend beyond state payers have been entirely voluntary, and no state has had success advancing uptake of a streamlined measure set using a voluntary alignment strategy. Oregon has pursued alignment with legislation requiring a state work group to set a consistent quality measurement system across payers of state-financed health care (Medicaid, state employees, and educators). However, as in most other states, the alignment mandated by Oregon will be limited to a small number of payers covering less than one-third of the population, which means providers will continue to face the burden of multiple systems.

Under the SIM Initiative, states developed new performance feedback and data reports to providers, who viewed the reports as having some value but as mostly flawed. Most performance reports were shared only with individual providers who were participating in SIM-related care delivery and payment models. Reports ranged from those specific to individual patients to reports based on a provider's entire patient panel. Arkansas, for example, improved on its quarterly reports for each EOC assigned to PAP based on submitted claims, beginning with aggregated reports, and in later years of the SIM Initiative, including individual patient-level data that explained each PAP's risk share issues. Arkansas also standardized reports to PAPs across payers using the EOC model and used a similar system for standardizing PCMH feedback reports to PCMH providers.

Most provider-oriented reporting systems were aggregated, typically including all Medicaid beneficiaries attributed to a primary care practice or provider organization (Massachusetts, Maine, Oregon). These reports sometimes also included state averages, giving providers an idea of where they stand relative to a performance benchmark. Providers participating in Massachusetts' PCPRI felt that the infrastructure that was built for the data reporting prepared them for more advanced data reporting requirements and the ability to be successful under future pay-for-performance metrics. Some providers found these reports helpful in identifying previously unrecognized shortcomings. As one provider in Oregon said:

> *I would assume I was taking good care of my diabetics, but I would have no idea if that was true or not. I would have some, probably based on my most recent day, some percentage in my mind of how well I was doing, but it's really getting the feedback [on actual data].*—Oregon Provider

However, other providers in nearly every state expressed doubt about the value of feedback reports from payers who led new SIM-related payment models. Specifically, in the early years of the SIM Initiative, Arkansas providers felt that the data used to generate reports were too old to be useful for quality improvement activities; Minnesota providers reported similar concerns with data delays. In Massachusetts, PCPs participating in PCPRI even doubted the accuracy of the state's patient panel attribution model because they did not recognize many of the names the state identified as their patients. Further, many of the providers in Massachusetts did not understand how the type of information in performance feedback reports could help them identify performance-improving changes in practice.

States that publicly reported a set of quality measures prior to the SIM Initiative—not specifically related to measures included in SIM-related payment models—continued to do so, with few changes resulting from the SIM Initiative. Some states used public release of comparative performance metrics at the plan level, such as in Oregon's semiannual CCO reports; at the provider level as in Maine's GetBetterMaine.org website; or information on the relative performance on measures by clinic, medical group, and hospital, as Minnesota Community Measurement has produced since 2004. In Oregon, CCO representatives interviewed generally valued these reports, deriving from them motivation to improve relative to their peers, but also seeing the reports as an opportunity to explore with other CCOs best practices for improvement on quality metrics.

There is some indication that quality metrics that carried financial incentives for providers demonstrated greater improved performance, although findings are mixed. For example, in Oregon, a variety of screening measures with financial incentives (e.g., colorectal cancer screening) have improved in PCPCHs across populations with different coverage (Medicaid and commercial)[11]; in Arkansas, HIV and chlamydia screenings have increased in pregnant women covered by Medicaid (and paid under the perinatal EOC); and in Vermont developmental screenings for young children, a Medicaid SSP payment measure, increased. However, other incentivized measures show no such improvement, or even decline (see ***Chapter 3*** for more discussion and ***Appendices A, B, D,*** and ***F*** for individual state results).

2.6 How Did States Advance Health IT and Health Information Exchange Under the SIM Initiative?

KEY INSIGHTS

- Providers and state officials recognized event notification systems as a key component within HIEs. Consumers were aware that their providers were notified when they had a hospitalization or ED visit.
- States used the SIM Initiative to expand HIE and support providers' use of health IT, but also spent significant time encountering challenges and finding ways to change plans in response.
- Lack of interoperability between systems and privacy concerns about data sharing continued to be an issue for providers in many states, inhibiting care coordination and care management.

SIM Initiative investments in health IT were integral to each state's payment and delivery model reform efforts. The Office of the National Coordinator for Health Information Technology's (ONC's) 2015–2020 strategic plan underscores the need to translate health data into informed action that can achieve improved care delivery, improved health, and reduced cost growth (ONC, 2014). This section highlights how states used their SIM funding to move beyond generating electronic health data, toward informed action, the extent to which they were successful, and themes in both activities and challenges. ***Table 2-6*** provides an overview of implementation activities and challenges across all states.

[11] Results reported in the SIM Initiative Evaluation Year Four Annual Report.

Table 2-6. Activities and challenges in health IT, HIE, and telehealth during the SIM Initiative

Activity or challenge	AR	ME	MA	MN	OR	VT
EHR expansion						
Expansion to providers not covered by MU incentives				●		●
SIM-funded HIE/ENS activities						
Expansion or improvement of statewide HIEs	●	●	●		●	●
Support of provider-driven HIE networks				●		
Development or implementation of statewide ENSs of admission, discharge, transfer information, enabling better care coordination		●	●		●	●
Policy levers or strategies to support use of HIEs						
New legislation or requirements	●		●	●	●	
Technical assistance to providers		●	●	●		
Toolkits for providers		●		●		
Consumer-focused activities						
Patient access to HIE records pilot		●				
Publicly available Healthcare Databook		●				
Expanding the use of telehealth technology						
Telehealth to support behavioral health access or care			1		●	●
Telehealth to expand access in rural areas or support care management					●	●
Challenges (identified in provider focus groups or stakeholder interviews)						
Lack of EHR interoperability	●	●	●	●	●	●
Providers choosing to use their own EHR system over a statewide HIE	●		●	●	●	●
Reluctance to use HIEs because of cost or time	●	●				●
Confidentiality and privacy barriers regarding mental health and substance use disorder data		●	●	●	●	●
Complexity of health IT systems or projects resulting in slow progress	●		●	●		●

AR = Arkansas; EHR = electronic health record; ENS = event notification system; health IT = health information technology; HIE = health information exchange; ME = Maine; MA = Massachusetts; MN = Minnesota; MU = meaningful use; OR = Oregon; VT = Vermont.

Note: 1. The health IT section in the SIM Initiative Evaluation Year Four Annual Report included SIM efforts related to the Massachusetts Child Psychiatry Access Project (MCPAP), which delivers child psychiatry consultation via telephone. Because that program does *not* use both electronic information and telecommunications, the activities supporting MCPAP are not categorized as telehealth in this final report.

Most providers used EHRs before the SIM Initiative test period began. In all states, most providers had EHRs, funded in part through CMS's Medicare and Medicaid EHR Incentive Programs (renamed Promoting Interoperability Programs) and the Electronic Prescribing (eRx) Incentive Program, begun in 2011. These programs encouraged eligible professionals[12] and hospitals to "adopt, implement, upgrade, and demonstrate meaningful use (MU) of certified EHR technology." Providers who began the EHR Incentive Programs in 2011 or 2012 could receive the maximum funding over 5 years, thus encouraging the early adoption (CMS, 2013, 2018).

All states had some form of HIEs prior to the SIM Initiative. Because the EHR incentive programs had HIE requirements for MU, ONC created the State Health Information Exchange Cooperative Agreement (State HIE) Program, to help states rapidly build HIE capacity. Through the program, which operated from 2010 to 2014, every state was awarded a one-time investment to develop and begin implementation of its plan. States were given flexibility in design, such as a statewide HIE or network of networks. States applied these funds to develop HIE capacity in the following ways:

- Arkansas's HIE, State Health Alliance for Records Exchange (SHARE), was created beginning in 2010.
- Maine initiated its HIE in 2010, HealthInfoNet (HIN), by Executive Order.
- The Massachusetts Health Information Highway, or Mass HIway, was established in 2012.
- Minnesota opted for HIEs at the provider organization level rather than statewide. Through a 2008 legislative mandate, all hospitals and health care providers in Minnesota were required to have an interoperable EHR system by 2015.
- Oregon implemented CareAccord in 2012, its HIE platform that enabled direct secure messaging for providers.
- Vermont's Act 70 in 2007 designated the state's operator of its HIE, the Vermont Health Information Exchange (VHIE).

Additionally, four states—Arkansas, Massachusetts, Minnesota, and Oregon—participated in another concurrent ONC effort (2011–2013), the Trailblazer Project, which targeted alignment of health IT and health care transformation activities at the state level by offering states health IT consultants, experts, and intensive technical assistance (no direct funding).

[12] Behavioral health providers were notably not among the eligible professionals, defined as physicians, dentists, optometrists, podiatrists, and chiropractors for the Medicare incentive program, and physicians, dentists, optometrists, nurse practitioners, certified nurse midwives, and physician assistants at FQHCs or rural health centers all with minimum volume of Medicaid patients for the Medicaid incentive program.

Prior to the SIM Initiative, strategic plans or legislation addressed access to care via technology. For the two states that implemented telehealth pilots—Oregon and Vermont—existing plans or legislation in part provided the foundation. Oregon featured telehealth prominently in its 2012 Strategic Plan for Health Information Technology. Telehealth was one of six priority subject areas (along with EHRs, HIE, analytics, health IT workforce, and technical assistance) and included in three of the nine strategies to advance health IT to meet Oregon's health goals. Telehealth was less integrated in Vermont's 2010 strategic plan—although the plan did identify home health telemonitoring as a future activity. In 2012 Vermont passed Act 107, which required all health insurance plans in the state to provide coverage for telemedicine services delivered in a health care facility to the same extent as services provided through in-person consultation.

States used SIM funding to expand EHRs to providers not eligible for MU programs. Minnesota funded adoption and effective use of EHR systems for the small percentage of remaining providers who had not yet met that state requirement. Vermont purchased EHRs for the state psychiatric hospital and home health agencies throughout the state. SIM funding also had indirect effects on technology use and provider readiness for delivery system reform. For example, through ongoing 3-year stakeholder participation in Vermont's SIM Initiative Health IT work group, a mental health Designated Agency representative noted that their network of agencies had a much clearer idea of what was needed in their next EHR system purchase.

SIM activities strengthened and expanded use of existing HIEs or funded new HIEs. Minnesota awarded a series of HIE planning grants (to help provider organizations determine what information they wanted to share and how), implementation grants, and HIE-to-data analytics grants. Massachusetts offered capacity-building grants to support utilization of the Mass HIway. Both Massachusetts and Arkansas implemented new regulations or requirements for HIE participation, with Arkansas requiring PCMH practices to have access to an HIE for notifications on hospital admissions and ED visits. Maine expanded its HIE connection to behavioral health organizations[13]; providers in Maine felt that the HIE was user friendly and improved access to discharge data which they used to target high-risk patients. Oregon implemented its Emergency Department Information Exchange (EDIE), allowing all hospitals to share ED admission, discharge, and transfer data. Vermont focused its initial efforts on connecting ACOs to the VHIE and in improving the quality of data being exchanged to improve its use.

Event notification systems (ENSs) promoted the use of HIEs to improve care coordination and care management. Three states (Massachusetts, Oregon, Vermont) used SIM funds to develop, implement, or expand the use of a statewide ENS to allow providers to receive

[13] Some of which were BHHs.

alerts related to hospital admissions, discharges, and transfers (ADTs) and ED visits. In Oregon and Vermont, these systems enabled providers to follow up with patients and potentially reduce readmissions or future ED visits or inpatient admissions through better managed care; Massachusetts' ENS is under development and not yet operational. Additionally, Maine has a notification system built into its HIE and also developed a notification system specifically for Medicaid care managers. Although Minnesota did not explicitly focus on these systems, its providers reported increased use of ENSs within their networks—likely facilitated by the larger health systems using ENS and many providers using few vendors. Consumers also confirmed the use of ENSs. In focus groups in three states (Massachusetts, Oregon, and Vermont), consumers indicated that their providers knew if they had been admitted to the hospital or had an ED visit.

To support providers in their use of health IT, states provided technical assistance and created toolkits. Stakeholders in Maine and Minnesota credited those states' strong focus on helping providers use health IT and data analytics as a key success resulting from the SIM Initiative. Maine's state HIE and contractor under the SIM Initiative, HIN, conducted monthly webinars and individualized technical assistance for behavioral health providers, covering data privacy issues and use of EHRs and HIEs. Maine also funded a data-focused learning collaborative to assist primary care and behavioral health providers in using data to leverage quality improvement. Minnesota created its eHealth roadmap to help "priority setting" providers (behavioral health, local public health, social services, and long-term and post-acute care) who may have been less experienced with health IT systems. Minnesota funded a grant to create the Foundations in Privacy toolkit, which helps providers and provider organizations both understand laws, rules, and regulations related to the use or disclosure of patient information and develop corresponding policies, procedures, and staff trainings. The publicly posted toolkit included webinar training videos to assist in its usage. In addition, early in Massachusetts' SIM Initiative, the state funded technical assistance to help connect behavioral health and LTSS providers to the Mass HIway, the state's HIE.

Through telehealth initiatives, states expanded access to care or enhanced care management. Oregon funded five telehealth pilots to expand care to rural areas, focusing on dementia care, oral health care, medication management for HIV/AIDS, psychiatric services for children, and reduction of hospital readmissions. The state also supported a Project ECHO (Extension for Community Health Care Outcomes) pilot to help integrate behavioral health and primary care.[14] Vermont tested two telehealth pilots—one focused on connecting home health service data to PCPs and the other using cellphone video technology to document appropriate at-

[14] Project ECHO is a collaborative medical education and care management model with worldwide reach that uses technology to connect teams to providers in rural and underserved areas, enabling them to provide needed specialty care: https://echo.unm.edu/about-echo/

home patient use of medication-assisted treatment for opioid dependence. Vermont also funded a telehealth strategic plan.

Maine was the only state to target consumers in its SIM-funded health IT activities. Maine implemented two patient-focused health IT programs. Through its Blue Button Project, Maine piloted a program to connect patients to their medical information in the HIE. Maine also created a publicly available Healthcare Databook, which compiled county, state, and national level information on health data, such as coverage, utilization, quality, and costs. The state chose not to continue funding these efforts—the former because many consumers already had access to their data through their health system's data portals, and the latter because the value of the databook for individuals, plans, payers, or policymakers was unclear.

All states pivoted when their original health IT and data infrastructure plans met unexpected challenges. States found that implementing health IT systems is an iterative process. States needed to plan, test, pause, reassess, and rework their plan to move forward. As the examples below demonstrate, health IT has many components that need to be aligned for success—changing technology, systems aligning, provider readiness, privacy issues, and monetary and time costs. As a result, the states changed their health IT strategies in the following ways:

- Arkansas, responding to providers' concerns about HIE costs, relaxed its requirements for PCMHs to connect to SHARE and allowed data exchange through provider network systems as an alternative. The state also changed its SHARE vendor to provide more flexibility within SHARE connections and reduce costs to providers.
- Maine connected its behavioral health organizations to the HIE, but discovered access to data on its own was not sufficient. To address this, Maine's partner health IT contractor provided extensive assistance to these behavioral health providers on how to leverage their EHR and HIE data into workflows.
- Massachusetts undertook several activities to assist providers in connecting to the Mass HIway early in the SIM Initiative, but later focused on policy changes that addressed widespread and fundamental barriers to using data in the HIway, such as streamlining rules for patient opt-in and opt-out to help providers align more easily with consent forms and Health Insurance Portability and Accountability Act (HIPAA) release forms.
- Minnesota's eHealth collaborative grants initially required provider networks to join with a Health Information Organization (HIO) or Health Data Intermediary (HDI); however, within 4 months of the initial award the lone HIO ceased operations and an HDI left the market. Many grantees had to rework their grants, and the state could no longer push for connection to an HIO, which the state perceives as better suited to support accountable care models. As the market evolved and the number of HDIs and HIOs increased, Minnesota was again able to require connection to an HIO.

- Oregon implemented a statewide secure messaging platform, CareAccord, but providers resisted using it during the SIM test period because of their view that it was duplicative of providers' EHR systems. Use of the service was limited primarily to FQHCs, whose EHR vendor includes CareAccord in its suite of applications. Rather than forcing providers to bend to the plan the state had envisioned and use CareAccord, Oregon recognized that providers' EHR systems met the same secure messaging goal, and the state no longer offers CareAccord to new users.
- In Vermont, providers were not willing to submit substance abuse and mental health data to the VHIE because of privacy concerns related to sharing these records. Vermont's Health IT work group, comprising many of these stakeholders, instead initiated work on a new data repository to store behavioral health data.

Lack of interoperability and data privacy concerns continue as challenges common to most states. Lack of interoperability remains a common concern among providers in several states. If providers' own EHR networks have the capability for data exchange and data analytics (see ***Section 2.7***) comparable to the state's HIE, providers are reluctant to spend additional time and money to connect. However, providers also voiced frustration with the inability of their network to connect with those of other providers or health systems whom their patients visit. Concerns about how to best adhere to federal regulations governing data privacy (e.g., 42 CFR Part 2, HIPAA) also inhibited the sharing of data between providers. States that supported their providers through education and streamlining consent processes were more successful in enabling the exchange and use of health data.

2.7 How Did States Advance Data Analytics for Medicaid, Payers, and Providers Under the SIM Initiative?

KEY INSIGHTS

- For all states, the majority of infrastructure needed for data analytics to support new payment models was developed using SIM funds.
- States used SIM funds to enhance analysis of Medicaid claims data in the following ways:
  - To calculate quality and cost measures to determine providers' outcomes under new payment models—Arkansas EOCs and PCMHs, Maine ACs, and Massachusetts, Minnesota, and Vermont ACOs.
  - To give providers information on their patients, often through portals and dashboards (all states).
- Four states had plans to sustain the data infrastructure and analytic capabilities they developed (Arkansas, Maine, Oregon, Vermont).

Three states—Arkansas, Maine, and Vermont—had existing data analytics capabilities for generating provider-specific cost and quality data that predated the SIM Initiative. Arkansas Blue Cross and Blue Shield developed the Advanced Health Information Network prior to the SIM Initiative for its own claims administration and later leveraged the platform for reporting cost and quality metrics to providers under the statewide Arkansas Health

Care Payment Improvement Initiative. Maine had several analytics platforms built into its existing HIE, known as HIN, and SIM-supported data analytics were built off of these existing platforms. Similarly, Vermont had an HIE that predated the SIM Initiative, which was significantly augmented through the SIM Initiative so that ACOs participating in the Medicaid and commercial shared savings programs could use it to examine their own quality and cost measures.

During the SIM Initiative, states expanded their data analytics capabilities, which allowed for enhanced monitoring of clinical data and utilization. Arkansas developed a new dashboard, the Medical Neighborhood Performance Report (Golden & Harris, 2017), which gave PCPs insight into specialists' cost and quality for the first time. Arkansas envisioned that this new data source would drive PCPs to make better referral decisions for their patient populations. Under the SIM Initiative, Maine's HIE contractor augmented the HIE's electronic notifications system to create a dashboard (the MaineCare Clinical Dashboard) that merges Medicaid claims data and clinical HIE data. Vermont began storing and exchanging behavioral health data from service agencies through the SIM-funded Vermont Care Partners Data Repository with the hope that it would improve care delivery and care coordination. As a representative for the Vermont network of community-based agencies providing behavioral health and developmental disabilities services noted:

> *Our repository is phenomenal. Having the ability to pull and aggregate the data from all 16 agencies, develop dashboards and analytics, to use to educate and demonstrate value, to look where we need to improve on our service delivery, and how we can share in acceptance of failures and learning amongst our network. … we looked at cost of services to develop a payment methodology. We realized we don't know our costs because we are paid by Medicaid. We knew what we get paid; it's not based on costs.*

As this quote describes, Vermont's Medicaid program currently pays a set amount to each Designated Agency to cover mental health services. Now, with cost of services data, the state and stakeholder communities are currently planning value-based mental health payment reform (Vermont Department of Mental Health, 2018).

Medicaid programs faced challenges marshalling the combined data infrastructure, staffing, and expertise to conduct the analyses required for calculating potential savings and care improvement metrics under new payment models. As a state official in Arkansas remarked, "The systems have been a real choke point for us. You just can't make that many big changes all at the same time. We were more dependent on the health IT systems than we originally anticipated in terms of our timelines." Many states used SIM funds to hire contractors to improve their data analytics and assess the success of payment reform. In several states, Medicaid contracted out the work to develop and build the infrastructure (e.g., for dashboards and provider portals) to conduct analyses of provider cost and quality and provide technical assistance in conducting and communicating the utilization, costs, and computing quality of care

metrics. In Arkansas, one contractor worked closely with the state on analyses of claims for the initial EOCs, and other contractors were overseeing the development and upkeep of the state's Episode-based Payment System. Massachusetts also worked with contractors to provide technical assistance for claims analyses related to beneficiary assignment and capitation payments under its Accountable Care Strategy. Maine worked with state contractors (Maine Health Management Coalition [MHMC], Maine Quality Counts, and HIN) to implement SIM-supported activities, with MHMC using the state's Medicaid data to calculate shared savings.

In contrast to the states listed above, which used contractors for purposes internal to Medicaid, Minnesota used SIM funds to hire a contractor (3M) to teach and build capacity, both within the Department of Health and within IHPs, to develop reports and analytics using Medicaid claims data. The state also issued grants directly to IHPs to support their data analytics efforts. Minnesota's IHPs had varying assessments of the Medicaid data they were given access to, with one stating "it's the best I've ever seen" but others saying that significant additional resources are needed to make the data actionable.

Like Minnesota's focus on having IHPs use their own EHR data in addition to analyzing the Medicaid claims data they received, other states were moving more toward using clinical data from provider EHRs and HIEs (Arkansas, Vermont, Maine). Vermont worked with Vermont Information Technology Leaders, which helps store, evaluate, and transmit data in the HIE, which ACOs later use to analyze their own data. As noted above, Maine used its state HIE as a platform for new data analytics.

2.8 How Did States Advance Practice Transformation and Workforce Development Efforts?

KEY INSIGHTS

- Learning collaboratives that emphasized peer-to-peer learning were considered particularly effective in driving transformation.
- Individualized technical assistance received positive feedback from providers.
- Direct funding to health care providers and community organizations inspired innovative approaches to local health care transformation and workforce development.
- Clearly defining roles and responsibilities for new workforce professionals deemed essential to successful integration.

Learning collaboratives that emphasized peer-to-peer learning helped foster connections among providers and were considered particularly effective in driving transformation. Four states convened learning collaboratives to help providers adapt to practicing within new delivery models (Maine, Minnesota, Oregon, and Vermont). Specific

topics addressed in these forums are described in ***Table 2-7***. Stakeholders particularly valued sessions that were less didactic in nature and provided opportunities for participants to discuss implementation experiences with one another. For example, the Vermont SIM Initiative created the Integrated Communities Care Management Learning Collaborative, which created opportunities for participants to share approaches for identifying high-risk patients and strategies for filling gaps in existing services. One provider from Vermont noted that peer-based instructional models were instrumental in helping them form collaborative relationships with other providers and community partners. In the Spring of 2017, Maine's data-focused learning collaborative directed its educational efforts to helping HHs and BHHs improve their HbA1c monitoring and screening rates for patients with diabetes. In addition to improving health outcomes, Maine health care professionals credited these workshops with creating useful opportunities for networking, which allowed providers to share best practices and exchange implementation ideas with colleagues.

Table 2-7. Topics covered in learning collaboratives convened in Model Test states

Topic	ME	MN	OR	VT
Meeting certification requirements for transitioning to a PCMH, health home, or other alternative delivery model	✓	✓	✓	
Behavioral health integration	✓		✓	✓
Data collection for quality measurement	✓	✓	✓	
Care management/care coordination	✓		✓	✓
Using community health workers to address social determinants of health		✓		✓
Improving monitoring and screening for patients with diabetes	✓			

ME = Maine; MN = Minnesota; OR = Oregon; PCMH = patient-centered medical home; VT = Vermont.

In addition to learning collaboratives, stakeholders touted the value of individualized technical assistance tailored to the unique needs of practices. Providers from several states (Arkansas, Maine, Massachusetts, and Oregon) relayed positive feedback about the individualized technical assistance they received during their transformation. One-on-one assistance was considered particularly useful in helping practices overcome obstacles that prevented them from meeting various certification or state regulatory requirements. For example, SIM leaders from Massachusetts shifted from relying largely on group webinars to one-on-one coaching to help primary care practices meet milestones related to behavioral health integration. Similarly, in Arkansas, SIM leaders hired a physician outreach specialist to work with individual practices to troubleshoot challenges related to EOC implementation. In both Arkansas and Maine, technical assistance vendors offered individualized technical assistance in conjunction with telephonic support to help providers address specific issues that were difficult to resolve during teleconferences or webinars.

Direct funding to health care providers and community organizations inspired innovative approaches to local health care transformation and workforce development. Four states applied SIM funding to support individual health care providers or local entities that work with providers to facilitate change across different health care settings (Maine, Minnesota, Oregon, and Vermont). In most cases (with some exceptions in Minnesota and Vermont), these types of grants were not designed to support a SIM-related payment model implemented in the state. For example, the Maine SIM Initiative collaborated with provider and community organizations to educate providers on a broad range of subjects including leadership and team-based care delivery, pain expression in individuals with developmental disabilities, and shared decision making related to low back pain and medication management. Minnesota targeted a selection of its SIM-funded grants to small and rural providers to support performance-based payment, health IT, and quality improvement projects. Vermont awarded grants to providers to address problems such as high utilization and obesity. A state-by-state list of SIM-funded grants that promoted practice transformation and workforce development is shown in ***Table 2-8***.

Table 2-8. Practice transformation and workforce development activities supported by SIM-funded direct grants or contracts

State	Example
Maine	Training teams of clinicians, administrative staff, and health care leaders on managing change in health care organizations
Maine	Testing the integration of community health workers into primary care practices and health systems to improve chronic disease management and patient experience
Minnesota	Integration of emerging professionals into various health care settings (i.e., community paramedics, community health workers, and dental therapists)
Oregon	Community prevention projects focused on opiate overdose reversal and prevention, pregnancy screening and prenatal care, and tobacco cessation
Vermont	Provider subgrants related to high-utilizers, screening and interventions, surgical variation and lab ordering, and community-based wellness

Pilot tests integrating new health care workers in clinical care teams revealed that clearly defining roles and responsibilities for new workforce professionals is essential to successful integration. Two states (Maine and Minnesota) used SIM funds to test the integration of new types of health care workers into clinical care teams. Maine implemented a community health worker (CHW) pilot program in four primary care settings and Minnesota pilot-tested the integration of CHWs, dental therapists, and community paramedics. When integrated successfully, these health care workers can help clinicians work at the top of their license by assuming practice responsibilities that do not require clinical training. In Minnesota, dentists appreciated having dental therapists available to perform minor tasks and procedures. Similarly, hospitals in Minnesota noted the valuable role community paramedics play in delivering follow-

up services to patients discharged after an admission. In both cases, clearly defining roles and responsibilities for these new team members was considered a facilitator to successful integration. In contrast, providers from both states noted challenges incorporating CHWs into practice workflow and operations. Some were uncertain how to use CHWs effectively because their functions were unclear and seemed to duplicate those of care coordinators in the office. To facilitate better integration of CHWs moving forward, Maine created a stakeholder work group to develop competencies for CHWs and train supervisors on effective integration approaches. By the end of Year 3, the implementation of this curriculum was considered a notable achievement by Maine state officials.

2.9 How Did States Engage Stakeholders to Implement Models and Activities Under the SIM Initiative?

KEY INSIGHTS

- The SIM Initiative catalyzed collaboration and communication across multiple stakeholder groups including providers, payers, state agencies, and advocates. This engagement was important to promote buy-in and improve coordination across programs, although some stakeholders shared concerns that their input had not been accounted for.
- Stakeholder groups and experts provided in-kind resources that supported development of reforms and facilitated states' successes.
- The strategy for engagement evolved over time—from broad-based engagement, to more focused strategies—as states' efforts transition from development of SIM Initiative reforms to operationalization of those reforms.

One of the accomplishments of the SIM Initiative was an increase in collaboration and communication across sectors and providers in all states; yet, stakeholder input was not always taken into account to shape the direction for the SIM Initiative. States including Arkansas, Maine, Massachusetts, and Vermont considered strong stakeholder engagement a hallmark of SIM Initiative efforts. From the beginning of the SIM Initiative, most states invested heavily in stakeholder infrastructure that included participation from a wide selection of state agencies and officials, health plans and purchasers, providers, and community and social services in steering committees, advisory committees, and work groups (see ***Table 2-9***); fewer of these committees or work groups included consumers or consumer advocates. Oregon, in contrast, had planned its direction for state health care system transformation prior to the SIM Initiative, using policy changes under Medicaid and state employee health plan contracting to drive improved care coordination in the delivery system and thus had less stakeholder involvement in these types of advisory committees and work groups.

Table 2-9. Opportunities for stakeholder input and types of participants in each state's SIM Initiative

Opportunity for stakeholder input	State	State officials	Payers	Physical health providers	Community and social services (including behavioral health and LTSS providers)	Consumers and consumer advocates
Executive/Steering Committee[1]	AR	✓	✓	✓	✓	—
	ME	✓	✓	✓	✓	✓
	VT	✓	—	✓	✓	—
Advisory Committee or Workgroup on Payment/Delivery Model Development[2]	AR	✓	✓	✓	✓	—
	MA	✓	✓	✓	✓	✓
	ME	✓	✓	✓	✓	—
	MN	✓	✓	✓	✓	✓
	OR	✓	✓	✓	✓	✓
	VT	✓	✓	✓	✓	✓
Advisory Committee or Workgroup on Data, Health IT, or Measurement[3]	AR	✓	✓	✓	—	—
	ME	✓	✓	✓	✓	✓
	MN	✓	✓	✓	✓	—
	VT	✓	✓	✓	✓	✓

AR = Arkansas; LTSS = long-term services and supports; MA = Massachusetts; ME = Maine; MN = Minnesota; OR = Oregon; VT = Vermont.

✓ = participants of this type of stakeholder; — = no participants of this stakeholder type

Notes:

[1] Massachusetts, Minnesota, and Oregon involved stakeholders in an advisory rather than decision-making role that an executive or steering committee would have.

[2] Vermont also had work groups on Disability and LTSS, Population Health, Practice Transformation, and Workforce.

[3] Massachusetts and Oregon did not convene a committee or work group in this area.

Stakeholders in most states reported that one of the greatest achievements of the SIM Initiative were opportunities to develop new conversations between participants in health system transformation. Originally, Vermont dedicated one full-time employee to direct its stakeholder engagement, but then increased staffing to three full-time equivalent staff to keep up with the work of preparing for more than 20 hours of monthly public meetings and keeping the health care innovation website up to date. Similarly, stakeholders in Arkansas and Maine noted that the SIM Initiative facilitated valuable connections with additional commercial payers and state officials that were unavailable prior to the SIM Initiative.

Despite increased communication and engagement, stakeholders in Arkansas, Maine, Minnesota, and Vermont did not always feel as though their input was taken into account to shape the vision of the SIM Initiative in their state. Stakeholders in Minnesota noted in both 2014 and 2017 interviews that, although the state listened to stakeholders, state officials "already have their vision of where this is going" and that the state represented a payer in these discussions rather than taking the role of a convener. Some providers in Vermont felt that although the state invested a lot in an inclusive process, state officials were largely influenced by the most vocal participants or favored state agency personnel perspectives over provider perspectives. Finally, providers in Arkansas, specifically physicians in smaller practices, lamented the difficulty they had in participating in informational town hall meetings and webinars because they could not afford staff time to attend, and the lack of interaction between providers and state officials during these meetings reduced the imperative to attend (providers could later view recordings of these meetings).

In-kind investments from experts and stakeholders contributed to the success of SIM Initiative activities in Maine and Vermont. Stakeholders and experts in Maine and Vermont who offered insight and participated in stakeholder activities on a voluntary basis created valuable in-kind support that amplified the reach of the SIM Initiative in their states. In Maine, SIM Initiative committee members donated their time to attend meetings and became a significant source of in-kind investment from thought leaders dedicated to helping Maine's SIM Initiative succeed. Vermont's stakeholders offered valuable insight and perspective to help shape the elements of Vermont's SIM Initiative including measure sets, health IT investments, priorities for payment reform, and workforce transformation objectives. As described by one official, the work of the stakeholders had a "multiplier effect" on the SIM Initiative, with participants bringing in "hundreds of hours" of in-kind research and expertise to Vermont's efforts. In-kind investments received from key stakeholders and experts allowed Maine and Vermont to leverage and extend SIM Initiative funding further and in Maine, many activities may be sustained, because organizations that were responsible for their implementation under the SIM Initiative may carry on some, if not all, of the work they began using their own funding or in-kind resources.

The level, periodicity, and methods of engagement with stakeholders evolved for most states over the SIM Initiative's model test period. As states' efforts evolved throughout the SIM Initiative so did their stakeholder engagement. Information and listening sessions that took place as the initiative launched transformed to targeted engagement with specific stakeholders. In its initial phase, Arkansas's SIM Initiative included large, regional meetings with providers to share the state's plans and receive feedback. Providers that participated in these events offered mixed reviews of the overall benefit because they felt the state was sharing information but not truly taking feedback into account. However, as reforms were implemented to the PCMH and EOC models, the state began engaging targeted groups of providers in regular conference calls to identify specific issues providers were facing and develop solutions. Both the

state officials and provider groups noted the benefit of these calls and shared that they would continue beyond the SIM Initiative's model test period. Similarly, as Massachusetts was seeking to design its Medicaid ACO model, the state held calls with targeted groups of stakeholders, including provider groups and health plans. Providers and plans appreciated being included in the early design discussions, but once the state released the Request for Responses the discussions needed to change and became more focused on identifying issues for implementation.

2.10 What SIM-Related Activities Will States Sustain, and How?

KEY INSIGHTS

- States intend to sustain both Medicaid-only and multi-payer delivery and payment reform models begun under the SIM Initiative using several distinct policy levers and funding sources.
- States have also prioritized practice transformation, performance feedback reports, and some HIE investment as important areas, but the sustainability of other types of infrastructure support for health system transformation is less clear.
- The SIM Initiative has built networks and relationships that can serve as a foundation for future reform efforts in the Test states.

All states plan to sustain or evolve payment and delivery reform models launched or accelerated under the SIM Initiative. Most states made commitments through their Medicaid programs, using state plan amendments or Section 1115 waivers, to continue Medicaid payment models that the SIM Initiative accelerated or helped develop (see ***Table 2-10***). Both mechanisms represent the state's investment in administering a model under Medicaid; additionally, Massachusetts and Vermont have entered agreements with CMS that will offer funding to support new components of their respective ACO models.

During the SIM Initiative, Massachusetts, Minnesota, and Vermont planned the next evolution of their delivery and payment models that reflect lessons from SIM-related models. Massachusetts learned lessons from its Pilot ACO program in 2017 to apply to the launch of the Full ACO program in 2018, such as how providers understand the specific beneficiaries for whom they are accountable in terms of quality and cost. Minnesota developed "Version 2.0" of its IHP model, in which IHPs will receive small prospective payments in addition to (for some larger integrated health systems) two-sided risk, with a significant amount of savings contingent on quality. Vermont shifted from its ACO SSP model, with delayed retrospective payments, to a prospective capitated payment model.

Table 2-10. Continuation of SIM-related models in Medicaid

State	Models					Sustainability levers		
	PCMH	HH / BHH	ACO	EOC	CCM	SPA	1115 Waiver	Other
Arkansas	✓			✓		✓	✓ [1]	
Maine		✓	✓			✓		
Massachusetts			✓				✓ [2]	
Minnesota		✓	✓			✓	✓ [1]	
Oregon	✓				✓		✓	
Vermont	✓		✓				✓	✓ [3]

ACO = accountable care organization; BHH = behavioral health home; CCM = Coordinated Care Model; EOC = Episode of Care; HH = health home; PCMH = patient-centered medical home; SPA = state plan amendment.

Notes:

(1) Arkansas and Minnesota have Medicaid Section 1115 waivers to implement other aspects of their Medicaid program; in Arkansas, waiver authority expands Medicaid eligibility to nondisabled adults under age 65 by giving them coverage under Qualified Health Plans (the "Private Option"), and in Minnesota, waiver authority enables their Medicaid managed care program. (2) Massachusetts is sustaining its ACO pilot via Delivery System Reform Incentive Payment Program funding of $1.8 billion and a Medicaid Section 1115 waiver extended to 2022.
(3) Vermont has secured $9.5 million of funding from CMS for components of its All-Payer ACO Model and a 5-year extension of its Section 1115 waiver, which enables Medicaid to be a full partner in the model.

All commercial payers that were involved in alternative payment models before the SIM Initiative are continuing participation in the models after, specifically in Arkansas (EOC), Minnesota (HCHs), and Vermont (PCMH). Commercial payers that became involved in new payment models during the SIM Initiative are also continuing their involvement, including in Arkansas (PCMH), Oregon (CCM), and Vermont (ACO).

States are also sustaining practice transformation assistance and performance feedback reports. As noted in ***Table 2-3*** above, all states had at least one delivery system/payment model in which participating providers received technical assistance around practice transformation and performance feedback reports during the SIM Initiative. At the end of the SIM Initiative, three states (Maine, Oregon, Vermont) were planning to invest in the infrastructure for providing technical assistance after the SIM Initiative period. Oregon secured a legislative appropriation for years 2017–2019 to continue supporting its Transformation Center, established during the SIM Initiative, which provides training, technical assistance, and networking opportunities to CCOs and other health care entities. In Maine, state officials are considering establishing an innovation or practice transformation center for medical providers. Vermont transitioned two of its collaborative programs, Integrated Communities Care Management Learning Collaborative and Accountable Communities for Health Peer Learning

Lab, into the third, Regional Collaborations, to consolidate and sustain these practice transformation efforts (State of Vermont, 2017).

States have also planned to continue performance feedback reports, which are central to helping providers maintain accountability for quality of care. Specific examples include Arkansas's Medical Neighborhood Performance Report tool, which integrates and conveys cost and outcome information from EOCs to PCMH providers from across participating payers (Medicaid and commercial); performance reports for HHs, BHHs, PCMH, or ACO models—or sometimes more than one model—in Maine, Massachusetts, Minnesota, and Vermont; and continued CCO quality measure reports in Oregon.

Post-SIM Initiative sustainability of health IT efforts varies by program. Many health IT activities were designed to be one-time investments to move the state forward, such as EHR expansion, infrastructure support for HIE connections, and telehealth pilots. Maintenance and support of statewide HIEs will continue through state funding or provider investments. Two states will continue state investment in HIEs. Maine will continue e-mails with ADT information from the state HIE to MaineCare care managers and continue to subsidize HIE subscriptions fees for BHH providers. Massachusetts is looking for ways to use its state HIE, the Mass HIway, to offer an ENS at no cost. For activities that had been subsidized by the state, such as ENSs to deliver ADT information to providers, shifting the cost to providers may reduce their future use. For example, Vermont had subsidized the Patient Ping service, and Oregon piloted PreManage subscription to delivery information from EDIE to a targeted group of providers—two services that will now require provider investment to continue, as was always the case in Arkansas and Minnesota (see ***Table 2-11***).

Table 2-11. Technical assistance, performance feedback, and health IT continuing to support SIM-related models after the SIM Initiative

Type of support	AR	ME	MA	MN	OR	VT
Transformation/Innovation Center					●	
Learning Collaboratives					●	●
Performance reports from payers to providers	●	●	●	●	●	●
ENS	○	●	●	○	○	○

AR = Arkansas; EHR = electronic health record; ENS = event notification system; health IT = health information technology; HIE = health information exchange; MA = Massachusetts; ME = Maine; MN = Minnesota; OR = Oregon; VT = Vermont.

● = State investment

○ = provider investment

Beyond administering federal funding through Medicaid, states secured state budget funding to continue investment in health care transformation. Examples of states' investment to continue what they tested under the SIM Initiative follow:

- Arkansas continued its support for ongoing administration of its PCMH and EOC models by full-time state employees, with the assistance of the same contractors used throughout the SIM period.
- The Massachusetts state legislature approved a surcharge on commercial health plans to sustain MCPAP and MCPAP for Moms.
- Minnesota used a one-time funding stream from its state budget to maintain operations for HCHs.
- Oregon's budget funded its multi-payer reform initiative called the Primary Care Payment Reform Collaborative (and the Transformation Center, as noted above) through 2019, and its all payer claims database (APAC) for data analytics.
- Vermont continued support of its HIE and behavioral health data repository.

The sustainability of activities outside the core payment and delivery reform is less certain. States used SIM funding to test strategies to address workforce development and population health. Activities included CHW pilot projects (Maine, Minnesota), leadership development training (Maine), support for patients with developmental disabilities (Maine), diabetes prevention efforts (Maine), e-Referral systems (Massachusetts), food security grants (Minnesota), care coordination in subsidized housing (Oregon), oral health access initiatives (Minnesota, Oregon), and health care equity initiatives (Oregon), and provider subgrants to test a range of topics including reducing obesity (Vermont). States' commitment toward and funding for these activities is less certain than other strategies designed to target providers participating in new delivery and payment models.

The SIM Initiative helped develop relationships and networks that can serve as the foundation for future reform efforts throughout the Test states. Provider training, practice transformation, technical assistance, and learning collaborative programs strengthened relationships and built networks of providers experienced in implementing value-based delivery and payment system reform. In so doing, states developed a potential foundation for future state-level health care reform initiatives.

2.11 Lessons From SIM Initiative Implementation in a Post-2018 Health Policy Environment

In each of the annual reports for the SIM Initiative evaluation, we have summarized successes and challenges from states' SIM Initiative implementation from the most recent single analytic year. This section presents consistent themes from implementation analysis across all years that are applicable as lessons for the post-2018 health policy environment.

Lesson for the Innovation Center: Federal policy is critical in giving new options and levers to states. The experience of six states awarded Round 1 Model Test funding demonstrated the potential impact the federal government can have in influencing the trajectory of state health policy. We see this impact in three interrelated ways: First, through federal law and rulemaking; second, through hands-on technical assistance and guidance; and third, through funding. The foundation of federal policy—first through the ACA of 2010 and then through MACRA of 2015—offered states opportunities to change payment models under Medicaid (e.g., HH model, Delivery System Reform Incentive Payment Program) and to ensure that Medicare- and Medicaid-participating providers could be rewarded similarly for participation in alternative payment models, respectively. Participation in the SIM Initiative gave states both technical assistance and funding from the Innovation Center, which worked together to help states draw lessons from their peers when planning future investments (which they could make with the infusion of SIM dollars) in health care transformation. State officials appreciated the usefulness of well-informed the Innovation Center officials and seamless transfer of funds when they occurred, but they chafed when the federal SIM team repeatedly changed their points of contact or took a long time to approve requested expenditures. Although states are well positioned to lead health care transformation, a key lesson for the Innovation Center is that Medicare and Medicaid policy made at the federal level is as much or more critical in enabling states to innovate, as is their having the funds and knowledge to implement those innovations.

Federal rulemaking in Medicare and Medicaid enables state-led health policy innovation.

Lesson for state lawmakers: State legislation is powerful in accelerating change. SIM states with enabling legislation achieved certain milestones consistent with their state transformation goals: commercial payer participation (for QHP products) aligned with the Medicaid PCMH program in Arkansas, streamlined consent policies to facilitate use of the state HIE in Massachusetts, and greater investment in primary care across commercial payers in Oregon. Additionally, stakeholders in a few states noted the importance of pre-SIM state legislation that signaled the state's direction to all stakeholders—for example, legislation in Massachusetts indicating goals for alternative payment model participation across state-funded health programs, in Minnesota requiring new payment model development in Medicaid, and in Vermont establishing the Green Mountain Care Board, an independent entity for expanding payment and delivery system reforms through testing and evaluation. State legislation may not be necessary or sufficient for stakeholder alignment, but it can help move forward a consistent state-led agenda for health care transformation.

Lesson for Medicaid administrators: Providers need good, timely data to participate in new payment models. In several states, providers identified flaws with the data and performance feedback reports they received from Medicaid agencies about Medicaid beneficiaries for whom they were accountable. Complaints about delay and inaccuracy of the reports contributed to provider dissatisfaction and skepticism about participating in alternative

payment models, although some providers expressed appreciation for the data they received that gave an overall sense of the quality of care they delivered, even if retrospectively.

Medicaid agencies across states offer different strategies to improve data they delivered to providers, and it is likely that one or more of these strategies are necessary to give providers greater comfort with cost and quality accountability. Arkansas began delivering reports on average costs for specialists to PCPs to help them understand the cost implications of specialist referrals. Maine gave technical assistance on using performance feedback reports. In addition to giving ACOs data on all Medicaid beneficiaries (regardless of MCO), which providers praised, Minnesota funded technical assistance to Medicaid ACOs to help them use their own data and data from the state.

Lesson for Medicaid: Providers are concerned about assuming financial risk for patients' cost of care, and Medicaid can structure opportunities to build provider confidence. Providers in some states indicated concern over taking on risk for their attributed patients' cost of care. In Arkansas, where the EOC model was mandatory for providers caring for Medicaid beneficiaries, some providers went as far to say they may reduce patient access to avoid incurring financial penalties for costs that they perceive as out of their control. In Maine, where ACs had the choice of one- or two-sided risk, all four of these Medicaid ACOs chose one-sided risk to avoid potential penalties. In Vermont, Medicaid ACO SSP-participating providers had concerns about financial risk for different provider types, with the FQHC-led ACO considering joining with the larger health system-led ACO when the SSP model transitioned to two-sided risk. Ultimately, the FQHC-led ACO was unable to move to two-sided risk, and because of financial concerns, it ended ACO operations.

Yet, Medicaid agencies can structure alternative payment model programs to build providers' experience, ability, and confidence in managing cost and quality for their attributed patients. Arkansas EOC providers reduced their episode-based costs for some conditions through receiving reports comparing them to their peers and recognizing their peers' cost-effective approaches that did not diminish quality of care (e.g., being selective as to what specimens are sent for pathologists' review). After using the SIM Initiative to test one Medicaid payment model, PCPRI, Massachusetts took lessons from that experience to design a comprehensive payment model, the ACS, that involves more provider types, more financial risk, and a greater proportion of Medicaid beneficiaries than other states. Minnesota was able to expand participation in its Medicaid ACO program by offering options to providers on services included in total cost of care, quality measures, and assumption of one- or two-sided financial risk. Vermont was able to transition to a prospectively capitated model for its Medicaid Next Generation ACO program after the ACO had 3 years' experience with one-sided risk.

> Medicaid agencies can use incremental changes to payment models over time and other supports to develop providers' ability to manage cost and quality.

Lesson in health IT: State HIEs are still not offering complete provider-to-provider connectivity, but systems that deliver information on hospital ADT and ED use were well received. During the SIM Initiative, providers indicated they still had difficulty receiving information about patients from health systems other than their own—a problem that many state HIE architects had hoped an HIE could solve. Some challenges to using the HIE are nuanced and refer to specific use cases (e.g., where a patient record is incomplete because of a lack of a provider's connectivity to the HIE or legal barriers to submitting substance use treatment data [to keep compliant with 42 CFR Part 2] or where connection to the HIE is prohibitively expensive for providers [Arkansas and Maine]).

Despite the chasm between expectations and reality of what state HIEs can deliver, state officials and providers identified emerging strategies that advanced use of health IT to improve care coordination. Most significantly, state officials and providers prioritized getting hospital ADT and ED use information delivered to physician offices: Arkansas revised PCMH requirements to focus on this functionality rather than connection to the state's HIE, and Vermont subsidized the service Patient Ping for providers. Massachusetts is planning to leverage its state HIE to offer this functionality to providers who do not subscribe to another private ENS. Minnesota required ADT functionality in the newest integration of the IHPs (2.0) and hired a vendor to facilitate its success in meeting that requirement.

Maine and Vermont also had notable successes in improving movement of health data to improve patient care. Maine subsidized the connection of behavioral health organizations to the HIE, a development that behavioral health providers valued so they could monitor and address their patients' use of other health services. Vermont conducted in-depth data gap analysis and remediation efforts to improve the quality of data providers submit to (and can therefore retrieve) from the Vermont HIE and funded the Vermont Care Partners Data Repository to enable providers to access behavioral health data from agencies across the state, which providers found to be extremely valuable.

Lesson in delivery system development: Tests of how best to coordinate across health and social services are still ongoing. Four states tested different strategies for fostering connections between health and social services to meet patient and community health needs, and the specific outcomes are not yet known. More evaluation of these coordination efforts will be an important area of future study, given the growing interest in factors affecting health care costs for which providers will be held accountable.

These states' approaches included offering seed money (Minnesota and Oregon), convening (Vermont), and mandating contracts (Massachusetts). With SIM funds, Minnesota offered direct grants to ACHs, partnerships between an ACO or an ACO-like entity, and community organizations that form to address the needs of a defined population. Of the 15 ACHs that the state funded using a competitive selection process, eight demonstrated savings or

established organizational relationships sufficient to continue their operations once the funding period ended. Similarly, Oregon funded a test of the Housing With Services model and the implementation of "innovator agents" to coordinate across LTSS. Vermont supported Regional Collaborations, one in each of Vermont's 14 health service areas, comprising health care providers (including representatives from the Blueprint for Health—the PCMH model—and ACOs) and social service providers. These collaborations, which grew out of providers already coming together to address potential improvement opportunities in the context of learning collaboratives, identify local priorities and how to address them; stakeholders noted the value of local relationship-building through their participation. Finally, Massachusetts' ACO model required ACOs to have formal contracts with Community Partners, community-based behavioral health and LTSS providers who are already serving a large proportion of the Medicaid population. These contracts specify processes for integrating and coordinating care and will launch in mid-2018. In addition, Massachusetts applied for approval of a flexible services protocol to allow ACOs to be reimbursed for providing services to address some social determinants of health.

Lesson in consumer engagement: Providers view consumer behavior and choices as potential wild cards in the health system's ability to achieve expected cost and quality outcomes. Participation in new payment models is changing how providers deliver health care, and not all consumers will be satisfied with all changes, even those considered desirable by payers. For example, adding new staff, nurse practitioners, and physician assistants to a primary care practice is a practical response to a PCMH model requirement to improve access to clinicians—yet some consumers express concerns about not seeing the same individual clinician at every visit, even same-day appointments. Reducing antibiotic prescriptions for viral respiratory infections, as is the goal of implementing the upper respiratory infection EOC in Arkansas, runs contrary to what consumers with a cold expect from a physician visit. Providers may invest in connecting to social services, but consumers may not take advantage of new services available for any number of reasons.

Just as providers may be wary of new risks under new payment models, consumers may also be wary of providers' motivations and new efforts to change their behavior. Consumer engagement was not an area where states invested in SIM funds directly, although Oregon's state employee health plans offered consumers incentives to enroll in plans that adopted its CCM. However, consumer engagement may be an area where providers focus more as they perceive greater incentive to change consumer behavior to meet or exceed expectations for overall cost and quality.

The next chapter integrates more information about implementation of new payment models in Medicaid to interpret outcomes related to care coordination, utilization, expenditure, and quality of care.

Addendum Table 2.1. Definition of delivery and payment models implemented during the SIM Initiative

Model	States	Definition
Accountable Care Organization	Maine, Massachusetts, Minnesota, Vermont	Groups of doctors, hospitals, and other health care providers who joined voluntarily to enter into contracts in which they will be held accountable for quality and total cost for an attributed population.
Accountable Communities for Health	Minnesota	As tested in Minnesota, partnerships between an ACO, or ACO-like entity, and a priority setting (defined as behavioral health, LTSS, social service, or local public health) that addresses the needs of a defined population in the community.
Coordinated Care Model	Oregon	Oregon-specific model applied to health plans that espouse the following attributes: (1) using best practices to manage and coordinate care; (2) sharing responsibility among providers, payers, and consumers for health; (3) increasing transparency in price and quality; (4) measuring performance; (5) paying providers for better quality care and health; and (6) achieving a sustainable rate of health care expenditure growth.
Health Homes (including Behavioral Health Homes)	Maine, Minnesota, Vermont	As defined by the Medicaid Health Home State Plan Option in Section 2703 of the ACA, these are state-designed models with the requirement that providers integrate and coordinate all primary, acute, behavioral health, and LTSS to treat the whole person. States that implemented health homes received enhanced federal funding to support models that served Medicaid beneficiaries who met specific clinical criteria, including behavioral health needs.
Episode of Care	Arkansas	Principal Accountable Providers are held responsible for the total cost of care and quality for all services related to the specific conditions and procedures included in a defined episode. As implemented in Arkansas, participation is mandatory for all providers caring for Medicaid beneficiaries. Commercial payers chose the episodes to which providers under contract would be subject.
Patient-Centered Medical Home	Arkansas, Massachusetts, Oregon	The PCMH model emphasizes accessible, comprehensive, continuous, and coordinated care provided by a primary care practice. State-designed PCMH models may impose their own requirements for becoming a PCMH. In Oregon, the model is called the Patient-Centered Primary Care Home.

ACA = Patient Protection and Affordable Care Act; ACO = accountable care organization; LTSS = long-term services and supports; PCMH = patient-centered medical home.

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3. Impact Findings for SIM Initiative–Supported Delivery and Payment Models

One goal of the SIM Initiative Round 1 evaluation is to determine whether the states' investments in delivery and payment model implementation—and supporting infrastructure to help providers optimize performance under new models—may be associated with measurable impacts on cost and quality. To accomplish this goal, we estimated how key expenditure, utilization, care coordination, and quality of care outcomes changed for individuals served by each state's SIM-supported delivery and payment models once implementation began.

Payment and delivery models implemented across the SIM Round 1 states varied considerably in terms of specific payment and incentive structures, populations included, and providers that were targeted. ***Figure 3-1*** summarizes the benefits and limitations of such a comparison across models.

This evaluation analyzed the SIM-supported delivery and payment models and payer populations described in ***Table 3-2*** at the end of ***Section 3.1.*** We first present an overall summary of results across each payment and delivery model by selected features of model design, context, and implementation in ***Section 3.1***. We present the model-specific findings in more detail by model type in ***Section 3.2*** and offer summary conclusions in ***Section 3.3***.

3.1 Cross-State Overview of Findings

Across all the models, we examined inpatient admissions, emergency department (ED) visits not leading to a hospitalization (referred to as ED visits throughout this chapter), and total expenditures. Quality metrics varied by model. Although the expected direction of outcomes varies by model type, in general, the goals of the SIM Round 1 models were to lower total expenditures; reduce avoidable, more expensive types of utilization such as ED visits and inpatient admissions; and improve quality of care. ***Table 3-1*** is a summary of how the SIM Round 1 models fared for each of these goals relative to the presence of features expected to affect outcomes as represented in a heat map (darker colors representing strongest presence).

In general, the accountable care organization (ACO) models had the most favorable outcomes on expenditures, utilization, and quality metrics. Although there was not one factor that emerged as being the key to favorable outcomes, it does appear that the models that had multiple activities across the different health care settings had the most impact. We summarize the findings for expenditures, utilization, and quality below.

Figure 3-1. Strengths limitations, and key findings from a comparison of outcomes produced by SIM-supported delivery and payment models

Strengths	Limitations
• All outcomes discussed in this chapter are for Medicaid beneficiaries.[15] • All models were implemented in similarly motivated states that the Innovation Center deemed ready for a Model Test award in 2013, and the post-implementation periods for each model mostly overlapped. • Outcomes for most models are described relative to a comparison group to answer the question of whether outcomes were different than in the absence of model implementation. Because the comparison groups are mostly in-state and subject to the same health reform efforts of the state absent the model, the findings are indicative of the impact of the model as implemented in the current health care environment.	• The Medicaid beneficiaries included in each model are not the same. Episode of care (EOC) models targeted subsets of Medicaid beneficiaries with specific conditions, and criteria for beneficiary attribution to other models varied slightly. • States had different starting points with regard to pre-SIM transformation efforts and supporting infrastructure. • "Pure" comparison groups not touched by other health reform efforts are impossible to select, so results may not show the full impact of the model, or could show no difference even if one exists.
Key Findings	
• The Vermont Medicaid ACO Shared Savings Program is the delivery and payment model that demonstrates the most favorable outcomes. Vermont has a long history of supporting providers in changing care delivery. • EOCs, in which financial incentives and quality measures were both tied to care for patients with a single condition, produced significant improvements in quality but may have had unintended consequences. • Models in which providers were held accountable for cost outcomes, and at risk for financial penalties for high costs (two-sided risk), did not achieve better outcomes for total expenditures or utilization.	

[15] We only include Medicaid beneficiaries in this chapter because most of the SIM payment models were targeted to Medicaid beneficiaries. None of the models included Medicare as a payer. As such, we do not present any findings for the Medicare population.

Table 3-1. How do models implemented in Medicaid populations compare on outcomes related to expenditures, ED visit rates, inpatient admission rates, and quality after at least 2 years of implementation?

Legend*				More favorable outcomes[1] Fewer favorable outcomes						
Yes	Limited	No	Not reported	ACO			EOC		PCMH	
	Model characteristics			VT	MN	ME	AR Perinatal	AR URI	OR PCPCH	MA PCPRI
Context	Three or more years of implementation period data available for analysis			Yes	Yes	No	No	No	Yes	No
	Pre-SIM transformation efforts in primary care			Yes	Yes	Yes	No	No	Yes	Yes
	Multiple payers aligned on same model			Yes	No	No	Yes	No	Limited	No
Payment model	Participating provider organizations include providers across the care continuum			I&O	I&O	I&O	Limited		PCF	PCF
	Provider level of risk			Limited	I&O	Limited	I&O	I&O	PCF	Limited
SIM-funded support	Practice transformation assistance			Yes	Yes	Limited	No	No	Yes	Yes
	Data or performance feedback reports			Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Grants to providers			Yes	Yes	No	No	No	No	Yes
Provider-reported care delivery	Follow-up after hospitalization (including use of electronic event notifications)			Most	Some	NR	Most	Most	NR	Most
	Quality measurement			Most	Some	Some	Most	Most	Some	Most
	Enhanced access to care			Some	Most	Some	NR	NR	Some	Some
	Quality improvement and performance			Some	Most	Some	Few	Few	NR	Most
	Develops individual patient care plans			Some	Some	NR	NR	NR	NR	NR
	Incorporates evidence-based guidelines into care			NR	Some	NR	NR	NR	NR	NR
	Uses interdisciplinary team-based care			Most	Most	Some	NR	NR	Some	Most
	Refers patients to community resources			Most	Most	NR	NR	NR	NR	Some

ACO = accountable care organization; AR = Arkansas; ED = emergency department; EOC = episode of care; IHP = Integrated Health Partnership; OR = Oregon; MA = Massachusetts; ME = Maine; MN = Minnesota; PCMH = patient-centered medical home; PCPCH = Patient-Centered Primary Care Home; PCPRI = Primary Care Payment Reform; PMPM = per member per month; SSP = Shared Savings Program; URI = upper respiratory infection; VT = Vermont.

***Detailed legend**

Context	**Payment model:** Participating provider organizations include providers across the care continuum	**Payment model:** Provider level of risk	SIM-funded support	Provider reported care delivery practices
Yes	Inpatient and outpatient (I&O)	2-sided risk	Yes	Most reported
Limited	Variable	1-sided risk	Limited	Some reported
No	Primary care focused (PCF)	PMPM payments	No	Few reported
	Not reported (NR)			Not reported (NR)

Notes: (1) Relative to comparison group after at least 2 years of implementation, some models had similar outcomes:

- Vermont ACO SSP had favorable outcomes on expenditures, ED visits, inpatient, and some quality measures
- Minnesota IHPs had favorable outcomes on expenditures, ED visits and some quality measures
- Maine ACOs had favorable outcomes on ED, inpatient, and some quality measures
- Arkansas Perinatal EOC had favorable outcomes on ED visits and some quality measures
- Arkansas URI EOC and Oregon PCPCH had favorable outcomes on physician visits and quality measures
- Massachusetts PCPRI had positive findings on primary care use, but otherwise had null or negative findings

3.1.1 Did the models lower total expenditures?

- Of the payment and delivery models where we were able to compare the change in expenditures for model participants relative to a comparison group, **only Vermont's ACO model had a statistically significant smaller growth in total expenditures**.
  - These results indicate that, in general, the SIM Round 1 models were not effective at reducing total expenditures during the evaluation analysis period.
  - However, the Vermont ACO model was also one of only two models for which we had 3 years of expenditure data after the model implementation. Lowering the expenditure growth trend—or outright decreasing net expenditures—may take longer than 1 to 2 years to observe.
  - Several of the models found an increase in expenditures in the first 1 to 2 years after model implementation. If improved care management results in connecting patients to needed services and supports, then expenditures could increase because patients are receiving more care in the short run. Increases in the short run do not necessarily mean that long-term reductions in total Medicaid expenditures are unachievable. It often takes significant time for new models of care delivery to become fully functional, and patients need adequate supports to ultimately control high-cost, unnecessary spending.

3.1.2 Did the models reduce ED visit rates?

- All ACO models and the Arkansas perinatal episode model had greater decreases in the rate of ED visits for model beneficiaries relative to the comparison groups.
  - ACO models and the perinatal episodes in Arkansas are the models that include hospital-affiliated providers.[16]
    - It may be that provider groups with strong and established organizational ties to hospitals and ED staff may have strengthened processes to identify and redirect patients who substitute EDs for more efficient primary care.

3.1.3 Did the models reduce inpatient admission rates?

- Inpatient admission rates improved less or declined more for beneficiaries in Vermont's (increased less) and Maine's (declined more) ACO models relative to the comparison groups.
  - We observed no clear pattern explaining the success of these models relative to others. As ACO models, they included hospital-affiliated providers, which may have helped in reducing the inpatient admission rate. However, the inpatient admission rate statistically significantly increased for participants in the Minnesota ACO model and the Arkansas perinatal EOC model relative to the comparison group, despite the inclusion of hospital providers for both models.

[16] The principle accountable provider (PAP) for Arkansas upper respiratory infection (URI) episodes is the provider who first diagnoses the patient with a URI, which could be in an outpatient office clinic or during an ED visit.

3.1.4 Did the models achieve better care coordination?

- Primary care use improved across the PCMH models, which is consistent with the expectation that PCPs will take a more active role in monitoring and promoting their patients' health after becoming a PCMH.
- However, there were few signs of improvement in care coordination, as measured by primary care use and follow-up visits after hospitalizations, for the ACO models.

3.1.5 Did the models achieve better quality of care?

- The Arkansas episode of care (EOC) models demonstrated significant improvements in quality across multiple outcomes.
  - The EOC models were also focused on a specific population and time-limited clinical events. Providers may have been able to better focus on clinical protocols for specific populations and disease groups that had measurable positive impacts on quality.

Guide to interpreting results

We compare the changes over time *before* model implementation and *after* model implementation (i.e., the model test period) for both populations served by providers *participating* in the model and served by provider *nonparticipants* (the model and comparison groups are listed in ***Table 3-1*** above).[17] Known as a difference-in-differences (D-in-D) approach, the results from these analyses isolate the effect of the delivery/payment model beyond what changes may have taken place in the absence of such a model.

Although this analytic approach is rigorous, there are limitations in interpreting the impact of the SIM Initiative on person-level outcome measures. Variation in providers' readiness to make changes to care delivery under each model is not precisely captured in the analyses, nor is providers' use of SIM-supported infrastructure such as quality measure data reports or health information exchange (HIE) systems. In addition, the comparison group may have had some exposure to similar health care delivery patterns as the model participants. At the same time, these limitations reflect the realistic roll-out of payment and delivery models, which often have uneven uptake by providers, length and intensity of exposure for beneficiaries, and variable significance and implementation for providers involved. Although this creates uncertainty around what impact a "pure" implementation of these delivery and payment models would have, the advantage to this design is that the results are biased to be more conservative (i.e., to find less of an effect or to not find an effect when one truly exists) rather than to overstate any effect.

[17] The Maine behavioral health home (BHH) analysis and the Arkansas EOC expenditure analysis are exceptions; because of data availability, these are pre-/post-analyses only without a comparison group.

Table 3-2. Details of the SIM Initiative–supported payment and delivery model-specific analysis, by state

Model name	Payer population(s)	Model and comparison groups[a]	Analysis period	Weighted number of total person-years[b]
Arkansas				
Upper Repository Infection Episodes of Care	Medicaid	MG: The intervention group comprises URI episodes for Arkansas Medicaid beneficiaries who are followed for 21 days after triggering a URI EOC. CG: The comparison group comprises URI episodes for Missouri and Mississippi beneficiaries who are followed for 21 days after triggering a URI EOC.	Oct 2010–Sept 2012 *(pre)* **Oct 2012–Sept 2014** *(test)*	MG: 403,401 CG: 401,158
Perinatal Episodes of Care	Medicaid	MG: The intervention group comprises singleton live birth perinatal episodes (begins 40 weeks prior to delivery and ends 60 days after delivery) for Arkansas Medicaid beneficiaries. CG: The comparison group comprises singleton live birth perinatal episodes of the same length for Missouri and Mississippi Medicaid beneficiaries.	Oct 2010–Sept 2012 *(pre)* **Oct 2012–Sept 2014** *(test)*	MG: 27,559 CG: 27,471
Patient-centered medical homes[†]	Medicaid	MG: Beneficiaries who are first assigned to a newly enrolled PCMH practice January 2014. A third of the 111 intervention practices were pediatric and 63% were family practice. CG: To identify the comparison group, we selected the 21 practices that enrolled in the Arkansas PCMH in 2015 and selected beneficiaries who were first assigned to these practices in January 2015.	2010–2013 *(pre)* **2014** *(test)*	MG: 962,879 CG: 742,825
Maine				
Behavioral health homes	Medicaid	MG: Beneficiaries enrolled in a BHH at some point in each of the two test period years. Note: There is no CG because the BHH analysis used a pre-post design.	April 2011–March 2014 *(pre)* **April 2014–March 2016** *(test)*	MG: 30,580
Accountable Communities	Medicaid	MG: Beneficiaries assigned to providers associated with an AC. Beneficiary attribution occurred on an annual basis, and to be eligible members had to have been continuously enrolled for at least 6 months or 9 months noncontinuously enrolled in the year of attribution. Beneficiaries were attributed either through being assigned to a Health Home that was a part of an AC, having a plurality of primary care visits to an AC provider, or having three or more ED visits to a hospital that was part of an ACO. CG: To be in the CG, beneficiaries had to be (1) continuously enrolled for at least 6 months or noncontinuously enrolled for 9 months during the year; AND (2a) enrolled in a Health Home practice that was not a part of an AC OR (2b) have had a plurality of primary care visits at a practice not affiliated with an AC; OR (2c) have had three or more ED visits at a hospital not part of an AC.	August 2011–July 2014 *(pre)* **August 2014–July 2016** *(test)*	MG: 210,139 CG: 211,555

(continued)

Table 3-2. Details of the SIM Initiative–supported payment and delivery model-specific analysis, by state (continued)

Model name	Payer population(s)	Model and comparison groups[a]	Analysis period	Weighted number of total person-years[b]
Massachusetts				
Primary Care Payment Reform Initiative (PCMH model)[†,c]	Medicaid	MG: Fee-for-service beneficiaries enrolled in PCC plans who were attributed to a PCPRI-participating practice.[d] CG: Beneficiaries eligible for PCPRI by being in a PCC plan but were not attributed to a PCPRI-participating practice.	January 2011–June 2014 *(pre)* **July 2014–March 2016** *(test)*	Pre-period only: MG: 109,405 CG: 110,809
Minnesota				
Integrated Health Partnerships (Minnesota-specific Medicaid Accountable Care Organization)	Medicaid	MG: Beneficiaries attributed to an IHP if a provider within that IHP supplied a health care home service, or, if the beneficiary received the plurality of primary care services from an IHP provider. CG: Beneficiaries not ever attributed between 2013 and 2016 to an IHP but were eligible.	2010–2012 *(pre)* **2013–2016** *(test)*	MG: 2,282,897 CG: 2,277,622
Oregon				
Patient-Centered Primary Care Home (PCMH model) [†]	Medicaid	MG: Those who received the plurality of their medical services at a given PCPCH-certified clinic. CG: The comparison group received the plurality of medical services at clinics that were not PCPCH certified. Patients without primary care services in the study window were not included in the analysis.	2011–2014 *(pre and test vary by individual practice)*	Medicaid[e]: 17,003,526 person-months
Vermont				
Shared Savings Program (ACO model)	Medicaid	MG: Beneficiaries assigned to providers associated with an ACO participating in the Medicaid SSP. Beneficiary attribution occurred on an annual basis, and to be eligible members had to have been enrolled for at least 10 months in the year of attribution. Attribution occurred either through a claims-based algorithm or through the affiliation of the beneficiary's assigned primary care provider. CG: Beneficiaries assigned to a provider not affiliated with an ACO *or* a provider associated with an ACO participating in the commercial SSP only.	2011–2013 *(pre)* **2014–2016** *(test)*	MG: 387,066 CG: 387,160

(continued)

Table 3-2. Details of the SIM Initiative–supported payment and delivery model-specific analysis, by state (continued)

AC = Accountable Community; ACO = accountable care organization; BHH = behavioral health home; CG = comparison group; ED = emergency department; EOC = episode of care; FFS = fee-for-service; IHP = Integrated Health Partnership; MG = model group; PCC = Primary Care Clinician; PCMH = patient-centered medical home; PCPCH = Patient-Centered Primary Care Home; PCPRI = Primary Care Payment Reform Initiative; SSP = Shared Savings Program; URI = upper respiratory infection.

[†] The three PCMH models in Oregon, Massachusetts, and Arkansas were presented in the Year Four Annual Report (RTI International, 2018). A brief summary of the results is included here for context.

[a] With the exception of Maine ACs and BHHs, Medicaid beneficiaries are not Medicare-eligible and have full benefits. In Maine ACs, some beneficiaries who were Medicare-eligible or had restricted benefits were included in the attributed population we received from the state and thus were included in the analysis. The Maine BHH model includes beneficiaries dually eligible for Medicare and Medicaid.

[b] The number of comparison group observations is weighted by the inverse probability weight (1/(1-propensity score)), the number of intervention group observations is unweighted. Person-years are the sum of the weighted N for each year in the analysis, as reported in tables found in *Section 2.4 Propensity score evaluation* of each state chapter appendix's second sub-appendix.

[c] We classify the PCPRI model as a PCMH model because it is a primary care–based model. However, the model does have aspects of an accountable care organization model also as it holds providers accountable for total cost of care (one-sided risk) and non–primary care services (two-sided risk).

[d] In Massachusetts, Medicaid beneficiaries are restricted to those in the FFS Medicaid program (i.e., not enrolled in a Medicaid managed care organization because only FFS beneficiaries were eligible for PCPRI).

[e] Although the Oregon analysis includes four payers, we focus on the Medicaid results in this chapter because it was the only payer making any incentive payments to PCPCHs during the period of analysis for this report.

3.2 Results

We first present results for the Arkansas EOC and Maine BHH models separately because each model has distinct goals and outcomes. We then present results for the Medicaid ACO models across the three states that implemented ACO models in their Medicaid population. Finally, we summarize the results from the three patient-centered medical home (PCMH) models included in the Year Four Annual Report (RTI International, 2018).

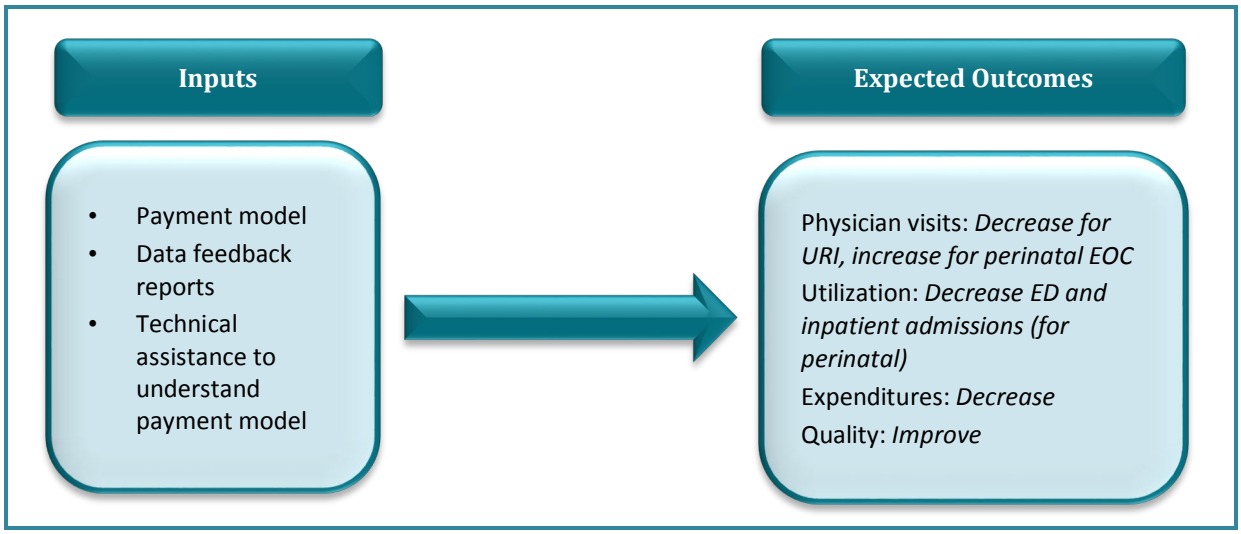
3.2.1 Arkansas Episodes of Care

Episodes of care 	• After 2 years, both upper respiratory infection (URI) and perinatal episodes of care for Arkansas Medicaid beneficiaries, relative to a comparison group, showed significant improvements in targeted quality metrics. – Antibiotic use declined for URI episodes and some utilization and preventive screenings improved for perinatal episodes. • However, there were also unintended consequences resulting from the EOC models. – ED visits increased for URI episodes in Arkansas relative to the comparison group, perhaps because patients sought antibiotics elsewhere after not receiving a prescription at their initial visit. – Prenatal inpatient admissions also increased for perinatal episodes in Arkansas relative to the comparison group.

Background

Arkansas's EOC model encompassed relevant care delivered by multiple providers around a specific clinical situation with a designated start and end date. Each episode aimed to encourage guideline-concordant care and reduce growth in expenditures (see ***Figure 3-2***). For the analysis presented in this report, we include two of the episodes implemented in Arkansas's first set of episodes: the URI and perinatal EOC.

Figure 3-2. Logic model for expected outcomes of EOCs in Arkansas



ED = emergency department; EOC = episode of care; URI = upper respiratory infection.

EOC model: How payers pay for value

- **Quality:** Hold providers accountable to achieve threshold in measures that reflect adherence to evidence-based guidelines for the condition (i.e., URI or pregnancy).
- **Cost:** Compare costs to thresholds—if average costs exceed a certain threshold, pay penalties; if below a certain threshold, eligible for shared savings.

A primary goal of the **URI episode** was to reduce unnecessary antibiotic prescribing in Arkansas. The URI episode included three types of URIs: (1) nonspecific URIs; (2) sinusitis (sinus infection); and (3) pharyngitis (sore throat). At the end of the performance period, providers receive a report on their average costs per URI episode and performance on a set of quality metrics. To be eligible for gain sharing, the provider's average costs had to be below a certain threshold and they had to administer a strep test for at least 47 percent of patients who were diagnosed with pharyngitis and prescribed an antibiotic. Providers were also monitored on antibiotic use and frequency of visits. To meet cost thresholds, providers were incentivized to reduce unnecessary utilization. As such, we expected to see a reduction in antibiotic use, physician visits, and ED visits (both all cause and URI related) and improvements in quality metrics after the episode implementation.

The **perinatal EOC** aimed to increase preventive screenings to minimize pregnancy complications, to improve delivery of prenatal care, and to reduce caesarean section delivery rates. After the episode implementation, we expect to see increases in preventive screenings and reductions in ED visits and caesarean section delivery rates.

To assess the impact of EOC models, we compare changes in utilization and quality of care outcomes before and after model implementation for episodes in Arkansas to episodes in an out-of-state comparison group. Although there are some contextual differences between

Arkansas and these comparison states, such as both comparison states being non-Medicaid expansion states, these two comparison states were selected based on data availability and similarities on baseline state-level characteristics (such as demographic characteristics of the state's population, access to care measures, and provider supply). The URI episodes analysis is not impacted by expansion status because more than 90 percent of URI episodes are in children and URIs do not determine Medicaid eligibility. For perinatal episodes, however, we see fewer Medicaid fee-for-service covered births in the 2014 Medicaid MAX files and a different demographic composition of women with Medicaid-covered deliveries in Arkansas in 2014 compared to previous years. As a result, our findings for 2014 may be biased toward not finding a difference between the Arkansas perinatal episodes and comparison group episodes even if a true difference exists.

Because the comparison group states are Medicaid managed care states, we are not able to compare expenditures for Arkansas relative to the comparison group. Instead, we did a pre-post analysis comparing expenditures for the Arkansas episodes before and after the EOC model implementation. Given the goals of the episodes to control costs, we expected expenditures to decline after the EOC models were implemented. Additional detail can be found in the Arkansas state chapter, ***Appendix A***, and all methods are available in ***Sub-appendix A-2***.

URI episodes

Table 3-3 presents the results of the D-in-D regression analyses for the utilization (antibiotic use, the likelihood of physician visits [all cause and URI related], the likelihood of ED visits [all cause and URI related]), and quality of care (appropriate treatment for children and strep test use) outcomes. Because of differences in clinical practice, the change in antibiotic use was expected to vary by URI episode type, so we present the results for antibiotic use separately by type of episode. The quality metric for appropriate treatment for children was only relevant for nonspecific URI and sinusitis episodes, and strep test use is only relevant for pharyngitis episodes. For all other outcomes, we present the results across the three types of episodes combined.

After 2 years, URI EOCs for Arkansas Medicaid beneficiaries, relative to a comparison group, showed significant improvements in most utilization and quality of care outcomes. We found:

- Relative to the comparison group, antibiotic use declined by 6.4 more percentage points for nonspecific URI episodes in Arkansas ($p < 0.001$). Some of this change may be attributed to changes in provider coding of diagnoses triggering the URI episode. Provider focus groups reported that in certain instances, especially for nonspecific URIs, providers may use diagnosis codes that do not trigger any URI episodes to be more accurate and to avoid the episode. Antibiotic use for pharyngitis and sinusitis episodes also declined statistically significantly more among episodes in Arkansas relative to the comparison group, although the magnitude of the relative change was small for both episodes.

Table 3-3. Difference in the pre-post annual change in utilization and quality of care for Medicaid beneficiaries in Arkansas Upper Respiratory Infection Episodes of Care relative to the comparison group, first 2 years of implementation (October 2012 through September 2014)

Outcome	Expected direction of outcome	Change in outcome from baseline to implementation period		Regression adjusted D-in-D (90% CI)	Relative difference (%)	p-value
		MG	CG			
Antibiotic use for nonspecific URI episodes (%)	↓	↓	↓	−6.4 (−7.01, −5.82)	−14.8	<0.001
Antibiotic use for pharyngitis episodes (%)	↓	↓	↓	−0.9 (−1.42, −0.35)	−1.2	0.01
Antibiotic use for sinusitis episodes (%)	↓	↓	↓	−0.8 (−1.31, −0.26)	−0.9	0.01
Any physician visit for all three types of URI episodes (%)	↓	↓	↓	−0.2 (−0.51, 0.04)	−1.5	0.15
Any URI-related physician visit for all three types of URI episodes (%)	↓	↓	↓	−0.6 (−0.78, −0.43)	−10.1	<0.001
Any ED visit for all three types of URI episodes (%)	↓	−	↓	0.2 (0.09, 0.34)	5.9	0.01
Any URI-related ED visit for all three types of URI episodes (%)	↓	−	↓	0.1 (0.08, 0.20)	16.5	<0.001
Appropriate treatment for children ages 1 to 18 for nonspecific URI and sinusitis episodes (%)	↑	↑	↑	3.9 (3.22, 4.55)	8.2	<0.001
Strep test use for pharyngitis episodes (%)	↑	↑	↑	9.4 (8.48, 10.30)	17.5	<0.001

CG = comparison group; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; MG = model group; URI = upper respiratory infection.

- There were no statistically significant differences in the probability of having any physician visit during the episode subsequent to the triggering event between Arkansas and the comparison group. However, there was a 0.6 percentage point greater decline in the likelihood of a URI-related physician visit for Arkansas relative to the comparison group after implementation ($p < 0.001$). This is in line with the incentives of the URI EOC model to reduce avoidable utilization.
- Receipt of appropriate treatment increased for URI episodes in both Arkansas and the comparison group, but it increased by 3.9 percentage points more in Arkansas ($p < 0.001$). The percentage receiving a strep test increased in both Arkansas and the comparison group, but there was a 9.4 percentage point greater increase

among episodes in Arkansas relative to the comparison group ($p < 0.001$). The increase in both measures is consistent with the goals of the EOC model in Arkansas because both are quality metrics for PAPs in Arkansas.

- However, there were also unintended consequences resulting from the model. Namely:
  - The percentage of episodes with any ED visits following the index visit during the episode increased by 0.2 percentage points for URI episodes in Arkansas relative to the comparison group ($p < 0.05$). Likewise, the likelihood of episodes with a URI-related ED visit following the index visit increased by 0.1 percentage points for Arkansas URI episodes relative to the comparison group ($p < 0.001$). This finding is corroborated by reports from physicians that patients may seek care elsewhere when they are not given an antibiotic prescription at the initial visit because the ED use may be substituting in part for the URI-related physician visits after the initial visit that declined the requested prescription. Even so, we cannot determine from the pharmacy claims data whether or not an antibiotic was prescribed at the subsequent ED visit.

Perinatal episodes

Table 3-4 presents the results of the D-in-D regression analyses for the utilization (prenatal care, ultrasounds, inpatient admissions, ED visits, and 30-day readmissions) and quality of care (caesarian section delivery and preventive screening rates) outcomes.

- After 2 years, perinatal episodes of care for Arkansas Medicaid beneficiaries, relative to a comparison group, showed significant improvements in most care coordination and quality of care outcomes. We found:
  - Preventive screenings generally improved for Arkansas episodes relative to the comparison group. Screenings for HIV, chlamydia, and Group B strep are monitored for shared savings and losses. HIV and chlamydia screenings increased statistically significantly more for Arkansas relative to the comparison group, and Group B strep tests declined statistically significantly less for Arkansas episodes.
  - The other screening measures, asymptomatic bacteriuria, Hepatitis B, and gestational diabetes were tracked by the state but not tied to payment. The asymptomatic bacteriuria and Hepatitis B screening rates increased statistically significantly more in Arkansas relative to the comparison group, but gestational diabetes screening rates unexpectedly declined in Arkansas while increasing in the comparison group. It may be that providers in Arkansas are screening patients for glucose in their urine and only testing when necessary to keep the episode costs down.
  - There was no difference in the change in rates of caesarian section deliveries in Arkansas relative to the comparison group; the rate declined similarly in Arkansas and the comparison group. The caesarian section delivery rate was tracked by the state, but it was not tied to payment during the analysis period.

Table 3-4. Difference in the pre-post annual change in utilization and quality of care for Medicaid beneficiaries in Arkansas Perinatal Episodes of Care relative to the comparison group, first 2 years of implementation (October 2012 through September 2014)

Outcome	Expected direction of outcome	Change in outcome from baseline to implementation period		Regression adjusted D-in-D (90% CI)	Relative difference (%)	p-value
		MG	CG			
Ultrasounds	↓	↑	↑	0.2 (0.13, 0.28)	0.09	<0.001
Inpatient admissions during prenatal period	↓	↑	↓	1.2 (0.4, 2.0)	17.5	0.02
Total ED visits	↓	↓	↓	−0.1 (−0.2, −0.1)	−11.6	0.01
30-day readmission	↓	↑	↓	0.3 (−0.1, 0.6) †	16.2	0.19
Caesarian section delivery (%)	↓	↓	↓	−1.6 (−3.8, 0.7)	−4.8	0.26
HIV screening (%)	↑	↑	↓	6.2 (4.0, 8.5)	6.9	<0.001
Chlamydia screening (%)	↑	↑	↓	9.5 (7.2, 11.8)	12.2	<0.001
Gestational diabetes screening (%)	↑	↓	↑	−1.7 (−2.9, −0.4)	−2.0	0.03
Group B streptococcus screening (%)	↑	↓	↓	2.6 (0.5, 4.6)	3.1	0.04
Asymptomatic bacteriuria screening (%)	↑	↑	↑	2.4 (1.0, 3.7)	2.4	0.004
Hepatitis B screening (%)	↑	↑	↑	5.5 (3.3, 7.7)	6.2	<0.001

CG = comparison group; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; MG = model group.

- However, the utilization results were more mixed. Specifically:
  - There was a small (0.09 percent), but statistically significant, greater increase in the average number of ultrasounds performed during pregnancy in Arkansas relative to the comparison group ($p < 0.001$), despite expecting the number of ultrasounds to decline post implementation.
  - The EOC model was also associated with a 1.2 percentage point greater increase in the likelihood of an inpatient stay during the prenatal period ($p < 0.05$). This was driven by an increase in rates of inpatient use in the second year of the model

(2014), which may in part be the result of the change in composition of Arkansas beneficiaries with perinatal episodes after the Medicaid expansion in 2014.[18]

– The total number of ED visits during the episode declined by 0.1 more visits in Arkansas relative to the comparison group (p = 0.01), which is consistent with the goals of the episode, including better management of care for pregnant women and a reduction of pregnancy-related complications.

3.2.2 Maine Behavioral Health Homes

- Findings were mixed for Maine Medicaid beneficiaries enrolled in the BHH program. During the 2 years after implementation of the BHH model:
  - Expenditures, including behavioral health–related expenditures, increased
  - Primary care and specialty care use increased
  - Inpatient admissions increased
  - Care coordination, as measured by follow-up after a mental health–related admission, declined or did not change
  - Behavioral health–related quality measures improved, but a physical health–related measure declined
- The increase in some types of utilization and overall expenditures may be expected under a model that promotes improved care management and coordination.

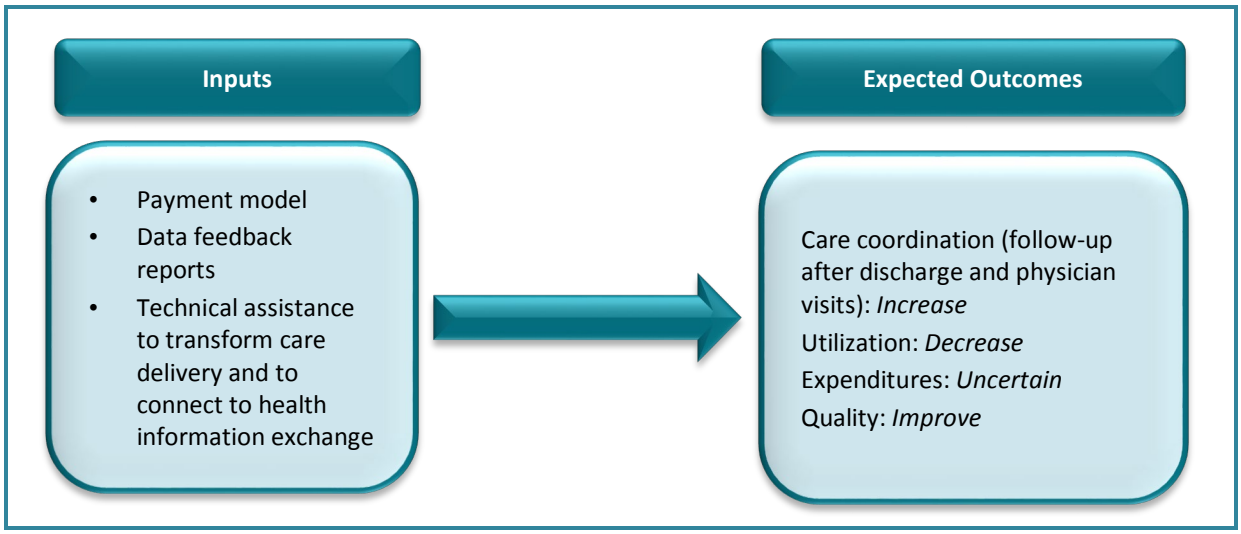
Background

BHH model: Participating BHOs submit data on quality measures and meet certain requirements, but payment is not tied to quality.

BHHs are community-based behavioral health organizations (BHOs) licensed in the state of Maine to provide behavioral health services. Like a PCMH, BHHs are expected to provide team-based care, enhanced access to care, population risk stratification and management, and patient/family-directed care plans. BHHs work to integrate physical and behavioral health, include patients and families in decision making, make connections to community resources when necessary, commit to quality improvement, and build capacity in their health information technology (health IT) infrastructure. As such, we expect primary care utilization and care coordination (as measured by follow-up visit rates) to increase with BHHs as providers take a more active role in monitoring and promoting their patients' behavioral and physical health (see ***Figure 3-3***). As care is better managed and integrated, more

[18] Arkansas Medicaid beneficiaries who qualified for the private option plans under the Medicaid expansion were included in the pre-2014 sample but not the 2014 sample, whereas beneficiaries who remained eligible for traditional Medicaid were included in the sample for all study years. The latter group tended to have more risk factors associated with poorer health (e.g., lower income) - data that we did not have thus could not adjust for in our analyses – which may have contributed to a greater need for health care services like inpatient stays. The comparison states, on the other hand, did not expand Medicaid and thus had no change in the composition of beneficiaries. Therefore, the increase in inpatient stays among Arkansas beneficiaries, relative to the comparison group may be an artifact of the Arkansas Medicaid expansion rather than a consequence of the EOC model.

Figure 3-3. Logic model for expected outcomes of BHHs in Maine



BHH = behavioral health home.

expensive ED visits and preventable hospitalizations are expected to decline. The expected effect on expenditures is less clear, however. If BHHs were successful in assessing patient needs and connecting them to additional behavioral health and non–behavioral health services, then costs may grow despite any reductions in avoidable ED visits or inpatient admissions.

For the BHH model in Maine, we compare outcomes before and after model implementation for beneficiaries attributed to the BHH model. We do not include a comparison group in the BHH analysis because we could not replicate the state's method of attribution to a BHH using claims data. As such, the results may be biased by regression to the mean, secular trends in health care use and expenditures, or unobserved characteristics of BHH enrollees that may change over the course of this study period. Additional detail can be found in the Maine state chapter, ***Appendix B***, and all methods are available in ***Sub-appendix B-2***.

Results

Table 3-5 presents the results of the pre-post regression analyses for the care coordination (physician visits and follow-up visit rates), utilization (all-cause acute inpatient admissions, inpatient admissions related to behavioral health, and ED visits), expenditure (total and behavioral health–related per beneficiary per month [PBPM]), and quality of care (Hemoglobin A1c [HbA1c] screening and depression medication management) outcomes.

- BHH enrollees experienced a 2 percentage point increase ($p = 0.004$) in the percentage of beneficiaries with a visit to a primary care provider (PCP) and a 4 percentage point increase ($p < 0.001$) in the percentage of beneficiaries having a visit to a specialty care provider, which aligns with expectations that BHHs would connect patients to needed care.

Table 3-5. Difference in the pre-post annual change in outcomes for Medicaid beneficiaries in Maine Behavioral Health Homes, first 2 years of implementation (April 2014 through March 2016)

Outcome	Expected direction of outcome	Change in outcome from baseline to implementation period: BHH	Regression-adjusted pre-post estimate (90% confidence interval)	Relative difference (%)	p-value
Percentage with any primary care visit	↑	↑	1.9 (0.8, 2.9)	2.7	0.004
Percentage with any specialty care visit	↕	↑	4.1 (3.0, 5.3)	8.1	<0.001
Follow-up within 7 days of discharge from hospitalization for mental illness (%)	↑	↓	−3.5 (−6.0, −0.9)	−4.5	0.03
Follow-up within 30 days of discharge from hospitalization for mental illness (%)	↑	↓	−0.6 (−2.5, 1.3)	−0.6	0.62
ED visits per 1,000 beneficiaries	↓	↓	−9.8 (−21.1, 1.6)	−1.7	0.16
Inpatient admissions per 1,000 beneficiaries	↓	↑	1.8 (−7.3, 11.0)	1.0	0.74
Inpatient admissions related to behavioral health per 1,000 beneficiaries	↓	↑	4.2 (−4.2, 12.6)	5.8	0.41
Total expenditures (PBPM)	↕	↑	169.77 (124.97, 214.58)	11.6	<0.001
Behavioral health expenditures (PBPM)	↕	↑	36.72 (−8.69, 82.14)	3.9	0.18
Among enrollees with diabetes, receipt of HbA1c test (%)	↑	↓	−7.0 (−8.8, −5.2)	−8.1	<0.001
Patients who remained on antidepressant medication for at least 84 days (%)	↑	↑	4.0 (1.2, 6.8)	6.9	0.02
Patients who remained on antidepressant medication for at least 180 days (%)	↑	↑	2.3 (0.2, 4.4)	5.1	0.07

BHH = behavioral health home; ED = emergency department; PBPM = per beneficiary per month.

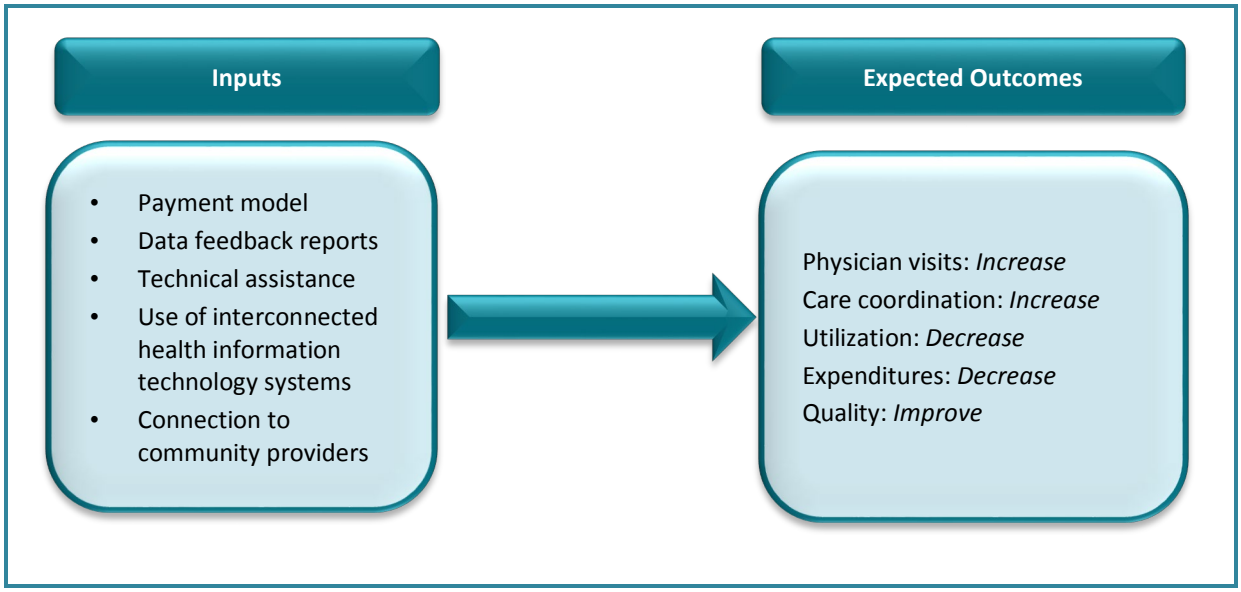
- Contrary to expectations, BHH enrollees experienced a statistically significant 3.5 percentage point decline in the percentage of mental health inpatient discharges that had a follow-up visit to a provider for a mental health visit within 7 days. BHH enrollees had fairly high rates of follow-up prior to the SIM Initiative, which may have been hard to improve upon during the test period, but it is unclear why the rates would decline. BHH providers reported increased use of the HIE to follow up with patients recently discharged, so it could be that providers were following up with patients by telephone or other ways that were not captured in the claims data.
- All-cause and behavioral health–related inpatient admissions increased for all BHH enrollees, but the increases were not statistically significant.
- There was a non-statistically significant decrease in ED visits for all BHH enrollees, including adults and children, but there was a statistically significant decrease for individuals with disabilities ($p = 0.02$). BHH providers reported increased use of the HIE to monitor ED use and follow-up with patients recently discharged, so this observed reduction in ED visits rates could be attributed to the use of heath IT to monitor utilization.
- Among all BHH enrollees, total PBPM Medicaid expenditures significantly increased, and behavioral health PBPM expenditures had a nonsignificant increase. The increase in expenditures is not wholly unexpected if BHHs are succeeding in connecting patients with needed services.
- Among Medicaid enrollees aged 18–75 years with diabetes, Hba1c testing rates significantly declined for BHH enrollees by 7 percentage points ($p < 0.001$).
  - The declining rates of HbA1c testing were known to the Maine SIM team and were a motivating factor for the Maine SIM Initiative to begin the data-focused learning collaborative to improve testing rates for BHH enrollees. This initiative began in March 2017, after this analysis period ended. The expectation is that with the technical assistance from the collaborative, testing rates will improve for BHH enrollees over time.
- Among Medicaid enrollees aged 18 years or older with depression, the percentage who remained on antidepressant medication for at least 84 days significantly increased by 4 percentage points ($p = 0.019$), and the percentage who remained on antidepressant medication for at least 180 days significantly increased by 2 percentage points ($p = 0.072$). Given the BHH focus on care management, results suggest that BHHs have been able to work with enrollees directly to manage medication adherence or have been successful in partnering with BHH enrollees' PCPs to do so.

3.2.3 Medicaid Accountable Care Organizations

Three states implemented Medicaid ACO-type models: Maine, Minnesota, and Vermont. The ACO models aim to improve care and deliver it more efficiently using quality measures and financial incentives to earn shared savings. An increased emphasis on care coordination and care management should result in fewer avoidable hospitalizations, fewer inpatient admissions, and fewer ED visits (see ***Figure 3-4***). We expect primary care use to increase as ACOs engage in care management and because some quality metrics such as well-child visits and adolescent well visits require primary care use. The expected impact on specialty care is more ambiguous. Use of specialty care could increase if care management activities are connecting patients with needed care, or use of specialty care could decline if more care is being delivered in the primary care setting.

ACO: How payers pay for value
• **Quality:** Hold providers accountable to achieve performance on a range of quality measures. • **Cost:** Compare costs to predicted spending for attributed population. For one-sided risk, earn incentives if certain cost and quality targets are met. For two-sided risk, earn incentives for meeting cost and quality targets or risk penalties if costs exceed a certain percentage of predicted spending.

Figure 3-4. Logic model for expected outcomes of Medicaid ACOs



ACO = accountable care organization.

Depending on the level of these potential decreases in more costly utilization, overall costs could decrease. Controlling and lowering costs is a core objective for the Medicaid ACO models. Quality of care is also expected to improve after implementation as providers respond to specific quality metrics and improve coordination of care for patients with chronic diseases. Even so, given the time it takes to change patterns of health care use and achieve practice transformation, we do not expect to see large impacts on outcomes during the early

implementation period. The implementation period included in this report for each ACO model varies by state; we include 2, 3, and 4, years of implementation period data for Maine, Vermont, and Minnesota, respectively. As such, we expect to see a greater impact on outcomes in Minnesota and Vermont. That does not mean that all states are not making progress; it just means that measurable outcomes of these goals may take some more time to become observable.

For the ACO models, we compare outcomes before and after model implementation for beneficiaries attributed to the state's payment and delivery model and an in-state comparison group. There was some variation in the payment structure and data availability for these states, so the methods we used to assess each of these models differed slightly. Additional detail relevant to individual states can be found in the state chapter appendices (***Appendices B, D,*** and ***F***), and all methods are available in the state chapters' respective sub-appendix (***Sub-appendices B-2, D-2,*** and ***F-2***).

Physician visits and care coordination

- The likelihood of any physician visit (primary care and specialty visits) generally declined for ACO beneficiaries relative to the comparison group.
- There was no difference in the change in follow-up visit rates post-discharge in Vermont or Maine.
- However, the 14-day post-discharge follow-up visit rate did improve for ACO beneficiaries in Minnesota relative to their comparison group.

Physician visits

- The percentage of beneficiaries with a primary care visit generally declined across each ACO model (see ***Table 3-6***).
  - Relative to the comparison group, the percentage of beneficiaries with any primary care visits in the year declined among ACO beneficiaries in Maine and Minnesota by a large magnitude (9–10 percent).
  - The percentage of beneficiaries with a primary care visit also declined among ACO beneficiaries in Vermont, although the decline was not statistically significantly different from the decline observed in the comparison group.

Table 3-6. Difference in the change in physician visit outcomes for ACO beneficiaries and their comparison group

State	Outcome	Expected direction of outcome	Change in outcome from baseline to implementation period		Regression adjusted D-in-D (90% CI)	Relative difference (%)	p-value
			ACO	CG			
ME	Percentage with any primary care visit	↑	↓	↑	−5.8 (−9.1, −2.5)	−10.1	0.004
ME	Percentage with any specialty care visit	↕	↑	↑	−1.1 (−1.7, −0.5)	−3.6	0.001
MN	Percentage with any primary care visit	↑	↓	↓	−7.8 (−8.0, −7.7)	−8.5	<0.001
MN	Percentage with any specialty care visit	↕	↓	↓	−9.4 (−9.5, −9.3)	−24.6	<0.001
VT	Percentage with any primary care visit	↑	↓	↓	−0.5 (−1.2, 0.2)	−0.7	0.212
VT	Percentage with any specialty care visit	↕	↓	↑	−1.8 (−2.4, −1.2)	−6.3	<0.001

ACO = accountable care organization; CG = comparison group; CI = confidence interval; D-in-D = difference-in-differences; ME = Maine; MN = Minnesota; VT = Vermont.

Note: For Maine, the implementation period is August 2014–July 2016 and the baseline period is August 2011–July 2014. For Minnesota, the implementation period is 2013–2016 and the baseline period is 2010–2012. For Vermont, the implementation period is 2014–2016 and the baseline period is 2011–2013.

- Likewise, the percentage of beneficiaries with a specialty care visit statistically significantly declined in each ACO group relative to its comparison group.
  - In both Maine and Vermont, the percentage of beneficiaries with a specialty care visit remained about the same from the baseline to the implementation period for the ACO group but increased slightly for the comparison group, resulting in a statistically significant relative decline of about 1 to 2 percentage points in the likelihood of any specialty care visit.
  - For Minnesota, the percentage of beneficiaries with a specialty visit declined by 9.4 more percentage points (25 percent) for the ACO group relative to the comparison group.
- Although somewhat contrary to expectations, the relative declines in likelihood of primary care and specialist visits may indicate that ACOs were successful in preventing unnecessary use of outpatient care. For example, providers may be using alternative ways of following up with patients to avoid unnecessary visits such as

using patient portals or follow-up phone calls. In Vermont, care management by community health teams may be substituting for some physician visits.

- Even so, we expected that the focus on care management activities in ACOs may increase physician visits, particularly if providers are encouraging use of physician visits in place of more expensive care like ED visits and avoidable admissions. Moreover, ACO performance measures used to qualify for shared savings included well-child and adolescent well-care visits in Vermont and Maine, so some increase in primary care use was expected.

Care coordination

- There were no statistically significant differences in the percentage of follow-up within 7 or 30 days of discharge from hospitalization for mental illness for ACO beneficiaries in Maine or Vermont relative to the comparison group (see ***Table 3-7***).

Table 3-7. Difference in the change in care coordination outcomes for ACO beneficiaries and their comparison group

State	Outcome	Expected direction of outcome	Change in outcome from baseline to implementation period: ACO	Change in outcome from baseline to implementation period: CG	Regression adjusted D-in-D (90% CI)	Relative difference (%)	p-value
ME	Follow-up within 7 days of discharge from hospitalization for mental illness (%)	↑	↓	↑	−1.2 (−5.2, 2.7)	−1.7	0.61
ME	Follow-up within 30 days of discharge from hospitalization for mental illness (%)	↑	↓	↓	−0.6 (−3.2, 2.1)	−0.6	0.73
MN	Follow-up within 14 days of discharge from acute hospitalization (%)	↑	↑	↑	0.8 (0.4, 1.1)	1.5	0.001
VT	Follow-up within 7 days of discharge from hospitalization for mental illness (%)	↑	↑	↑	−0.1 (−4.7, 4.6)	−0.1	0.98
VT	Follow-up within 30 days of discharge from hospitalization for mental illness (%)	↑	↑	↑	0.7 (−2.9, 4.4)	0.9	0.74

ACO = accountable care organization; CG = comparison group; CI = confidence interval; D-in-D = difference-in-differences; ME = Maine; MN = Minnesota; VT = Vermont.

Note: For Maine, the implementation period is August 2014–July 2016 and the baseline period is August 2011–July 2014. For Minnesota, the implementation period is 2013–2016 and the baseline period is 2010–2012. For Vermont, the implementation period is 2014–2016 and the baseline period is 2011–2013.

- The percentage of discharges with a follow-up visit within 14 days increased by 0.8 more percentage points (or 1.5 percent) for beneficiaries receiving care from Minnesota's Medicaid ACOs relative to the comparison group ($p = 0.001$).
  - This finding corroborates reports from providers that the prevalence of near real-time discharge notifications increased during this period. Additionally, the findings could reflect increasing care management activities.

Utilization and expenditures

- Relative to the in-state comparison group:
  - ED visits declined for ACO beneficiaries in all three states.
  - Inpatient admissions declined or increased at smaller rates for ACO beneficiaries in Maine and Vermont but increased slightly in Minnesota.
- The reduction in utilization translated to smaller increases in expenditures in Vermont, but there was no change in total expenditures for Maine ACO beneficiaries relative to the comparison group.

- The ED visit rate declined statistically significantly more for the ACO group in each state relative to the comparison group (see ***Table 3-8***).
  - The ED visit rate declined by 3 percent, 5 percent, and 7 percent more for beneficiaries in ACOs in Maine, Vermont, and Minnesota, respectively ($p < 0.01$).
  - The faster decline in the ED visit rate for ACO participants could be associated with increased care management efforts by ACO providers.
  - Additionally, in site visit interviews in Vermont, ACO representatives specifically identified reducing ED visits as one target to optimize savings under the earlier Medicare Shared Savings Program. We would expect those ED visit–related activities to carry over somewhat to their Medicaid populations.
- There were mixed findings on the impact of ACO models on inpatient utilization.
  - As expected, the inpatient admission rate declined in the ACO population relative to the comparison group in both Vermont and Maine. In Maine, the inpatient admission rate declined by 7 more admissions per 1,000 beneficiaries (or 7 percent) for ACO beneficiaries relative to the comparison group. In Vermont, the inpatient admission rate increased by 6 fewer admissions per 1,000 beneficiaries (or 11 percent) for ACO beneficiaries relative to the comparison group.
    - The relative declines in admissions is expected if providers are able to better manage care and successfully avoid unnecessary hospital admissions.

Table 3-8. Difference in the utilization and expenditure outcomes for ACO beneficiaries and their comparison group

State	Outcome	Expected direction of outcome	Change in outcome from baseline to implementation period		Regression adjusted D-in-D (90% CI)	Relative difference (%)	p-value
			ACO	CG			
ME	ED visits per 1,000 beneficiaries	↓	↓	↓	−12.4 (−18.6, −6.2)	−3.0	0.001
ME	Inpatient admissions per 1,000 beneficiaries	↓	↓	↓	−6.8 (−10.8, −2.7)	−6.8	0.01
ME	Total PBPM expenditures ($)	↓	↑	↑	8.94 (−22.75, 40.63)	1.3	0.64
MN	ED visits per 1,000 beneficiaries	↓	↓	↓	−29.7 (−30.9, −28.5)	−7.0	<0.001
MN	Inpatient admissions per 1,000 beneficiaries	↓	↑	↑	7.4 (6.6, 8.1)	7.4	<0.001
MN	Total PBPM expenditures ($)	↓					
VT	ED visits per 1,000 beneficiaries	↓	↓	↓	−15.8 (−19.7, −11.8)	−4.5	<0.001
VT	Inpatient admissions per 1,000 beneficiaries	↓	↑	↑	−5.8 (−7.8, −3.9)	−10.8	<0.001
VT	Total PBPM expenditures ($)	↓	↑	↑	−39.92 (−50.21, −29.63)	−8.4	<0.001

ACO = accountable care organization; CG = comparison group; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; ME = Maine; MN = Minnesota; PBPM = per beneficiary per month; VT = Vermont.

Note: For Maine, the implementation period is August 2014–July 2016 and the baseline period is August 2011–July 2014. For Minnesota, the implementation period is 2013–2016 and the baseline period is 2010–2012. For Vermont, the implementation period is 2014–2016 and the baseline period is 2011–2013.

– However, contrary to expectations, the rate of inpatient admissions in Minnesota increased by 7 more admissions per 1,000 beneficiaries (or 7 percent) in the ACO-attributed group than in the non-ACO group.

  • ACO-participating providers in focus groups told us that increased use of community health workers and care teams allowed them to engage patients with complex conditions more than before; this new outreach may have identified unmet needs that led to an increase in appropriate utilization.

- The findings for total expenditures were mixed.
  - Total expenditures increased in both the ACO group and comparison group in Vermont, but expenditures increased by $40 less in the ACO group relative to the comparison group ($p < 0.001$).
    - The overall lower rate of increase in total PBPM expenditures is consistent with what we would expect from a successful ACO model and corresponds to changes we observed in utilization. Through improved care management, ACOs aim to shift resources from higher cost settings to lower cost settings.
  - Overall, total Medicaid expenditures increased faster for Maine ACO enrollees relative to the comparison group, but the difference between groups was not statistically significant.
    - However, there are suggestions that payments may be trending toward desired results. Year Two results were more positive than Year One results, with the totals increasing but at a slower rate relative to the comparison group in Year Two. These results may indicate that the ACO model becomes more effective over time.

Quality of care

- Although both Minnesota and Vermont ACO beneficiaries had some improvements in screening measures relative to their comparison group counterparts, there was generally little improvement in quality metrics across the ACOs.

- Care coordination and incentives to meet quality targets may help explain statistically significant improvements in some quality measures (see ***Table 3-9***).
  - Developmental screenings increased by 13 percentage points (or 36 percent) among ACO beneficiaries in Vermont relative to the comparison group ($p < 0.001$).
    - Developmental screening was the only quality measure in this analysis that was included in the Medicaid Shared Savings Program (SSP) and not the commercial SSP, which could explain why it is the only measure (out of five)[19] that resulted in a statistically significant difference.

[19] The Vermont analysis included the following quality measures in addition to developmental screening: initiation of treatment and engagement of treatment after episode of alcohol and other drug dependence, hospitalizations for ambulatory care sensitive conditions, and adolescent well-care visits.

Table 3-9. Difference in quality of care outcomes for ACO beneficiaries and their comparison group

State	Outcome	Expected direction of outcome	Change in outcome from baseline to implementation period		Regression adjusted D-in-D (90% CI)	Relative difference (%)	p-value
			ACO	CG			
MN	Adult patient with diabetes who had HbA1c testing (%)	↑	↑	↓	3.0 (2.5, 3.4)	3.2	<0.001
VT	Developmental screenings (%)	↑	↑	↓	12.9 (9.2, 16.7)	35.8	<0.001

ACO = accountable care organization; CG = comparison group; CI = confidence interval; D-in-D = difference-in-differences; HbA1c = Hemoglobin A1c; MN = Minnesota; VT = Vermont.

Note: For Minnesota, the implementation period is 2013–2016 and the baseline period is 2010–2012. For Vermont, the implementation period is 2014–2016 and the baseline period is 2011–2013.

- Testing for HbA1c increased by 3 percentage points for adult patients with diabetes attributed to the Minnesota ACO relative to their counterparts in the comparison group ($p < 0.001$).
  - Optimal diabetes care, including HbA1c control, was a clinical quality metric tied to performance for ACOs, so we expect that the testing rate would improve over time.
- However, there were no statistically significant differences in the quality outcomes measured for the Maine ACO program (results not shown).[20]

3.2.4 Patient-Centered Medical Home Models

Patient-centered medical homes	
	• Consistent with the goals of the models, PCMH model participants had statistically significant improvements in primary care use and the likelihood of physician visits relative to the comparison group. • Despite improvements in primary care use, there were few statistically significant changes in ED or inpatient utilization and total expenditures across all models. The one exception was in Arkansas where the inpatient admission rate declined for PCMH beneficiaries relative to the comparison group. • There were few improvements or substantial changes in quality of care metrics across each state.

[20] The Maine analysis included the following quality measures: testing for HbA1c and remaining on antidepressant medication for at least 84 or 180 days.

Background

PCMHs are expected to provide team-based care, enhanced access to care, population risk stratification and management, and patient/family-directed care plans. A common element of the PCMH models in Arkansas, Massachusetts, and Oregon is directing patients toward primary care use, so we expect primary care utilization and care coordination (as measured by follow-up visit rates) to increase with both types of models as access to primary care improves and providers take a more active role in monitoring and promoting their patients' health. As care coordination and primary care use improves, more expensive ED visits and preventable hospitalizations are expected to decline, and quality metrics are expected to improve. The expected effect on expenditures is less clear. If improved care management results in connecting patients to needed services and supports, then expenditures could increase because patients are receiving more care in the short run. Increases in expenditures could be offset by reductions in expenditures from high-cost care such as inpatient admissions and ED visits, resulting in a net decrease in total Medicaid expenditures. However, if reductions in high-cost services are not large enough, we could see increases in total Medicaid expenditures.

Results

For the PCMH models in Arkansas, Massachusetts, and Oregon, we compared outcomes before and after model implementation for beneficiaries attributed to a PCMH and an in-state comparison group in the Year Four Annual Report (RTI International, 2018). To summarize:

- In Arkansas and Massachusetts, the likelihood of having any physician visits declined more slowly relative to the comparison group.
  - These results suggest that PCMH models, with their focus on increased access to primary care (such as increased attention to whether patients have received all appropriate screenings and same-day scheduling), may be mitigating a general decline in primary care use among Medicaid beneficiaries in Arkansas and Massachusetts.
  - In contrast, the likelihood of primary care use increased for PCMH model participants in Oregon. These results are consistent with the expectation that PCPs will take a more active role in monitoring and promoting their patients' health after becoming a PCMH.
- Except for Arkansas, the relative increase in PCMH primary care use did not lead to significantly lower rates of ED visits or inpatient admissions. In Arkansas, the inpatient admission rate (and thus inpatient expenditures) declined more among PCMH beneficiaries relative to comparison group beneficiaries in the first year after PCMH implementation, but there was no statistically significant difference in the change in ED visit rate.
- The change in total expenditures did not differ between PCMH beneficiaries and comparison group for Arkansas or Oregon Medicaid beneficiaries; however, expenditures significantly increased for the PCMH group relative to the comparison group for Massachusetts.

- There were some improvements in quality metrics (asthma control medication use improved in Arkansas and colorectal screening improved in Oregon), but minimal changes during the early implementation period.

3.3 Conclusions

The goals of the SIM Round 1 Models were to achieve better quality of care, lower costs, and improved health for the population of the participating states (CMS, 2018). Although we did find some evidence of reduced utilization in the ED and inpatient admissions across models, we generally did not find that the reductions in expensive utilization translated to cost savings. The one exception is the ACO model in Vermont, where we found that total expenditures increased less in the first 3 years of implementation for Medicaid beneficiaries attributed to an ACO relative to Medicaid beneficiaries served by other providers in Vermont. We did not have 3 years of post-implementation expenditure data for the other models, so it may be that it takes more time to see a change in expenditures, although we also found a decline in expenditures in Vermont in the first 2 years.

We found some evidence of improved quality, but for the most part there was little change in the quality measures we included in the analysis that were calculated from claims data. It may be that other quality metrics that we are not able to capture using claims data did improve, however. The models with the most impact on quality were the episodes of care models in Arkansas. Providers must achieve certain quality benchmarks to be eligible for gain sharing for episode models, which may have motivated provider behavior change. Moreover, the EOCs are focused on specific clinical outcomes and patient populations, which may have made it easier for providers to focus on specific changes.

Because of differences in implementation periods, payment structures, and included populations, it is difficult to draw broad conclusions across all model types. However, there were some consistent themes and potential lessons learned for states seeking to implement alternative payment models in Medicaid populations. Specifically:

- Patterns of care delivery under new payment models that are effective in reducing utilization and cost may take time and additional resources to implement. As such, expenditures may increase in the short run; this may not necessarily indicate that the model is not working, only that more time for observable impact is needed.
  - The Vermont Medicaid ACO is the delivery and payment model that demonstrates the most favorable outcomes. The Vermont ACO results may be affected by both Vermont's multi-payer focus on ACOs and its purposeful build on other statewide health reform initiatives.
- There may be more incentive to change relationships between providers, and therefore patterns of care delivery, in arrangements with the potential for shared savings for providers in both inpatient and outpatient settings.

- Models in which providers were held accountable for cost outcomes, and at risk for financial penalties for high costs (two-sided risk), did not achieve better outcomes for total expenditures or utilization.
- Focusing on specific clinical measures, for example in EOCs, can be an effective way to see movement in those measure, but there is a potential for unintended consequences.

3.4 References

CMS. (2018). *State Innovation Models initiative: General information*. Available at https://innovation.cms.gov/initiatives/state-innovations/

RTI International. (2018). *State Innovation Models (SIM) Initiative evaluation: Model Test year four annual report.* Available at: https://downloads.cms.gov/files/cmmi/sim-rd1-mt-fourthannrpt.pdf

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4. Evaluation Results to Inform Future State Models

The SIM Initiative awarded funds and technical assistance to six state governments to test how they could improve health care systems through regulatory authority, policy development, and influence as a neutral convener of stakeholders. This evaluation examined how states targeted SIM Initiative funds to address the highest-priority areas for change, as identified by state officials themselves and other state stakeholders and given states' health care reform histories prior to the SIM Initiative. Many of these priority areas—e.g., health information technology (health IT) investments, quality measure alignment, workforce development, and strategies to improve population-wide health—would not yield detectable results within the timeframe of this evaluation, 5 years after the SIM Initiative started. Additionally, each state's pre-SIM context could have as much of an effect on health and health care outcomes as do investments made during the SIM Initiative. Still, progress in these areas is often considered a necessary condition for other levers—most prominently, new payment and delivery models—to attain optimal results. The SIM Initiative evaluation provides insight into not just what occurred during the SIM Initiative but also the cumulative effects of SIM activities' interactions with past and concurrent state health care reform policy and investment. The SIM Initiative Round 1 Evaluation offers several insights for policy makers to inform future state models.

History matters. Positive SIM findings are likely not solely attributed to the payment model itself but also to state history, policy, and governance. To illustrate this concept, we note that the payment model with the most significant results in the desired direction—the Vermont Medicaid accountable care organization (ACO) Shared Savings Program (SSP)—was heavily supported by the state's history and success in reform. While Vermont demonstrated accelerated SIM Initiative-funded improvement in health care utilization, expenditures, and quality, other factors in Vermont's SIM Initiative implementation that may have influenced these findings include the following:

- High engagement of state agencies, payers, providers, and community organizations, as exemplified by many multi-stakeholder workgroups governing the SIM Initiative strategies; commercial payer participation and input into an aligned ACO SSP; and regional learning collaboratives centered on integrated care.
- A multi-payer patient-centered medical home (PCMH) model, Blueprint for Health.
- The mid-Initiative decision to focus on streamlining model implementation for Blueprint for Health and the ACO model and drop a third payment model (episodes of care [EOCs]) that may have distracted from momentum toward delivery system change under other models.
- Legislatively-granted authority in the Green Mountain Care Board to monitor state health care expenditures and create standards for ACOs in the state.

Similarly, Minnesota's Medicaid ACO model built on its long-standing multi-payer Health Care Home model; had legislation in place to direct Medicaid to test new payment models; and was supported through state agency, payer, provider, and community organization engagement, albeit of a different variety than Vermont. Payers in Minnesota participated in planning greater alignment of data analytics, and providers participated in implementing SIM-funded grants to both transform their own practices and coordinate with community organizations.

States with fewer positive findings for beneficiaries covered by new-payment-model-participating providers had less engagement from key stakeholders, who without the well-established relationships that result from a history of joint efforts, may not see the state as a reform partner. For example, Massachusetts's Primary Care Payment Reform Initiative (PCPRI) involved relatively few (but engaged) primary care provider sites and no payer involvement other than from the Medicaid fee-for-service plan; after 2 years, the model yielded no significant findings in the desired direction. Arkansas offered limited technical assistance to providers involved in its EOC models, with clinicians from smaller provider practices reporting in focus groups that they were unaware of this new model of care; although the EOC model yielded generally positive results on quality measures, other utilization patterns may suggest a shift in utilization may have accompanied changes in care processes directly under the control of Principal Accountable Providers.

States' contexts shape how and where they should spend resources to accomplish the most. Minnesota and Vermont provide a useful contrast to illustrate a second lesson from the SIM Initiative: states received resources with which to progress toward larger goals, but without a prescribed path, they could be successful in many—and different—ways. Vermont centralized some of their investments in improving data quality within the state health information exchange (HIE) that could support its ACOs, whereas Minnesota developed some part of their strategy centrally (with one contractor addressing privacy and security policy) and otherwise awarded funds to providers to plan their own solutions to the exchange of health information with community partners because there is no statewide HIE. This finding is useful when planning investments to spur local health care transformation but makes it difficult to offer evaluation-based evidence on the return on investment in quantitative terms.

Federal and state policy making are necessary for sustaining positive health care transformation. Although we observed the importance of reform efforts that build on the totality of state and stakeholder prior groundwork, ultimately, that progress is lasting if it culminates in more formalized policy making. Federal and state policy, combined with the momentum created by having funds associated with a SIM Initiative award, are necessary for sustaining positive health care transformation. Federal policy defined the choices available to states for changing Medicaid payment policy and influenced which models would require a waiver or not; additionally, the Medicare Access and Children's Health Insurance Program

(CHIP) Reauthorization Act of 2015 (MACRA) offered additional incentive for providers to participate in those payment models to avoid financial penalties under Medicare payment policy. State law committed state agencies to a direction, offering greater certainty to private sector actors (i.e., payers and providers) whose own choices could be influenced by Medicaid policy. For example, although Massachusetts's PCPRI was terminated and did not yield the desired results, the fact that the state passed a law in 2012 committing it to the use of alternative payment methodologies allowed the state's Medicaid program to build on PCPRI's lessons and create a new ACO model, implemented in 2018, that reached a far greater number of payers, providers, and beneficiaries than earlier models. State laws in Arkansas, Minnesota, Oregon, and Vermont similarly signaled continued interest in changing the policy environment in which the health care system operated.

The SIM Initiative offered states the opportunity to take on many parts of the health care delivery and payment system at once, to create a greater lever for change than either policy alone or grants to support health IT, workforce, quality measurement and reporting, or population health alone. Furthermore, just as earlier federal and state policy laid the groundwork for accomplishments during the SIM Initiative award period, SIM Initiative-related activities have proved foundational to state policy development following the award period, continuing the cycle of learning and then formalizing state health policy direction. Data available from the five reports produced under the federal SIM Initiative Round 1 evaluation offer a strong foundation on which to compare future trajectories in policy development, programmatic investment, health care outcomes, and ultimately statewide health.

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Appendix A: Arkansas SIM Initiative Progress and Findings

Arkansas SIM Initiative

Award
$42 million

Period of performance
October 1, 2013 – September 30, 2016

Pre-SIM Landscape

Arkansas Center for Health Improvement
Non-profit established in 1998 to conduct evidence-based policy analysis.

Health Information Exchange
State Health Alliance for Records Exchange developed in 2010 using federal funds.

Arkansas Health Care Payment Improvement Initiative
Established in 2011 and proposed a multipayer model that included EOCs.

CMS's Comprehensive Primary Care Initiative
State participation began in 2012 with the development of multipayer PCMHs.

Health Care Independence Act of 2013
Expanded Medicaid to childless adults with household incomes <138 percent FPL using a "private option."

Plans for Delivery System Reform
The State engaged stakeholders starting in 2012 to design and plan Medicaid Section 2703 health homes.

Strategies

Symbols represent strategies that build on efforts that pre-date SIM.

Establish EOCs
Arkansas established a multipayer, retrospective episode of care model with financial and quality metrics incorporating risk and gain sharing.

Expand PCMHs
Arkansas established a PCMH model for Medicaid, later adopted by commercial payers, that complements the CPC initiative by making PBPM payments available for a broader range of providers, including pediatricians, and offering an opportunity for shared savings.

Pursue health homes
Arkansas pursued Medicaid health homes or older adults and people with DD, SMI, and LTSS needs, but did not implement them due to provider resistance and shifting legislative focus.

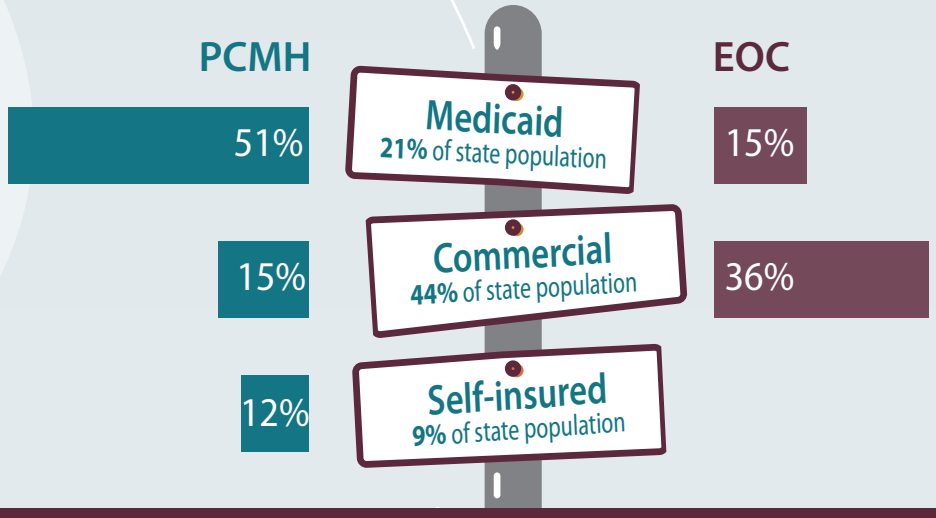
Enhance health IT and data infrastructure
The state leveraged the BCBS provider portal to deliver performance reports, developed a Medicaid claims tool for EOC and PCMH metrics, and required PCMHs to receive ED and inpatient utilization information from hospitals.

Emphasize LTSS reforms
LTSS providers signed memoranda of understanding with the state to commit to savings by enhancing care coordination, emphasizing HCBS, and using independent assessments to establish level of care.

Reach

as of September 2016

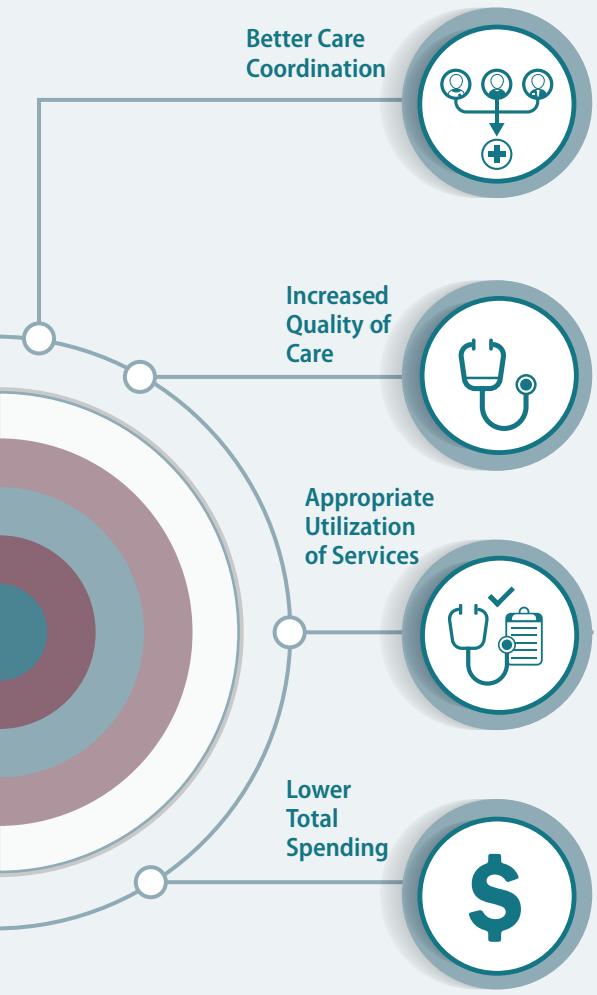
Arkansas' PCMH model reached 51% of the state's total Medicaid population, while 15% received care paid under the EOC model.



BCBS = Blue Cross and Blue Shield; DD = developmental disabilities; ED = emergency department; EOC = episode of care; HCBS = home- and community-based services; LTSS = long-term services and supports; PCMH = patient-centered medical home; PBPM = per beneficiary per month; SMI = serious mental illness

Impact on Medicaid Population

✓ = Performed better than the CG
✗ = Performed worse than the CG
● = No statistically significant change



	PCMH	URI EOC	Perinatal EOC
Better Care Coordination	✓ Physician visits Consumers and providers reported improved access to same day appointments.	▲	▲
Increased Quality of Care	✓ Asthma control medication use ● ADHD medication and follow-up ● HbA1c testing	✓ Appropriate antibiotic use ✓ Strep test for pharyngitis	✓ HIV, chlamydia, strep B screening ● C-section rate
Appropriate Utilization of Services	✓ Inpatient admissions ● ED visits	✓ Antibiotic dispensing ✓ URI-related physician visits ✗ ED visits	✓ ED visits during pregnancy ✗ Inpatient visits during pregnancy ✗ Readmissions
Lower Total Spending	✓ Inpatient PBPM spending ✓ Total PBPM spending ● Other services PBPM spending	▲	▲

▲ Care coordination measures were not considered relevant to the objectives of these EOCs. Expenditures could not be analyzed relative to the CG.

Limitations

PCMH findings should be interpreted with caution because 1) they compare early adopter PCMH practices to late adopter practices, and there may be unobserved systematic differences between the two; and 2) we only observe the first year of PCMH implementation.

Both of the comparison states for the perinatal EOC had Strong Start funding and Arkansas did not, which may result in underestimation of findings.

Not all Medicaid-covered births (and associated perinatal care) are eligible for payment under the perinatal EOC, so results should not be generalized to the entire Medicaid population.

Lessons Learned

- ☑ The state found success investing in a physician outreach specialist early in the payment design process, to help them gain provider perspectives on key EOC and PCMH implementation challenges.
- ☑ Acute or procedure-based EOCs (such as URI and total joint replacement) with defined start and end dates were easier to implement than EOCs for conditions requiring ongoing care (such as ADHD or asthma).
- ☑ To mitigate the high cost of connecting to the state HIE, the state allowed providers to obtain information about patient hospitalizations and ED visits from local information sharing networks.

ADHD = attention-deficit/hyperactivity disorder; CG = comparison group; ED = emergency department; EOC = episode of care; HIE = health information exchange; PCMH = patient-centered medical home; PBPM = per beneficiary per month; URI = upper respiratory infection

A.1 Arkansas SIM Initiative, 2013–2016

Arkansas's SIM Initiative ran from October 1, 2013, to September 30, 2016.[21] The SIM Initiative's leaders planned from the beginning to develop new payment models with commercial payers "to promote coordinated, evidence-based care while bending the cost curve." To accomplish its goals, the state initially focused its SIM Initiative efforts on developing three main models of care delivery and payment: physical and behavioral episodes of care (EOCs), patient-centered medical homes (PCMHs), and health homes to provide care coordination for individuals who use long-term services and supports (LTSS) and with developmental disabilities (DD) and serious mental illnesses.

This section describes the evolution of Arkansas's SIM Initiative, beginning with a timeline depicting major health care delivery and payment transformation activities and policies as they pertain to the SIM Initiative (see ***Figure A-1***). An overview of the health environment in Arkansas leading up to the SIM Initiative begins the discussion. The section goes on to describe major activities under the SIM Initiative followed by a review of the successes, challenges, and lessons learned during the test period. The section ends with a look forward to issues of sustainability and further progress in Arkansas's health system transformation.

Box 1. Summary of Arkansas's goal

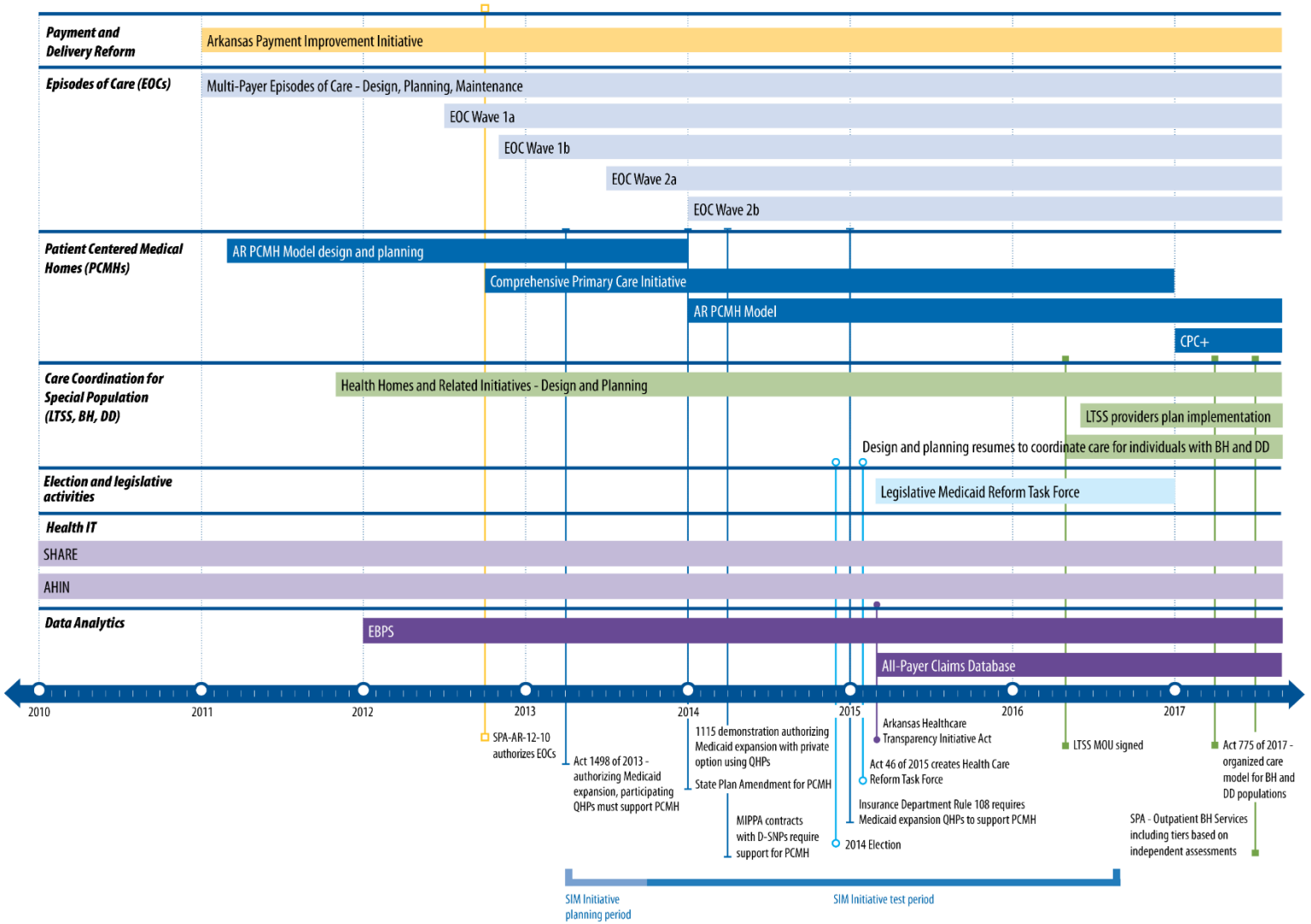
The state's goal was to transition away from traditional fee-for-service and promote coordinated, cost-effective health care across payers and populations served.

A.1.1. Setting the stage for the SIM Initiative in Arkansas

Arkansas came to the SIM Initiative with a considerable foundation of prior health system reform efforts. The five major components of the state's pre-SIM reform history, in chronological order, were the establishment of the Arkansas Center for Health Improvement (ACHI; 1998), the State Health Alliance for Records Exchange (SHARE; 2009), the Arkansas Health Care Payment Improvement Initiative (AHCPII; 2011), the state's participation in CMS's Comprehensive Primary Care Initiative (CPC; 2012), and the state's Health Care Independence Act of 2013.

[21] The SIM Initiative award began with a 6-month planning period, April to September 2013. The state did not request a no-cost extension beyond its original 3-year test period.

Figure A-1. Highlights from Arkansas's health care system transformation before, during, and after the SIM Initiative



AHIN = Advanced Health Information Network; AR = Arkansas; BH = behavioral health; CPC = Comprehensive Primary Care; DD = developmental disabilities; D-SNPs = Dual Eligible Special Needs Plans; EBPS = Episode-Based Payment System; EOC = episodes of care; LTSS = long-term services and supports; MIPPA = Medicare Improvements for Patients & Providers Act; MOU = memorandum of understanding; PCMH = patient-centered medical home; QHPs = qualified health plans; SHARE = State Health Alliance for Records Exchange; SIM = State Innovation Models; SPA = state plan amendment.

Arkansas Center for Health Improvement. Arkansas established the foundation of its subsequent health system reform efforts as far back as 1998, setting up ACHI as a nonpartisan entity to provide evidence-based policy analysis to the state. With core funds provided annually by Arkansas Blue Cross Blue Shield (BCBS), Arkansas Children's Hospital, Arkansas Department of Health, and University of Arkansas for Medical Sciences, ACHI convenes diverse stakeholders and offers an administrative home to projects, research, and infrastructure dedicated to improving health care access and quality for all Arkansans (ACHI, n.d.).

State Health Alliance for Records Exchange. Developed in 2010 by the Arkansas Office of Health Information Technology with a federal grant from the Office of the National Coordinator (ONC) and state matching funds, SHARE is the health information exchange (HIE) for the state (SHARE, 2013). By February 2014, at the end of the ONC grant period, SHARE was able to connect 14 hospital systems and nearly 150 practices.

Arkansas Health Care Payment Improvement Initiative. Arkansas's most ambitious pre-SIM health system reform was the AHCPII. In February 2011, Governor Mike Beebe wrote to the Secretary of the U.S. Department of Health and Human Services, Kathleen Sibelius, proposing a multi-payer EOC model for Medicaid and Arkansas BCBS. In his letter to the Secretary, the Governor described reduced state revenues, increased Medicaid enrollments, and increased health care costs, among other factors, as reasons for both public and commercial payers to take a new approach. As a result, the Arkansas Division of Medical Services (Medicaid), joined by Arkansas BCBS and QualChoice of Arkansas, developed a new system of care, which they titled the AHPCII. The new system was conceptualized to address the state's rising health care inefficiencies through pay for performance and a shared interest in exploring alternative payment models, with the core principles that health care be "patient-centered, clinically appropriate, practical, and data driven."

The AHPCII began in 2011 with the EOC model planning and grew to include a pre-SIM PCMH model. When these payment improvement initiatives began to get underway in 2012, Arkansas hired a contractor to provide technical assistance. The state Medicaid agency, BCBS, and QualChoice all contributed to funding this contractor's services.

The state initially proposed EOCs in a Medicaid state plan amendment (SPA) that described prospective payment for episodes. But stakeholders persuaded the state to change the model to retrospective payment, citing two main issues: (1) general stakeholder concerns about cases where multiple providers would turn out to have contributed to a patient's care episode, and (2) provider concerns that prospective payment would negatively affect the cash flow they needed to remain operational. Under the agreed-on retrospective system, providers continued to receive fee-for-service (FFS) payments from payers, with reconciliation (positive or negative) at the end of the year. The state used the initial 2012 SPA (Medicaid.gov, 2018) to authorize the

methodology behind implementation of the Medicaid episode-based payment and the first EOC wave, which was launched in 2012. Arkansas funded subsequent EOC waves with new SPAs.

Comprehensive Primary Care Initiative. While Arkansas was designing the initial EOCs, the state began participating in the CMS CPC initiative in 2012—a federal advanced medical home initiative for regions with multi-payer participation to join Medicare in designing innovative approaches to transform both payment and delivery systems for primary care. The initial wave of Arkansas CPC began with 69 practices and 275 providers, although some later dropped out. CPC had payer participation from BCBS, QualChoice, Humana, TRICARE, Walmart's self-insured plan, the Arkansas public employees' and teachers' insurance plans, Medicaid, and Medicare. Arkansas treated the 4-year initiative and multi-payer participation as "Wave 1" of the state's transformation to PCMHs under the SIM Initiative.

Health Care Independence Act of 2013. This legislation established Arkansas's approach to expanding Medicaid eligibility to childless adults with household incomes below 138 percent of the federal poverty line under the Affordable Care Act. The Health Care Independence Act enabled such adults to purchase health insurance on the Health Insurance Marketplace[22] through qualified health plans (QHPs) starting January 1, 2014 (also called the "private option"). The legislation also required QHPs to participate in Medicaid's PCMH program, which was launched in 2014 (see more below).

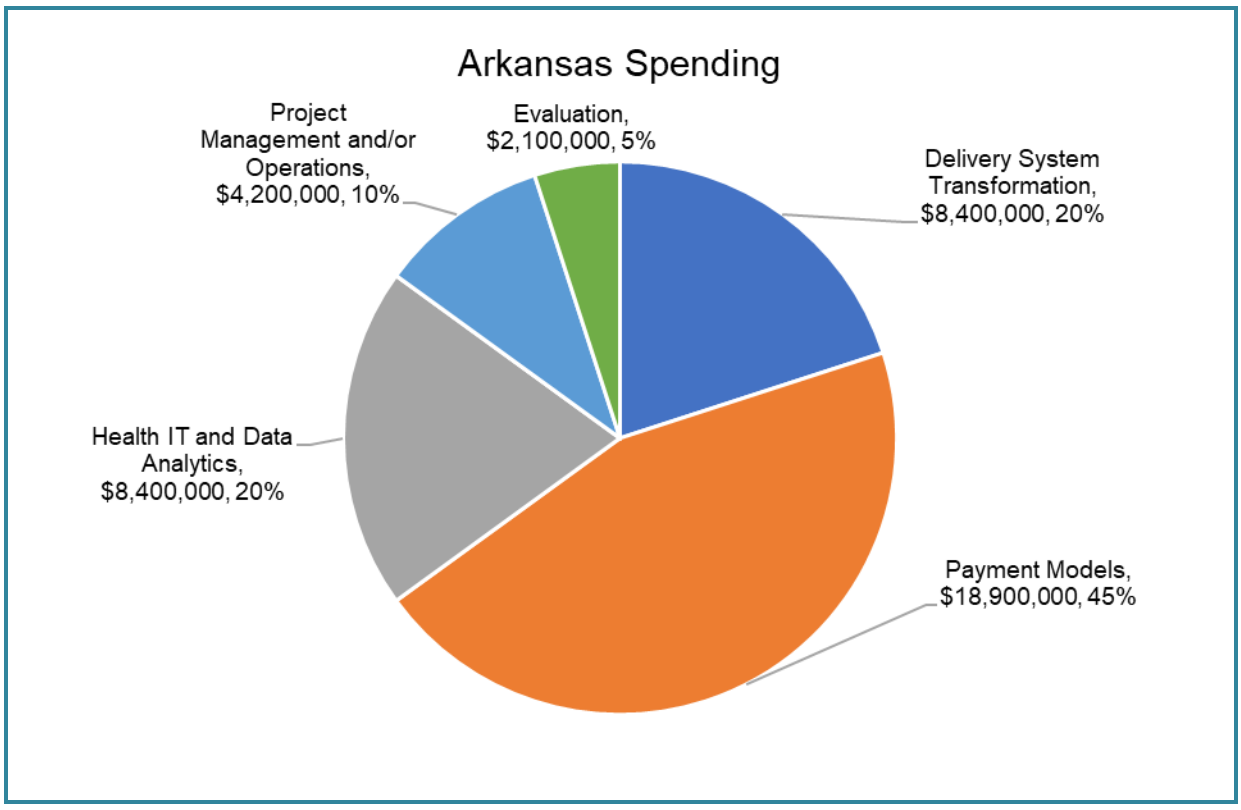
Other relevant activities that predated SIM funding (2012). Arkansas recognized that Medicaid beneficiaries who used LTSS, individuals with DD, and individuals with behavioral health or serious mental illnesses needed more intensive care coordination than could be provided through the PCMH model. To address this need, the state began working to design Medicaid Section 2703 health homes (Medicaid.gov, 2012). A multi-payer approach was not feasible because Medicaid is the dominant payer for these populations, but state officials said they leveraged the momentum of AHCPII to engage LTSS, DD, and behavioral health stakeholders in the design and planning of health homes and related changes. Concurrently, Arkansas worked to implement comprehensive assessments for these populations, which the state planned to use to determine eligibility and prospective payments for LTSS and level of care for behavioral health services and to inform care planning for all three populations. Arkansas also focused on workforce development before the SIM Initiative, starting with ACHI's publication of the *Arkansas Health Workforce Strategic Plan* in 2012, which listed recommendations to help the state meet four specific health workforce goals, one of which was to adjust the payment system to support increased team-based care, technology use, and provider supply.

[22] The Health Insurance Marketplace refers to the website where consumers in Arkansas can shop for health insurance plans and determine subsidy eligibility.

A.1.2. Major activities fully or partially supported with SIM funds

In early 2013, Arkansas was awarded up to $42 million from the SIM Initiative Round 1, which the state viewed as the federal government's investment in the broader AHCPII reforms already under way, as described above. About one-third of the SIM funds were used for program development, which included stakeholder engagement (see ***Figure A-2*** for a list of activities and SIM funding amounts). Arkansas state leaders, for example, met with stakeholders and organized an official tour of the state to educate providers about changes planned with SIM funding and to gather feedback; state leaders also engaged LTSS, DD, and behavioral health providers in discussing the Medicaid health home model. Most of the remainder of the SIM funds went to further develop the EOC model already in place as part of AHPCII, and to design "Wave 2" of PCMHs in the state. Although Arkansas's SIM Initiative originally focused on three major delivery system and payment reforms—EOCs, PCMHs, and health homes for certain populations—the state did not implement health homes during the model test period.

Figure A-2. Arkansas SIM Initiative spending 2013–2016



Source: Arkansas state officials

Arkansas's SIM Initiative was rolled out under Department of Human Services (DHS) leadership with support from the Governor and multi-payer collaborators. SIM leads made it clear that they viewed the payment models the SIM Initiative was putting in place as a permanent change, believing that such a message would stimulate providers to participate in the health system transformation in its early stages, rather than waiting for the new system to mature. The state worked with outside contractors to help with further design and subsequent model implementation, including meeting with private payers to advise on episode development, providing support for ongoing data analytics and feedback reports to providers, running the episode "engines," and educating providers.

Box 2. Arkansas's approach

"I'm not just turning this off in 3 years. What does it mean to have 50 laboratories of democracy? It means you allow us to be the lab and run it and make reasonable decisions, which I think we are. It's not just a test of episodes or multi-payer. We just decided to do health care differently statewide at the broader level."—*Arkansas state official*

Shortly after applying for SIM Initiative funding, Arkansas applied for the federal Balancing Incentive Program (BIP) to support state efforts to rebalance LTSS expenditures and to develop the LTSS infrastructure. BIP funding began in 2013 and provided support for health home planning and implementation of standardized assessments for individuals receiving LTSS, behavioral health, and DD services, and other changes to increase use of community-based services. Brief descriptions of major activities fully or partially funded by the SIM Initiative follow. ***Table A-1*** summarizes the two Arkansas payment models that moved forward under the SIM Initiative (PCMH and EOCs), along with participating payers.

Episodes of care. With support from the SIM Initiative, the state continued to invest in contractor support related to developing and analyzing EOCs. This included the development of algorithms to determine a Medicaid provider's eligibility to be paid under an EOC and to develop the Episode-Based Payment System (EBPS) used for analysis of Medicaid claims to determine risk/gain sharing payments for each EOC.

Fourteen Medicaid EOCs were in production by the end of the SIM Initiative, with several commercial payers also participating in selected EOCs. Arkansas's initial plan was to develop and implement 50 EOCs within the first 2–3 years of implementation. After presenting the plan to stakeholders and rolling out the first EOCs, however, it became clear that fewer, more impactful episodes, would be a better approach.

Box 3: The Arkansas EOC model

The EOC model held principal accountable providers (PAPs) liable for cost and quality outcomes associated with a particular episode of care (see ***Table A-1***) (CMS, 2016a, p. 19). Through retrospective reconciliation, PAPs either received a bonus payment (through shared savings) or paid a penalty based on overall episode costs compared to that of other PAPs providing the same type of episode. Provider participation in the model was mandatory if the provider served patients covered by Medicaid or participating private payers.

Table A-1. SIM Initiative–related delivery system and payment models in Arkansas

Delivery system model	Payment model	Participating payers	Retrospective or prospective[a]	Payments based on whom?	Risk[b]	Payment targets[c]	Health Care Payment Learning & Action Network Payment Category[d]
Episodes of care	FFS payment + Risk/Gain Sharing	Medicaid FFS; BCBS (subset of episodes); QualChoice (subset of episodes)	Retrospective	Patients who meet EOC-specific criteria	Two-sided	Financial and quality	Category 3
PCMH	FFS + PMPM for care coordination and overall practice transformation	Medicaid FFS	Prospective	Quarterly, risk adjusted $1–$30 PMPM payment (average = $4 PMPM for beneficiaries assigned to PCMH)	N/A	Process measures (10 PCMH activities during first 2 years)	Category 2
		BCBS commercial products in mid-2015	Prospective	Beneficiaries assigned to PCMH	N/A	N/A	
		QHPs—4 carriers beginning in 2015: Ambetter, BCBS, QualChoice, UnitedHealth	Prospective	$5 PMPM for each beneficiary assigned to PCMH	N/A	N/A	
		Medicare Advantage D-SNPs (5 carriers)	Prospective	$5 PMPM for each beneficiary assigned to PCMH	N/A	N/A	
		Self-funded employers (3 employers)	Prospective	Beneficiaries assigned to PCMH	N/A	N/A	
	PCMH Shared savings	Medicaid FFS	Retrospective	Annual payment based on number of beneficiaries who selected PCP	One-sided	Financial and quality	Category 3
		BCBS	Retrospective	Annual payment based on number of beneficiaries who selected PCP or were attributed based on geographic location	One-sided	Financial and quality	

BCBS = Blue Cross and Blue Shield; D-SNPs = Dual Eligible Special Needs Plans; EOC = episode of care; FFS = fee-for-service; N/A = not applicable; PCMH = patient-centered medical home; PCP = primary care provider; PMPM = per member per month; QHP = qualified health plan.

[a] Retrospective payment means that providers submit a bill and are paid for services after they are provided. Prospective payment refers to a fixed payment provided to payers regardless of actual services rendered.

[b] One-sided risk means that providers are eligible to earn shared savings for meeting lower total cost target but are not subject to penalties for higher than expected costs; two-sided risk means that providers are eligible to earn shared savings (the percentage earned is usually higher than one-sided risk options) for meeting lower total cost target and are expected to pay back money if costs are higher than expected.

[c] Payment targets describe the type of metrics for which payers held providers accountable under each model (i.e., financial, quality, or process metrics).

[d] The Health Care Payment Learning & Action Network framework outlines a four-category payment model classification system to describe provider payment in the context of paying for value, not volume. Additional details about the framework can be found at https://hcp-lan.org/

Arkansas enhanced multi-payer participation by allowing the two participating private payers (BCBS and QualChoice) flexibility in whether to implement any specific EOC, based on the characteristics and health care needs of their populations. Arkansas BCBS and QualChoice voluntarily adopted certain subsets of EOCs for their enrolled populations (see ***Addendum Table A.1*** at end of ***Section A.1***). For example, neither private payer implemented the attention deficit hyperactivity disorder (ADHD) or oppositional defiant disorder (ODD) EOCs because these conditions were either not as prevalent in their covered lives or did not have large cost disparities compared to Medicaid beneficiaries. Although Ambetter, an Arkansas QHP covering individuals eligible for coverage through Medicaid expansion, was in discussions regarding the EOCs, it did not implement any of them for its population during the test period.

Arkansas spent considerable effort in 2013 and 2014 to create and standardize the episode documentation required of PAPs. State officials also took clinical feedback into consideration:

> *We started the [EOC] initiative and looked to local clinicians to see what is appropriate care here, not just national standards. We have had a good [provider] feedback mechanism that oftentimes leads to incremental changes…. It's a dynamic process and will continue to be.*—State official (2014)

Despite the state's effort early on, initial EOC implementation proved challenging as the development and rollout was a learning experience for everyone. Provider pushback included not wanting "to be told how to practice medicine," complaining that some quality guidelines did not make sense, and finding that "a cookie cutter approach is frustrating … especially when we disagree with what we're supposed to do." As providers became more familiar with EOCs, some of their hesitation subsided. State officials were also aware that "episode avoidance" was likely occurring (i.e., choosing to code for a condition that would not trigger an EOC). The state monitored these patterns closely to consider how to more aggressively pursue corrective actions or other measures to ensure that providers assign diagnosis codes appropriately.

Patient-centered medical homes. Arkansas considered CPC to be the first wave of the state's PCMH model. CPC began in 2012 with participation from Medicare, Medicaid, and commercial payers. Arkansas launched its own state PCMH model (considered "Wave 2") with SIM funding. Wave 2 differed only slightly from the CPC model and enabled pediatric practices, which were excluded from CPC, to participate, which opened participation to children with Medicaid.

The Arkansas SIM Initiative achieved multi-payer PCMH participation through a state legislative mandate. The state began enrolling practices into its Medicaid PCMH model beginning on January 1, 2014, and subsequently enrolled new PCMHs in mid-2014, January 1, 2015, and thereafter on an annual basis.[23] With Arkansas Rule 108 signed by the Arkansas Insurance Commissioner in November 2014, effective January 1, 2015, all QHPs participating in the Health Insurance Marketplace were required to either provide support for, and align with, the Medicaid PCMH program or structure their PCMH program after nationally accepted models. Arkansas Medicaid also leveraged the participation of Medicare Advantage Special Needs Plans in PCMHs through a provision in its contracts for Medicare and Medicaid services coordination. Commercial payers volunteered to participate in the state's PCMH model for their fully covered and self-insured populations in mid-2015, aligning their PCMH requirements with the state's Medicaid model. As one state official noted, the state thought it important to "send consistent signals to payers," regardless of how each patient's care was financed. Such widespread multi-payer participation resulted in the PCMH model reaching a substantial proportion of patients statewide.

Box 4: The Arkansas PCMH model

The PCMH model aimed to increase patient care coordination across providers, with the goal of reducing cost and quality variations for similar services. To become a state-recognized PCMH and receive monthly Medicaid PMPM payments, practices were required to enroll in Arkansas's existing case management program for primary care services covered by Medicaid—known as the ConnectCare Primary Care Case Management (PCCM) Program. Participating practices were expected to engage in practice transformation activities, including providing 24/7 live voice access to a health professional, developing and implementing care plans, offering flexible same-day visit scheduling, using electronic health records (EHRs), and assessing opportunities for practice improvement. The PCCM program gave providers tools to facilitate and encourage care management, including quarterly reports on patient costs and utilization. Additionally, practices were eligible for shared savings payments if they met financial and quality targets (ACHI, 2015, 2017).

Arkansas used SIM funds to offer practice transformation assistance to participating PCMH practices beginning in 2014. The assistance was provided by two contracted vendors and was specific to the Medicaid PCMH model. It included assistance on how to interpret and implement PCMH requirements and how to develop reports. This support was free of charge to PCMH providers for the first 2 years of PCMH implementation.

The state began participating in the next "evolution" of the PCMH program—CMS's Comprehensive Primary Care Plus (CPC+) initiative—on January 1, 2017.[24] All former CPC and most current Medicaid PCMH practices participate in CPC+.

[23] Two of the 111 practices certified under the Medicaid PCMH on January 1, 2014, were also participants in the CPC.

[24] CPC+ is an Innovation Center-funded advanced primary care model that aims to increase access to primary care and to improve the quality, cost, and efficiency of primary care delivery.

Health homes. Efforts to transform delivery system reforms for older adults and individuals with physical disabilities who use institutional and community-based LTSS, individuals with DD, and individuals who use behavioral health services stalled for much of the SIM test period. Although nonprofit providers of community services were generally supportive of the SIM efforts, nursing home providers and some for-profit behavioral health providers lobbied against changes they perceived would hurt them financially. State officials also encountered challenges because of providers' limited capacity to function as health homes, difficulties identifying appropriate quality measures for prospective payments for home and community-based services (HCBS), and challenges with the Medicaid data infrastructure system.

After the November 2014 election, a new Governor took office and a shift in the legislature occurred. At that time, Arkansas Medicaid delayed most public discussion about health homes, and specific actions to implement health homes. However, in January 2015, the Arkansas legislature passed the Arkansas Health Reform Act of 2015, also known as Act 46, creating a legislative Task Force charged with recommending ways to modernize Medicaid. In October 2015, the Task Force presented its report (Arkansas Health Care Reform Legislative Task Force, 2016), recommending either health homes or capitated managed care to coordinate care for individuals who use LTSS and for individuals with serious mental illness (The Stephen Group, 2015). The Governor announced his support for capitation, which LTSS, DD, and behavioral health providers all opposed. Five months later, the task force deadlocked on whether to support Medicaid managed care or an alternative managed FFS model proposed by LTSS providers (Davis, 2016).

State officials and providers both attributed the softening of the previous resistance by nursing facilities and behavioral health providers to the threat of capitated managed care. In May 2015, the LTSS providers signed a memorandum of understanding (MOU) with the Governor and the Department of Human Services (DHS) director, committing the providers to collaborate with DHS in achieving $250 million in savings over 5 years as an alternative to managed care. Reforms mentioned in the MOU included care coordination, greater emphasis on HCBS, and use of independent assessments to determine eligibility and level of care for nursing facility services. Stakeholders were still planning this initiative when the test period ended. Unlike LTSS providers, behavioral health providers did not actively promote an alternative to managed care, according to state officials. When planning for special populations resumed in 2016, state agencies took the lead in planning changes for the behavioral health and DD populations and services.

Health information technology (IT) and data infrastructure. Three health IT and data infrastructure efforts were critical in supporting Arkansas's value-based reform efforts under the SIM Initiative: (1) BCBS's Advanced Health Information Network (AHIN), (2) the analytic engine for the Medicaid EBPS, and (3) SHARE. Because SHARE was funded by the 4-year ONC grant the state received in 2012, as discussed above, PCMH practices were expected to use

SHARE to help them meet their requirement to contact patients as soon as possible after in-patient hospitalization or an emergency department (ED) visit; thus, no SIM Initiative funds were dedicated to expanding or enhancing SHARE. Instead, Arkansas devoted the SIM Initiative's health IT funding to further develop AHIN and the EBPS.

Advanced Health Information Network. AHIN, a subsidiary of Arkansas BCBS, was built as a claims administration tool for providers to check on patient eligibility and benefits and track claims status. AHIN leveraged its secure technologies to create a web-based tool that is now used by the majority of Arkansas's providers to attest to compliance with AHCPII program requirements and submit required information. For example, throughout the SIM Initiative, AHIN's portals allowed specialists to upload information necessary for calculating EOC metrics and to see their EOC results. PCMH providers could see their attributed patients and risk scores, identify patients needing care plans, and upload patient care plans through AHIN. Providers also could see their own EOC and PCMH quality and financial performance metrics, which determined eligibility for gains or losses on EOCs and eligibility for shared savings under the PCMH program. Toward the end of the test period, the state worked to provide more data transparency by using information derived from EOC and PCMH metrics and costs to produce the Medical Neighborhood Performance Report, available through AHIN, to show providers their and their peers' metrics.

Analytic engine for the EBPS. The EBPS analytic engine is a software platform developed by contractors, with oversight by the state and BCBS Enterprise Business Intelligence. The analytic engine EBPS software supports both EOC and PCMH analytics. For EOCs, the EBPS applied the EOC algorithms to the state's Medicaid claims to determine gain and risk share for each provider, and outputted provider reports that were made available to providers through AHIN. Because the Arkansas EOCs were retrospective, one of the initial barriers to stakeholder acceptance was the long lag time for payment claims adjudication to identify risk and gain shares. Despite working with a legacy Medicaid Management Information System, the state was able to reduce this lag time, thus more closely tying the timing of performance-based payment to the timing of performance. The state used the EBPS to compile data into a dashboard to analyze PCMH trends and prepare data output for presentations and reports.

Quality measure alignment. SIM-funded stakeholder engagement efforts helped Arkansas's payers align their PCMH quality metrics and reporting requirements for shared savings to lessen provider burden and fatigue. SIM leaders said they achieved alignment of PCMH quality measures through regular all-payer meetings. Rather than dictate which measures providers would be evaluated on, the state asked payers to share their quality goals so core measures could be identified collectively. The payers primarily use the same Healthcare Effectiveness Data and Information Set (HEDIS) and National Committee for Quality Assurance (NCQA) measure sets, but with minor modifications to some measure specifications to address variation in their respective covered populations. Besides the core metrics, payers could choose

several additional measures appropriate for their covered beneficiaries. Most payers reported liking this unified payer approach because it was beneficial for providers, while allowing payers to tailor the quality metrics to their covered populations.

A.1.3. How Arkansas's SIM Initiative changed state health policy: successes, challenges, and lessons learned

The Arkansas SIM Initiative's efforts to help foster health system change in the state, as described above, were intended to be fully transformative and sustainable—and this has indeed proved to be the case. The state's EOC and PCMH models were designed to work in coordination with one another—with the PCMH model focused on efficient provision of primary care and care management and EOCs on value-based purchasing of both primary and specialty services. Both, in combination, have become integral to the state's health care delivery system, with public and private payers participating. In addition to these successes, there were inevitable challenges and important lessons learned. This section reviews the SIM Initiative's successes, challenges, and lessons learned during the test period.

Successes

The PCMH model is well entrenched in the state. As of September 2016, the PCMH program had reached 878 individual primary care providers (PCPs) in 179 PCMH-eligible practices, covering nearly 330,000 patients (51 percent of all Medicaid beneficiaries and 87 percent of beneficiaries eligible for PCMH-provider care) (see ***Addendum Table A.2*** at the end of this section). This expanded PCMH reach, according to a state report, contributed $5 million in savings to the state's Medicaid total savings of over $34 million in 2014 (ACHI, 2016). This same state-generated report also cites Arkansas's PCMH reach throughout the state as a reason for PCPs seeing patients earlier, thus reducing the need for more expensive treatment later in the disease trajectory. State officials noted reductions in ED visits and inpatient hospitalizations, with an RTI analysis finding a statistically significant decrease in the latter (RTI International, 2018). Many pediatricians have also enrolled in the Medicaid PCMH program, according to consumer organizations, which makes the PCMH model critical for changing pediatric care. Medicaid covered approximately 43 percent of all Arkansas children as of January 2017 (American Academy of Pediatrics, 2017).

By the end of the SIM period of performance, state officials began to see desired outcomes for several EOCs. An October 2016 EOC Performance Summary provided by the state indicated that average costs for the ADHD episode, for example, went from $4,405 in the baseline year to $1,808, $1,529, and $1,463 for performance years 1, 2, and 3, respectively (Arkansas Medicaid, 2016). A similar average cost pattern has become apparent for the total joint replacement EOC: $9,219 at baseline and $9,194, $9,248, and $8,864 for performance years 1, 2, and 3, respectively. Average costs for other episodes, and for the overall EOC cost, remained relatively constant over the test period, despite an expected increase in overall

spending because of increased primary care use. Quality of care outcomes and some utilization metrics have also started to improve (CMS, 2016a). For example, elective C-section rates decreased and appropriate use of ultrasound improved, likely related to the prenatal EOC. Two important outcomes related to the upper respiratory infection (URI) episode (strep test prior to antibiotic use and more appropriate antibiotic prescribing generally) have also improved (CMS, 2016a), with consumers noticing providers cutting back on antibiotics:

> *He won't give me antibiotics…. Even the nurse is like, "You sound like you've got bronchitis," and the doctor's like, "You're fine." … He told me to take some Mucinex and cough medicine.*—Consumer

State officials' perceptions confirm the initial EOC results in suggesting that physicians are indeed reevaluating their clinical practices and making changes that improve patient outcomes and costs. When asked to name the Arkansas SIM Initiative's biggest success, a state official said this:

> *Physicians [are] actually looking at things. Especially the older physicians, who have been doing the same thing for 30 years or more. They see there's another way to do it and are actually seeing their results as well.… Enlightenment is the one word I would use to describe it.*—State official

Early communication efforts were pivotal in achieving widespread stakeholder engagement in the SIM Initiative. State officials noted that communication events with stakeholders, which were purposefully closely coordinated in their educational SIM messaging, were a key component of onboarding physicians in implementing health system reform with broad uptake throughout the state. The state's two major commercial payers voluntarily participated in the SIM Initiative and were critical to AHCPII development and implementation. Providers were pleasantly surprised during the early stages of payment reform by the united front among Medicaid and the state's two major commercial payers. Medicare was the only major payer missing from the Arkansas SIM Initiative's conversations; however, Medicare participated in both CPC and CPC+.

Challenges

Providers struggled to implement EHRs to comply with PCMH requirements. To become certified as a Medicaid PCMH, practices were required to have a certified EHR and be able to capture hospital discharge and ED visit information from the state HIE, SHARE. But providers found that the promise of access to more complete patient data was impeded by EHR interoperability issues. Providers typically had to work with their EHR vendor to establish connectivity to SHARE. All this certainly contributed to provider difficulties in becoming comfortable with, and proficient in, the new technology more generally and to providers'

concerns, expressed as late as 2016, that the required documentation meant spending less time with patients.

Providers working in small practices noted barriers to PCMH participation. In smaller practices, often in rural settings, providers felt that many of the PCMH program requirements did not account for their more limited resources. For example, in addition to an EHR system, the state required a minimum Medicaid panel size for PCMH participation. Although the state determined that the required minimum actuarially ensured that the PMPM amounts would be sustainable over time, providers in smaller practices thought otherwise. Practices that lacked the additional minimum Medicaid patient panel to participate in the PCMH shared savings program were given the option to pool with other small practices, but no providers we encountered in focus groups were enthusiastic about this option. And practices that did pool together to qualify to become a PCMH noted that relatively small pools still suffer disproportionately more when a single doctor performs poorly on either quality or financial measures.

New urgent care centers disrupted the care delivery system. At the same time that PCMHs were being held financially accountable for care, under the presumption that patients would have more coordinated care under the PCMH model, patients sought care from non-PCMHs. Providers reported having to compete with urgent care clinics that had more widely publicized extended hours and walk-in appointments at all hours of the day. Although PCPs were also providing 24/7 consultation, which aimed to reduce the need for urgent care visits, patients continued to seem unaware of that fact. Providers also noted that some patients visited an urgent care facility precisely because their PCP did not prescribe them an antibiotic "on demand." Finally, providers noted the challenges of managing care for patients who use such urgent care facilities because providers are unable to obtain patient encounter data from them, most of which are individually owned and for-profit and have no affiliation with public health care facilities.

Care location affected the total cost of an EOC for which a PAP was accountable. If a patient was treated at a clinic with a facility fee or at a higher price hospital, for example, their EOC cost would be commensurately higher. This experience led to a 2015 law addressing provider concerns about financial penalties perceived to be outside provider control. The state passed Act 902 to "limit the use of factors that are not under a physician's control in determining reimbursement in alternative payment systems" (State of Arkansas, 2015a).[25] Both commercial

[25] Financial penalties could accrue to providers in an EOC model because of differences in rates negotiated by insurers for hospital reimbursement, which may make the same EOC more or less costly for patients who choose one hospital versus another. Act 902 states: "A healthcare payor doing business in this state, when determining any gain-sharing or risk-sharing for a physician, shall not attribute to a physician any costs that are a result of variations in the healthcare payor's freely negotiated contract pricing with other persons or entities outside the physician's practice if including the costs reduces a physician's gain-sharing amount or increases a physician's risk-sharing amount."

carriers participating in the EOC model were unhappy with the restrictions of the new law. BCBS challenged the Act as not applying to self-insured plans, an opinion that ultimately prevailed; as of January 1, 2017, this act applies only to fully insured lines of business and not self-insured lines of business covered under ERISA[26] (Arkansas BCBS AHCPII Help Desk, 2017). QualChoice handled the differential reimbursement issue by making EOCs voluntary and focusing on EOCs that have hospitals as their PAP.

Some providers continued to lack knowledge of EOCs, even after 3 years of implementation. Generally, rural providers were unfamiliar with the EOC model, possibly because many had not seen enough patients to qualify for episode payment. Other providers either (1) were not aware if they had been a PAP for an EOC or (2) noted receiving small gain share checks (i.e., less than $5) but not knowing specifically how their payment was calculated. Providers also reported that office managers typically handle program requirements and transactions, leaving providers unaware of the ins and outs of initiatives like EOCs. Providers in Little Rock were somewhat more aware of the EOC model than in less urban areas, but had not fully come to understand many model details, such as why they owed a penalty or how they could improve.

Lessons learned

State officials advise spending the first full year of EOC implementation gathering data, and educating providers, rather than initiating two-sided risk from the beginning.

Having learned early about provider concerns stimulated by SIM Initiative planning, the state invested SIM funds in a physician outreach specialist to work closely with providers to help them understand key implementation challenges related to the EOCs and PCMHs. The physician outreach specialist identified important provider concerns and changes in provider behavior that led, or could lead, to unintended consequences of new payment model implementation such as reduced access to health care services for certain patient groups because of potential financial risk. In retrospect, state officials suggested that other states considering an EOC model would be well advised to spend the first full year gathering data, educating providers, and working closely with them to better understand the vision of where the state wants to go, rather than initiating two-sided risk from the beginning.

A particularly worrisome unintended consequence of payment reform that involves financial penalties was potentially reduced care access for Medicaid beneficiaries. The following provider comment exemplifies this type of concern:

[26] ERISA refers to the Employee Retirement Income Security Act of 1974, which covers self-insured health insurance plans and preempts otherwise applicable state health insurance regulations.

It makes you apprehensive about taking a Medicaid patient who's further along in a pregnancy. My concern…with some of these programs is that I will be financially penalized for this mother's overuse of emergency services and that my only response is going to ultimately be…I'm not going to provide care for this patient.—Provider

Providers might also refuse to care for this population because it is deemed more challenging and less financially rewarding to manage. Specialists said, for example, that they might stop doing procedures (such as tonsillectomies) that trigger an EOC, are poorly reimbursed, involve patient hassles, and are not financially significant enough to help their practice.

Even with the extensive planning and outreach within the state, providers complained about being held accountable for patient behavior they could not control. Providers emphasized the need for patient education about the SIM models and sought additional resources to educate patients. Providers felt that patient education is an important part of their clinical duties but acknowledged that providers cannot always change patient behavior regardless of how much they try to educate them. As one provider stated, "We've not done a good job educating the population about what they should and should not be doing." Providers were especially frustrated with patient behaviors that reflect poorly on their EOC and PCMH performance, such as patients visiting the ED when they could have called their PCP to access 24/7 care. One provider put it this way:

True emergencies…[are] in the eyes of the lay person…75 percent of the time… they're clinic type things that could be handled the next day but in their mind this toothache's been going on for 4 or 5 days then, all of a sudden 10:00 at night "I've got to go the emergency room and get it taken care of."… Again that's the variable that's never really factored in, in terms of the patient variable, in terms of how their response will be.—Provider

One provider suggested giving PMPM payments to patients as an incentive for appropriate use of medical services and self-management. Additionally, providers felt that care coordination for Medicaid beneficiaries required more resources than Medicaid offered as part of the PMPM under the PCMH program and shared savings payments. Providers reported hardship from trying to adhere to PCMH certification requirements, such as completing a care plan for a high-risk patient, when patients failed to keep scheduled appointments. This provider comment was typical:

Then you go back to the large percentage of no-shows that those patients usually have and you've set aside a 20- or 30-minute slot of time for this care plan, for this kid with multiple problems, and they don't show up for it. Then you get penalized…They're not showing up for two or three appointments.—Provider

Acute or procedure-based EOCs (such as URI and total joint replacement) with defined start and end dates were much easier to implement than chronic conditions or conditions requiring ongoing care (such as ADHD or asthma). Arkansas began with a broad

vision for EOCs, initially anticipating development of 75–100 episodes for AHCPII. Toward the end of the SIM award period, the state realized that a more realistic goal was 20–30 episodes because EOCs are most appropriate for conditions that have significant clinical variability in care and that focus on acute events and surgeries. State officials believe that future planning and development should focus on the relatively limited set of episodes that significantly contribute to costs and utilization and have sizable variation.

Medicaid beneficiaries had mixed views throughout the SIM period on the PCMH program's assignment of PCPs, care coordination, and access to care. In 2013, Medicaid beneficiaries participating in focus groups for this evaluation were unaware of the pre-SIM changes that practices were already making (for example, same-day appointments and reduced wait times at the doctor's office) as part of the pre-SIM PCMH model. In focus groups held later in the SIM Initiative, most Medicaid beneficiaries did come to understand their ability to get same-day appointments, for themselves and for their children, but these appointments were typically not with their PCP but with an advanced practice nurse, which patients did not like.

When PCMHs were expected to better coordinate care but faced obstacles connecting to the state HIE, providers sought Medicaid approval for alternative solutions to facilitate information sharing across providers. Connection to SHARE, the state HIE, was a requirement of Medicaid PCMH certification, but the state did not dedicate any SIM funding, aside from some practice transformation assistance, to help primary care practices connect their EHRs to SHARE. State officials acknowledged "a lot of magical thinking" regarding the time, effort, and cost assumptions for connecting providers to coordinate care across all health care constituencies, with the consequence that their request for SIM funding did not include financial support to practices or to SHARE to ensure information sharing via the state HIE.

State officials and other stakeholders thought that by connecting to SHARE, practices could receive information about ED visits and hospital admissions and therefore better coordinate care. However, as noted, providers were looking for a less costly and onerous way of obtaining this information rather than connecting to SHARE. Because many PCMHs were affiliated with health systems that could transmit hospitalization information to their affiliates without the need for a SHARE connection, they were able to convince Medicaid to relax the requirement that PCMHs' certified EHRs needed to connect to SHARE. Meanwhile, the state engaged an HIE vendor that gave providers a menu of options that ultimately reduced the provider cost of joining SHARE.

A.1.4. Anticipated long-term changes following the SIM Initiative

Stakeholders noted three major areas in which health care transformation would continue past the end of the SIM Initiative's period of performance in fall 2016: multi-payer health care delivery and payment models, LTSS, and new resources for data analytics.

Multi-payer health care delivery and payment models. State officials believe both PCMH and EOC models have improved care quality while reducing care costs. PCMH requirements aim to give patients (1) access to care 24/7 without having to resort to more expensive ED visits, and (2) visits with their PCP shortly after an ED visit or inpatient hospitalization. Besides the expected benefits of the EOCs (i.e., reined-in costs and better quality of care), the state found that providers had not necessarily been aware of current best practices for their specialty, such as when to obtain a pathology report on removed surgical tissue. Providers are now keenly aware of their performance metrics for PCMH and EOCs because they receive standardized quarterly reports with financial metrics and claims and clinical quality measures.

State officials emphasized the importance of integrating the PCMH and EOC models within state government operations as the test period came to its end. The management structure and budget for the Arkansas Medicaid program, for example, now includes ongoing administration of these payment and delivery system reforms by full-time state employees. The data infrastructure is also in place to support EOC maintenance and development. Said one senior state official, "These [programs] have become an integral part of Arkansas DHS and the health care innovation team, and they march forward regardless of SIM funding." The multi-payer participation that is a hallmark of the PCMH and EOC models in Arkansas lends additional support to maintaining these efforts.

On reflection, about a year after the state's test period had ended, state officials and stakeholders agreed that the SIM Initiative enabled Arkansas to make lasting health care delivery change. Most Medicaid beneficiaries were connected to a PCP and received follow-up care after an ED visit. "These changes are here to stay," reported one state Medicaid official. A few EOCs manifested significant impacts that align individuals' care with best practices. For example, inappropriate antibiotic use for postoperative patients had been at 13 percent and is now at 2 percent as a result of informing doctors about best practices in clinical care. Also, removing tonsils for most surgeons used to mean automatically testing them for pathology, even though it is known to be usually unnecessary. Informing Arkansas providers of practice improvements in this area resulted in significant cost savings without negatively impacting patients' quality of care.

Long-term services and supports. A major missing piece in Arkansas's SIM implementation achievements was implementation of the health home model proposed for certain populations. But this is now changing because of state action since the test period ended. For example, Arkansas implemented a new outpatient behavioral health services program on July 1, 2017, to replace the existing rehabilitative services program, implementing changes proposed under the SIM Initiative. This new program includes a tier system to determine the appropriate level of services, crisis stabilization services, and recovery-oriented services (such as peer supports, supported employment, and supportive housing).

In place of health homes, the state chose to use managed care entities to coordinate care for individuals with DD and behavioral health needs, but ensured Medicaid providers an opportunity to participate in this initiative. Act 775 (2017) authorized the provider-led Arkansas Shared Savings Entity (PASSE) model of care. Under this model, specialty managed care plans will coordinate physical health care with behavioral health and DD community services. Five organizations submitted applications in 2017, each comprising a health plan and Medicaid providers. The new model is scheduled to launch in early 2018. During the first year, the PASSE entities will be paid to provide care coordination for beneficiaries, while other Medicaid services will remain FFS. Beginning in 2019, PASSE entities will receive global payments to cover both administration and services.[27] Although Arkansas has not implemented assessment-based payments, independent assessments are in use or planned for all the special populations to determine the appropriate level of services for LTSS and outpatient behavioral health services and attribution to the PASSE care management model.

New resources for data analytics. Developed in the last year of the SIM award, Arkansas's newest data analytics initiative, the Medical Neighborhood Performance Report (Golden & Harris, 2017), integrated and conveyed cost and outcome information from the EOCs to PCMH providers. This new initiative enabled PCMH providers, when they needed to refer patients, to see which specialists have good quality and cost performance metrics. Specialists could also compare their own performance to that of their peers on EOC-specific outcomes and utilization. The URI EOC, typically managed by PCPs, was the first report generated from the Medical Neighborhood initiative; similar reports will be developed for all current and future EOCs.

Additionally, during the SIM Initiative, ACHI began developing an all-payer claims database (APCD). The Arkansas Healthcare Transparency Initiative Act, passed in 2015, requires payers with more than 2,000 covered lives to submit claims to Arkansas's APCD. About 60 payers have submitted data as of January 2018, including Medicaid, the population insured through the Marketplace, some commercial health insurance carriers, dental carriers, workers' compensation carriers, and third-party administrators. Medicare also participates voluntarily; but as a result of Gobeille v. Liberty Mutual Insurance Co., Inc. decision in 2016, self-payer data are not required to be included and haven't been voluntarily submitted. The APCD has data from January 2013 through mid-2017, which can be requested via the Arkansas APCD website.

[27] The PASSE program is described on this webpage: https://www.medicaid.state.ar.us/general/programs/passe.aspx

A.1.5. Summary of SIM Initiative implementation

At the end of the Arkansas SIM Initiative, the state had achieved the following:

- **Sustained and expanded delivery models—PCMHs and EOCs—**that reached a significant proportion of Medicaid beneficiaries and commercially insured individuals (through health plans, including QHPs serving the population eligible for coverage through Medicaid expansion, group insurance products, employer self-insured plans, and Medicare Advantage D-SNPs). The SIM investment allowed Medicaid to drive payment reform in the state and enabled continued collaboration with commercial insurers in the AHCPII.
- **Enhanced provider participation in the delivery models.** Developers of Arkansas's AHCPII recognized that the new payment models had to address the needs of rural providers through the Medicaid PCMHs and rein in specialist costs using another model, essentially bundled costs through the EOCs.
- **Extensive planning for health homes for LTSS, DD, and behavioral health.** Arkansas implemented independent, comprehensive assessments for the LTSS, DD, and serious mental illness populations to support delivery and payment reforms according to assessed need.
- **Results of payment reform** from both the state and federal evaluation (ACHI, 2017; RTI International, 2018) suggest Medicaid savings and improved quality of care.
- **Improved data infrastructure** enhances state government's capacity to manage the data analytics required to support the EOC model of care.

Arkansas's Episode of Care (EOC) model, having been conceptualized and planned before the SIM Initiative, was one of two well-established health system reform models in the state during the SIM Initiative. This makes the state's EOC model an excellent focus for rigorous quantitative analyses of the Arkansas SIM Initiative's early impact on key utilization and quality of care outcomes. The analyses measure Arkansas's performance on these key outcomes against experience for a comparable population in the group of non-SIM comparison states selected for the Arkansas-specific impact analyses.

Sections A.2 and ***A.3***, respectively, present the estimated impacts of two of the state's most prevalent EOCs—the upper respiratory infection (URI) EOC and the perinatal EOC. These were among the 14 Medicaid EOCs launched in 2012, for which the first 2 years of implementation data (October 2012–December 2014) are available for analysis.

Addendum Table A.1. Implementation status of Arkansas's Episodes of Care

Episode & wave	Legislative review	State plan amendment effective date	Reporting period start date/episode launch	First performance period ends	Episode status[c]	Payers
Active episodes						
Wave 1a						
1–3. URI	Spring 2012	10-1-12	7-31-12	9-30-13	Active (In Production)	Medicaid
4. ADHD	Spring 2012	10-1-12	7-31-12	12-31-13	Active (In Production)	Medicaid
5. Perinatal	Spring 2012	10-1-12	7-31-12	9-30-13	Active (In Production)	Medicaid, BCBS, QualChoice
Wave 1b						
6. CHF	Nov 2012	2-1-13	11-30-12	12-31-13	Active (In Production)	Medicaid, BCBS
7. Total joint	Nov 2012	2-1-13	11-30-12	12-31-13	Active (In Production)	Medicaid, BCBS, QualChoice
Wave 2a						
8. Colonoscopy	May 2013	10-1-13	7-31-13	9-30-14	Active (In Production)	Medicaid, BCBS, QualChoice
9. Gallbladder	May 2013	10-1-13	7-31-13	9-30-14	Active (In Production)	Medicaid, BCBS, QualChoice
10. Tonsillectomy	May 2013	10-1-13	7-31-13	9-30-14	Active (In Production)	Medicaid, BCBS
11. ODD	July 2013	10-1-13	10-31-13	03-31-15	Active (In Production)	Medicaid
Wave 2b						
12. CABG	July 2013	10-1-13	1-31-14	3-31-15	Active (In Production)	Medicaid, BCBS
13. Asthma	July 2013	10-1-13	4-30-14	06-30-15	Active (In Production)	Medicaid, BCBS
14. COPD	July 2013	10-1-13	10-31-14	12-31-15	Active (In Production)	Medicaid, BCBS

(continued)

Addendum Table A.1. Implementation status of Arkansas's Episodes of Care (continued)

Episode & wave	Legislative review	State plan amendment effective date	Reporting period start date/episode launch	First performance period ends	Episode status	Payers
Episodes under development or pending						
15. PCI	July 2013	10-1-13	TBD	TBD	In final design review for Medicaid, launched by BCBS[a]	Medicaid, BCBS, QualChoice
16–23. Neonatal	TBD	TBD	TBD	TBD	Undergoing further review	Medicaid
24. ADHD-ODD	July 2013	10-1-13	TBD	TBD	In design review	Medicaid
25. Tympanostomy ear tubes procedure)[b]	TBD	TBD	TBD	TBD	Commercial carriers may still be interested in this as an EOC	Unknown
26. Pediatric Pneumonia (in ED)	TBD	TBD	TBD	TBD	In promulgation process	Medicaid
27. Urinary Tract Infection (ED)	TBD	TBD	TBD	TBD	In promulgation process	Medicaid
28. Hysterectomy	TBD	TBD	TBD	TBD	In promulgation process	Medicaid
29. Appendectomy	TBD	TBD	TBD	TBD	In promulgation process	Medicaid

ADHD = attention deficit hyperactivity disorder; BCBS = Blue Cross Blue Shield; CABG = coronary artery bypass graft; CHF = coronary heart failure; COPD = chronic obstructive pulmonary disease; ED = emergency department; ODD = oppositional defiant disorder; PCI = percutaneous coronary intervention; TBD = to be determined; URI = upper respiratory infection.

[a] Source: ACHI (2016).

[b] Medicaid's research showed insufficient variations in the tympanostomy procedure or costs to justify launching this episode.

[c] In promulgation process means the episode has been sent to the Healthcare Quality and Payment Policy Advisory Committee for review; In design review refers to episodes that are undergoing analytic review; Undergoing final review refers to episodes that are still under review but are further along in the process; Active (in production) means that the episode is "live"—the state is collecting data and producing provider reports.

Addendum Table A.2. Providers and populations reached by Arkansas's SIM Initiative–related delivery system and payment models

Arkansas (as of September 2016)	Participating payers	Participating providers	Population reached
PCMH	Medicaid	878	51%[a]
	Commercial	678[b]	15%
	Self-insured	—	12%
EOCs	Statewide	2,464 (42%)	—
	Medicaid	—	15%
	Commercial	—	36%

EOC = episode of care; PCMH = patient-centered medical home.

[a] According to Arkansas's final progress report (CMS, 2016a), of Medicaid beneficiaries eligible to participate, 83% were served by PCMHs.

[b] The number of participating providers in the PCMH for the commercially insured population is approximate because of uncertainty in the overlap of primary care providers reported by participating commercial carriers: Arkansas Blue Cross Blue Shield (678), QualChoice (618), Centene/Ambetter (606), United Healthcare (295).

Note: Sources for these provider and population data are detailed in the Year Four Annual Report (RTI International, 2018).

A.2 Model-Specific Impact Findings: *Arkansas's Upper Respiratory Infection Episode*

The URI episode was designed to encourage guideline-concordant care for the treatment of three types of URIs: (1) nonspecific, (2) sinusitis (sinus infection), and (3) pharyngitis (sore throat). The goals of the episode included containing costs and reducing unnecessary antibiotic prescriptions for Medicaid patients presenting with URIs. Participation in the URI episode was mandatory for providers who accepted Medicaid patients, thus reaching all Medicaid patients who met the URI episode inclusion criteria.

KEY INSIGHTS

- After 2 years, URI episodes of care for Arkansas Medicaid beneficiaries, relative to a comparison group, showed significant improvements in clinical outcomes. We found:
  - **Greater declines in antibiotic use.**
  - **Greater declines in URI-related physician visits.**
  - **Larger increases in appropriate care for children and use of strep tests.**
- However, there were also unintended consequences resulting from the model. Namely:
  - **Emergency department (ED) visits increased relative to the comparison group,** perhaps because patients sought antibiotics elsewhere after not receiving a prescription at their initial visit.
- Physicians reported changing their diagnosis coding practices to avoid triggering a nonspecific URI episode in focus groups, potentially making it difficult to track real declines in antibiotic use.

EOCs encompass relevant care delivered by multiple providers around a specific clinical situation with a designated start and end date. A URI EOC is triggered by paid Medicaid claims with a primary diagnosis of acute ambulatory URI occurring in an office visit, clinic visit, or ED visit. The EOC begins on the day of diagnosis and ends 21 days later. Medicaid holds one key provider—the Principal Accountable Provider (PAP)—accountable for overall cost and quality of the EOC. For the URI EOC, the PAP is the Medicaid provider who first diagnosed the patient with one of the three diagnoses in the ambulatory care setting.

Box 5: URI EOC: How payers pay for value

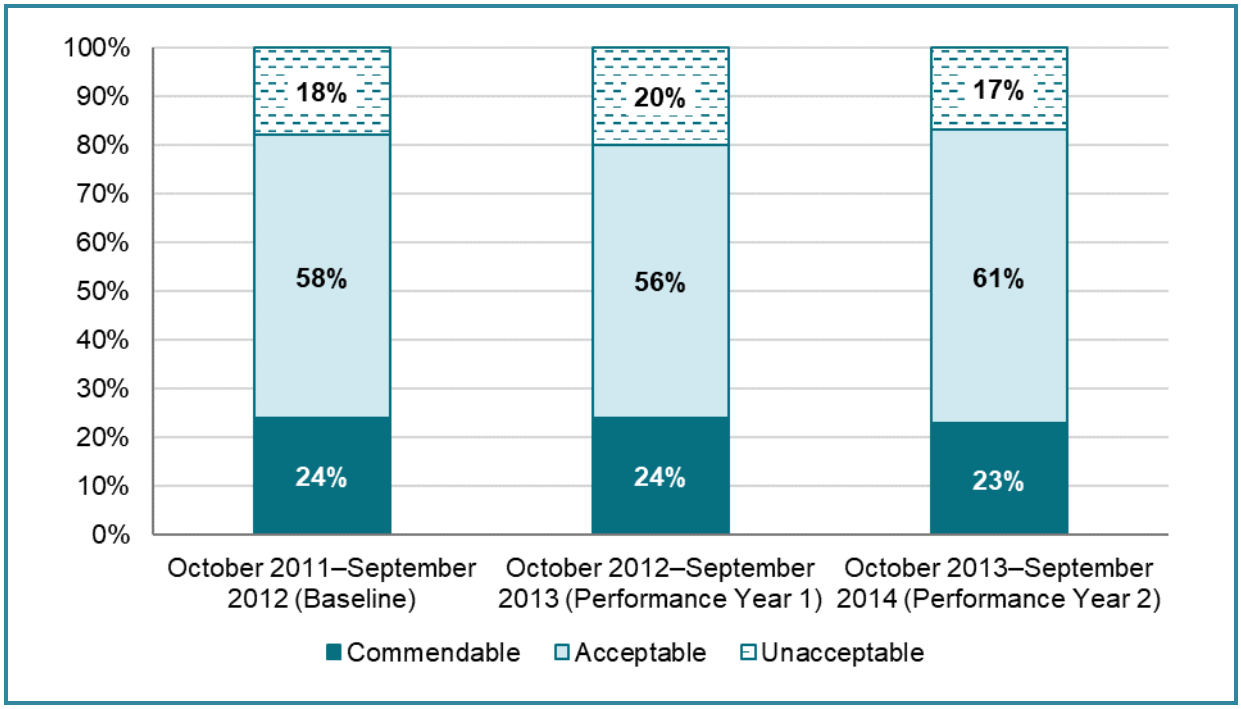
- **Quality:** PAPs must use a strep test when prescribing antibiotics for pharyngitis 47 percent of the time within a measurement year to be eligible for shared savings.
- **Cost:** Compare costs to thresholds—if average costs exceed a certain threshold, pay penalties; if below a certain threshold, eligible for shared savings.

The state analyzes Medicaid claims to retrospectively evaluate the PAP's costs and quality metrics for a 1-year performance period (October to September of each year). Arkansas sets thresholds for average costs to rate provider performance as acceptable, commendable, or poor and to predetermine shared savings limits. At the end of the performance period, PAPs receive a performance report indicating if they qualify for a shared savings payment or must pay back excess costs of the episode. If a provider's average cost is between the acceptable and commendable thresholds, there will be no changes in payments. For the URI episode, the state determined that PAPs must use a strep test when an antibiotic is prescribed for acute pharyngitis 47 percent of the time to be eligible for gain sharing. Other quality metrics that are tracked include frequency of antibiotic use and average number of visits during the EOC. URI EOCs are excluded from determination of a PAP's performance status for both clinical criteria (less than 1 year of age, comorbidities, hospitalizations during

EOC) and business criteria (dually eligible for Medicare, not continuously enrolled in Medicaid, cost outliers).

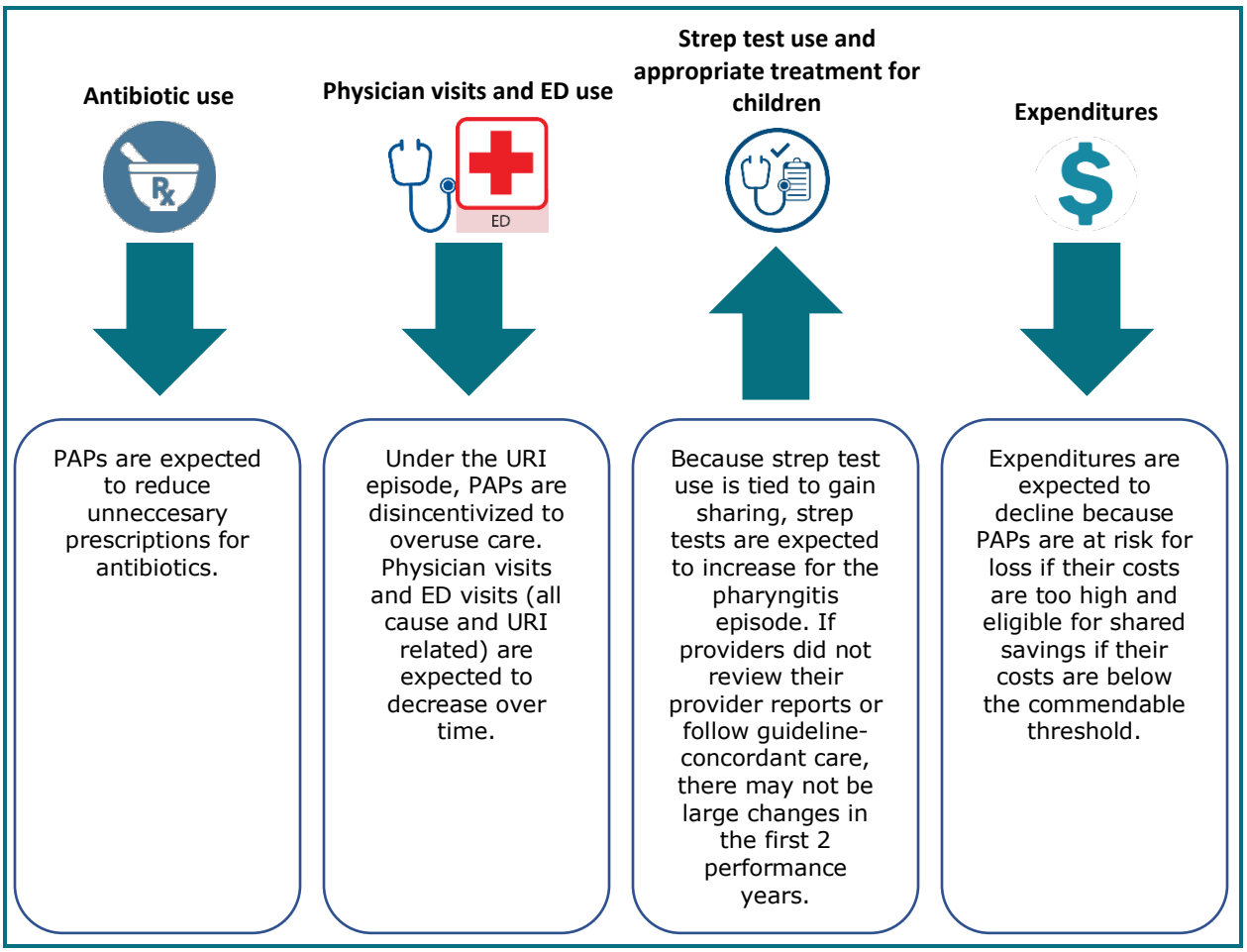
According to data reported by Arkansas, the percentage of providers with average episode costs that exceeded the acceptable range (thus requiring pay back) increased slightly from the baseline year (October 2011–September 2012) to the first performance year (October 2012–September 2013) then declined again in the second performance year (October 2013–September 2014) (***Figure A-3***) (Arkansas Center for Health Improvement, 2015, 2016). The percentage of providers with average costs below the commendable threshold (thus making them eligible for shared savings) did not change substantially from the baseline year through the first 2 performance years, however. The lack of movement in the percentage of providers who were eligible for shared savings may be in part the result of a lack of awareness of EOCs. Especially early in the SIM implementation period, many providers were not aware of EOCs—either their selection as being a PAP or the potential for risk/gain-sharing payments. Although all PAPs received a payment report, in the provider survey we conducted in early fall of 2014, 40 percent of respondents acknowledged receipt of a payment report, 24 percent reported not receiving a report, and 36 percent did not know whether they received a report. Without knowing about the EOC cost threshold values or how their average costs compare to the thresholds, providers may not be incentivized to change practice patterns to contain URI episode costs.

Figure A-3. Percentage of providers in the commendable, acceptable, and unacceptable cost thresholds



Several outcomes are expected because of the URI EOC (see ***Figure A-4***). Because of the quality metrics that are tracked and required for shared savings, we expect to see reductions in antibiotic use, improvements in the use of strep tests when antibiotics are prescribed for pharyngitis, and increases in the appropriate treatment for children (defined as the number of children who are not prescribed antibiotics within the first 3 days of diagnosis of a nonspecific URI or sinusitis). PAPs are also disincentivized to overuse care. We therefore expect to see reductions in physician visits (all cause and URI-related) and ED visits (all cause and URI-related) after the URI EOC implementation. Cost containment is a primary goal of URI episodes. As such, we would expect expenditures to decline after episode implementation. Even so, given the lack of movement in the percentage of PAPs that had average costs less than the commendable threshold over this period and the lack of awareness of receiving a payment report among providers noted above, we do not expect to see large changes in expenditures during the first 2 years of implementation.

Figure A-4. Expected direction of outcome measures



ED = emergency department; PAP = Principal Accountable Provider; URI = upper respiratory infection.

To assess the effects of Arkansas's URI EOC on utilization, quality of care, and expenditures, we addressed the following research question:

- How did trends in key outcomes for utilization (antibiotic use, physician visits [URI related and all cause], ED visits [URI related and all cause]) and quality of care (strep test use for pharyngitis episodes, appropriate treatment for children for nonspecific URI and sinusitis episodes) change for URI EOCs in Arkansas after implementation relative to URI EOCs in the comparison states?
- How did trends in URI expenditures change for episodes in Arkansas after implementation?

To address the first research question, we used a difference-in-differences (D-in-D) model to compare outcomes for URI episodes in Arkansas before and after the EOC implementation to episodes from an out-of-state comparison group. Using the description contained in the EOC Provider Manual (Arkansas Medicaid, n.d.) to define our evaluation's URI EOCs, we used Medicaid Analytic eXtract (MAX) claims data to examine the 2 performance years before (October 2010 to September 2012) and the 2 performance years after (October 2012 to September 2014) the start of the URI EOC. The intervention group comprises URI episodes for Medicaid beneficiaries in Arkansas, and the comparison group comprises URI episodes for Medicaid beneficiaries in Missouri and Mississippi. Despite Arkansas's Medicaid expansion in 2014, and that comparison states did not participate in Medicaid expansion, we do not expect to see differences in the population triggering a URI EOC because URIs do not qualify a person for Medicaid eligibility and URIs occur primarily in children who were not impacted by the expansion.

Following comparison group selection, we constructed annual EOC-level propensity score weights to balance the Arkansas group and comparison group on individual and county characteristics. The intervention group and weighted comparison group were similar at baseline on key demographic characteristics (***Table A-2***). A summary of the analytic methods is included below, and the methods are detailed in ***Sub-appendix A-2***.

Because the comparison group states are Medicaid managed care states, we are not able to compare expenditures for Arkansas relative to the comparison group.[28] Instead, to address the second research question, we did a pre-post analysis comparing expenditures for the Arkansas episodes before and after the EOC model implementation. These results should be interpreted with caution, however, because without a comparison group, we are unable to eliminate the influence of general, secular trends in expenditures that may be occurring irrespective of the URI episodes. Moreover, the pre-post expenditure analyses were not adjusted for inflation, so any increases we observe could in part be the result of inflation.

[28] Medicaid managed care plans do not routinely submit expenditure data to CMS.

Table A-2. Weighted means and standardized differences prior to Arkansas URI Episode of Care implementation, Arkansas and comparison group, 2012

Characteristic	Arkansas URI episodes	Comparison group URI episodes	Weighted standardized difference[a]	*p*-value
Weighted number of episodes	103,815	103,126		
Individual-level sociodemographic characteristics of beneficiaries with episodes				
Age at time of episode	8.9	9.0	0.4	0.40
Male (%)	45.6	45.8	0.3	0.56
Black (%)	13.7	13.8	0.5	0.30
Hispanic (%)	35.6	35.1	1.1	0.01
White (%)	41.4	41.8	0.8	0.07
Other (%)	9.3	9.3	0.1	0.84
Health status characteristics of beneficiaries with episodes				
Health risk score (CDPS Score)	1.0	1.2	5.1	<0.001
Eligible for Medicaid because of disability (%)	11.8	12.1	1.1	0.01
Emergency department as triggering location (%)	8.8	9.6	2.6	<0.001
Emergency department visit, 2011 (%)	5.7	5.8	0.6	0.20
Inpatient admission, 2012 (%)	0.35	0.35	0.1	0.91
County-level characteristics for counties of residence for beneficiaries with episodes				
Metropolitan status (%)	56.2	56.6	0.8	0.08
Population at federal poverty level, 2012 (%)	20.1	20.2	2.0	<0.001
Hospital beds per 1,000, 2010	3.7	3.6	2.7	<0.001
Median Age, 2010	37.9	37.8	1.5	<0.001
Uninsured, ages <65, 2012 (%)	19.6	19.5	3.6	<0.001

CDPS = Chronic Illness and Disability Payment System (CDPS score is a risk-adjustment score calculated from ICD9 and ICD10 diagnosis codes included on hospital and outpatient claims, with larger CDPS scores corresponding to a larger number of comorbidities or a more severe set of comorbidities); URI = upper respiratory infection.

[a] Absolute standardized differences (SDs) are expressed as percentages. <10% SD is ideal for inferring balance between groups. To balance the population characteristics for the claims-based analyses, we estimated propensity scores for all individuals from the comparison group for each year of the analysis. After propensity score weighting, the standardized differences between the weighted comparison group means and intervention group means were all well under the standard 10% threshold for individual-level variables; however, a few county-level variables exceed the threshold. Nonetheless, the differences in the county-level means is still quite small. County-level variables are shown here to provide context. Because there was little variation in county-level characteristics, balancing on these variables difficult. Therefore, to optimize the balance and avoid extreme weights, county-level covariates were excluded from the propensity score model.

Although the URI episodes did not target any subset of the Medicaid population with a URI diagnosis, certain subpopulations may be impacted by the model differently because they have different inherent utilization patterns. To assess the impact of the URI episodes on subpopulations, we ran the models for key utilization outcomes (antibiotic use, physician visits, and ED visits) separately for the overall, child, and adult populations. We include the results for the overall population and child and adult subpopulations in this chapter.

Methods Snapshot for Impact Analysis

- **Study design:** D-in-D quasi-experimental design. We used an episode-year level model to compare outcomes for episodes before and after EOC implementation. For expenditures, we use a pre-post design.
- **Population**: The intervention group comprised URI episodes for Arkansas Medicaid beneficiaries who are followed for 21 days after triggering a URI EOC. The comparison group comprised URI episodes for Missouri and Mississippi Medicaid beneficiaries who are followed for 21 days after triggering a URI EOC.
- **Data:** MAX claims data from October 2010 to September 2014.
- **Sample:** Nondual Medicaid beneficiaries who were enrolled for the months covering the 21-day URI EOC. Utilization measures included the full sample. Denominators varied for quality of care measures.
- **Measures:** Utilization (antibiotic use, physician visits [URI related and all cause], ED visits [URI related and all cause]), and quality of care (strep test use for pharyngitis episodes, appropriate treatment for children for nonspecific URI and sinusitis episodes) were modeled as a probability of occurrence during the episode. Total Medicaid expenditures were measured as average per member per month expenditures during the episode.
- **Statistical analysis:** Logistic regression (binary) weighted by propensity weights was used for the utilization and quality measures. An ordinary least squares pre-post regression was used to model expenditures. Standard errors were clustered at the individual level to account for multiple episodes per beneficiary. The models adjusted for beneficiary-level demographic and health status variables and county-level socioeconomic variables.

A.2.1 Did utilization change within Arkansas URI episodes?

KEY INSIGHTS

- **Antibiotic use declined more** for combined URI and nonspecific URIs in Arkansas relative to the comparison group. There were greater declines in antibiotic use for pharyngitis and sinusitis episodes in Arkansas relative to the comparison group, albeit small changes.
  - During focus groups physicians reported using alternate diagnosis codes to avoid triggering an episode, which may explain part of the decline in antibiotic use.
  - The likelihood of having a physician visit overall did not change, but the likelihood of having any **URI-related physician visits declined more** for Arkansas episodes relative to the comparison group.
- **ED use, including URI-related ED use, increased** for Arkansas episodes relative to the comparison group.
  - This finding is corroborated by reports from physicians that patients may seek care elsewhere when they are not given an antibiotic prescription at the initial visit. The ED use may also be substituting in part for URI-related physician visits.

Table A-3 reports the D-in-D regression analysis on antibiotic use during the episode for each type of URI episode, and for all episodes combined. Because of differences in clinical practice, the change in antibiotic use was expected to vary by URI episode type, so we present the results for antibiotic use separately by type of episode. We report annual regression adjusted D-in-D estimates individually for the first 2 years after the implementation of the EOC model, along with an overall -D-in-D estimate for both years combined for each URI subtype.

- Among all URI episodes combined, **antibiotic use in Arkansas** declined by 1.8 percentage points, relative to the comparison group ($p < 0.001$). For nonspecific URI episodes, **antibiotic use in Arkansas** declined from 43 to 34 percent from the baseline period to the first 2 performance years. Relative to the comparison group, antibiotic use declined by 6.4 more percentage points for nonspecific URI episodes in Arkansas ($p < 0.001$).
  - However, provider focus groups reported that in certain instances, providers may code diagnoses other than nonspecific URI (such as bronchitis) to be more specific on the patient's illness and to avoid triggering any URI EOC. If providers avoid using the diagnosis codes that trigger the nonspecific URI episode, particularly for patients they expect will demand antibiotics regardless of their condition, this may help explain some of the reductions in antibiotic use we observe for nonspecific URI episodes.
- **Antibiotic use** for pharyngitis and sinusitis episodes also declined statistically significantly more among episodes in Arkansas relative to the comparison group, although the magnitude of the relative change was small for both episodes.

Table A-3. Difference in the pre-post annual change in antibiotic use for Medicaid beneficiaries in Arkansas URI Episodes of Care relative to the comparison group, first 2 years of implementation (October 2012 through September 2014)

Outcome and time period	Pre-period adjusted mean, AR	Pre-period adjusted mean, CG	Test-period adjusted mean, AR	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	N
Antibiotic use for combined URI episodes (%)								**349,966**
Year One	63.8	65.2	59.1	62.5	−1.9 (−2.4, −1.3)	−2.9	<0.001	
Year Two	63.8	65.2	57.7	60.9	−1.7 (−2.2, −1.1)	−2.6	<0.001	
Overall	63.8	65.2	58.4	61.7	−1.8 (−2.1, −1.4)	−2.8	<0.001	
Antibiotic use for nonspecific URI episodes (%)								**349,966**
Year One	43.4	49.2	35.9	47.3	−5.7 (−6.6, −4.9)	−13.2	<0.001	
Year Two	43.4	49.2	32.3	45.2	−7.3 (−8.1, −6.4)	−16.7	<0.001	
Overall	43.4	49.2	34.3	46.3	−6.4 (−7.0, −5.8)	−14.8	<0.001	
Antibiotic use for pharyngitis episodes (%)								**323,041**
Year One	73.8	73.4	70.5	71.0	−0.9 (−1.6, −0.1)	−1.2	0.05	
Year Two	73.8	73.4	69.2	69.6	−0.9 (−1.6, −0.1)	−1.2	0.06	
Overall	73.8	73.4	69.9	70.3	−0.9 (−1.4, −0.3)	−1.2	0.01	
Antibiotic use for sinusitis episodes (%)								**131,552**
Year One	90.4	88.8	89.1	88.1	−0.7 (−1.4, 0.1)[Ŧ]	−0.7	0.13	
Year Two	90.4	88.8	87.1	86.2	−0.9 (−1.7, −0.2)	−1.0	0.05	
Overall	90.4	88.8	88.1	87.2	−0.8 (−1.3, −0.3)	−0.9	0.01	

AR = Arkansas; CG = comparison group; CI = confidence interval; D-in-D = difference-in-differences; URI = upper respiratory infection.

Note:

[Ŧ] 80% CI: Year one, Sinusitis (−1.2, −0.2). Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only.

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in the likelihood of a care coordination event in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in the likelihood of a care coordination event in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention group's baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the difference in likelihood of an antibiotic prescription fill. The estimates are multiplied by 100 to obtain percentage probabilities. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix A-2* for additional detail.

Source: RTI analysis of MAX/AMAX Medicaid Claims, 2011–2014.

- The declines in antibiotic use were driven by declines in the pediatric population; there were no differences in antibiotic use for episodes among adults in Arkansas relative to the comparison group (***Table A-1-3 and Table A-1-4*** in ***Sub-appendix A-1***). Given that children comprise 93 percent of URI episodes, it is not surprising that their antibiotic use is driving the overall results.

Table A-4 reports the D-in-D regression analysis on having a physician or ED visit subsequent to the triggering visit during the episode. Because results are similar across subtypes, we only report the results for all three types of URI episodes combined here for simplicity. ***Tables A-1-1*** and ***A-1-2*** in ***Sub-appendix A-1*** show the results by type of URI episode.

- There were **no statistically significant differences** in the probability of **having any physician visit** during the episode subsequent to the triggering event between Arkansas and the comparison group. The overall results continue to be driven by the results for children. There were no statistically significant differences in the probability of having any physician visit among children, but there was a statistically significant smaller increase in the probability of any physician visit among adults (***Tables A-1-3*** and ***A-1-4*** in ***Sub-appendix A-1***).
- However, there was a 0.6 percentage point greater decline in the likelihood of a **URI-related physician visit** for Arkansas relative to the comparison group after implementation ($p < 0.001$). These results were similar across all three types of URI episodes (***Table A-1-2*** in ***Sub-appendix A-1***).
- In contrast, the likelihood of **any ED visit** and **URI-related ED visits** increased during the URI episodes in Arkansas relative to the comparison group ($p < 0.05$). Although the likelihood of a URI-related ED visit increased for all three types of episodes, the likelihood of any ED visit increased for nonspecific URI and sinusitis episodes only (***Table A-1-1*** in ***Sub-appendix A-1***).
- Similarly, the probability of ED use for all three types of URI episodes combined increased among children. However, there were no significant differences in ED use among adults.
  - This finding is corroborated by reports from physicians that patients may seek care elsewhere when they are not given an antibiotic prescription at the initial visit. The ED use may also be substituting in part for URI-related physician visits.
  - Nonetheless, overall ED use for URIs remained low (approximately 1 percent for each type of URI episode) both before and after implementation of the URI episode.

Table A-4. Difference in the pre-post annual change in physician and ED visits for Medicaid beneficiaries in Arkansas URI Episodes of Care beneficiaries relative to the comparison group, first 2 years of implementation (October 2012 through September 2014)

Outcome and time period	Pre-period adjusted mean, AR	Pre-period adjusted mean, CG	Test-period adjusted mean, AR	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value
Any physician visit for all three types of URI episodes (%)							
Year One	15.9	18.5	15.3	18.9	−0.8 (−1.2, −0.4)	−5.1	0.001
Year Two	15.9	18.5	15.8	18.0	0.4 (0.02, 0.8)	2.6	0.08
Overall	15.9	18.5	15.6	18.5	−0.2 (−0.5, 0.04) ₮	−1.5	0.15
Any URI-related physician visit for all three types of URI episodes (%)							
Year One	6.0	6.5	5.1	6.2	−0.6 (−0.9, −0.4)	−10.5	<0.001
Year Two	6.0	6.5	4.8	5.9	−0.6 (−0.8, −0.3)	−9.7	<0.001
Overall	6.0	6.5	5.0	6.0	−0.6 (−0.8, −0.4)	−10.1	<0.001
Any ED visit for all three types of URI episodes (%)							
Year One	3.6	4.8	3.6	4.7	0.1 (−0.1, 0.3)	2.5	0.42
Year Two	3.6	4.8	3.7	4.4	0.4 (0.2, 0.5)	9.7	0.001
Overall	3.6	4.8	3.6	4.6	0.2 (0.1, 0.3)	5.9	0.01
Any URI-related ED visit for all three types of URI episodes (%)							
Year One	0.9	1.2	0.9	1.1	0.1 (0.1, 0.2)	16.1	0.01
Year Two	0.9	1.2	0.9	1.1	0.1 (0.1, 0.2)	16.8	0.004
Overall	0.9	1.2	0.9	1.1	0.1 (0.1, 0.2)	16.5	<0.001

AR = Arkansas; CG = comparison group; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; URI = upper respiratory infection.

Note:

₮ 80% CI Overall URI (−0.4, −1.3). Standard statistical practice is to use CIs of 90% or higher. Eighty percent CIs are provided here for comparison purposes only.

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in the likelihood of a care coordination event in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in the likelihood of a care coordination event in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention group's baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the difference in likelihood of a physician or ED visit. The estimates are multiplied by 100 to obtain percentage probabilities. The regression-adjusted D-in-D estimates represent the average treatment effect *on the treated*, whereas the regression-adjusted means represent the average treatment effect. As a result, the regression-adjusted D-in-D and the D-in-D calculated from the adjusted means will differ. The adjusted D-in-D may not match the D-in-D calculated from the adjusted means because these are methodologically distinct in nonlinear specifications. See *Sub-appendix A-2* for additional detail.

The weighted N for all regression analyses was 804,559.

Source: RTI analysis of MAX/AMAX Medicaid Claims, 2011–2014.

A.2.2 Did quality of care change within Arkansas URI episodes?

KEY INSIGHTS

- Receipt of appropriate treatment for URI episodes **increased more among children in Arkansas relative to the comparison group**.
- As expected, there was also a **greater increase in the use of strep tests for children diagnosed with pharyngitis** in Arkansas relative to the comparison group.

Table A-5 reports the results of the D-in-D regression analyses on the receipt of appropriate treatment for a URI diagnosis among children ages 1 to 18. Appropriate treatment is defined as the percentage of children diagnosed with a URI, other than pharyngitis, who did not receive an antibiotic within 3 days of the diagnosis. We report regression-adjusted D-in-D annual estimates individually for the first 2 years after the implementation of the URI episodes, along with an overall -D-in-D estimate for all years combined.

- Receipt of **appropriate treatment among children** increased for URI episodes in both Arkansas and the comparison group, but it increased by 3.9 percentage points more in Arkansas ($p < 0.001$). The effect of the EOC on the probability of appropriate treatment for URI was driven by a 7.4 percentage point greater increase among nonspecific URI EOCs relative to the comparison group ($p < 0.001$).
- Among children diagnosed with sinusitis, there was a small but statistically significant increase in the probability of **not receiving an antibiotic** within the first 3 days of the episode relative to the comparison group. The increase is consistent with the goals of the EOC model in Arkansas because antibiotic use was tracked among PAPs in Arkansas.

Table A-5. Difference in the pre-post annual change in appropriate treatment for child Medicaid beneficiaries in Arkansas URI Episodes of Care relative to the comparison group, first 2 years of implementation (October 2012 through September 2014)

Outcome and time period	Pre-period adjusted mean, AR	Pre-period adjusted mean, CG	Test-period adjusted mean, AR	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	N
Nonspecific URI and sinusitis combined (%)								**288,168**
Year One	47.2	43.7	53.2	45.5	4.1 (3.2, 5.0)	8.7	<0.001	
Year Two	47.2	43.7	54.3	47.2	3.6 (2.6, 4.6)	7.6	<0.001	
Overall	47.2	43.7	53.7	46.3	3.9 (3.2, 4.5)	8.2	<0.001	
Nonspecific URI (%)								**213,863**
Year One	60.9	54.4	69.1	55.8	6.9 (5.9, 8.0)	11.4	<0.001	
Year Two	60.9	54.4	71.6	57.3	8.0 (7.0, 9.1)	13.2	<0.001	
Overall	60.9	54.4	70.2	56.5	7.4 (6.7, 8.2)	12.2	<0.001	
Sinusitis (%)								**74,304**
Year One	9.6	12.6	10.4	12.5	0.8 (−0.1, 1.8) ₸	8.7	0.14	
Year Two	9.6	12.6	10.9	13.3	0.7 (−0.3, 1.7)	7.5	0.24	
Overall	9.6	12.6	10.7	12.9	0.8 (0.1, 1.5)	8.1	0.06	

AR = Arkansas; CG = comparison group; CI = confidence interval; ED = emergency department; D-in-D = difference-in-differences; URI = upper respiratory infection.

Note:

₸ 80% CI: Year one, Sinusitis (0.1, 9.4). Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only.

Denominator: All children age 1 to 18 at the time of the URI diagnosis, who had an ED or outpatient visit with only a diagnosis of nonspecific upper respiratory infection (URI). *Numerator*: Children who were not dispensed an antibiotic. (NQF 0069)

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in the likelihood of a quality of care event in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in the likelihood of a quality of care event in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention group's baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the difference in likelihood of a quality of care event. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix A-2* for additional detail.

Data source: RTI analysis of MAX/AMAX Medicaid Claims, 2011–2014.

Table A-6 reports the results of the D-in-D regression analyses on receipt of a strep test for children who were diagnosed with pharyngitis and received an antibiotic.

- The overall percentage of pharyngitis episodes that include a **strep test increased** from 54 percent at baseline to 65 percent over the first 2 years of the episode implementation in Arkansas. The percentage receiving a strep test also increased in the comparison group, but there was a 9.4 percentage point greater increase among episodes in Arkansas relative to the comparison group ($p < 0.001$). The increase is consistent with the goals of the EOC model in Arkansas because strep tests rates are a quality metric for PAPs in Arkansas.

Table A-6. Difference in the pre-post annual change in strep tests for child Medicaid beneficiaries diagnosed with pharyngitis in Arkansas URI Episodes of Care relative to the comparison group, first 2 years of implementation (October 2012 through September 2014)

Outcome and time period	Pre-period adjusted mean, AR	Pre-period adjusted mean, CG	Test-period adjusted mean, AR	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value
Pharyngitis (%)							
Year One	53.7	53.1	62.0	53.9	7.7 (6.4, 8.9)	14.3	<0.001
Year Two	53.7	53.1	68.3	56.6	11.2 (9.9, 12.5)	20.9	<0.001
Overall	53.7	53.1	65.1	55.2	9.4 (8.5, 10.3)	17.5	<0.001

AR = Arkansas; CG = comparison group; D-in-D = difference-in-differences; URI= upper respiratory infection.

Denominator: Children 3 to 18 years old, with a negative medication history, who had an outpatient visit, an observation visit, or an emergency department visit with only a diagnosis of pharyngitis and a dispensed antibiotic for that episode of care. *Numerator*: A group A streptococcus (strep) test in the 7-day period from 3 days prior to the episode start date through 3 days after the episode start date. https://www.qualitymeasures.ahrq.gov/summaries/summary/49702.

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in the likelihood of a quality of care event in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in the likelihood of a quality of care event in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention group's baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the difference in likelihood of a quality of care event. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix A-2* for additional detail. The total weighted N is 145,483.

Data source: RTI analysis of MAX/AMAX Medicaid Claims, 2011–2014.

A.2.3 Did Medicaid expenditures change within Arkansas URI episodes?

KEY INSIGHTS

- **Overall and URI-related expenditures for professional and outpatient services increased** from the baseline to the post period.
- However, **average prescription (antibiotic and any drug) expenditures did not change** from the baseline period to the post period.
- These findings are generally consistent with Arkansas's self-reported findings on annual adjusted average episode expenditures and antibiotic-related expenditures.

Table A-7 displays the adjusted average expenditures for Arkansas URI episodes from 2011 to 2014.

- Average adjusted **expenditures for professional and outpatient services**[29] during the URI episode increased over the study period, from $206 during the baseline period to $211 in 2013 and $221 in 2014. Compared to the baseline adjusted average, there was an increase of $10.39 ($p < 0.001$) per episode in the post period overall.
- Average adjusted **URI-related expenditures for professional and outpatient services** also increased over the study period, from $64 per episode in the baseline period to $65 in 2013 and $66 in 2014. Compared to the baseline period adjusted average, there was an increase of $1.10 ($p < 0.001$) per episode in the post-test period overall.
  - Because this increase is relatively small and we used actual expenditures for this analysis (i.e., not adjusted for inflation), this increase may be the result of increases in prices for health services over time.
- Average adjusted **expenditures for any prescriptions** filled during the episode did not change from the baseline period to 2013 but decreased slightly in 2014. Compared to the baseline period adjusted average, there was a decrease of $2.22 ($p = 0.012$) per episode in 2014; however, there was no overall difference in the change in average expenditures for prescriptions from the baseline period to the post period.
- Average adjusted expenditures for antibiotic prescriptions filled during the episode increased from $18 per episode in the baseline period to $20 in 2013 before decreasing to $17 in 2014. Compared to the baseline period adjusted average, there was an increase of $1.64 ($p < 0.001$) per episode in 2013 and a decrease of $1.40 ($p < 0.001$) in 2014. There was not a significant difference in the **change in antibiotic expenditures overall**.

[29] Expenditures for professional and outpatient services include all expenditures included in the "Other Therapy" file in the Medicaid MAX file. This includes physician services, lab/X-ray, clinic services, home health, hospice, and outpatient hospital institutional claims. We do not include inpatient expenditures because episodes with inpatient claims were excluded from Arkansas's URI EOCs.

Table A-7. Change in adjusted average Medicaid FFS expenditures for Arkansas URI episodes in 2011 through 2014

Outcome	Pre-period adjusted mean	Post-period adjusted mean	Regression-adjusted marginal effect (90% confidence interval)	Relative difference (%)	p-value
Professional and outpatient expenditures ($)					
Year One	205.51	211.21	5.71 (2.46, 8.96)	2.8	0.004
Year Two	205.51	221.17	15.66 (11.95, 19.36)	7.6	<0.001
Overall	205.51	215.90	10.39 (7.94, 12.84)	5.1	<0.001
URI-related professional and outpatient expenditures ($)					
Year One	64.36	64.93	0.57 (0.28, 0.86)	0.9	0.001
Year Two	64.36	66.06	1.70 (1.37, 2.03)	2.6	<0.001
Overall	64.36	65.47	1.10 (0.88, 1.32)	1.7	<0.001
All prescription expenditures ($)					
Year One	59.51	60.26	0.74 (−0.76, 2.25)	1.3	0.42
Year Two	59.51	57.29	−2.22 (−3.67, −0.77)	−3.7	0.01
Overall	59.51	58.86	−0.65 (−1.70, 0.40)	−1.1	0.31
Antibiotic expenditures ($)					
Year One	17.91	19.55	1.64 (1.31, 1.97)	9.2	<0.001
Year Two	17.91	16.50	−1.40 (−1.72, −1.09)	−7.8	<0.001
Overall	17.91	18.11	0.21 (−0.02, 0.44) ₸	1.2	0.13

CI = confidence interval; FFS = fee-for-service; URI = upper respiratory infection.

Note:

₸ The 80% CI for overall antibiotic expenditures is (0.03, 0.39). Standard statistical practice is to use CIs of 90% or higher. Eighty percent CIs are provided here for comparison purposes only.

How to interpret the findings: A *negative* value corresponds to a *decrease* in expenditures and a *positive* value corresponds to an increase. The relative difference is the regression estimate as a percentage of the baseline period adjusted mean.

Methods: An ordinary least squares model was used to obtain estimates for differences in expenditures. All analyses used actual expenditures not adjusted for inflation. The total weighted N is 403,401.

Data source: RTI analysis of MAX/AMAX Medicaid Claims, 2011–2014.

A.2.4 Discussion and limitations

The URI EOC was designed prior to the start of the SIM Initiative, and only the last year of the analytic period for this evaluation overlaps with the first year of the SIM Initiative. Thus, findings are unlikely to be attributable to SIM Initiative activities, although the SIM Initiative did support AHIN, the platform through which PAPs received performance metric information, and the EBPS, the algorithm that determined risk/gain sharing payment information for PAPs. In general, this evaluation seeks to understand the early experience of implementing the URI EOC. Inappropriately prescribing antibiotics for children is common (Hersh et al., 2011). A primary

goal of the URI episode was to reduce unnecessary antibiotic prescribing in Arkansas. Our findings indicate that the URI EOC successfully reduced antibiotic use for URI episodes. We found that antibiotic use for nonspecific URIs declined from 44 percent at baseline to 34 percent over the first 2 years of the EOC implementation. These results are very similar to reports from Arkansas that antibiotic use declined from 45 percent in the baseline year to 34 percent in the second performance year for nonspecific URI episodes. Although antibiotic use also declined in the comparison group and nationally (CDC, 2017), the declines in Arkansas were statistically significantly greater than the declines in the comparison group. We also found small but significant declines in antibiotic use among the sinusitis and pharyngitis episodes. Similarly, we found that the percentage of children with nonspecific URI or sinusitis episodes who were *not* prescribed an antibiotic within 3 days increased substantially for Arkansas episodes relative to the comparison group. Focus groups indicated that some providers are educating their patients about antibiotic use, which may explain some of the decline we observe. Providers noted that patient education is difficult, takes time, and is not typically reimbursable; however, patient education is a valuable investment in adjusting patient behaviors to align with episode quality outcomes. Consumers also reported that providers were intentional about prescribing antibiotics. Providers may have made changes in clinical practice that resulted in fewer prescriptions for antibiotics as a result of the built-in incentives and tracking in the URI episode.

Even so, the decline in antibiotic use may not be attributed entirely to the URI EOC. Provider focus groups reported that in certain instances, providers may use diagnoses codes that are more specific so as not to trigger the URI EOC, especially for nonspecific URIs. According to numbers reported by Arkansas, the number of nonspecific URIs declined by 25 percent from 2012 to 2014. Over the same time period, our sample had a 22 percent decline in the number of nonspecific URIs, while the comparison group experienced a 10 percent decline. If providers in Arkansas avoided diagnosing patients with a URI episode to avoid triggering the episode, especially if these patients are likely to be high cost or more likely to use an antibiotic, then selection bias may be introduced during the post period, producing more favorable results. Given that the decline in antibiotic use and improvement in appropriate treatment for children results were both largely driven by the findings for the nonspecific URI episode, some of the change in these outcomes may be attributed to modifications in provider coding of diagnoses triggering the URI episode.

Although there was no difference in odds of a physician visit during the episode, odds of URI-specific physician visits declined in Arkansas relative to the comparison group. These findings are consistent with the expectation of the URI EOC. Arkansas sets thresholds for the average cost per URI episode to identify costs that are "acceptable" and "commendable"; the acceptable threshold rates are $67, $80, and $87 for nonspecific URI, sinusitis, and pharyngitis, respectively. The most recent Medicaid fee schedule in Arkansas indicates that provider reimbursement of an evaluation and management visit can range between $14 and $137 in 2017 (CMS, 2016b). Thus, an additional visit would likely place the provider outside the spending

threshold for the episode. By creating an incentive to lower costs for URI episodes, providers appear to be less likely to follow up with the patient by having the patient return to the clinic. It may be that the providers are following up with beneficiaries by telephone or through patient portals. Providers may also be effectively educating their patients that antibiotics are not appropriate and a follow-up clinic visit is not required during the episode time period.

Along with the decline in URI-related physician visits, there was a corresponding slight increase in the probability of an ED visit (for any reason and for a URI visit) during the Arkansas episodes relative to the comparison group. This suggests that visiting the ED may have substituted for some additional physician visits. Physician focus groups suggested that patients who are not prescribed an antibiotic by the first provider they see for their URI (the PAP) may visit additional providers and perhaps the ED to obtain antibiotics for their URI. Providers expressed frustration with behavior they perceived as being outside of their control; if the patient wanted an antibiotic or sought further medical assistance he or she could visit the ED, particularly after clinic or office hours.

Arkansas's rate of strep tests for those diagnosed with pharyngitis and prescribed antibiotics improved relative to the comparison group. Strep test use was the only quality measure that a PAP had to meet a minimum threshold for to be eligible for gain sharing, so it is not surprising that the strep test use rate increased for Arkansas episodes relative to the comparison group.

We also found that overall and URI-related expenditures for professional and outpatient services increased from the baseline to the post period while prescription expenditures (including those for antibiotics) were unchanged. Arkansas reported that average expenditures for nonspecific URI and sinusitis declined slightly from 2012 to 2015; $70 to $68 (sinusitis) and $56 to $54 (nonspecific). However, there was slight increase among those with pharyngitis during this timeframe ($71 to $73). Our findings are similar in overall magnitude, but we found a slight increase in overall expenditures. Arkansas reported a 28 percent reduction in antibiotic use from 2012 relative to 2015 while episode costs remained flat despite an increase in drug prices. Similarly, our results indicated that there was no overall change in expenditures for antibiotics from the baseline to the post period, despite also observing declines in antibiotic use during the episode.

Our results should be interpreted with caution for several reasons. First, because the comparison states used in this analysis have a large percentage of Medicaid beneficiaries enrolled in Medicaid managed care plans, we were only able to evaluate expenditures in a pre-post analysis. Without a comparison group, we are unable to eliminate the influence of general, secular trends in expenditures that may be occurring irrespective of the URI episodes. Moreover, the pre-post expenditure analyses were not adjusted for inflation, so any increases we observe could be in part because of inflation. Second, our findings indicating a reduction in antibiotic use

may be in part the result of selection bias where providers trigger an episode when they can predict patient behavior related to antibiotic use. Finally, we assume that patients are visiting the ED as a secondary way to obtain either antibiotics or other medical attention. We would expect a higher prescription rate in the ED during the post years relative to the baseline years because ED providers may be less aware of triggering the URI episode, but we are unable to test this assumption because pharmacy claims have only the National Provider Identifier of the prescriber, and not where the prescription was prescribed.

In summary, we found that the URI EOC was effective in improving clinical outcomes for URIs—antibiotic use declined, URI-related physician visits declined, appropriate care for children improved, and strep tests for pharyngitis episodes increased. However, we also found unintended consequences resulting from the episode. Namely, physicians reported changing their diagnosis coding practices to avoid triggering a nonspecific URI episode in focus groups, and ED visits increased, perhaps in part because of patients seeking antibiotics elsewhere after not receiving a prescription at their initial visit.

A.3 Model-Specific Impact Findings: *Arkansas's Perinatal Episode*

The perinatal EOC was designed to encourage guideline-concordant care, increase screening to minimize pregnancy complications, and reduce pregnancy-related expenditures. Participation in the perinatal EOC was mandatory for providers who accepted Medicaid patients so all Medicaid deliveries that met the perinatal inclusion criteria were reached by the model. Two of Arkansas's commercial payers—Arkansas Blue Cross Blue Shield and QualChoice—also included the perinatal EOC in their payment models. This analysis focuses on the deliveries paid for by Medicaid.

KEY INSIGHTS

- After 2 years, perinatal EOCs in Arkansas relative to a comparison group showed mixed findings for utilization outcomes. We found:
  - **Relative increases in inpatient use and readmissions.**
  - **Greater declines in ED visits.**
- Even so, we found **improvements in most quality metrics**, especially the three screening measures required for shared savings (HIV, Group B streptococcus [GBS], and chlamydia all **statistically significant**).
- Pregnancy-related expenditures also declined during the first 2 years of the perinatal EOC implementation (no comparison group due to data limitations).
- The perinatal EOC model shows promise to improve quality of care during pregnancy while reducing costs; however, there may be unintended consequences that increase hospital utilization.

A perinatal EOC is triggered by a singleton live birth, where the delivery is coded on a professional claim and a corresponding facility claim. The EOC encompasses the period beginning 280 days before the delivery date and continues through 60 days after the delivery date. For the perinatal EOC, the Principal Accountable Provider (PAP) is the Medicaid provider or provider group that performs the delivery.

Box 6: Perinatal EOC: How payers pay for value

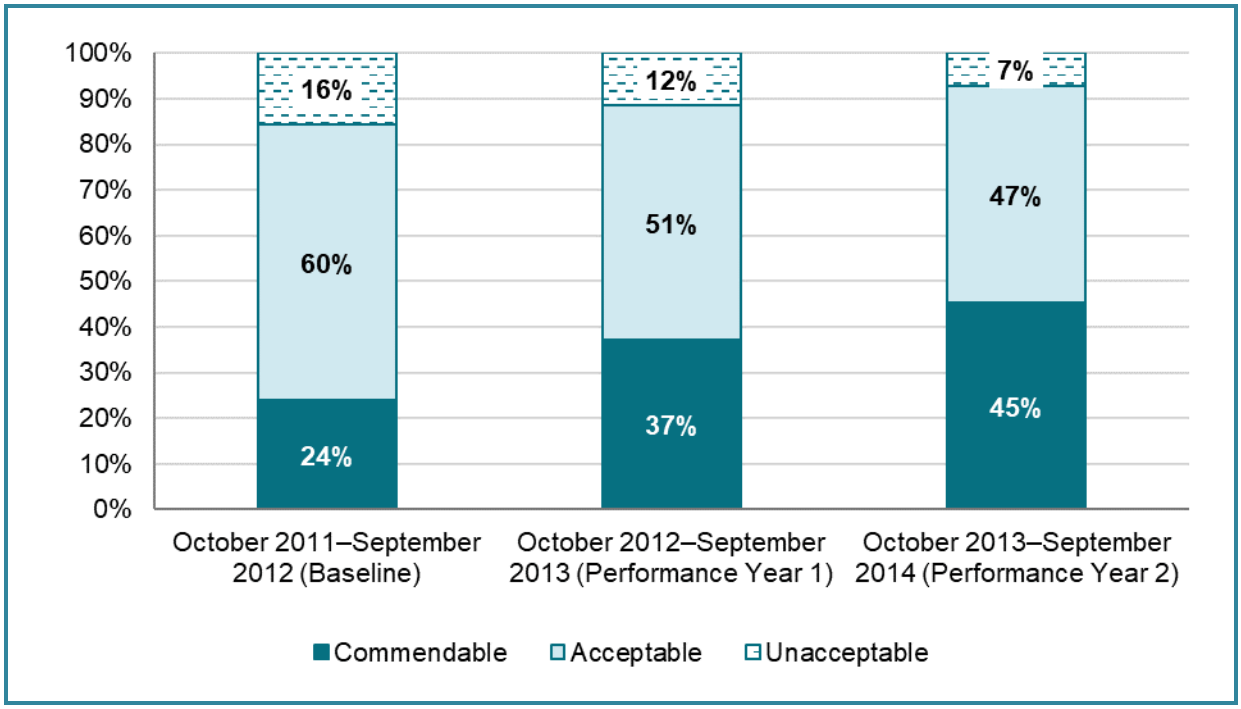
- **Quality:** PAPs must screen for HIV, GBS, and chlamydia in at least 80 percent of episodes during the measurement year to be eligible for shared savings.
- **Cost:** Compare costs to thresholds—if average costs exceed a certain threshold, pay penalties; if below a certain threshold, eligible for shared savings.

The state analyzes Medicaid claims to retrospectively evaluate the PAP's costs and quality metrics for a 1-year performance period (October to September of each year). PAPs that have at least five deliveries during the performance period can share in the savings or pay back excess costs of the perinatal episode. To receive shared savings, the PAP must pass certain quality metrics, and additional quality metrics are tracked and reported to the PAP. For the perinatal episode, PAPs must screen for HIV, GBS, and chlamydia for at least 80 percent of perinatal episodes to be eligible for shared savings. In addition, the state tracks the following quality measures: number of ultrasounds; screenings for gestational diabetes, asymptomatic bacteriuria, and Hepatitis B; and caesarian section (C-section) rates. Perinatal EOCs are excluded from determination of a PAP's performance status for several reasons, including limited prenatal care between the start of the EOC and 60 days prior to delivery, delivering provider did not provide any perinatal services, and the EOC has no professional claim for delivery. In addition, EOCs with select pregnancy-related conditions that may cause a complicated birth and other comorbidities were excluded.[30]

According to data reported by Arkansas, the percentage of providers with average costs below the commendable threshold (thus making them eligible for shared savings) increased from 24 percent in the baseline year (October 2011–September 2012) to 45 percent by performance Year Two (October 2013–September 2014) (***Figure A-5***) (ACHI, 2015, 2016), whereas the percentage of providers with unacceptable cost thresholds declined from 16 to 7 percent. These findings are corroborated by what we heard during focus groups and interviews. Obstetricians said that the EOC was "rein[ing] in the few specialists who do over-test mothers during pregnancy or perform too many elective C-sections" (RTI International, 2018).

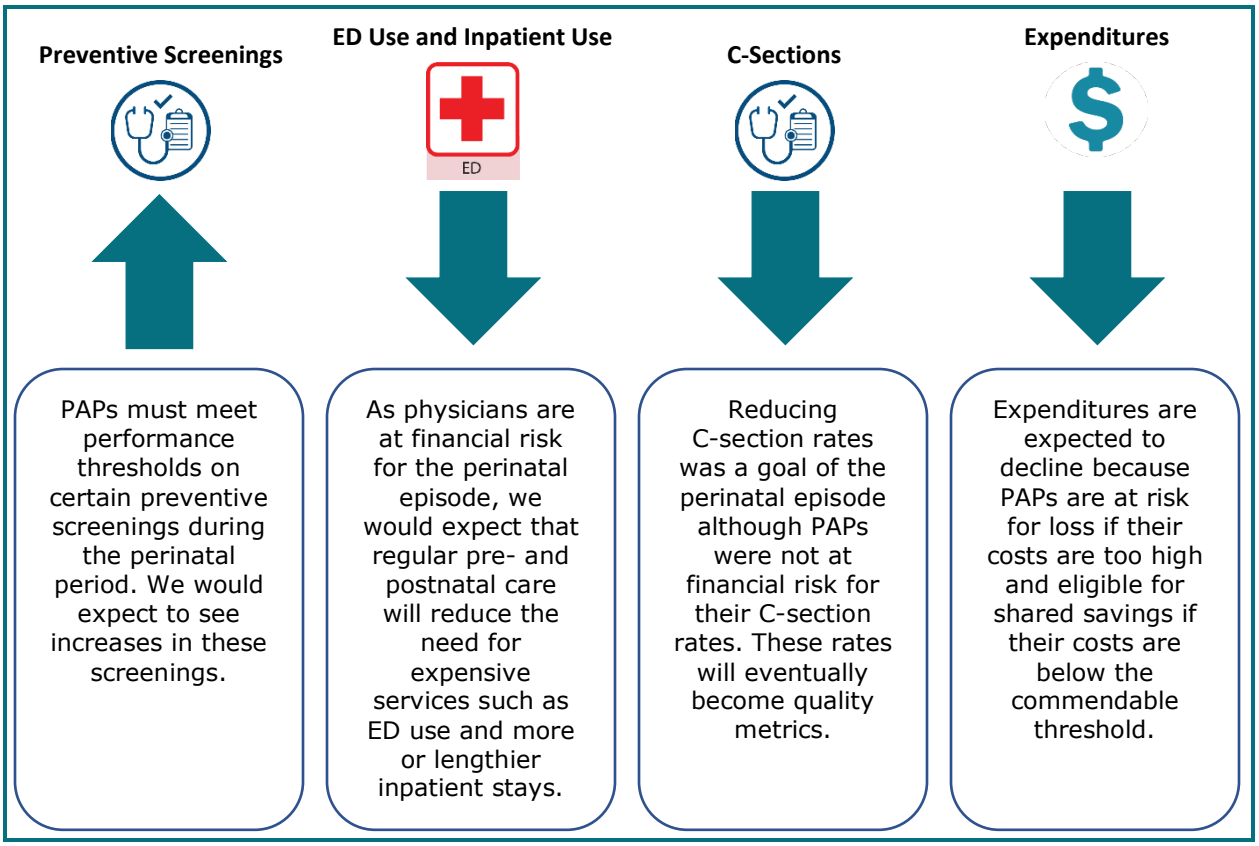
[30] Exclusions for pregnancy-related conditions include amniotic fluid embolism, obstetric blood clot embolism, placenta previa, severe preeclampsia, multiple gestation ≥3, late effect complications of pregnancy/childbirth, puerperal sepsis, suspected damage to fetus from viral disease in mother, cerebrovascular disorders. Other comorbidities exclusions include cancer, cystic fibrosis, congenital cardiovascular disorders, DVT/pulmonary embolism, other phlebitis and thrombosis, end-stage renal disease, sickle cell, Type I diabetes.

Figure A-5. Percentage of providers in the commendable, acceptable, and unacceptable cost thresholds



Several outcomes are expected to change because of the perinatal EOC. Because of the quality metrics that are required to qualify for shared savings, we expect to see increases in the screening rates for HIV, GBS, and chlamydia. In addition, we expect screening rates for gestational diabetes, asymptomatic bacteriuria, and Hepatitis B to improve and C-section rates to go down because of tracking and reports to providers. Further, because providers are at financial risk for higher than expected costs, we expect potentially preventable more expensive utilization, such as pre- and post-delivery ED visits and inpatient stays, to decline. We also expect pregnancy-related expenditures to decline (see ***Figure A-6***).

Figure A-6. Expected direction of outcome measures



ED = emergency department; C-section = cesarean section; PAP = Principal Accountable Provider.

To assess the effects of Arkansas's perinatal EOC on utilization and quality of care, we addressed the following research questions:

- Did the perinatal EOC payment model reduce utilization of unnecessary costly services such as ultrasounds, ED visits, and non–delivery-related inpatient stays?
- Did the perinatal EOC payment model improve the quality of care as measured by the percentage of pregnant women with selected screening procedures?
- Did the EOC payment model have an impact on C-section delivery rates?
- Did Medicaid expenditures for perinatal episodes change in Arkansas after the implementation of the perinatal EOC model?

To address the first three research questions, we used a difference-in-differences (D-in-D) regression model, incorporating a comparison group to control for underlying changes in the health care environment. To identify perinatal episodes, we used the description contained in the EOC Provider Manual to define our evaluation's perinatal EOC (Arkansas Medicaid, n.d.). However, due to data constraints, we deviated from Arkansas's Medicaid definition in three key ways: (1) we did not exclude episodes with delivery providers who did not provide perinatal

services for the mother; (2) we did not require both a facility and a professional claim for delivery to include the episode in the analysis; and (3) we did not restrict the analysis to PAPs with a minimum of 5 perinatal episodes in the year. As a result, our analysis includes episodes that were not included in Arkansas's calculations for risk and gain sharing and our findings may understate the full impact of the EOC on quality and expenditure outcomes. However, our research objective is not to exactly replicate the risk and gain sharing calculations for providers, but rather to determine whether the perinatal EOC model changed physician behavior in Arkansas and thus key outcomes for Medicaid deliveries in the state. As such, we believe the more inclusive sample is appropriate to answer the research questions presented here.

We used Medicaid claims (MAX) data to examine the two performance years before (October 2010 to September 2012) and the two performance years after (October 2012 to September 2014) the start of the perinatal EOC. The intervention group comprises perinatal episodes in Arkansas, and the comparison group comprises perinatal episodes for Medicaid beneficiaries in Missouri and Mississippi. Because perinatal episodes were implemented statewide in Arkansas, we used a comparison group from similar states. Both comparison states had similar income limits for traditional and poverty-related Medicaid eligibility. While there are some contextual differences between Arkansas and these comparison states, such as both comparison states being non-Medicaid expansion states, beneficiaries within these states were similar to Arkansas beneficiaries on a number of characteristics.

Arkansas expanded Medicaid through the private option in 2014. Under the private option, women of childbearing age with incomes up to 138 percent of the federal poverty level (FPL) can receive premium assistance to purchase private coverage from the health insurance marketplace. Therefore, in 2014, many women who would have qualified for Medicaid only when they became pregnant were already covered under the private option and hence received maternity benefits through this plan. Given that coverage was provided through commercial plans, data on private option enrollees are not readily available. As such, we expect to see fewer Medicaid FFS covered births in the 2014 MAX files and a different demographic composition of women with Medicaid-covered deliveries in Arkansas in 2014 compared to previous years. We examined whether the characteristics of women with perinatal episodes changed after the expansion of Medicaid through the private option in Arkansas (see ***Table A-1-5*** and ***Table A-1-6*** in ***Sub-appendix A-1***). We found that beneficiaries with perinatal episodes in Arkansas were more likely older, non-white, and enrolled in traditional Medicaid in 2014 compared to previous years, whereas the composition of beneficiaries with episodes in 2014 is unchanged for the comparison group. As a result, our findings for 2014 may be biased toward less favorable findings for Arkansas episodes relative to the comparison group.

Because the comparison group states are Medicaid managed care states, we are not able to compare expenditures for Arkansas relative to the comparison group.[31] Instead, to address the fourth research question, we did a pre-post analysis comparing expenditures for the Arkansas episodes before and after the EOC model implementation. These results should be interpreted with caution, however, because without a comparison group, we are unable to eliminate the influence of general, secular trends in expenditures that may be occurring irrespective of the perinatal episodes. Moreover, the pre-post expenditure analyses were not adjusted for inflation, so any increases we observe could in part be the result of inflation.

For the D-in-D regression analysis, we constructed annual EOC-level propensity score weights to balance the intervention and comparison group on individual and county characteristics. The intervention group and weighted comparison group were similar at baseline on key demographic characteristics (***Table A-8***). A summary of the analytic methods is included below, and the methods are detailed in ***Sub-appendix A-2***.

Methods Snapshot for Impact Analysis
• **Study design:** D-in-D quasi-experimental design. We used an episode year–level model to compare outcomes for episodes before and after EOC implementation. For expenditures, we use a pre-post design.
• **Population**: The intervention group comprised Arkansas Medicaid beneficiaries with a singleton live birth from FY 2011 to FY 2014. The comparison group comprised similar singleton live births among Medicaid beneficiaries in Missouri and Mississippi.
• **Data:** MAX claims data from October 2010 to September 2014.
• **Sample:** Singleton live births among eligible Medicaid beneficiaries with full or pregnancy-related limited coverage during the month of delivery.
• **Measures:** Binary utilization (any inpatient use, postpartum ED use, and readmission 30 and 60 days post-delivery), and quality of care (C-section rates and preventive screenings) were modeled as a probability of occurrence during the episode. Other utilization measures (the number of ultrasounds, ED visits [prenatal, total], length of hospital stay during delivery) were measured as a count. Pregnancy-related expenditures were measured as average per member per month expenditures during the episode.
• **Statistical analysis:** Logistic regression (binary) models were used for the binary utilization and quality measures. Negative binomial models were used for the number of ED visits (prenatal, total). Ordinary least squares (OLS) models were used to model the number of ultrasounds and length of stay. All models were weighted by the propensity score. An OLS pre-post regression was used to model expenditures. Standard errors were clustered at the individual level to account for multiple episodes per beneficiary. The models adjusted for beneficiary-level demographic and health status variables and county-level socioeconomic variables.

[31] Medicaid managed care plans do not routinely submit expenditure data to CMS.

Table A-8. Weighted means and standardized differences prior to Arkansas perinatal Episode of Care implementation, Arkansas and comparison groups, 2012

Characteristic	Arkansas perinatal episodes	Comparison group	Standardized difference[a]	p-value
Weighted number of episodes	7,438	7,423		
Sociodemographic characteristics of beneficiaries with episodes				
Age at time of the episode (%)				
16 to 19	18.1	18.6	1.2	0.48
20 to 24	43.3	43.0	0.5	0.76
25 to 34	35.0	34.8	0.4	0.80
35 and older	3.6	3.6	0.01	1.00
Race (%)				
Black	26.7	27.1	0.4	0.83
Hispanic	5.7	5.9	0.7	0.64
Other	4.8	4.6	0.7	0.64
White	62.6	62.4	0.4	0.83
Disability (%)	5.8	5.9	0.4	0.80
Health risk score (CDPS score)	1.6	1.6	3.4	0.04
Poverty-related eligibility (%)	76.5	76.2	0.7	0.66
Months of full-Medicaid enrollment during prenatal period	9.1	9.1	0.3	0.87
Diabetes (%)	3.9	3.9	0.2	0.92
Asthma (%)	2.9	2.4	0.5	0.76
Hypertension (%)	1.7	1.7	0.6	0.72
Emergency department visit, 2011 (%)	33.7	33.6	0.2	0.92
Inpatient admission, 2011 (%)	9.7	9.7	0.2	0.92
Characteristics of county of residence for beneficiaries with episodes				
Metropolitan status (%)	53.9	55.2	2.4	0.14
Population at federal poverty level, 2012 (%)	20.7	20.7	0.6	0.71
Hospital beds per 1,000, 2010	3.8	4.5	19.6	<0.001
Median age, 2010	37.9	37.3	17.6	<0.001
Uninsured, ages <65, 2012 (%)	19.5	18.2	46.5	<0.001

CDPS = Chronic Illness and Disability Payment System (CDPS score is a risk-adjustment score calculated from ICD9 and ICD10 diagnosis codes included on hospital and outpatient claims, with larger CDPS scores corresponding to a larger number of comorbidities or a more severe set of comorbidities).

[a] Absolute standardized differences (SDs) are expressed as percentages. <10% SD is ideal for inferring balance between groups. To balance the population characteristics for the claims-based analyses, we estimated propensity scores for all individuals from the comparison group for each year of the analysis. After propensity score weighting, the standardized differences between the weighted comparison group means and intervention group means were all well under the standard 10% threshold for individual-level variables; however, a few county-level variables exceed the threshold. Nonetheless, the differences in the county-level means is still quite small. County-level variables are shown here to provide context. Because there was little variation in county-level characteristics, balancing on these variables difficult. Therefore, to optimize the balance and avoid extreme weights, county-level covariates were excluded from the propensity score model.

A.3.1 Did utilization change within Arkansas perinatal episodes?

KEY INSIGHTS

- The **likelihood of any inpatient utilization and the likelihood of a 30- or 60-day readmission post-delivery increased** for Arkansas episodes relative to the comparison group during the second year (2014) of the perinatal EOC.
  - This increase could in part be the result of the change in the composition of beneficiaries with perinatal episodes in Arkansas in 2014, which represented a sicker cohort than in previous years.
  - Providers also reported shifting caring for non–pregnancy-related conditions to admissions separate from the delivery to keep delivery episode costs down, which could partly explain the increase in readmissions post-delivery.
- Even so, the **overall use of the ED did not change whereas the number of ED visits declined slightly during the prenatal period and for the episode overall** in Arkansas relative to the comparison group, which is in line with the goal of the episode to better manage care and reduce costly utilization.

In ***Table A-9***, we present the results of the D-in-D regression analyses for the number of ultrasounds, any inpatient use, ED visits (prenatal, postpartum, total), length of hospital stay during delivery, and readmission 30 and 60 days post-delivery. We report regression-adjusted D-in-D estimates individually for the first 2 years after the implementation of the perinatal EOC, along with an overall D-in-D estimate for all years combined.

- There was a small, but statistically significant, greater increase in the average number of **ultrasounds performed** during pregnancy in Arkansas relative to the comparison group ($p < 0.001$). The state tracked ultrasound rates during this time period but did not hold providers financially accountable for their performance.
- The perinatal EOC model in Arkansas was also associated with a small, but statistically significant, increase in **hospital utilization during the prenatal period** of the episode. There was a 1.2 percentage point (17.5 percent) greater increase in the likelihood of an inpatient stay during the prenatal period and a 0.1-day increase in the length of stay for the delivery ($p < 0.05$). The increase in percentage of episodes with an inpatient stay was the result of an increase in Year Two of the model; we did not observe a change in inpatient utilization for Arkansas episodes relative to the comparison group in Year One of the model.
- Similarly, there was a statistically significant 34 percent relative increase in the likelihood of both a **30- and 60-day readmission post-delivery** in Year Two. Likewise, there was an 18 percent overall relative increase in a 60-day readmission ($p < 0.10$), but no significant overall changes were observed in a 30-day readmission.
  - Provider focus groups indicated that providers may not handle non–pregnancy-related conditions during the delivery to avoid incurring additional episode costs. If providers are shifting non–pregnancy-related conditions to separate admissions, these would appear as readmissions after delivery.

Table A-9. Difference in the pre-post annual change in utilization for Medicaid beneficiaries in Arkansas perinatal Episodes of Care relative to the comparison group, first 2 years of implementation (October 2012–September 2014)

Outcome and time period	Pre-period adjusted mean, AR	Pre-period adjusted mean, CG	Test-period adjusted mean, AR	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
Number of ultrasounds during the episode								
Year One	2.3	3.4	2.7	3.6	0.1 (0.003, 0.2) ǂ	0.03	0.11	58,381
Year Two	2.3	3.4	3.0	3.7	0.3 (0.2, 0.5)	0.2	<0.001	
Overall	2.3	3.4	2.8	3.7	0.2 (0.1, 0.3)	0.1	<0.001	
Any inpatient admissions during prenatal period (%)								
Year One	6.8	5.6	7.0	4.9	0.7 (−0.2, 1.7)	10.8	0.22	58,381
Year Two	6.8	5.6	8.4	4.8	1.7 (0.4, 3.0)	24.7	0.04	
Overall	6.8	5.6	7.7	4.9	1.2 (0.4, 2.0)	17.5	0.02	
Number of emergency department visits not leading to hospitalization during prenatal period								
Year One	0.9	1.3	0.8	1.2	−0.1 (−0.1, 0.2) ǂ	−7.8	0.13	58,381
Year Two	0.9	1.3	0.8	1.3	−0.1 (−0.3, −0.01)	−16.3	0.07	
Overall	0.9	1.3	0.8	1.2	−0.1 (−0.2, −0.03)	−11.9	0.02	
Length of hospital stay during delivery, days								58,381
Year One	2.2	2.4	2.2	2.3	0.1 (0.1, 0.3)	5.9	<0.001	
Year Two	2.2	2.4	2.2	2.4	0.02 (−0.1, 0.1)	1.1	0.62	
Overall	2.2	2.4	2.2	2.4	0.1 (0.03, 0.1)	3.6	0.004	
30-day readmission (%)§								54,175
Year One	1.7	1.2	1.5	1.1	−0.01 (−0.4, 0.4)	−0.4	0.98	
Year Two	1.7	1.2	2.6	1.0	0.6 (0.04, 1.1)	34.0	0.08	
Overall	1.7	1.2	2.1	1.0	0.3 (−0.1, 0.6) ǂ	16.2	0.19	
60-day readmission (%)§								54,175
Year One	2.1	1.6	2.0	1.4	0.1 (−0.4, 0.6)	4.0	0.78	
Year Two	2.1	1.6	3.2	1.3	0.7 (0.1, 1.3)	34.3	0.05	
Overall	2.1	1.6	2.6	1.3	0.4 (0.01, 0.8)	18.6	0.09	
Any emergency department visits not leading to hospitalization during postnatal period (%)§								54,175
Year One	8.6	15.4	7.8	14.7	−0.4 (−1.8, 1.1)	−4.4	0.66	
Year Two	8.6	15.4	8.5	14.3	0.6 (−1.6, 2.8)	7.4	0.64	
Overall	8.6	15.4	8.1	14.5	0.1 (−1.2, 1.4)	1.3	0.89	

(continued)

Table A-9. Difference in the pre-post annual change in utilization for Medicaid beneficiaries in Arkansas Perinatal Episodes of Care relative to the comparison group, first 2 years of implementation (October 2012–September 2014) (continued)

Outcome and time period	Pre-period adjusted mean, AR	Pre-period adjusted mean, CG	Test-period adjusted mean, AR	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
Total number of ED visits during the episode[§]								54,175
Year One	1.2	1.8	1.0	1.8	−0.1 (−0.2, −0.02)	−8.9	0.04	
Year Two	1.2	1.8	1.0	1.8	−0.2 (−0.3, −0.03)	−14.5	0.05	
Overall	1.2	1.8	1.0	1.8	−0.1 (−0.2, −0.1)	−11.6	0.01	

AR = Arkansas; CG = comparison group; CI = confidence interval; ED = emergency department.

Note:

[§] These outcomes were estimated only on episodes where the beneficiary had full Medicaid benefits during the 60-day period post-delivery.

[Ŧ] 80% CI: 0.2, 0.1, ultrasounds; 80% CI: −0.1, −0.01, emergency department visits during pregnancy; 80% CI: 0.003, 0.5, 30-day readmission. Standard statistical practice is to use CIs of 90% or higher. Eighty percent CIs are provided here for comparison purposes only.

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in payments or in the rate in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in payments or in the rate in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention groups baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The estimates are multiplied by 100 to obtain percentage probabilities. Negative binomial models were used for the number of ED visits (prenatal, total). The output is interpreted as average expected number of events. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix A-2* for additional detail.

Ordinary least squares models were used to model the number of ultrasounds and length of stay. The output is interpreted as the average number of ultrasounds or days in the hospital. The year-specific regression-adjusted D-in-D may not match the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights across these figures. See *Sub-appendix A-2* for additional detail.

Data source: RTI analysis of MAX/AMAX claims FY 2011–FY 2014.

– Moreover, the change in inpatient utilization and readmissions in Year Two may in part be the result of the change in composition of Arkansas beneficiaries with perinatal episodes in Year Two. As noted above, beneficiaries with perinatal episodes in 2014 in Arkansas have more risk factors for poor health than previous years, but there was no change in the composition of beneficiaries with episodes in the comparison group because the comparison states did not expand Medicaid.

- In contrast, the **number of ED visits** declined by 0.14 visits during the prenatal period and 0.17 visits over the entire episode ($p < 0.05$). There was no change in the likelihood of ED use during the postpartum period.
  - The reduction of the total number of ED visits is consistent with the goals of the episode, including better management of care for pregnant women and a reduction of pregnancy-related complications.

A.3.2 Did quality of care change within Arkansas perinatal episodes?

KEY INSIGHTS

During the first 2 years of perinatal EOC implementation:

- **The C-section rate declined faster in Arkansas** relative to the comparison group; however, the **difference between the two groups was not statistically significant**.
- As expected, the percentage of perinatal episodes with screenings for the **three measures required for shared savings (HIV, GBS, and chlamydia) increased in Arkansas** relative to the comparison group.
- Although **two other screening measures that are tracked and reported to providers also increased** in Arkansas episodes relative to the comparison group (asymptomatic bacteriuria and Hepatitis B), there was a **small decline in the probability of gestational diabetes screening** among perinatal EOC in Arkansas.

In ***Table A-10***, we present the results of the D-in-D regression analyses for our quality of care measures. We report regression-adjusted D-in-D annual estimates individually for the first 2 years after the implementation of the perinatal EOC along with an overall D-in-D estimate for all years combined.

- During the first 2 years of perinatal EOC implementation, the **C-section rate** declined faster in Arkansas relative to the comparison group; however, the difference between the two groups was not statistically significant.
- As expected, the percentage of perinatal episodes with **screenings** for the three measures required for shared savings (**HIV, GBS, and chlamydia**) statistically significantly increased in Arkansas relative to the comparison group.
  - Overall, HIV screenings increased from 91 to 93 percent among Arkansas episodes while declining in the comparison group, resulting in a 6.2 percentage point relative increase in HIV screenings in Arkansas ($p < 0.001$).
  - Likewise, screening for chlamydia increased in Arkansas while declining in the comparison group, leading to a relative increase of 9.5 percentage points for Arkansas episodes ($p < 0.001$).
  - Screening for GBS declined in both groups, but there was a 2.6 percentage point smaller decline observed in Arkansas episodes relative to the comparison group ($p < 0.05$).

Table A-10. Difference in the pre-post annual change in quality of care for Medicaid beneficiaries in Arkansas perinatal Episodes of Care relative to the comparison group, first 2 years of implementation (October 2012 to September 2014)

Outcome and time period	Pre-period adjusted mean, AR	Pre-period adjusted mean, CG	Test-period adjusted mean, AR	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	N
Caesarian section delivery (%)								58,381
Year One	32.4	29.6	30.8	29.3	−1.3 (−3.8, 1.3)	−4.0	0.40	
Year Two	32.4	29.6	29.9	28.9	−1.8 (−5.7, 2.0)	−5.7	0.44	
Overall	32.4	29.6	30.4	29.1	−1.6 (−3.8, 0.7)	−4.8	0.26	
HIV screening (%)								58,381
Year One	90.7	83.3	92.8	84.5	2.4 (0.4, 4.4)	2.6	0.05	
Year Two	90.7	83.3	94.0	80.5	10.4 (6.2, 14.5)	11.4	<0.001	
Overall	90.7	83.3	93.4	82.6	6.2 (4.0, 8.5)	6.9	<0.001	
Chlamydia screening (%)								58,381
Year One	77.8	83.1	81.7	81.7	5.8 (3.4, 8.2)	7.4	<0.001	
Year Two	77.8	83.1	84.1	77.7	13.5 (9.4, 17.6)	17.3	<0.001	
Overall	77.8	83.1	82.9	79.8	9.5 (7.2, 11.8)	12.2	<0.001	
Gestational diabetes screening (%)								58,381
Year One	85.4	83.2	84.9	86.2	−2.4 (−3.7, −1.1)	−2.8	0.002	
Year Two	85.4	83.2	83.4	82.2	−0.9 (−3.1, 1.3)	−1.0	0.52	
Overall	85.4	83.2	84.2	84.3	−1.7 (−2.9, −0.4)	−2.0	0.03	
Group B streptococcus screening (%)								58,381
Year One	82.2	86.3	78.6	84.1	−0.7 (−2.6, 1.2)	−0.9	0.52	
Year Two	82.2	86.3	78.2	76.0	6.1 (2.5, 9.8)	7.4	0.01	
Overall	82.2	86.3	78.4	80.2	2.6 (0.5, 4.6)	3.1	0.04	
Asymptomatic bacteriuria screening (%)								58,381
Year One	97.2	96.5	98.5	97.4	1.0 (0.0, 2.0)	1.1	0.09	
Year Two	97.2	96.5	98.7	96.3	3.8 (1.2, 6.4)	3.9	0.02	
Overall	97.2	96.5	98.6	96.9	2.4 (1.0, 3.7)	2.4	0.004	
Hepatitis B screening (%)								58,381
Year One	89.2	81.3	91.3	82.6	2.0 (−0.1, 4.1) ₸	2.2	0.11	
Year Two	89.2	81.3	92.9	79.4	9.2 (5.2, 13.3)	10.4	<0.001	
Overall	89.2	81.3	92.0	81.0	5.5 (3.3, 7.7)	6.2	<0.001	

(continued)

Table A-10. Difference in the pre-post annual change in quality of care for Medicaid beneficiaries in Arkansas perinatal Episodes of Care relative to the comparison group, first 2 years of implementation (October 2012 to September 2014) (continued)

AR = Arkansas; CG = comparison group; CI = confidence interval.

Note:

[Ŧ]Eighty percent CI for Hepatitis B Screening Year One is (0.4, 3.6). Standard statistical practice is to use CIs of 90% or higher. Eighty percent CIs are provided here for comparison purposes only.

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in the likelihood of a quality of care event in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in the likelihood of a quality of care event in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention groups baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the difference in likelihood of a quality of care event. The estimates are multiplied by 100 to obtain percentage probabilities. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix A-2* for additional detail.

Data source: RTI analysis of MAX/AMAX claims FY 2011–FY 2014.

- Although two other measures that are tracked and reported to providers also increased in Arkansas episodes relative to the comparison group (**asymptomatic bacteriuria and Hepatitis B screenings**), there was a small decline in the probability of **gestational diabetes screening** among perinatal EOC in Arkansas.
  - Screening for asymptomatic bacteriuria increased by 2.4 more percentage points in Arkansas relative to the comparison group ($p = 0.004$).
  - Overall, screening for Hepatitis B increased in Arkansas while declining slightly in the comparison group, leading to a relative increase of 5.5 percentage points for Arkansas episodes ($p < 0.001$).
  - Screening for gestational diabetes declined slightly in Arkansas while increasing in the comparison group, leading to a 1.7 percentage point decline in Arkansas episodes relative to the comparison group ($p < 0.05$).

A.3.3 Did Medicaid expenditures change within Arkansas perinatal episodes?

KEY INSIGHTS

- **Total pregnancy-related expenditures declined** among Arkansas perinatal episodes during the first 2 years of implementation, relative to the baseline period.
- These findings align with Arkansas's self-reported findings that pregnancy-related episode spending declined from 2012 to 2014.

Table A-11 displays the adjusted average combined pregnancy, delivery-related, and postpartum payments for Arkansas perinatal episodes from the baseline period (October 2010 to September 2012) through the first 2 years of perinatal EOC implementation (October 2012 to September 2014).

- The adjusted average **pregnancy-related expenditures** during the perinatal episode declined from $3,051 in the baseline period to $2,975 in Year One of EOC implementation and to $2,954 in Year Two. Adjusted expenditures declined by $86 overall during the first 2 years of implementation ($p < 0.001$).
- These findings are comparable to Arkansas's self-reported findings that also indicated a decline in perinatal spending (CMS, 2016b). Total average adjusted pregnancy-related payments were $3,508 in 2012 and $3,412 in 2014.

Table A-11. Pre-post change in expenditures for Medicaid beneficiaries in Arkansas perinatal Episodes of Care from the baseline period (October 2010 to September 2012) to the first 2 years of the post period (October 2012 to September 2014)

Outcome and time period	Pre-period adjusted mean	Post-period adjusted mean	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	Weighted N
Pregnancy-related expenditures during perinatal episodes ($)						26,744
Year One	3,050.85	2,974.82	−76.04 (−121.49, −30.59)	−2.49	0.01	
Year Two	3,050.85	2,954.26	−96.59 (−146.04, −47.15)	−3.17	0.001	
Overall	3,050.85	2,964.89	−85.97 (−119.47, −52.46)	−2.82	<0.001	

How to interpret the findings: A *negative* value corresponds to a *decrease* in payments. A *positive* value corresponds to an increase in payments. The relative difference is the pre-post estimate as a percentage of the intervention group's baseline period adjusted mean.

Methods: An ordinary least square model was used to obtain estimates for differences in expenditures.

Data source: RTI analysis of MAX/AMAX claims FY 2011–FY 2014.

A.3.4 Discussion and limitations

The perinatal EOC was designed prior to the start of the SIM Initiative, and only the last year of the analytic period for this evaluation overlaps with the first year of the SIM Initiative. Thus, findings are unlikely to be attributable to SIM Initiative activities, although the SIM Initiative did support AHIN, the platform through which PAPs received performance metric information, and the EBPS, the algorithm that determined risk/gain sharing payment information for PAPs. In general, this evaluation seeks to understand the early experience of implementing the perinatal EOC, which was intended to lead to better management of pregnant women in the outpatient setting to reduce pregnancy-related complications that may lead to an ED visit or C-section. We found that during the first 2 years of the perinatal EOC in Arkansas, pregnancy-related and total ED visits declined, but hospitalizations and readmissions post-delivery

increased. Although there was a decline in C-sections trends in Arkansas, this difference was not significant relative to the comparison group. The impact on preventive screening measures that were required for shared savings, and tracked by Arkansas, were more consistent: we found relative increases in preventive screening for most metrics. These mixed results highlight both the positive effects of episode-based payment models for perinatal care and the potential for unintended consequences.

The perinatal EOC model requirements may have had the unintended consequence of increasing hospitalizations, both during pregnancy and after delivery. During focus groups, providers noted that they may shift care for non–pregnancy-related conditions to other providers or after delivery to avoid incurring the costs during the episode. As such, we found increases in hospital 30- and 60-day readmissions post-delivery. As a sensitivity analysis, we inspected the change in the proportion of post-delivery hospitalizations that are non–pregnancy-related to see if providers may be deferring nondelivery treatment to a separate hospital stay. We found that the proportion of non–pregnancy-related hospitalizations[32] occurring within 60 days of a delivery increased from 57 to 66 percent from 2011 to 2014 in Arkansas. In the comparison group, there was decline from 65 to 59 percent over the same time period. Although this is not conclusive evidence of an unintended effect of the EOC model on utilization, further investigation is warranted.

Even so, the increases in inpatient admissions and readmissions should be interpreted with caution. We found increases in hospitalizations in the second year of implementation, October 2013–September 2014. At the same time, the composition of Arkansas beneficiaries with perinatal episodes changed because of the Medicaid expansion. As noted above, beneficiaries with perinatal episodes in 2014 in Arkansas have more risk factors for poor health than previous years, but there was no change in the composition of beneficiaries with episodes in the comparison group because they did not expand Medicaid. The relative increases in hospital utilization could therefore in part be the result of a poorer health status among beneficiaries with perinatal episodes in Arkansas in 2014.

Arkansas's perinatal EOC was designed to increase preventive screenings for HIV, GBS, and chlamydia. To be eligible for shared savings, 80 percent of a PAP's episodes had to include screening for all three of these conditions. Not surprisingly, we found relative increases in all three of these screening measures. We also found relative increases in two of the three screening measures (Hepatitis B and asymptomatic bacteriuria) that are tracked but not tied to payments. Our findings are consistent with those reported by the Arkansas Health Care Payment Improvement Initiative (AHCPII) in 2017, with some exceptions (ACHI, 2017). Similar to our results, AHCPII reported that Medicaid perinatal episodes had improvements in chlamydia

[32] Non-pregnancy hospitalizations refer to any hospitalizations that do not include any pregnancy related diagnosis codes.

screening, Hepatitis B screening, and GBS from 2012 to 2015. However, Arkansas reported a decline in HIV screening, whereas our results indicated that, on average, HIV screening increased relative to the comparison group.

Arkansas chose to track the C-section rate rather than tie the rate to payments during the first 2 years of the model, although state officials indicated that they expected to eventually include C-section rates in the list of quality measures that PAPs must pass to be eligible for shared savings. In the period between 2012 and 2015, AHCPII reports that C-sections declined from 38.6 to 31.8 percent (ACHI, 2017). Our results indicate that C-section rates declined, but there were no differences in the decline relative to episodes in the comparison group. Arkansas providers were aware of efforts to reduce C-section rates, noting that their hospital has a committee devoted to discussing ways to reduce the incidence of C-sections. However, we also heard evidence that the EOC may not impact C-sections. One provided noted, "I never saw anyone get sued for doing a C-section. People get sued for bad outcomes from a vaginal delivery when they should have had a C-section. It's a lose-lose situation." Another provider suggested that if Medicaid was really concerned about C-section rates, it should track what time in the day they occur or why the C-section was done.

These analyses complement a recent analysis of Arkansas's perinatal EOC model among deliveries using commercial claims from the MarketScan Research Databases (Carrol et al., 2017). Estimating the impact of the EOC model on expenditures, utilization, and quality of care measures in the commercial population, Carrol et al. only found a slight increase in chlamydia screening, but a 3.8 percent overall decrease in perinatal spending relative to the comparison group (Alabama, Kentucky, Louisiana, and Oklahoma). The reduction in spending was driven by a reduction in facility spending during the delivery, although there was no observed change in C-section rates or in hospital length of stay. Our study compared total pregnancy- and delivery-related spending during the episode before the implementation of the perinatal EOC and after implementation. We found that total pregnancy-related expenditures declined during the post period. This finding is consistent with Arkansas's self-reported findings and corresponds with findings that the perinatal EOC contributed to decline in some types of spending for beneficiaries in the private market (Carrol et al., 2017). An important caveat to our analysis is that we compare pre- and post-EOC implementation among Arkansas-only episodes, we do not incorporate a comparison group in this analysis. Thus, no causal inference can be described in these results.

This study has several limitations. We tried to mimic the state's definition for the perinatal episode; however, as noted in the introduction, our definition deviated from Arkansas Medicaid's definition due to data limitations. Thus our analysis may include episodes the state deemed as not eligible for risk-gain assessment, while also excluding some episodes that the state deemed as eligible, and so our analysis may not parallel the state's EOC analysis.

Moreover, the exclusion criteria[33] resulted in reducing the number of evaluable episodes by around 50 percent for both Arkansas and the comparison states; thus, our findings may not be generalizable to all Medicaid deliveries in Arkansas. However, we conducted a sensitivity analysis on all Medicaid deliveries in the state. With exception to the likelihood of C-section and readmission, we were able to replicate our findings for most outcomes when estimating outcome on all identified episodes, regardless of exclusion status (see ***Table A-1-7, Sub-appendix A-1***). In addition, we set our test period as October 2012 to September 2014, the period of time immediately following the state-defined "baseline" period. However, the state defined the first "performance period" in which PAPs were accountable for quality and cost outcomes to start March 2013. Thus, our test period includes the 6-month ramp-up period that the state excluded from its performance period. This may attenuate any effects we can detect, given that PAPs may not have changed behavior in the 6 months prior to the period in which they were held accountable for outcomes by the state; however, this approach to defining the test period as immediately following the baseline period is consistent with our approach across analyses, and mirrors the inclusion of a ramp-up period early in the test period across other interventions analyzed in this report. As would be expected, our overall results are driven by changes in the second test year. Finally, because of the expansion of Medicaid for private insurance in 2014, the characteristics of Arkansas's perinatal episodes changed from previous years, resulting in a greater proportion of episodes with traditional Medicaid eligibility during delivery. There may be unobserved differences in health and social factors between episodes in 2014 compared to previous years, which are not accounted for our analysis.

In summary, after 2 years, the perinatal EOC model showed mixed findings for utilization outcomes. Although we found declines in ED visits during the episode, we also found relative increases in inpatient hospital utilization. Even so, we found statistically significant improvements in most quality metrics, especially the three screening measures required for shared savings (HIV, GBS, and chlamydia). Pregnancy-related expenditures also declined during the first 2 years of the perinatal EOC implementation. The perinatal EOC model shows promise to improve quality of care during pregnancy while reducing costs; however, there may be unintended consequences that increase hospital utilization.

[33] To mimic Arkansas's definition, episodes with limited prenatal care between the start of the EOC and 60 days prior to delivery and those with select pregnancy-related conditions that may cause a complicated birth and other comorbidities were excluded.

A.4 Model-Specific Impact Findings: *Spillover Effects of the Medicaid PCMH Model on the Commercially Insured Population*[34]

Arkansas launched its Patient-Centered Medical Home (PCMH) Program in 2014 as part of the Arkansas Health Care Payment Improvement Initiative, described in ***Section A.1***, which aims to promote payment models that reward providers who consistently deliver high-quality, coordinated, and guideline-concordant care to patients. As noted in ***Section A.1***, Arkansas considered its participation in the CMS-sponsored Comprehensive Primary Care (CPC) initiative, which began in 2012 with participation from Medicare, Medicaid, and commercial payers, as "Wave 1" of the process to encourage primary care practices to become PCMHs. The state's own state PCMH model, developed with SIM funding, became "Wave 2" and was designed to share most characteristics of the CPC model, but to engage more pediatric practices because the majority of Arkansas Medicaid beneficiaries are children. Medicaid was the first payer to financially support practices certified under the state's PCMH model.

The state enrolled 111 practices into its Medicaid PCMH model beginning on January 1, 2014, and subsequently enrolled new PCMHs in mid-2014, January 1, 2015, and thereafter on an annual basis. Each practice participating in the PCMH model received $4 per member per month (PMPM), on average, to engage in practice transformation activities including 24/7 live voice access to a health professional, care plans as necessary, flexible same-day visit scheduling, use of Meaningful Use certified electronic health records, and assessment of opportunities for practice improvement. Additionally, some practices meeting minimum panel size requirements were eligible for one-sided risk shared savings payments if they met financial and quality targets (ACHI, 2015, 2017). Because the requirements to become certified as a PCMH under the state's PCMH program would necessarily be practice-wide, this analysis considers what, if any, "spillover" there is to the commercially insured population served by practices receiving financial support under the Medicaid PCMH Program.

[34] This report and its findings are independent research conducted by RTI International. The Arkansas Insurance Department and the Arkansas All-Payer Claims Database have not evaluated the content of the report or its findings beyond determining compliance with minimum cell size and complementary cell suppression rules; incorporation of appropriate protections to prevent inferential identification; consistency with the initial project description. The said report or findings do not represent the positions or opinions of the Arkansas Insurance Department or the Arkansas Healthcare Transparency Initiative Board.

KEY INSIGHTS

- Comparing practices that adopted PCMH to practices that had not yet adopted PCMH, we see **small and insignificant changes in all outcome**s, suggesting that the PCMH had little to no spillover impact on outcomes for commercial plan members served by these practices.
- Among "early adopter" PCMHs certified in early 2014, relative to later adopting practices, we see that commercial individuals served by these **PCMHs had relatively higher total and professional expenditures as well as increased rates of primary care provider (PCP) and specialist visits**.
  - However, due to broader changes during this time period, we cannot conclude that PCMHs alone are responsible for these results.
  - It appears that health care market changes in 2014 that resulted from the introduction of the ACA temporarily increased expenditures and utilization.
  - These increased expenditures were present in both the Marketplace and non-Marketplace populations, suggesting this trend was not solely the result of an influx of individuals newly receiving health insurance in 2014.

The commercially insured population in Arkansas includes the large group, small group, and individual markets,[35] including those who receive health care coverage under the Patient Protection and Affordable Care Act (ACA) through its subsidized premiums on plans offered under the Arkansas Health Insurance Marketplace. Low-income adults who received health care coverage under Arkansas's 2014 Medicaid expansion are also considered commercially insured in this analysis because of the way Arkansas expanded Medicaid. Known as the "private option," Arkansas used a Medicaid Section 1115 waiver to enroll these newly eligible adults in qualified health plans (QHPs) that also offer the individual ACA policies on the Health Insurance Marketplace. The private option alone increased the number of people with insurance through the Marketplace by three-fold (Guyer et al., 2015).

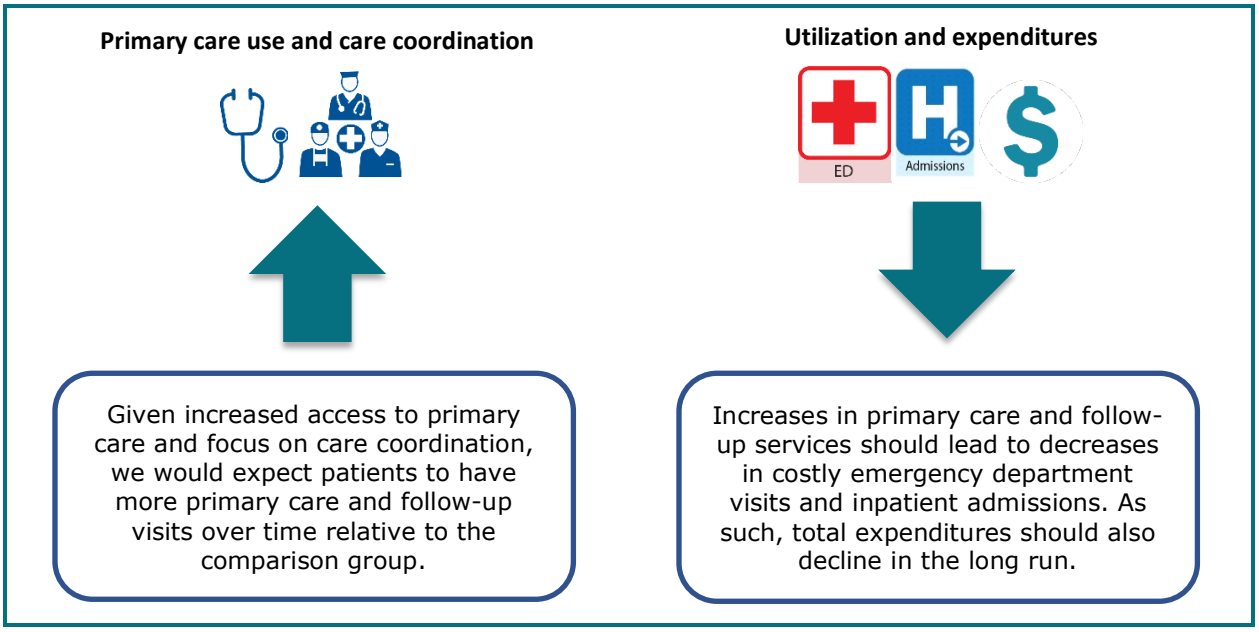
Under Arkansas Rule 108, by January 1, 2015, all QHPs participating in the Marketplace were required to either provide support for, and align with, the Medicaid PCMH program or structure their PCMH program after nationally accepted models. Commercial insurers began paying PMPMs to state-recognized PCMHs for individuals enrolled in employer-based and self-insured products outside of the Marketplace later in 2015, but the exact extent to which PCMHs received payments for their commercially insured patients by the middle of the study period is unknown; therefore, we consider this analysis to be a "spillover" effect of the Medicaid PCMH program to commercially insured patients.

For practices that became PCMHs, the enhanced care coordination and access to primary care services was expected to replace avoidable, higher cost utilization such as emergency

[35] Large group refers to an employer-sponsored health insurance for employers with 51 or more employees. Small group refers to an employer-sponsored health insurance for employers with 50 or fewer employees. Individual market refers to health insurance coverage obtained directly from an insurer by an individual.

department (ED) visits and inpatient admissions, and thus control total expenditures (see ***Figure A-7***). However, not all of the PCMH requirements were fully implemented in 2014, but rather the requirements were phased in over time. Arkansas used SIM funds to offer practice transformation assistance to participating PCMH practices beginning in 2014. The assistance provided was specific to the Medicaid PCMH model, including how to interpret and implement PCMH requirements and how to run reports. Two practice transformation vendors were contracted to offer this support, which was free of charge to PCMH providers for the first 2 years of PCMH implementation. More than 70 practices enrolled in the PCMH model worked with a practice transformation coach in 2014, and those who did were more likely to meet the full PCMH requirements during the year.

Figure A-7. Expected direction of outcome measures



There are factors that could reduce the likelihood of observing spillover impacts of the PCMH model. As of 2014, only 36 practices enrolled in the PCMH model had a sufficient Medicaid panel size to qualify for shared savings, so many practices were not as motivated as those that did qualify for shared savings to improve quality of care. Furthermore, in the early years of implementation, providers and stakeholder organizations reported long lags in receiving data reports on quality metrics because of the delays in Medicaid claims availability, which made it difficult for them to act on the metrics from their Medicaid patient panel. The analysis of the Medicaid PCMH on Medicaid beneficiaries, published in an earlier evaluation report (RTI International, 2018), showed a relative increase in physician visits and relative decrease in inpatient admissions and inpatient expenditures after the first year of PCMH implementation, but few other statistically significant differences.

To assess the spillover effects of Arkansas's Medicaid PCMH program on care for commercial plan members, we addressed the following research question:

- How did trends in key outcomes for utilization and expenditures for commercial plan members attributed to a Medicaid PCMH change after PCMH implementation relative to the comparison group?

To address this research question, we used a difference-in-differences (D-in-D) quasi-experimental study design that exploited the rolling implementation of PCMH adoption across different practices between 2014 and 2016. In the design, providers are part of the comparison group until they begin receiving PMPM payments, after which they become part of the treatment group. As shown in ***Table A-12***, the rolling implementation allows us to use commercial plan members seen by the later adopting practices as a comparison group while in the pre-PCMH phase.

Table A-12. PCMH implementation between 2014 and 2016

Analytic year	Treatment group	Comparison group
2013	*No* practices	*All* practices
2014	Practices that became a PCMH in early and mid-2014	Practices that became a PCMH in 2015 or 2016
2015	Practices that became a PCMH in 2014 or 2015	Practices that became a PCMH practice in 2016
2016	*All* practices	*No* practices

PCMH = patient-centered medical home.

We used commercial claims data from 2013–2016 extracted from the Arkansas All-Payer Claims Database (APCD) to examine spillover effects. We did not have a mapping of commercial plan member assignment to PCMH practices and had to develop our own attribution. Our main analytic approach uses a three-visit floor, meaning one must have at least three visits to the same PCMH practice in a year to be attributed. We kept only commercial plan members who could be attributed to a PCMH practice. Additionally, we only kept a practice, along with attributed plan members, in the time before PCMH implementation, and as long as the practice was continuously certified as a PCMH practice. This means that we dropped practices from the analysis if they let the PCMH certification lag or had it suspended or terminated within the observation window.

Our main statistical approach is a two-way fixed effects (practice level and quarterly fixed effects) D-in-D. We estimate a second variation of the statistical model that estimates the effect for early 2014 adopters only, relative to the other three adopting groups, because the early 2014 adopters have the longest follow-up period. Early adopting practices were also larger, more likely to be multispecialty, and more likely to be in urban areas than practices that were certified

later. The differences between intervention and comparison practices could be related to the strict PCMH requirements; providers in small clinics and rural settings noted in focus groups conducted in 2014 that they had difficulty meeting the PCMH requirements, and therefore delayed seeking PCMH certification (RTI International, 2018). As such, early adopting practices may have been further along with practice transformation efforts and more ready to change than late adopting practices. These differences may produce more favorable outcomes for the group of beneficiaries that were assigned to PCMHs in 2014.

Since the modeling of time is an important model assumption in the approach, we also explored a comparative interrupted time series (CITS) approach that uses a linear time trend (as opposed to quarterly fixed effects). A summary of the main analytic methods is included below, and all methods are detailed in ***Sub-appendix A-2.3***.

Methods Snapshot for Impact Analysis
• **Study design**: D-in-D quasi-experimental design that exploits the rolling adoption of PCMHs across providers to compare outcomes for patients who received care at a PCMH clinic (treatment group) to those who received care from a clinic who had not yet become a PCMH (comparison group). • **Population**: Commercial plan members in Arkansas attributed to PCMH providers receiving Medicaid PMPM payments. We assign plan members to one of four PCMH groups (early 2014, mid-2014, 2015, or 2016) based on whether the plan member had a minimum of three PCP visits per year to a PCMH practice. Individuals were included in the "intervention group" once their provider began receiving PMPM payments. The comparison group includes commercial plan members at practices not yet receiving PCMH PMPM payments. • **Data**: Claims and enrollment data from the Arkansas APCD from CY 2013 to CY 2016. • **Sample**: Attributed plan members with 6 months of continuous enrollment in commercial insurance throughout the year or 9 months of total, but discontinuous, enrollment throughout the calendar year. • **Measures**: PCP visits, specialty provider visits, inpatient visits, ED visits, and expenditures: total, inpatient facility, professional, and prescriptions. • **Statistical analysis:** Ordinary least square (expenditure) and logistic regression (utilization). Standard errors were clustered at the PCMH practice level. The models adjusted for demographic and insurance characteristics and socioeconomic county-level variables.

Table A-13 presents unadjusted, annualized outcomes and characteristics of the analytic sample by (1) PCMH status (pre- and post-adoption of PCMH); (2) calendar year; and (3) baseline year (2013) observations by PCMH group. With these different perspectives, we examine unadjusted pre-post differences by PCMH status, the secular change across time, and baseline differences among the PCMH adopter groups.

Table A-13. Weighted annual sample characteristics, PCMH-attributed Arkansas commercial plan members, 2013–2016

Characteristic	Annualized by PCMH status		Annualized by calendar year				Annualized by PCMH group in the baseline period (2013)			
	Pre-PCMH [1]	Post-PCMH [2]	2013 [3]	2014 [4]	2015 [5]	2016 [6]	Early 2014 PCMH adopters [7]	Mid- 2014 PCMH adopters [8]	2015 PCMH adopters [9]	2016 PCMH adopters [10]
Total expenditures	$4,044	$5,784	$3,427	$4,963	$6,036	$6,555	$3,243	$4,402	$4,304	$3,432
Professional expenditures	$1,561	$2,046	$1,400	$1,921	$2,125	$2,206	$1,348	$1,661	$1,600	$1,431
Prescription expenditures	$870	$1,270	$835	$1,007	$1,307	$1,466	$809	$963	$1,063	$797
Inpatient facility expenditures	$693	$1,077	$459	$873	$1,156	$1,279	$405	$721	$813	$445
Other facility expenditures	$920	$1,390	$734	$1,162	$1,448	$1,604	$681	$1,057	$828	$759
Any inpatient visit (%)	4.4	7.1	3.1	5.8	7.8	8.1	2.8	4.4	4.4	3.2
Any specialist visit (%)	42.5	48.6	43.0	46.3	49.3	50.7	42.6	50.3	41.3	39.9
Any ED visit (%)	24.1	31.5	20.7	29.6	33.0	33.5	20.5	20.7	22.8	21.7
Age	31.7	34.5	28.0	33.0	35.1	35.9	26.5	33.5	36.1	29.9
Female (%)	58.3	61.0	55.2	61.0	61.1	61.4	54.7	57.4	59.9	54.6
BH diagnosis (%)	20.0	23.9	18.5	22.6	24.6	25.4	18.2	17.6	23.2	19.6
Lives in MSA (%)	53.0	52.2	57.2	51.7	51.8	50.0	59.4	58.1	36.0	49.1
Has prescription drug coverage (%)	87.2	90.1	83.9	89.6	90.0	91.1	83.5	85.0	90.7	82.8
Marketplace plan (%)	20.8	43.0	0.0	36.3	46.2	48.2	0.0	0.0	0.0	0.0
Insurance product type										
Other commercial insurance (%)	15.5	19.5	14.2	16.8	19.3	22.0	13.2	14.9	16.1	19.4
Insurance type—PPO (%)	54.9	59.3	49.8	61.4	60.1	57.5	52.6	41.9	42.2	40.6
Insurance type—PoS (%)	21.8	14.3	27.2	16.0	13.9	12.9	25.9	32.4	30.1	30.2
Insurance market type										
Individual market plan (%)	43.7	60.5	27.8	54.5	63.3	64.7	26.9	33.9	30.6	27.1
Large employer plan (%)	33.3	24.4	42.7	26.6	23.2	22.4	43.5	40.0	41.6	40.2
Small employer plan (%)	9.2	6.7	11.8	7.4	6.4	5.9	11.9	11.8	12.8	11.2
Unweighted N	52,970	134,256	30,989	46,121	51,755	52,499	23,209	3,181	1,315	3,284
Weighted N	55,881	140,627	32,107	48,846	54,078	55,027	24,040	3,287	1,371	3,408

BH = behavioral health; ED = emergency department; MSA = metropolitan statistical area; PCMH = patient-centered medical home; PoS = point of service; PPO = preferred provider organization. Numbers in brackets refer to the column numbers. Column numbers are referenced in the text discussing this table.

Data source: RTI analysis of Arkansas All-Payer Claims Database, 2013–2016.

We find that utilization and expenditures increased substantially after PCMH implementation (columns 1 and 2) and over time (columns 3 through 6). After PCMH implementation, annual total expenditures increased by 43 percent and the proportion of plan members with an inpatient admission increased by 61 percent. The increase in study outcomes occurs after 2013, as shown by the annualized averages for 2013 through 2016 (columns 3 through 6). By 2016, nearly all outcomes doubled relative to 2013. This trend is driven by the influx of new enrollees through the Health Insurance Marketplace that was introduced in 2014. The sample size increased by approximately 50 percent after 2013. ***Appendix Table A-3.5*** provides summary statistics for the Marketplace and non-Marketplace populations and shows that the Marketplace population, which includes private option beneficiaries, had much higher expenditures and used more services. This trend of increased expenditures and utilization in the PCMH-attributed Marketplace population is consistent with the overall expenditure and utilization trends observed around the implementation of the ACA in Arkansas's traditional Medicaid and private option populations, in addition to programs such as Oregon's Health Insurance Experiment (Baicker, 2013). This suggests that increases observed in the PCMH-attributed Marketplace population was not isolated to this one population.

In terms of baseline differences, as displayed in columns 7 through 10 of ***Table A-13***, the mid-2014 and 2015 PCMH groups appear to have higher expenditure patterns at baseline than the early 2014 and 2016 groups, although similar service usage except for specialist visits.

As shown in column 1 of ***Table A-13***, before practices implemented PCMH the average sample member was in their early 30s and 58 percent were female. Most of the sample lived in a Metropolitan Statistical Area (MSA), except among the 2015 PCMH practices, which were more rural. Approximately 20 to 25 percent of the sample had a diagnosis for a behavioral health condition. For insurance characteristics, more than 80 percent of the sample had pharmacy benefits, most had a preferred provider organization, and most had an individual market plan.

A.4.1 Did utilization change among commercially insured plan members attributed to a Medicaid PCMH practice?

KEY INSIGHTS

- Rates of utilization (inpatient stays, visits to primary care and specialty providers, or ED visits) did not change among commercial plan members served by Medicaid PCMHs after PCMH adoption.
- However, the likelihood of a visit to both primary care and specialty care providers increased for commercial plan members served by the early adopting (2014) PCMH practices relative to later adopting PCMH practices.
- This finding is in line with the expectation that physician visits will increase as PCMH providers take a more active role in monitoring their patient's care and connecting them to services.
- Even so, the early PCMH implementation coincided with the implementation of the ACA, so these findings should be interpreted with caution.

We present the results of the main D-in-D regression analyses for quarterly rates of inpatient admissions, ED visits, PCP, and specialist physician visits in ***Table A-14***.

- There were no statistically significant differences in the change in utilization rates (inpatient stays, visits to primary care and specialty providers, or ED visits) after PCMH adoption. Therefore, it is unlikely that the Medicaid PCMH model impacted commercial plan members served by PCMH providers, at least within this observation window.

Table A-14. Estimated spillover effects of PCMH adoption on quarterly rates of utilization, Arkansas commercial plan members, 2013–2016

Outcome	2013 adjusted mean, PCMH	Difference-in-differences estimate (90% confidence interval)	Relative difference (%)	p-value	Weighted N
Inpatient stays per 1,000 member-quarters	9.1	0.3 (−0.93, 1.45)	2.9	0.72	701,897
Primary care visits per 100 member-quarters	70.5	0.3 (−0.32, 0.97)	0.5	0.41	704,416
Specialist visits per 100 member-quarters	18.6	−0.2 (−0.81, 0.44)	−1.0	0.63	704,384
Emergency department visits per 1,000 member-quarters	67.0	3.2 (−0.03, 6.36)	4.7	0.10	704,373

D-in-D = difference-in-differences; PCMH = patient-centered medical home.
Note: Difference-in-differences regression models were estimated maximum likelihood logits. The relative difference is the D-in-D estimate expressed as a percentage of the 2013 adjusted mean.

Data source: RTI analysis of Arkansas All-Payer Claims Database, 2013–2016.

We present the results of the D-in-D regression analyses that estimate the net effect of PCMH implementation for the early 2014 adopters, relative to all other PCMH groups, for quarterly rates of inpatient admissions, ED visits, PCP, and specialist physician visits in ***Table A-15***.[36]

- Early PCMH implementation was associated with an increase of 1.0 primary care visits per 100 member-quarters ($p < 0.05$) and 1.0 specialist visits per 100 member-quarters ($p < 0.05$). Even so, there were no statistically significant differences in inpatient admissions or ED visits rates.
- We might expect the early 2014 adopters to have different results than the other adopting groups either because the early 2014 practices were more ready for practice transformation or they have the longest follow-up period from which we can observe change.

Table A-15. Estimated effects of early 2014 PCMH adopters on quarterly rates of utilization, Arkansas commercial plan members, 2013–2016

Outcome	2013 adjusted mean, early 2014 PCMH practices	2013 adjusted mean, CG practices	Difference-in-differences estimate (90% confidence interval)	Relative difference (%)	p-value	Weighted N
Inpatient stays per 1,000 member-quarters	8.2	11.7	1.0 (−1.49, 3.43)	11.8	0.52	701,897
Primary care visits per 100 member-quarters	70.1	71.8	1.0 (0.30, 1.79)	1.5	0.02	704,416
Specialist visits per 100 member-quarters	18.3	19.6	1.0 (0.26, 1.84)	5.7	0.03	704,384
Emergency department visits per 1,000 member-quarters	65.4	71.6	5.0 (−1.99, 11.95)	7.6	0.24	704,373

CG = comparison group; PCMH = patient-centered medical home.
Note: Difference-in-differences (D-in-D) regression models were estimated using maximum likelihood logits. The relative difference is the D-in-D estimate expressed as a percentage of the 2013 adjusted mean. Standard statistical practice is to use confidence intervals of 90% or higher.
Data source: RTI analysis of Arkansas All-Payer Claims Database, 2013–2016.

[36] The D-in-D estimates for the utilization outcomes are calculated as an average marginal effect.

However, we emphasize that these findings should be interpreted with caution because of the potential influence of the broader implementation of the ACA. For example, it appears that the introduction of the ACA temporarily increased expenditures, an anomaly that may be the result of health care market changes in 2014. These increased expenditures were present in both the Marketplace and non-Marketplace populations, suggesting that this trend was not solely the result of an influx of individuals newly receiving health insurance in 2014.

A.4.2 Did expenditures change among commercially insured plan members attributed to a Medicaid PCMH practice?

KEY INSIGHTS

- PMPM expenditures (total, professional, pharmacy, inpatient, and outpatient) did not change among commercial plan members served by Medicaid PCMHs after PCMH adoption.
- However, total PMPM expenditures increased for commercial plan members served by the early adopting (2014) PCMH practices relative to later adopting PCMH practices.
- The increase in total PMPM expenditures was driven by a relative increase in professional PMPM expenditures, which was likely the result of the increases we observed in physician visits.
- A short-term increase in professional and total expenditures after patients are connected to needed services in a PCMH is expected; however, these results should be interpreted with caution as the early adoption of the PCMH coincided with marketplace changes introduced by the ACA in 2014.

Table A-16 displays the main D-in-D regression analyses for monthly total, professional, prescription drug, inpatient facility, and outpatient facility expenditures.

- There were no statistically significant differences in the change in PMPM expenditures (total, professional, prescription drug, inpatient facility, and outpatient facility expenditures) after PCMH adoption.

We also estimated a slightly modified D-in-D model that adds an additional comparison between people served by PCMHs that were certified in early 2014 and the other three PCMH practice groups. ***Table A-17*** also shows the model estimates with the additional comparison for each of the expenditure outcomes:

- PCMH implementation in the early 2014 practices was associated with a $35.73 (13 percent) increase in average PMPM total expenditures relative to the other PCMH practices ($p < 0.10$).
- The increase in total expenditures was driven by a $20.21 (18 percent) increase in average PMPM professional expenditures.

Table A-16. Estimated spillover effects of PCMH adoption on PMPM expenditures, Arkansas commercial plan members, 2013–2016

Outcome	2013 adjusted mean, PCMH	Difference-in-differences estimate (90% confidence interval)	Relative difference (%)	p-value	Weighted N
Total expenditures	292.8	0.0 (−22.25, 22.17)	0.0	>0.99	704,419
Professional expenditures	119.4	−2.3 (−8.35, 3.81)	−1.9	0.54	704,419
Pharmaceutical expenditures	71.1	5.4 (−1.30, 12.12)	7.6	0.19	704,419
Inpatient facility expenditures	39.9	−5.6 (−18.19, 7.07)	−13.9	0.47	704,419
Outpatient facility expenditures	62.4	2.4 (−7.64, 12.40)	3.8	0.70	704,419

PCMH = patient-centered medical home; PMPM = per member per month.
Note: Difference-in-differences (D-in-D) regression models were estimated using Ordinary Least Squares. The relative difference is the D-in-D estimate expressed as a percentage of the 2013 adjusted mean. Standard statistical practice is to use confidence intervals of 90% or higher.

Data source: RTI analysis of Arkansas All-Payer Claims Database, 2013–2016.

Table A-17. Estimated effects of early 2014 PCMH adopters on PMPM expenditures, Arkansas commercial plan members, 2013–2016

Outcome	2013 adjusted mean, early 2014 PCMH practices	2013 adjusted mean, CG practices	Difference-in-differences estimate (90% confidence interval)	Relative difference (%)	p-value	Weighted N
Total expenditures	275.4	344.8	35.7 (1.49, 69.99)	13.0	0.09	704,419
Professional expenditures	114.9	133.0	20.2 (11.42, 29.00)	17.6	<0.001	704,419
Pharmaceutical expenditures	68.9	77.6	−1.7 (−13.68, 10.26)	−2.5	0.81	704,419
Inpatient facility expenditures	33.5	58.9	14.5 (−8.21, 37.25)	43.3	0.29	704,419
Outpatient facility expenditures	58.1	75.3	2.7 (−9.24, 14.68)	4.7	0.71	704,419

CG = comparison group; PCMH = patient-centered medical home; PMPM = per member per month.
Note: Difference-in-differences (D-in-D) regression models were estimated using Ordinary Least Squares. The relative difference is the D-in-D estimate expressed as a percentage of the 2013 adjusted mean. Standard statistical practice is to use confidence intervals of 90% or higher.

Data source: RTI analysis of Arkansas All-Payer Claims Database, 2013–2016.

- There was a small, insignificant reduction in average monthly prescription drug expenditures associated with early PCMH adoption.
- There were no statistically significant differences in the change in inpatient or outpatient facility expenditures associated with early PCMH adoption.

However, we strongly caution that we cannot infer that the changes in expenditures were the result of PCMH adoption because of the broader implementation of the ACA that coincided with early PCMH adoption. The 2014 trends that show up in the baseline for the comparison group are such an anomaly that we think it is somehow the result of a change in 2014 (likely the ACA implementation).

A.4.3 Discussion and limitations

The Arkansas PCMH program aims to increase patient care coordination across providers. Thus, enhanced care coordination and access to primary care services is expected to increase primary care use, improve quality of care, and control total expenditures and decrease ED visits and hospitalizations for individuals seen by PCMH practices over time. After 1 year of PCMH implementation among Medicaid beneficiaries, we analyzed outcomes and found mixed evidence that the model was associated with improvements in these outcomes. Although we found expected increases in physician visits and coinciding decreases in hospitalizations and hospital expenditures, there were few other statistically significant differences in expenditures and quality of care outcomes.

For this analysis, we explored whether Arkansas's support of PCMH practices created a spillover effect among commercial populations being treated by the same practices receiving PMPM payments for their Medicaid patients. We found little to no evidence of spillover effects from Medicaid PCMH PMPM payments among the commercially insured population. However, we did find some congruence between results from the Medicaid and commercially insured populations served by PCMHs in 2014. In the current analysis, PCMH was associated with a relative increase in total and professional expenditures, including PCP and specialist visits, for the early 2014 PCMH adopter group. However, in our estimation, the broader implementation of the ACA beginning in 2014 and during the same period of PCMH implementation in Arkansas, is such a significant contributing factor to these results that we cannot infer any clear causality. A sensitivity analysis shows that both the Marketplace and the non-Marketplace populations experienced an increase in expenditures and utilization in 2014. ***Tables A-1-10***, ***A-1-11***, and ***A-1-12*** in ***Sub-appendix Section A-1.3.2*** contain the results from this sensitivity analysis.

As another sensitivity analysis, we used a CITS approach that models the change in trend differently over time because there may have been a gradual change in costs or utilization as providers adapted to PCMH components. In the CITS estimates presented in ***Tables A-1-8*** and ***A-1-9*** in ***Sub-appendix Section A-1.3.1***, there is weak evidence of short-term reductions in total, professional, and inpatient facility expenditures occurred, but we note this result with the strong caveats given that the unadjusted trends are not always linear.

There are a number of additional limitations to this analysis. We limited the sample to higher utilizers and excluded low-utilizing individuals by default, thereby limiting the generalizability of our findings to a less healthy population. We assessed the potential bias this

introduces by estimating the models using a sample attributed by a one-visit floor and we find similar results to the three-visit sample. Estimates from the one-visit models are available in ***Sub-appendix Sections A-1.3.3*** and ***A-1.3.4*** (***Tables A-1-13*** through ***A-1-20***).

As previously stated, the implementation of the ACA occurring during the same time period of this supplemental study presents a potential confounding influence, although we could not determine any clear causality of the ACA's effect or its magnitude. Additional analyses should be explored to better determine any confounding factors related to the ACA. For example, Arkansas's APCD excludes uninsured individuals, and many newly insured individuals have gained insurance through the private option in 2014. Examining data sources, such as hospital/ED admissions data, that include uninsured individuals may help understand how the gain in insurance coverage from the ACA may influence our results.

Our design also assigns treatment based on an observation of PCMH certification. We do not observe the uptake or maintenance of all PCMH components and are not able to identify heterogeneity in implementation. Finally, not all practices were continuously enrolled in PCMH. Approximately 20 percent of practices disenroll at some point, which affects less than 10 percent of member-quarters, and reasons practices dropped PCMH certification are unknown.

Looking across all PCMH groups, our spillover effect analysis produced small and insignificant changes in all utilization and expenditure outcomes. Although PCMH was associated with a relative increase in total and professional expenditures and PCP and specialist visits for the early 2014 PCMH adopter group, and the increase in physician visits is consistent with earlier analyses of the Medicaid population served by PCMHs in 2014, we cannot conclude that PCMHs alone are responsible for these results due to broader changes during this time period, such as the 2014 implementation of the ACA and rollout of the private option.

A.5 Discussion

The SIM Initiative in Arkansas began in October 2013 and ended in September 2016. During this time, the state built on work with the Division of Medical Services (Medicaid), Arkansas Blue Cross Blue Shield (BCBS), and QualChoice that predated the SIM Initiative to establish and implement two payment reforms—episodes of care (EOCs) and patient-centered medical homes (PCMHs). By the end of the SIM Initiative, Arkansas had launched 14 EOCs and a large proportion of primary care providers participated in the PCMH model. Arkansas also attempted to reform long-term services and supports, developmental disability, and serious mental health services through health homes but were not successful during the SIM test period, primarily because of stakeholder opposition.

Arkansas experienced great success with multi-payer participation in the SIM Initiative. Much of the success was the result of the state engaging with commercial payers early in the SIM design process and adopting a flexible approach to multi-payer participation. This flexibility

allowed payers to implement the EOCs most relevant to their unique populations, which differ in needs from the Medicaid population. The state also collaborated with stakeholders, including commercial payers, to align quality measures and reduce provider reporting burden. The SIM Initiative funded conversations among various stakeholder groups that would not have happened otherwise, and that ultimately contributed to Arkansas's success in rolling out its payment reforms to a large proportion of the state's population.

Arkansas reached a substantial portion of its population through the PCMH model and achieved even broader payer participation through legislation that required qualified health plans to support and align with the state's PCMH model. Arkansas began enrolling practices in the PCMH program in January 2014, had a mid-year enrollment that year, and then enrolled practices annually thereafter. As of September 2016, 87 percent of eligible PCPs and 71.6 percent of eligible provider groups were enrolled in the PCMH program (CMS, 2016a).

Concurrent with the implementation of the PCMH models in Medicaid and commercial payers, trends in statewide population health for Arkansas's low-income adults show a positive trend toward greater access to care: between 2013 and 2016, the proportion of low-income adults reporting not having a routine checkup in the last year reduced from 44 to 37 percent, a statistically significant drop of 7 percentage points. This is consistent with the Arkansas focus on moving its population into care from PCMHs, which had a significant reach among adults enrolled in Medicaid and commercial insurers' qualified health plans under Arkansas's Medicaid expansion (see ***Sub-appendix A-1*** for details). Moreover, Arkansas had a 21.7 percentage point drop in the proportion of low-income adults who reported not having health insurance, likely attributable to increased access to Medicaid and other Affordable Care Act–supported coverage.

The EOC bundled payment model was designed to work in coordination with the PCMH model. Whereas the PCMH model was focused on efficient provision of primary care and care management, the EOCs were designed for value-based purchasing for both primary and specialty services. Medicaid providers were required to participate in EOCs if applicable to their practice but commercial payers selected those EOCs relevant to their patient population. Despite the wide reach of the SIM Initiative in Arkansas, however, some providers remained uninformed about both the EOC and PCMH models.

The state leveraged health information technology to support its SIM Initiative and strategically invested in technology infrastructure and staff capabilities that could continue beyond the SIM Initiative. This included the analytic engine for the episode-based payment system, which also supported data analytics for PCMH. Arkansas BCBS's Advanced Health Information Network existed before the SIM Initiative but was leveraged as a web-based tool that is now used by the majority of Arkansas's providers to attest to compliance with AHCPII program requirements, to submit required information for quality measure evaluation, and to receive feedback reports on their EOC and PCMH performance. As part of PCMH care

coordination efforts, providers are required to have access to event notifications for hospitalizations and ED visits. Arkansas planned to have the state's HIE, SHARE, as the conduit for this information, but eventually relaxed its mandate requiring SHARE for this purpose and allowed providers to use existing interoperability channels for event notifications.

Findings from state and independent evaluations suggest that Arkansas's efforts under the SIM Initiative have achieved some savings and improved quality of care, although not all findings were positive. Arkansas Medicaid beneficiaries attributed to PCMHs in 2014, relative to an in-state comparison group, showed statistically significant improvements in the rate of physician visits, with a concomitant decline in inpatient admissions and expenditures (RTI International, 2018). In addition, as a supplemental analysis (see ***Section A.4*** and ***Sub-appendix A-1.3*** for details), we explored whether Arkansas's support of PCMH practices created a spillover effect among commercial populations being treated by the same practices receiving PMPM payments for their Medicaid patients. We found little to no evidence of spillover effects from Medicaid PCMH PMPM payments among the commercially insured population. PCMH was associated with a relative increase in total and professional expenditures, including PCP and specialist visits, for the early 2014 PCMH adopter group. We caution that because of broader changes during this time period, such as the implementation of the ACA in 2014, we cannot conclude that PCMHs alone are responsible for these spillover results. However, we did find some congruence between results from the Medicaid and commercially insured populations served by PCMHs in 2014.

Across all three URI EOCs—nonspecific URIs, pharyngitis, and sinusitis—antibiotic dispensing declined with a concomitant increase in strep tests for the pharyngitis EOC. However, contrary to what was anticipated, we saw an increase in ED visits during the 21-day episode duration, which we attribute to a potential unintended consequence whereby patients may have sought ED care to obtain the desired antibiotic prescription (see ***Section A.2*** for details). For the perinatal EOC, there was a statistically significant increase in preventive screenings for HIV and chlamydia overall and with respect to the comparison population. Group B strep test screening showed a statistically significant improvement compared to the comparison group but the rate of these screenings declined in both groups. C-section rates declined in both Arkansas and the comparison group, but difference-in-differences measure was not statistically significant. We noted potential unintended consequences of the perinatal EOC, in particular on increased inpatient stays, ultrasounds, and delivery length of stay (see ***Section A.3*** for details).

Relative to a group of comparison states, measures of health care delivery in Arkansas generally improved for commercially insured residents statewide[37] in the time period coinciding with SIM Initiative implementation and were inconsistent for Medicaid residents statewide with

[37] Based on analysis of MarketScan data, a product of Truven Health Analytics LLC, 2011–2016.

only 1 year of post-SIM Initiative implementation data. For commercially insured residents, Arkansas demonstrated a decline in the rate of inpatient admissions and ED visits not leading to hospitalization, and relative improvement in most quality measures,[38] but no change the rate of 30-day hospital readmission or total per member per month expenditures, relative to commercially insured residents in the comparison group states (see ***Sub-appendix A-1***). With the PCMH and EOC models reaching 15 percent and 36 percent of the commercially insured population, respectively, the positive changes in Arkansas for this population are unlikely attributable to SIM-related efforts but indicate a strong foundation on which to build future health reform efforts.

In contrast, relative to comparison group states, in the first year of the SIM Initiative, the statewide Medicaid population[39] had mixed outcomes in terms of utilization and expenditures. On the positive side, Medicaid beneficiaries statewide showed a relative decline in ED visits not leading to a hospitalization and a decline in total PBPM expenditures for individuals with only Medicaid coverage. However, there was a relative increase in rate inpatient admissions, no change in 30-day readmissions, and an increase in PBPM for individuals dually eligible for Medicaid and Medicare). In terms of quality of care measures, statewide residents with Medicaid coverage in Arkansas improved on several measures (rate of breast cancer screening, initiation of and engagement in alcohol and other drug-related treatment, one well-child measure, and rate of hospitalizations for ambulatory care-sensitive conditions) but declined relative to comparison group states in others (two well-child measures, flu vaccine, and percentage of patients age 5–64 years with persistent asthma who were appropriately prescribed medication) (all results described in ***Sub-appendix A-1***). Although these trends are likely unrelated to the PCMH and EOC payment models, which reached 51 percent and 15 percent of all Medicaid beneficiaries, respectively, they demonstrate room for improvement, especially within pediatric care, a focus of the Medicaid PCMH program.

In summary, Arkansas established two wide-reaching payment reform models—EOCs and PCMH—that continue beyond the end of the SIM Initiative. Health homes, which did not move forward during the SIM test period, paved the way for further reforms that have occurred since the SIM Initiative ended. Arkansas implemented a new outpatient behavioral health

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[38] Quality of care measures that improved relative to comparison group states, in the first year of the SIM Initiative, included: Percentage of acute admissions with a follow-up visit within 14 days; rate of hospitalizations for ambulatory care sensitive conditions (avoidable admissions); percentage of women age 41–69 years who had a mammogram to screen for breast cancer during the measurement year; percentage of children with six or more well-child visits by 15 months of age; initiation in alcohol and other drug dependence treatment; engagement of alcohol and other drug-related treatment; percentage of patients age 5–64 years with persistent asthma who were appropriately prescribed medication during the year; and percentage of patients age 18 years and older diagnosed with a new episode of major depression and treated with antidepressant medication who remained on medication treatment at least 180 days. Other well-child-related visits and antidepressant medication adherence measure remained unchanged, and one measure had a relative decline (rate of influenza vaccine between October 1 and March 31).

[39] Based on analysis of the Medicaid Analytic eXtract (MAX) files, 2011–2014.

services program to replace the existing rehabilitative services program, which includes a tier system to determine the appropriate level of services, crisis stabilization services, and recovery-oriented services (such as peer supports, supported employment, and supportive housing). Arkansas Act 775 (2017) authorized the Provider-led Arkansas Shared Savings Entity (PASSE) model of care whereby specialty managed care plans will coordinate physical health care with behavioral health and with community services for people with developmental disabilities. The state will be using independent assessments to determine the appropriate level of services for LTSS and outpatient behavioral health services and attribution to the PASSE care management model. Additionally, Arkansas is now participating in CPC+, which sustains payment reform momentum in the primary care setting gained through the SIM Initiative and addresses the Medicare and other commercially insured populations.

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Sub-appendix A-1. Supplementary Results

This sub-appendix contains additional data relevant to Arkansas during the SIM Initiative. ***Sections A-1.1*** and ***A-1.2*** describe results from additional analyses to test the impact of episodes of care in the Medicaid population. ***Section A-1.3*** presents population-level health status data drawn from a statewide survey, to offer some context of changes in the overall population health during the period of the SIM Initiative.

Section A-1.3 presents results from analyses of Medicaid-insured, commercially-insured, and Medicare-insured populations, comparing these populations in Arkansas statewide to statewide populations in a comparison group not participating in the SIM Initiative. These analyses test whether the SIM Initiative activities in Arkansas offered enough leverage to change the trajectory of utilization and expenditure outcomes throughout different types of populations statewide. This leverage would occur via two primary mechanisms: first, providers likely make changes in care delivery for all patients, not just those participating in a payment model; second, the state built some infrastructure under the SIM Initiative that could assist a range of providers statewide in improving care.

A-1.1 Supplementary Results for the Arkansas URI Episode Impact Analysis

In ***Table A-1-1*** and ***Table A-1-2***, we present the results of the difference-in-differences (D-in-D) regression analyses for emergency department (ED) visits not leading to a hospitalization and physician visits, respectively. In ***Table A-1-3*** and ***Table A-1-4***, we present the results of the D-in-D regression analyses for children and adults, respectively. We report annual regression adjusted D-in-D estimates individually for the first 2 years after the implementation of the upper respiratory infection (URI) episode of care (EOC), along with an overall D-in-D estimate for both years combined. These results are summarized in ***Appendix A, Section A.2***.

Table A-1-1. Difference in the pre-post annual change in ED visits for Medicaid beneficiaries in Arkansas URI Episodes of Care beneficiaries relative to the comparison group, first 2 years of implementation (October 2012 through September 2014)

Outcome and time period	Pre-period adjusted mean, AR	Pre-period adjusted mean, CG	Test-period adjusted mean, AR	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	N
Overall URI (%)								**1,681,962**
Year One	3.6	4.8	3.6	4.7	0.1 (−0.1, 0.3)	2.5	0.42	
Year Two	3.6	4.8	3.7	4.4	0.4 (0.2, 0.5)	9.7	0.001	
Overall	3.6	4.8	3.6	4.6	0.2 (0.01, 0.3)	5.9	0.01	
Overall—URI related (%)								**1,681,962**
Year One	0.9	1.2	0.9	1.1	0.1 (0.1, 0.2)	16.1	0.01	
Year Two	0.9	1.2	0.9	1.1	0.1 (0.1, 0.2)	16.8	0.004	
Overall	0.9	1.2	0.9	1.1	0.1 (0.1, 0.2)	16.5	<0.001	
Nonspecific URI (%)								**741,080**
Year One	3.6	4.9	3.7	4.7	0.3 (−0.03, 0.5)[Ŧ]	7.0	0.15	
Year Two	3.6	4.9	3.7	4.4	0.5 (0.2, 0.7)	12.8	0.01	
Overall	3.6	4.9	3.7	4.6	0.3 (0.14, 0.55)	9.6	0.01	
Nonspecific URI—URI related (%)								**741,080**
Year One	0.8	1.2	0.9	1.1	0.2 (0.03, 0.3)	19.2	0.05	
Year Two	0.8	1.2	0.9	1.1	0.1 (0.02, 0.3)	18.5	0.06	
Overall	0.8	1.2	0.9	1.1	0.2 (0.1, 0.2)	18.9	0.01	
Pharyngitis (%)								**660,115**
Year One	3.8	4.9	3.7	4.9	−0.1 (−0.4, 0.2)	−2.4	0.60	
Year Two	3.8	4.9	3.8	4.7	0.2 (−0.1, 0.5)	5.4	0.22	
Overall	3.8	4.9	3.8	4.8	0.1 (−0.1, 0.3)	1.4	0.66	
Pharyngitis—URI related (%)								**660,115**
Year One	1.1	1.5	1.2	1.5	0.1 (−0.04, 0.3)	10.2	0.22	
Year Two	1.1	1.5	1.1	1.3	0.1 (−0.02, 0.3)[Ŧ]	11.3	0.15	
Overall	1.1	1.5	1.2	1.4	0.1 (0.02, 0.2)	10.7	0.06	
Sinusitis (%)								**280,767**
Year One	3.3	4.4	3.3	4.2	0.1 (−0.2, 0.5)	3.8	0.57	
Year Two	3.3	4.4	3.3	3.8	0.4 (0.1, 0.8)	12.5	0.05	
Overall	3.3	4.4	3.3	4.0	0.3 (0.01, 0.5)	7.9	0.09	

(continued)

Table A-1-1. Difference in the pre-post annual change in ED visits for Medicaid beneficiaries in Arkansas URI Episodes of Care beneficiaries relative to the comparison group, first 2 years of implementation (October 2012 through September 2014) (continued)

Outcome and time period	Pre-period adjusted mean, AR	Pre-period adjusted mean, CG	Test-period adjusted mean, AR	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	N
Sinusitis—URI related (%)								**280,767**
Year One	0.3	0.6	0.4	0.5	0.1 (0.01, 0.2)	37.5	0.06	
Year Two	0.3	0.6	0.3	0.4	0.1 (0.03, 0.2)	41.3	0.03	
Overall	0.3	0.6	0.4	0.5	0.1 (0.1, 0.2)	39.3	0.004	

AR = Arkansas; CG = comparison group; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; URI = upper respiratory infection.

Note:

[Ŧ] 80% CI: Pharyngitis-URI Related (0.02, 11.4); Nonspecific URI (0.03, 7.2) Standard statistical practice is to use CIs of 90% or higher. Eighty percent CIs are provided here for comparison purposes only.

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in the likelihood of a care coordination event in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in the likelihood of a care coordination event in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention group's baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the difference in likelihood of a care coordination event. The estimates are multiplied by 100 to obtain percentage probabilities. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix A-2* for additional detail.

Data source: RTI analysis of MAX/AMAX Medicaid Claims, 2011–2014.

Table A-1-2. Difference in the pre-post annual change in physician visits for Medicaid beneficiaries in Arkansas URI Episodes of Care relative to the comparison group, first 2 years of implementation (October 2012 through September 2014)

Outcome and time period	Pre-period adjusted mean, AR	Pre-period adjusted mean, CG	Test-period adjusted mean, AR	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	N
Overall URI (%)								**1,681,962**
Year One	15.9	18.5	15.3	18.9	−0.8 (−1.20, −0.43)	−5.1	0.001	
Year Two	15.9	18.5	15.8	18.0	0.4 (0.02, 0.80)	2.6	0.08	
Overall	15.9	18.5	15.6	18.5	−0.2 (−0.51, 0.04)[Ŧ]	−1.5	0.15	
Overall—URI related (%)								**1,681,962**
Year One	6.0	6.5	5.1	6.2	−0.6 (−0.9, −0.4)	−10.5	<0.001	
Year Two	6.0	6.5	4.8	5.9	−0.6 (−0.82, −0.34)	−9.7	<0.001	
Overall	6.0	6.5	5.0	6.0	−0.6 (−0.8, −0.4)	−10.1	<0.001	
Nonspecific URI (%)								**741,080**
Year One	14.4	17.3	14.1	17.7	−0.7 (−1.3, −0.1)	−4.6	0.06	
Year Two	14.4	17.3	14.6	17.1	0.4 (−0.22, 1.0)	2.6	0.30	
Overall	14.4	17.3	14.3	17.4	−0.2 (−0.6, 0.2)	−1.4	0.43	
Nonspecific URI—URI related (%)								**741,080**
Year One	5.1	5.7	4.4	5.8	−0.8 (−1.1, −0.4)	−14.9	0.001	
Year Two	5.1	5.7	4.2	5.4	−0.6 (−1.0, −0.3)	−12.5	0.003	
Overall	5.1	5.7	4.3	5.6	−0.7 (−1.0, −0.4)	−13.8	<0.001	
Pharyngitis (%)								**660,115**
Year One	16.2	18.7	15.5	18.9	−0.9 (−1.50, −0.31)	−5.6	0.01	
Year Two	16.2	18.7	15.8	17.8	0.4 (−0.2, 1.0)	2.3	0.28	
Overall	16.2	18.7	15.7	18.4	−0.3 (−0.7, 0.1)	−1.7	0.27	
Pharyngitis—URI related (%)								**660,115**
Year One	6.4	6.9	5.4	6.5	−0.6 (−1.01, −0.21)	−9.5	0.01	
Year Two	6.4	6.9	5.1	6.1	−0.6 (−1.0, −0.2)	−9.3	0.01	
Overall	6.4	6.9	5.3	6.3	−0.6 (−0.9, −0.3)	−9.4	<0.001	
Sinusitis (%)								**280,767**
Year One	18.6	21.5	18.0	21.9	−1.0 (−1.9, −0.1)	−5.3	0.08	
Year Two	18.6	21.5	18.9	21.2	0.5 (−0.5, 1.5)	2.8	0.39	
Overall	18.6	21.5	18.4	21.6	−0.3 (−1.00.96, 0.4)	−1.5	0.50	

(continued)

Table A-1-2. Difference in the pre-post annual change in physician visits for Medicaid beneficiaries in Arkansas URI Episodes of Care relative to the comparison group, first 2 years of implementation (October 2012 through September 2014) (continued)

Outcome and time period	Pre-period adjusted mean, AR	Pre-period adjusted mean, CG	Test-period adjusted mean, AR	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	N
Sinusitis—URI related (%)								**280,767**
Year One	6.9	7.4	6.1	6.9	−0.4 (−1.0, 0.3)	−5.2	0.35	
Year Two	6.9	7.4	5.7	6.7	−0.5 (−1.2, 0.1)[₮]	−8.0	0.15	
Overall	6.9	7.4	5.9	6.8	−0.4 (−0.9, −0.01)	−6.5	0.10	

AR = Arkansas; CG = comparison group; CI = confidence interval; D-in-D = difference-in-differences; URI = upper respiratory infection.

Note:

[₮] 80% CI Year Two, Sinusitis-URI Related (−1.0, −7.5); Overall, Overall URI (−0.4, −1.3) Standard statistical practice is to use CIs of 90% or higher. Eighty percent CIs are provided here for comparison purposes only.

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in the likelihood of a care coordination event in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in the likelihood of a care coordination event in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention group's baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the difference in likelihood of a care coordination event. The estimates are multiplied by 100 to obtain percentage probabilities. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix A-2* for additional detail.

Source: RTI analysis of MAX/AMAX Medicaid Claims, 2011–2014.

Table A-1-3. Difference in the pre-post annual change in utilization for child Medicaid beneficiaries in Arkansas URI Episodes of Care relative to the comparison group, first 2 years of implementation (October 2012 through September 2014)

Outcome and time period	Pre-period adjusted mean, AR	Pre-period adjusted mean, CG	Test-period adjusted mean, AR	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value
Any emergency department use (%)							
Year One	3.3	4.3	3.3	4.2	0.2 (−0.02, 0.3)[ŦŦ]	4.9	0.15
Year Two	3.3	4.3	3.3	3.9	0.3 (0.1, 0.5)	9.2	0.01
Overall	3.3	4.3	3.3	4.1	0.2 (0.1, 0.4)	6.9	0.004
Any physician visit (%)							
Year One	15.3	17.6	14.8	17.8	−0.7 (−1.0, −0.3)	−4.6	0.004
Year Two	15.3	17.6	15.2	16.9	0.5 (0.1, 0.9)	3.2	0.05
Overall	15.3	17.6	15.0	17.4	−0.1 (−0.4, 0.2)	−0.9	0.43
Any antibiotic use (%)							
Year One	63.7	65.1	58.8	62.6	−2.4 (0.0, −1.8)	−3.8	<0.001
Year Two	63.7	65.1	57.7	61.1	−2.1 (0.0, −1.5)	−3.2	<0.001
Overall	63.7	65.1	58.3	61.9	−2.2 (−2.7, −1.8)	−3.5	<0.001

AR = Arkansas; CG = comparison group; CI = confidence interval; D-in-D = difference-in-differences; URI=upper respiratory infection.

Note:

[ŦŦ] 80% CI: Year one, Any Emergency Department Use (0.1, 7.0) Standard statistical practice is to use CIs of 90% or higher. Eighty percent CIs are provided here for comparison purposes only.

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in payments or in the rate in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in payments or in the rate in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention group's baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The probability estimates are multiplied by 100 to obtain percentage probabilities. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix A-2* for additional detail. Total weighted N = 746,183.

Data source: RTI analysis of MAX/AMAX Medicaid Claims, 2011–2014.

Table A-1-4. Difference in the pre-post annual change in utilization for adult Medicaid beneficiaries in Arkansas URI Episodes of Care relative to the comparison group, first 2 years of implementation (October 2012 through September 2014)

Outcome and time period	Pre-period adjusted mean, AR	Pre-period adjusted mean, CG	Test-period adjusted mean, AR	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value
Any emergency department use (%)							
Year One	7.9	8.4	8.3	9.2	−0.4 (−1.2, 0.3)	−5.4	0.33
Year Two	7.9	8.4	8.7	9.1	0.1 (−0.7, 0.9)	1.3	0.83
Overall	7.9	8.4	8.5	9.2	−0.2 (−0.7 0.4)	−2.1	0.60
Any physician visit (%)							
Year One	22.5	26.5	23.7	31.1	−3.0 (−4.2, −1.8)	−13.3	<0.001
Year Two	22.5	26.5	24.9	30.7	−1.5 (−2.7, −0.3)	−6.5	0.04
Overall	22.5	26.5	24.3	30.9	−2.2 (−3.1, −1.4)	−10.0	<0.001
Any antibiotic use (%)							
Year One	66.4	72.3	64.2	69.8	0.5 (−0.8, 1.8)	0.7	0.54
Year Two	66.4	72.3	59.7	66.5	−0.5 (−1.9, 0.9)	−0.8	0.54
Overall	66.4	72.3	62.0	68.2	0.0 (−1.0, 1.0)	0.0	1.00

AR = Arkansas; CG = comparison group; D−in-D = difference-in-differences; URI=upper respiratory infection.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in payments or in the rate in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in payments or in the rate in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention group's baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix A-2* for additional detail. Weighted N = 56,260.

Data source: RTI analysis of MAX/AMAX Medicaid Claims, 2011–2014.

A-1.2 Supplementary Results for the Arkansas Perinatal Episode Impact Analysis

In ***Table A-1-5*** we present the unweighted Arkansas perinatal episode characteristics, and in ***Table A-1-6*** we present covariates with associated odds ratios for a logistic regression on the odds of having a perinatal EOC in 2014. In ***Table A-1-7*** we present the results of the D-in-D regression analyses for utilization among Medicaid beneficiaries in **all** identified Arkansas perinatal EOC. We report annual regression adjusted D-in-D estimates individually for the first 2 years after the implementation of the perinatal EOC, along with an overall D-in-D estimate for both years combined. These results are summarized in ***Appendix A, Section A.3***.

Table A-1-5. Unweighted perinatal episode characteristics in Arkansas, post-private option and pre-private option, N = 29,610

Characteristic	2014 Episodes	2011–2013 Episodes	Standardized difference[a]	p-value
N	6,449	23,161		
Sociodemographic characteristics of beneficiaries with episodes				
Age indicator (%): 16 to 19	17.2	18.29	2.86	0.04
Age indicator (%): 20 to 24	40.15	42.27	4.31	<0.001
Age indicator (%): 25 to 34	37.29	34.57	5.67	<0.001
Age indicator (%): 35 and older (Referent)	4.19	3.62	2.91	0.04
Black (%)	26.25	27.41	2.61	0.06
Hispanic (%)	6.03	5.73	1.27	0.37
Other (%)	8.59	4.81	15.18	<0.001
White (Referent) (%)	59.13	62.05	5.99	<0.001
Disability (%)	5.8	5.8	0.02	0.99
Concurrent CDPS Score (%)	1.6	1.6	0.71	0.63
Poverty related eligibility (%)	72.32	77.1	11.01	<0.001
Months of full-Medicaid enrollment during prenatal period	9.1	9.1	3.04	0.03
Diabetes (%)	3.85	4.14	1.53	0.27
Asthma (%)	2.62	2.44	1.13	0.43
Hypertension (%)	1.88	1.65	1.72	0.23
County-level characteristics for counties of residence for beneficiaries with episodes				
Metropolitan status of county of residence (%)	54.43	54.22	0.42	0.76
Percent of population at federal poverty level, 2012	20.7	20.7	0.25	0.86
Hospital beds per 1,000, 2010	3.9	3.9	0.35	0.81
Median Age, 2010	37.9	37.9	0.09	0.95
Percent uninsured, ages <65, 2012	19.4	19.4	0.9	0.52

CDPS = Chronic Illness and Disability Payment System; SSP = Shared Savings Program.

Data source: RTI analysis of MAX/AMAX Medicaid Claims, 2011–2014.

Table A-1-6. Covariates for a logistic regression on the odds of having a perinatal Episode of Care in 2014

Covariate	Odds ratios (90% confidence interval)	Standard error	p-value
Constant	0.43 (0.27, 0.67)	0.10	<0.001
Demographic characteristics			
Age (16–19 years)	0.85 (0.73, 1.00)	0.07	0.05
Age (20–24 years)	0.83 (0.72, 0.95)	0.06	0.01
Age (25–34 years)	0.95 (0.82, 1.10)	0.07	0.51
Black	1.00 (0.93, 1.08)	0.04	0.92
Hispanic	1.11 (0.99, 1.26)	0.07	0.09
Other (Race)	1.98 (1.77, 2.21)	0.11	<0.001
Disability	0.66 (0.58, 0.76)	0.05	<0.001
Health status measure			
CDPS score (count of major comorbidities)	0.98 (0.94, 1.02)	0.02	0.31
Enrollment			
Months of full-Medicaid enrollment during prenatal period	0.97 (0.95, 0.99)	0.01	0.01
Poverty-Related Eligibility	0.70 (0.65, 0.76)	0.03	<0.001
Diabetes	0.90 (0.78, 1.04)	0.07	0.16
Hypertension	1.10 (0.89, 1.35)	0.12	0.39
Asthma	1.09 (0.91, 1.29)	0.10	0.36
County characteristics			
Metropolitan Statistical Area	1.00 (0.93, 1.07)	0.04	0.96
Uninsured Over 65 Years 2012 (%)	1.01 (0.99, 1.02)	0.01	0.31
Federal Poverty Level 2012 (%)	1.00 (0.99, 1.00)	0.00	0.50
Hospital Beds Per 1,000 Beneficiaries	1.00 (0.99, 1.01)	0.01	0.83
Median Age 2010	1.00 (1.00, 1.01)	0.00	0.31

CDPS = Chronic Illness and Disability Payment System.

Data source: RTI analysis of MAX/AMAX Medicaid Claims, 2011–2014.

Table A-1-7. Difference in the pre-post annual change in utilization for Medicaid beneficiaries in all identified Arkansas perinatal Episodes of Care relative to the comparison group, first 2 years of implementation (October 2012–September 2014)

Outcome and time period	Pre-period adjusted mean, AR	Pre-period adjusted mean, CG	Test-period adjusted mean, AR	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
Number of ultrasounds during the episode								
Year One	1.9	3.0	2.2	3.2	0.1 (0.0, 0.12)	0.03	0.08	149,759
Year Two	1.9	3.0	2.5	3.2	0.4 (0.3, 0.46)	0.20	<0.001	
Overall	1.9	3.0	2.4	3.2	0.2 (0.2, 0.27)	0.11	<0.001	
Any inpatient admissions during prenatal period (%)								
Year One	6.7	6.4	6.6	6.2	0.0 (−0.7, 0.8)	0.5	0.94	149,759
Year Two	6.7	6.4	7.0	5.4	1.1 (0.1, 2.1)	15.7	0.08	
Overall	6.7	6.4	6.8	5.8	0.5 (−0.1, 1.2) [Ŧ]	8.0	0.16	
Number of emergency department visits not leading to hospitalization during prenatal period								
Year One	0.7	1.1	0.6	1.1	−0.1 (−0.2, −0.1)	−15.1	<0.001	149,759
Year Two	0.7	1.1	0.6	1.1	−0.2 (−0.3, −0.1)	−24.7	<0.001	
Overall	0.7	1.1	0.6	1.1	−0.1 (−0.2, −0.1)	−19.8	<0.001	
Length of hospital stay during delivery								149,759
Year One	6.8	2.4	8.3	2.2	2.2 (1.4, 3.1)	32.6	<0.001	
Year Two	6.8	2.4	7.1	2.3	0.5 (−0.9, 1.9)	7.4	0.55	
Overall	6.8	2.4	7.7	2.3	1.4 (0.6, 2.2)	20.2	0.005	
30-day readmission (%)[§]								134,196
Year One	1.3	1.4	1.3	1.4	0.0 (−0.4, 0.5)	2.4	0.90	
Year Two	1.3	1.4	1.2	1.2	0.1 (−0.5, 0.7)	10.0	0.71	
Overall	1.3	1.4	1.3	1.3	0.1 (−0.3, 0.5)	6.2	0.71	
60-day readmission (%)[§]								134,196
Year One	1.7	1.9	1.6	1.8	0.0 (−0.4, 0.5)	2.5	0.88	
Year Two	1.7	1.9	1.6	1.5	0.3 (−0.4, 0.9)	15.5	0.51	
Overall	1.7	1.9	1.6	1.7	0.1 (−0.2, 0.5)	8.9	0.54	
Any emergency department visits not leading to hospitalization during postnatal period (%)[§]								134,196
Year One	8.9	14.7	9.1	14.2	0.4 (−0.5, 1.2)	4.1	0.47	
Year Two	8.9	14.7	10.9	13.2	2.4 (1.2, 3.5)	26.6	0.001	
Overall	8.9	14.7	10.0	13.7	1.4 (0.7, 2.1)	15.2	0.002	

(continued)

Table A-1-7. Difference in the pre-post annual change in utilization for Medicaid beneficiaries in all identified Arkansas perinatal Episodes of Care relative to the comparison group, first 2 years of implementation (October 2012–September 2014) (continued)

Outcome and time period	Pre-period adjusted mean, AR	Pre-period adjusted mean, CG	Test-period adjusted mean, AR	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
Total number of ED visits during the episode[§]								134,196
Year One	1.0	1.7	0.9	1.6	−0.1 (−0.2, −0.1)	−12.3	<0.001	
Year Two	1.0	1.7	0.8	1.6	−0.2 (−0.3, −0.1)	−18.3	0.001	
Overall	1.0	1.7	0.8	1.6	−0.2 (−0.2, −0.1)	−15.3	<0.001	

AR = Arkansas; CG = comparison group; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department.

Note:

[§] These outcomes were estimated only on episodes where the beneficiary had full Medicaid benefits during the 60-day period post-delivery.

[Ŧ] 80% CI: 0.05, 1.03, any inpatient admissions during prenatal period. Standard statistical practice is to use CIs of 90% or higher. Eighty percent CIs are provided here for comparison purposes only.

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in payments or in the rate in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in payments or in the rate in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention groups baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The estimates are multiplied by 100 to obtain percentage probabilities. Negative binomial models were used for the number of ED visits (prenatal, total). The output is interpreted as average expected number of events. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix A-2* for additional detail.

Ordinary least squares models were used to model the number of ultrasounds and length of stay. The output is interpreted as the average number of ultrasounds or days in the hospital. The year-specific regression-adjusted D-in-D may not match the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights across these figures. See *Sub-appendix A-2* for additional detail.

Data source: RTI analysis of MAX/AMAX claims FY 2011–FY 2014.

A-1.3 Supplementary Results for Analysis of Spillover Effects of the Medicaid PCMH Model on the Commercially Insured Population[40]

This sub-appendix contains additional data relevant to Arkansas during the SIM Initiative. ***Sections A-1.3.1*** through ***A-1.3.4*** describe results from additional analyses to test the spillover impact of the PCMH models on commercially insured individuals, as discussed in more detail in ***Section A.4*** of ***Appendix A***.

A-1.3.1 Supplementary analysis of core sample

We present supplementary comparative interrupted times series (CITS) estimates for the core sample attributed using a three-visit floor.[41] ***Tables A-1-8*** and ***A-1-9*** present results using the CITS approach, which replaces the quarterly fixed effects with a linear time trend and an interaction with the post-PCMH indicator; methods are discussed in more detail in ***Sub-appendix A-2, Section A-2.3.4*** under *Sensitivity Analyses*. The purpose of this section was to model the change in trend differently. Because there may have been a gradual change in costs or utilization as providers adapted to PCMH components, this alternative specification was a way to test an important assumption of the model. The CITS approach allows us to isolate how the slope of the trends are changing over time, rather than evaluating only a pre-post difference.

These results are discussed in ***Section A.4.3*** of ***Appendix A.*** In the CITS estimates presented in ***Tables A-1-8*** and ***A-1-9***, there is weak evidence of short-term reductions in total, professional, and inpatient facility expenditures, but we note this result with the strong caveats that the unadjusted trends are not always linear. Most outcomes have positive slope coefficients, suggesting congruence with the D-in-D approach.

[40] This report and its findings are independent research conducted by RTI International. The Arkansas Insurance Department and the Arkansas All-Payer Claims Database have not evaluated the content of the report or its findings beyond determining compliance with minimum cell size and complimentary cell suppression rules; incorporation of appropriate protections to prevent inferential identification; consistency with the initial project description. The said report or findings do not represent the positions or opinions of the Arkansas Insurance Department or the Arkansas Healthcare Transparency Initiative Board.

[41] We assigned commercial plan members to one of four PCMH groups (early 2014, mid-2014, 2015, or 2016) based on whether the beneficiary had a minimum of three primary care visits in a given calendar year to a PCMH practice.

Table A-1-8. Estimated quarterly effects of PCMH adoption on utilization and expenditures using CITS with calendar time, Arkansas commercial plan members, 2013–2016

Outcome	2013 adjusted mean, PCMH	Difference-in-differences estimate (90% confidence interval)	Relative difference (%)	p-value	Change in slope estimate (90% confidence interval)	p-value	Weighted N
Total expenditures	289.2	−49.5 (−84.10, −14.93)	−17.1	0.02	6.0 (0.33, 11.67)	0.08	704,419
Professional expenditures	120.1	−1.1 (−10.14, 7.96)	−0.9	0.84	0.1 (−1.33, 1.51)	0.92	704,419
Pharmaceutical expenditures	70.0	−7.7 (−19.53, 4.10)	−11.0	0.28	1.6 (−0.22, 3.41)	0.15	704,419
Inpatient facility expenditures	38.2	−25.9 (−42.52, −9.21)	−67.7	0.01	2.4 (−0.51, 5.26)	0.18	704,419
Outpatient facility expenditures	61.0	−14.8 (−29.65, −0.04)	−24.3	0.10	1.9 (−0.61, 4.51)	0.21	704,419
Inpatient stays per 1,000 member-quarters	8.6	0.3 (−1.20, 1.78)	3.3	0.75	0.1 (−0.10, 0.31)	0.40	701,897
Primary care visits per 100 member-quarters	70.5	0.9 (0.12, 1.66)	1.3	0.06	0.1 (−0.05, 0.18)	0.32	704,416
Specialist visits per 100 member-quarters	18.4	−0.2 (−0.93, 0.60)	−0.9	0.73	0.1 (−0.07, 0.22)	0.40	704,384
Emergency department visits per 1,000 member-quarters	66.4	3.3 (−0.48, 7.07)	5.0	0.15	−0.2 (−0.92, 0.48)	0.60	704,373

CITS = comparative interrupted time series; D-in-D = difference-in-differences; PCMH = patient-centered medical home.
Note: Comparative interrupted time series regression models were estimated using Ordinary Least Squares for the expenditure outcomes and maximum likelihood logit for the service use outcomes. The difference-in-differences estimates represents the intercept shift associated with PCMH adoption and can be interpreted similarly to a standard difference-in-differences model. The relative difference is the D-in-D estimate expressed as a percentage of the intervention group's pre-intervention period adjusted mean. Standard statistical practice is to use confidence intervals of 90% or higher.
Data source: RTI analysis of AR APC data, 2013–2016.

Table A-1-9. Estimated quarterly effects of early 2014 PCMH adopters on utilization and expenditures using CITS with calendar time, Arkansas commercial plan members, 2013–2016

Outcome	2013 adjusted mean, early 2014 PCMH practices	2013 adjusted mean, CG practices	Difference-in-differences estimate (90% confidence interval)	Relative difference (%)	p-value	Change in slope estimate (90% confidence interval)	p-value	Weighted N
Total expenditures	275.4	325.9	−3.0 (−71.26, 65.20)	−1.1	0.94	7.3 (−1.66, 16.17)	0.18	704,419
Professional expenditures	114.9	131.9	8.7 (−3.67, 21.06)	7.6	0.25	0.3 (−2.73, 3.35)	0.87	704,419
Pharmaceutical expenditures	68.9	73.4	−20.9 (−48.39, 6.52)	−30.4	0.21	5.6 (2.24, 8.92)	0.01	704,419
Inpatient facility expenditures	33.5	50.5	0.0 (−40.32, 40.26)	−0.1	1.00	2.3 (−3.76, 8.41)	0.53	704,419
Outpatient facility expenditures	58.1	70.0	9.2 (−6.23, 24.70)	15.9	0.33	−1.0 (−4.72, 2.81)	0.68	704,419
Inpatient stays per 1,000 member-quarters	8.2	9.8	7.0 (3.47, 10.54)	85.6	0.001	1.3 (0.58, 1.93)	0.002	701,897
Primary care visits per 100 member-quarters	70.1	71.4	7.1 (4.72, 9.43)	10.1	<0.001	1.3 (0.88, 1.67)	<0.001	704,416
Specialist visits per 100 member-quarters	18.3	18.9	−0.7 (−2.65, 1.33)	−3.6	0.59	−0.1 (−0.44, 0.33)	0.82	704,384
Emergency department visits per 1,000 member-quarters	65.4	68.9	10.7 (−3.49, 24.93)	16.4	0.21	2.4 (0.19, 4.66)	0.07	704,373

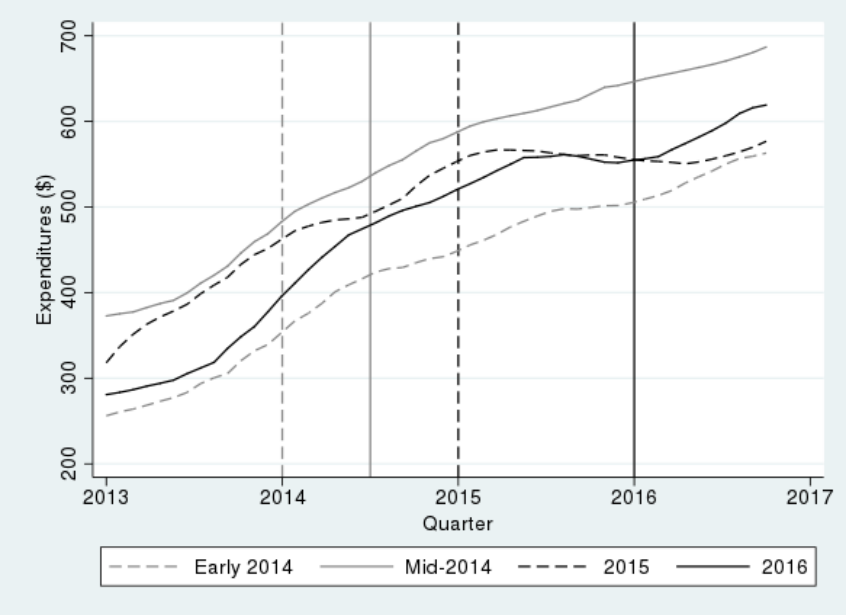
CG = comparison group; CITS = comparative interrupted time series; D-in-D = difference-in-differences; PCMH = patient-centered medical home.
Note: Comparative interrupted time series regression models were estimated using Ordinary Least Squares for the expenditure outcomes and maximum likelihood logit for the service use outcomes. The difference-in-differences estimates represents the intercept shift associated with PCMH adoption and can be interpreted similarly to a standard difference-in-differences model. The relative difference is the D-in-D estimate expressed as a percentage of the intervention group's pre-intervention period adjusted mean. Standard statistical practice is to use confidence intervals of 90% or higher.

Data source: RTI analysis of AR APC data, 2013–2016.

The interpretation of the CITS coefficients is not the same as the D-in-D coefficients. In the CITS model the effect of PCMH implementation is different in every quarter and requires one to look at both the D-in-D coefficient and the slope coefficient. The D-in-D coefficient in the CITS model is a starting point. For example, in ***Table A-1-8***, we found that PCMH adoption was associated with a $49.50 decline in total PMPM expenditures after PCMH implementation overall ($p < 0.10$). However, one must take into account the slope coefficient to understand the net change in every quarter. For total PMPM expenditures, we found that total expenditures were *increasing* at a rate of $6 per quarter. As such, we can conclude that as of January 2014, which is the fourth quarter in the data, PCMH adoption was associated with a $25.50 decline in total PMPM expenditures (i.e., −$49.50 + 4*6).

In this section, we also present the unadjusted quarterly time trends by PCMH group; ***Figures A-1-1*** *to* ***A-1-9*** contain the trends for each of the nine outcomes in this analysis for the core sample. D-in-D and CITS models are subject to a critical assumption that there are similar pre-treatment trends, or the parallel trends assumption. Although we tested this assumption empirically in ***Sub-appendix A-2, Section A-2.3 in Table A-2-18*** and did not find evidence of differential trends, a robust approach also assesses graphically the trends. Looking across ***Figures A-1-1*** *to* ***A-1-9*****,** there did not appear to be differential trends among the study outcomes in the common pre-PCMH year of 2013. The graphs also show the increase in expenditures and service utilization across PCMH groups after 2013.

Figure A-1-1. Unadjusted quarterly total expenditures by PCMH group (2013–2016)

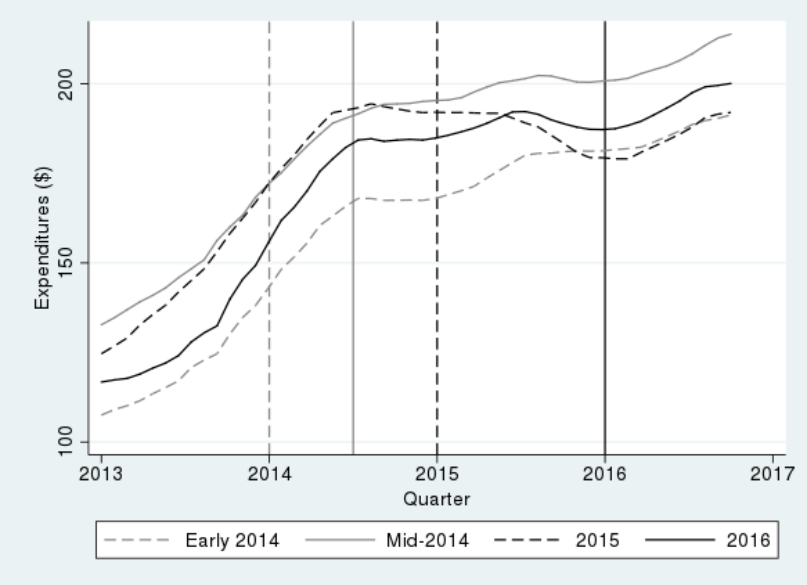


PCMH = patient-centered medical home.

Note: Quarterly trends were smoothed using local polynomial regression with an Epanechnikov kernel.

Data source: RTI analysis of AR APC data, 2013–2016.

Figure A-1-2. Unadjusted quarterly professional expenditures by PCMH group (2013–2016)

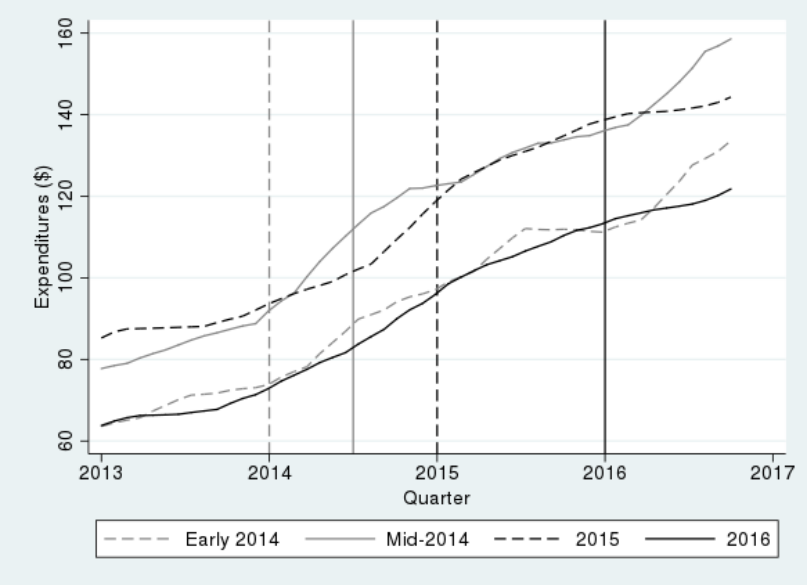


PCMH = patient-centered medical home.

Note: Quarterly trends were smoothed using local polynomial regression with an Epanechnikov kernel.

Data source: RTI analysis of AR APC data, 2013–2016.

Figure A-1-3. Unadjusted quarterly prescription drug expenditures by PCMH group (2013–2016)

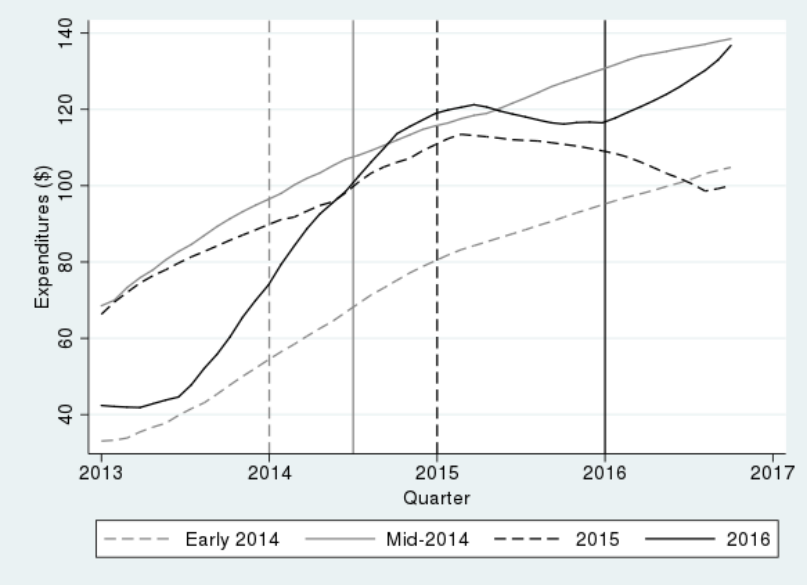


PCMH = patient-centered medical home.

Note: Quarterly trends were smoothed using local polynomial regression with an Epanechnikov kernel.

Data source: RTI analysis of AR APC data, 2013–2016.

Figure A-1-4. Unadjusted quarterly inpatient facility expenditures by PCMH group (2013–2016)

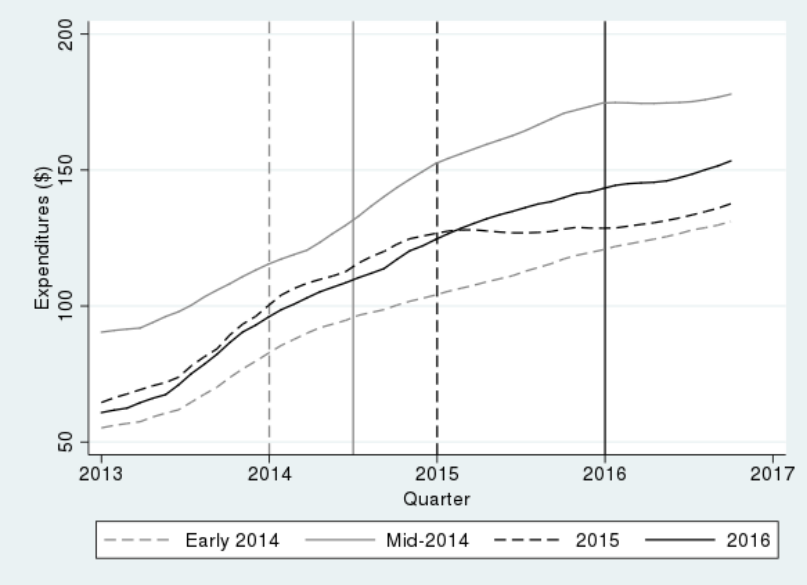


PCMH = patient-centered medical home.

Note: Quarterly trends were smoothed using local polynomial regression with an Epanechnikov kernel.

Data source: RTI analysis of AR APC data, 2013–2016.

Figure A-1-5. Unadjusted quarterly non-inpatient facility expenditures by PCMH group (2013–2016)

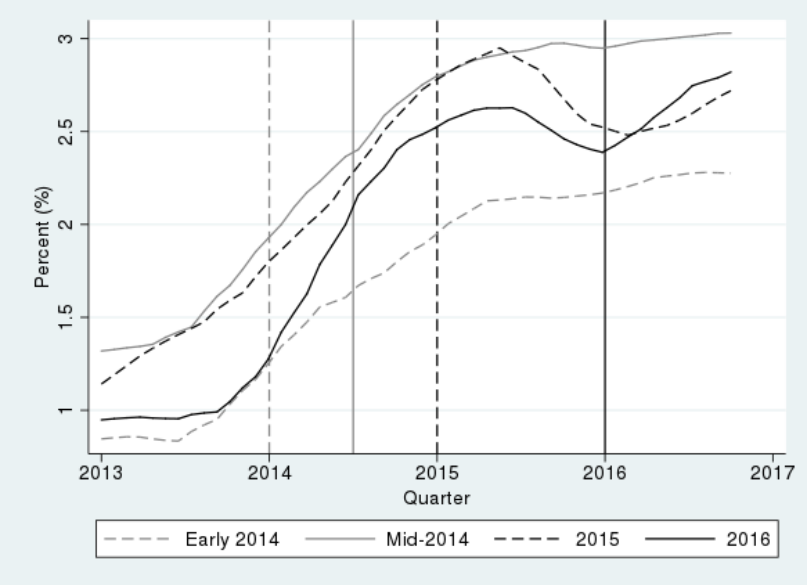


PCMH = patient-centered medical home.

Note: Quarterly trends were smoothed using local polynomial regression with an Epanechnikov kernel.

Data source: RTI analysis of AR APC data, 2013–2016.

Figure A-1-6. Unadjusted quarterly proportion with an inpatient stay, by PCMH group (2013–2016)

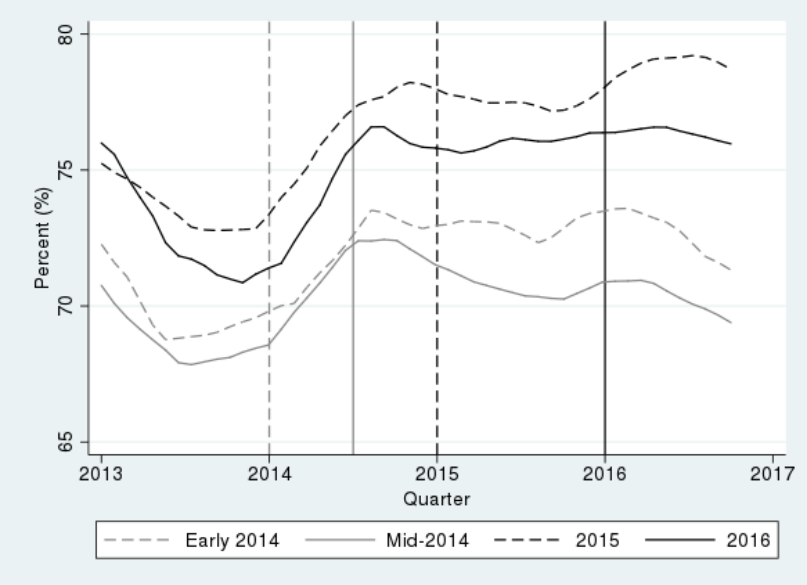


PCMH = patient-centered medical home.

Note: Quarterly trends were smoothed using local polynomial regression with an Epanechnikov kernel.

Data source: RTI analysis of AR APC data, 2013–2016.

Figure A-1-7. Unadjusted quarterly proportion with a primary care visit, by PCMH group (2013–2016)

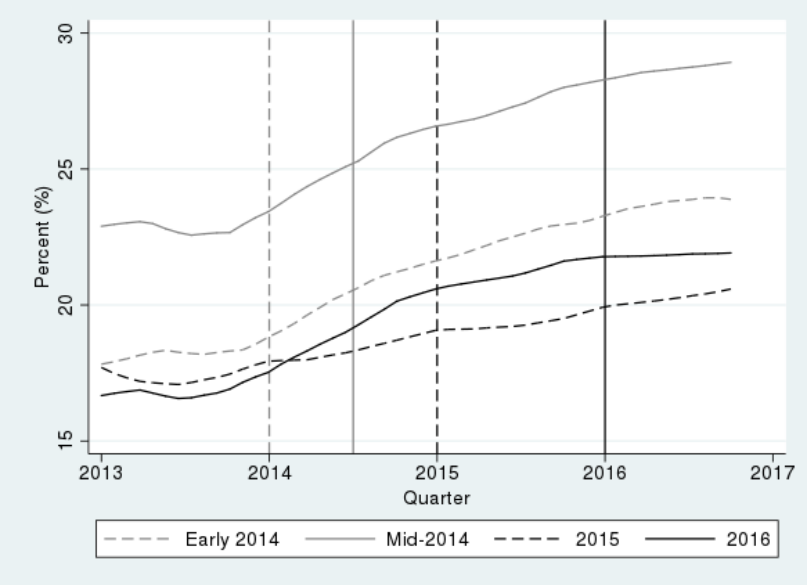


PCMH = patient-centered medical home.

Note: Quarterly trends were smoothed using local polynomial regression with an Epanechnikov kernel.

Data source: RTI analysis of AR APC data, 2013–2016.

Figure A-1-8. Unadjusted quarterly proportion with a specialist visit, by PCMH group (2013–2016)

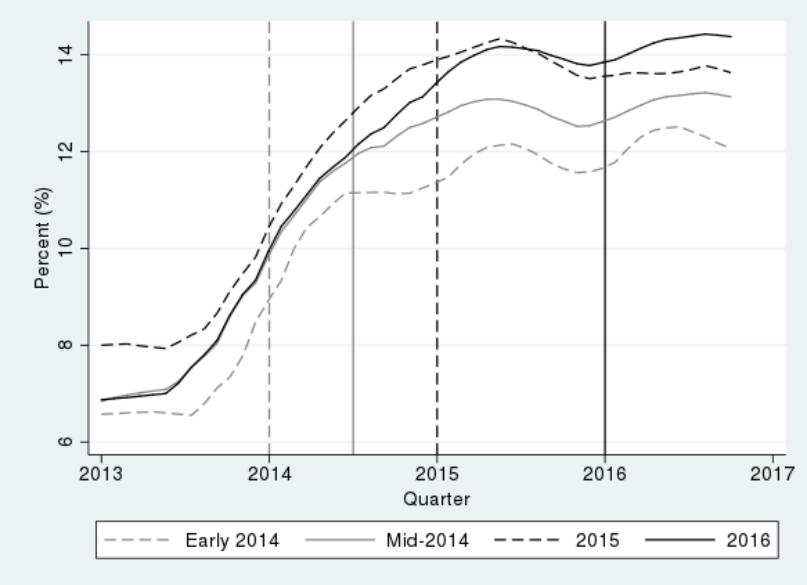


PCMH = patient-centered medical home.

Note: Quarterly trends were smoothed using local polynomial regression with an Epanechnikov kernel.

Data source: RTI analysis of AR APC data, 2013–2016.

Figure A-1-9. Unadjusted quarterly proportion with an emergency department visit, by PCMH group (2013–2016)



PCMH = patient-centered medical home.

Note: Quarterly trends were smoothed using local polynomial regression with an Epanechnikov kernel.

Data source: RTI analysis of AR APC data, 2013–2016.

A-1.3.2 Supplementary analysis of the non-Marketplace population for the core sample

We present supplementary estimates on the core sample that excludes individuals whose commercial insurance plan was issued through the Arkansas Health Insurance Marketplace. Beginning in 2014, individuals could purchase commercial health insurance through the Arkansas Health Insurance Marketplace, which increased the sample size in the data by 50 percent. The Marketplace population had much higher expenditures and used more services than the non-Marketplace population. This section presents summary statistics for the non-Marketplace and Marketplace populations, and then reestimates the D-in-D for the non-Marketplace sample-only as a sensitivity analysis.

These results are discussed in ***Section A.4.3*** of ***Appendix A. Table A-1-10*** presents summary statistics for the non-Marketplace sample. For comparison, ***Table A-1-10*** table also includes information on only those whose commercial insurance plan was issued through the Marketplace. We found that both the Marketplace and the non-Marketplace populations experienced an increase in expenditures and utilization after 2013. ***Tables A-1-11*** and ***A-1-12*** show estimates from the D-in-D models using the non-Marketplace sample. The D-in-D methods are discussed in more detail in ***Sub-appendix A-2, Section A-2.3.4*** under *Regression Model*. In ***Table A-1-11*****,** we found a similar pattern of results in the non-Marketplace sample as we did for the full sample where there were no significant effects on the study outcomes. In ***Table A-1-12***, we did not find significant increases in primary care or specialist visits among commercial plan members in the non-Marketplace sample who received care from 2014 PCMH adopters, unlike the findings for early 2014 PCMH adopters in the full sample.

The purpose of this section was to test whether the main results are significantly influenced by the introduction of the Marketplace in 2014. We see similar directions on the coefficients ***Tables A-1-11*** and ***A-1-12*****,** and although the magnitude of the coefficients did bounce around relative to the main results, we did not see evidence that suggests the main results are being driven solely by the Marketplace sample.

Table A-1-10. Weighted annual sample characteristics, PCMH-attributed Arkansas commercial plan members by Marketplace status, 2013–2016

Characteristic	Non-marketplace population annualized by PCMH status		Non-marketplace population annualized by calendar year				Marketplace-only population annualized by calendar year		
	Pre-PCMH	Post-PCMH	2013	2014	2015	2016	2014	2015	2016
Total expenditures	$3,353	$3,881	$3,427	$3,612	$3,904	$4,328	$7,330	$8,523	$8,944
Professional expenditures	$1,349	$1,483	$1,400	$1,459	$1,487	$1,575	$2,732	$2,868	$2,883
Prescription expenditures	$805	$1,046	$835	$880	$1,064	$1,204	$1,230	$1,591	$1,746
Inpatient facility expenditures	$466	$488	$459	$448	$503	$576	$1,617	$1,917	$2,033
Other facility expenditures	$734	$864	$734	$826	$849	$973	$1,752	$2,147	$2,282
Any inpatient visit (%)	3.0	3.4	3.1	3.0	3.5	3.9	10.7	12.8	12.6
Any specialist visit (%)	42.3	46.3	43.0	44.6	46.9	48.4	49.3	52.1	53.3
Any ED visit (%)	20.4	22.0	20.7	21.4	22.6	23.4	43.9	45.1	44.4
Age	29.6	30.9	28.0	29.7	31.5	32.3	38.9	39.3	39.8
Female (%)	55.5	55.6	55.2	55.7	55.5	55.9	70.4	67.5	67.4
BH diagnosis (%)	17.9	18.3	18.5	18.4	18.8	18.4	29.9	31.5	32.9
Lives in MSA (%)	55.3	57.1	57.2	53.6	58.0	56.7	48.4	44.6	42.7
Has prescription drug coverage (%)	83.8	82.6	83.9	83.7	81.5	82.8	100.0	100.0	100.0
Marketplace plan (%)	14.3	11.2	14.2	14.5	9.8	10.2	20.9	30.3	34.7
Insurance product type									
PPO (%)	27.5	25.1	27.2	25.1	25.8	25.0	0.0	0.0	0.0
PoS (%)	28.9	30.7	27.8	28.6	31.8	31.8	100.0	100.0	99.9
Other commercial insurance (%)	48.3	51.7	49.8	51.3	51.8	50.3	79.1	69.7	65.3
Insurance market type									
Individual market plan (%)	28.9	30.7	27.8	28.6	31.8	31.8	100.0	100.0	100.0
Large employer plan (%)	42.1	42.9	42.7	41.8	43.0	43.4	0.0	0.0	0.0
Small employer plan (%)	11.6	11.7	11.8	11.7	11.8	11.3	0.0	0.0	0.0
Unweighted N	42,732	77,567	30,989	30,176	28,272	27,453	15,945	23,484	25,047
Weighted N	44,261	80,102	32,107	31,102	29,121	28,480	17,744	24,957	26,548

BH = behavioral health; ED = emergency department; MSA = Metropolitan Statistical Area; PCMH = patient-centered medical home; PPO = preferred provider organization; PoS = point of service.

Data source: RTI analysis of AR APC data, 2013–2016.

Table A-1-11. Estimated quarterly effects of PCMH adoption on utilization and expenditures using difference-in-differences, Arkansas commercial plan members not enrolled through the Marketplace, 2013–2016

Outcome	2013 adjusted mean, PCMH	Difference-in-differences estimate (90% confidence interval)	Relative difference (%)	p-value	Weighted N
Total expenditures	292.8	6.5 (−13.62, 26.55)	2.2	0.60	458,622
Professional expenditures	119.4	2.4 (−3.35, 8.22)	2.0	0.49	458,622
Pharmaceutical expenditures	71.1	3.0 (−3.13, 9.04)	4.2	0.43	458,622
Inpatient facility expenditures	39.9	−1.2 (−12.57, 10.15)	−3.0	0.86	458,622
Outpatient facility expenditures	62.4	2.3 (−6.61, 11.19)	3.7	0.67	458,622
Inpatient stays per 1,000 member-quarters	9.1	0.6 (−0.81, 1.93)	6.2	0.50	453,099
Primary care visits per 100 member-quarters	70.5	0.2 (−0.36, 0.80)	0.3	0.53	458,622
Specialist visits per 100 member-quarters	18.6	−0.2 (−0.90, 0.48)	−1.1	0.62	458,594
Emergency department visits per 1,000 member-quarters	67.0	1.8 (−1.01, 4.58)	2.7	0.29	458,575

ACA = Affordable Care Act; PCMH = patient-centered medical home.

Note: Comparative interrupted time series regression models were estimated using Ordinary Least Squares for the expenditure outcomes and maximum likelihood logit for the service use outcomes. The difference-in-differences estimates represents the intercept shift associated with PCMH adoption and can be interpreted similarly to a standard difference-in-differences model. The relative difference is the D-in-D estimate expressed as a percentage of the intervention group's pre-intervention period adjusted mean. Standard statistical practice is to use confidence intervals of 90% or higher.

Data source: RTI analysis of AR APC data, 2013–2016.

Table A-1-12. Estimated quarterly effects of early 2014 PCMH adopters on utilization and expenditures using difference-in-differences, Arkansas commercial plan members not enrolled through the Marketplace, 2013–2016

Outcome	2013 adjusted mean, early 2014 PCMH practices	2013 adjusted mean, CG practices	Difference-in-differences estimate (90% confidence interval)	Relative difference (%)	p-value	Weighted N
Total expenditures	275.4	344.8	37.9 (4.70, 71.14)	13.8	0.06	458,622
Professional expenditures	114.9	133.0	16.6 (8.11, 25.15)	14.5	0.002	458,622
Pharmaceutical expenditures	68.9	77.6	2.9 (−10.00, 15.76)	4.2	0.71	458,622
Inpatient facility expenditures	33.5	58.9	13.7 (−10.02, 37.48)	41.0	0.34	458,622
Outpatient facility expenditures	58.1	75.3	4.7 (−7.14, 16.50)	8.1	0.52	458,622
Inpatient stays per 1,000 member-quarters	8.2	11.7	0.0 (−1.55, 1.64)	0.6	0.96	453,099
Primary care visits per 100 member-quarters	70.1	71.8	0.7 (−0.04, 1.34)	0.9	0.12	458,622
Specialist visits per 100 member-quarters	18.3	19.6	0.6 (−0.03, 1.28)	3.4	0.12	458,594
Emergency department visits per 1,000 member-quarters	65.4	71.6	1.8 (−2.77, 6.35)	2.7	0.52	458,575

ACA = Affordable Care Act; CG = comparison group; PCMH = patient-centered medical home.
Note: Comparative interrupted time series regression models were estimated using Ordinary Least Squares for the expenditure outcomes and maximum likelihood logit for the service use outcomes. The difference-in-differences estimates represents the intercept shift associated with PCMH adoption and can be interpreted similarly to a standard difference-in-differences model. The relative difference is the D-in-D estimate expressed as a percentage of the intervention group's pre-intervention period adjusted mean. Standard statistical practice is to use confidence intervals of 90% or higher.

Data source: RTI analysis of AR APC data, 2013–2016.

A-1.3.3 Supplementary analysis of the one-visit sample

We present supplementary estimates of the D-in-D and CITS models for a sample attributed using a one-visit floor.[42] The core approach of a three-visit floor limited the sample to higher utilizers and excluded low-utilizing individuals by default, thereby limiting the generalizability of our findings to a less healthy population. The purpose of this section was to

[42] We assigned commercial plan members to one of four PCMH groups (early 2014, mid-2014, 2015, or 2016) based on whether the beneficiary had a minimum of one care visit in a given calendar year to a PCMH practice. This attribution method is different than the main approach, which used a minimum of three primary care visits in a given calendar year to assign a beneficiary to a PCMH practice.

assess the potential bias in the core approach by reestimating the models using a sample attributed by a one-visit floor.

These results are discussed in ***Section A.4.3*** of ***Appendix A. Table A-1-13*** presents summary statistics. We found that the one-visit sample had lower expenditures and utilization compared to the core sample and was similar in demographic and insurance characteristics.

Tables A-1-14 and ***A-1-15*** are estimates from the main D-in-D models and the D-in-D methods are discussed in more detail in ***Sub-appendix A-2, Section A-2.3.4*** under *Regression Model*. In ***Table A-1-14*** we found a similar pattern of results in the one-visit floor sample as we did for the core sample where there were no significant effects on the study outcomes. In ***Table A-1-15***, the effect of total expenditures was not significant, and we did not find significant increases for primary care or specialist visits, unlike the core sample for early 2014 PCMH adopters. The effects among the one-visit sample tended to be smaller than the core sample.

Tables A-1-16 and ***A-1-17*** use the CITS approach with the one-visit floor. The CITS method replaces the quarterly fixed effects with a linear time trend and an interaction with the post-PCMH indicator; methods are discussed in more detail in ***Sub-appendix A-2, Section A-2.3.4*** under *Sensitivity Analyses.* The purpose of this method was to model the change in trend differently. Because there may have been a gradual change in costs or utilization as providers adapted to PCMH components, this alternative specification was a way to test an important assumption of the model. The CITS approach allows us to isolate how the slope of the trends are changing over time, rather than evaluating only a pre-post difference.

In ***Tables A-1-16*** and ***A-1-17***, there is weak evidence of short-term reductions in total and inpatient facility expenditures, and a long-term reduction in emergency department visits, but we note this result with the strong caveats that the unadjusted trends are not always linear. Most outcomes have positive slope coefficients (except ED visits), suggesting congruence with the D-in-D approach results from the core sample.

The interpretation of the CITS coefficients is not the same as the D-in-D coefficients. In the CITS model the effect of PCMH implementation is different in every quarter and requires one to look at both the D-in-D coefficient and the slope coefficient. The D-in-D coefficient in the CITS model is a starting point. For example, in ***Table A-1-16***, we found that PCMH adoption was associated with a $22 decline in total PMPM expenditures after PCMH implementation overall ($p < 0.10$). However, one must take into account the slope coefficient to understand the net change in every quarter. For total PMPM expenditures, we found that total expenditures were *increasing* at a rate of $3 per quarter. As such, we can conclude that as of January 2014, which is the fourth quarter in the data, PCMH adoption was associated with a $10 decline in total PMPM expenditures (i.e., −$22 + 4*3).

Table A-1-13. Weighted annual sample characteristics, Arkansas commercial plan members, 2013–2016, sample attributed using a one-visit floor

Characteristic	Annualized by PCMH status		Annualized by calendar year				Annualized by PCMH group in 2013			
	Pre-PCMH	Post-PCMH	2013	2014	2015	2016	Early 2014	Mid 2014	2015	2016
Total expenditures	$2,408	$3,647	$1,982	$3,051	$3,833	$4,227	$1,891	$2,488	$2,483	$3,459
Professional expenditures	$948	$1,303	$829	$1,197	$1,359	$1,433	$803	$952	$946	$1,369
Prescription expenditures	$533	$794	$498	$622	$829	$930	$481	$589	$639	$698
Inpatient facility expenditures	$397	$693	$246	$538	$747	$846	$222	$379	$410	$576
Other facility expenditures	$531	$857	$410	$693	$898	$1,018	$384	$568	$489	$816
Any inpatient visit (%)	2.9	5.0	2.0	3.9	5.5	5.8	1.8	2.7	2.7	4.6
Any specialist visit (%)	27.6	32.8	27.3	30.7	33.5	34.8	27.1	32.8	25.5	28.1
Any ED visit (%)	17.1	23.4	14.2	21.6	24.7	25.4	14.0	14.4	16.8	26.0
Age	30.1	32.5	27.1	31.1	33.2	33.8	25.8	32.4	33.2	35.9
Female (%)	53.7	56.1	51.6	55.8	56.1	56.7	51.3	52.9	55.7	60.7
BH diagnosis (%)	13.2	16.4	12.1	15.2	17.0	17.8	12.0	10.9	14.2	18.9
Lives in MSA (%)	53.3	53.1	56.8	52.5	52.8	50.9	59.1	56.7	34.2	33.0
Has prescription drug coverage (%)	86.7	88.9	84.2	88.8	88.6	89.8	83.6	86.5	90.0	94.4
Marketplace plan (%)	15.9	19.0	14.5	17.0	18.7	21.4	13.4	15.5	16.2	16.1
Insurance product type										
PPO (%)	23.2	16.2	27.3	17.9	16.1	14.7	26.5	31.1	27.7	15.1
PoS (%)	40.1	55.4	28.0	49.3	58.1	59.8	27.3	33.8	31.4	60.5
Other commercial insurance (%)	54.9	58.8	51.9	60.3	59.2	57.0	54.0	45.5	48.2	63.5
Insurance market type										
Individual market plan (%)	40.1	55.4	28.0	49.3	58.1	59.8	27.3	33.8	31.4	60.5
Large employer plan (%)	35.2	27.3	42.4	29.4	26.2	25.2	43.3	39.1	40.6	23.1
Small employer plan (%)	9.8	7.6	11.7	8.2	7.4	6.7	11.7	12.3	12.4	7.1
Unweighted N	116,256	270,034	72,434	97,178	102,940	101,921	54,425	7,324	2,984	5,444
Weighted N	123,057	284,626	75,497	103,082	108,349	107,681	56,737	7,612	3,126	5,857

BH = behavioral health; ED = emergency department; MSA = Metropolitan Statistical Area; PCMH = patient-centered medical home; PPO = preferred provider organization; PoS = point of service.

Data source: RTI analysis of AR APC data, 2013–2016.

Table A-1-14. Estimated quarterly effects of PCMH adoption on utilization and expenditures using difference-in-differences, Arkansas commercial plan members, 2013–2016, sample attributed using a one-visit floor

Outcome	2013 adjusted mean, PCMH	Difference-in-differences estimate (90% confidence interval)	Relative difference (%)	p-value	Weighted N
Total expenditures	171.4	−0.1 (−12.85, 12.59)	−0.1	0.99	1,440,629
Professional expenditures	71.7	−1.3 (−5.27, 2.58)	−1.9	0.57	1,440,629
Pharmaceutical expenditures	42.9	3.2 (−0.63, 6.97)	7.4	0.17	1,440,629
Inpatient facility expenditures	21.5	−2.9 (−10.61, 4.88)	−13.3	0.54	1,440,629
Outpatient facility expenditures	35.3	0.9 (−5.08, 6.91)	2.6	0.80	1,440,629
Inpatient stays per 1,000 member-quarters	5.6	0.1 (−0.73, 0.91)	1.6	0.85	1,440,629
Primary care visits per 100 member-quarters	50.5	0.3 (−0.26, 0.88)	0.6	0.37	1,440,629
Specialist visits per 100 member-quarters	10.7	−0.3 (−0.77, 0.16)	−2.8	0.28	1,440,629
Emergency department visits per 1,000 member-quarters	44.3	1.2 (−1.30, 3.69)	2.7	0.43	1,440,629

PCMH = patient-centered medical home.

Note: Comparative interrupted time series regression models were estimated using Ordinary Least Squares for the expenditure outcomes and maximum likelihood logit for the service use outcomes. The difference-in-differences estimates represents the intercept shift associated with PCMH adoption and can be interpreted similarly to a standard difference-in-differences model. The relative difference is the D-in-D estimate expressed as a percentage of the intervention group's pre-intervention period adjusted mean. Standard statistical practice is to use confidence intervals of 90% or higher.

Data source: RTI analysis of AR APC data, 2013–2016.

Table A-1-15. Estimated quarterly effects of early 2014 PCMH adopters on utilization and expenditures using difference-in-differences, Arkansas commercial plan members, 2013–2016, sample attributed using a one-visit floor

Outcome	2013 adjusted mean, early 2014 PCMH practices	2013 adjusted mean, CG practices	Difference-in-differences estimate (90% confidence interval)	Relative difference (%)	p-value	Weighted N
Total expenditures	163.0	196.7	1.3 (−23.51, 26.02)	0.8	0.93	1,440,629
Professional expenditures	69.4	78.4	6.5 (0.27, 12.69)	9.3	0.09	1,440,629
Pharmaceutical expenditures	41.5	47.3	−1.6 (−8.67, 5.54)	−3.8	0.72	1,440,629
Inpatient facility expenditures	18.8	29.7	2.5 (−8.81, 13.85)	13.4	0.71	1,440,629
Outpatient facility expenditures	33.3	41.3	−6.2 (−16.60, 4.24)	−18.5	0.33	1,440,629
Inpatient stays per 1,000 member-quarters	5.2	6.8	−0.4 (−2.13, 1.40)	−7.0	0.73	1,440,629
Primary care visits per 100 member-quarters	50.2	51.4	0.1 (−1.02, 1.17)	0.1	0.91	1,440,629
Specialist visits per 100 member-quarters	10.6	11.2	0.0 (−0.75, 0.68)	−0.3	0.94	1,440,629
Emergency department visits per 1,000 member-quarters	43.4	47.1	2.2 (−3.32, 7.75)	5.1	0.51	1,440,629

CG = comparison group; PCMH = patient-centered medical home.
Note: Comparative interrupted time series regression models were estimated using Ordinary Least Squares for the expenditure outcomes and maximum likelihood logit for the service use outcomes. The difference-in-differences estimates represents the intercept shift associated with PCMH adoption and can be interpreted similarly to a standard difference-in-differences model. The relative difference is the D-in-D estimate expressed as a percentage of the intervention group's pre-intervention period adjusted mean. Standard statistical practice is to use confidence intervals of 90% or higher.

Data source: RTI analysis of AR APC data, 2013–2016.

Table A-1-16. Estimated quarterly effects of PCMH adoption on utilization and expenditures using CITS with calendar time, Arkansas commercial plan members, 2013–2016, sample attributed using a one-visit floor

Outcome	2013 adjusted mean, PCMH	Difference-in-differences estimate (90% confidence interval)	Relative difference (%)	p-value	Change in slope estimate (90% confidence interval)	p-value	Weighted N
Total expenditures	170.6	−22.0 (−43.87, −0.11)	−12.9	0.10	3.0 (−0.15, 6.09)	0.12	1,440,629
Professional expenditures	72.1	−1.2 (−7.76, 5.42)	−1.6	0.77	0.3 (−0.62, 1.13)	0.64	1,440,629
Pharmaceutical expenditures	42.6	−3.1 (−9.38, 3.14)	−7.3	0.41	0.8 (−0.06, 1.68)	0.13	1,440,629
Inpatient facility expenditures	21.0	−15.1 (−23.29, −6.87)	−71.8	0.003	1.6 (0.16, 2.97)	0.07	1,440,629
Outpatient facility expenditures	34.9	−2.6 (−9.87, 4.63)	−7.5	0.55	0.3 (−0.88, 1.57)	0.64	1,440,629
Inpatient stays per 1,000 member-quarters	5.3	0.1 (−0.98, 1.14)	1.5	0.90	0.1 (−0.08, 0.22)	0.43	1,440,629
Primary care visits per 100 member-quarters	50.5	1.3 (0.59, 2.07)	2.6	0.003	0.3 (0.17, 0.52)	0.001	1,440,629
Specialist visits per 100 member-quarters	10.6	−0.1 (−0.58, 0.40)	−0.9	0.75	0.1 (−0.01, 0.24)	0.14	1,440,629
Emergency department visits per 1,000 member-quarters	44.1	1.6 (−0.99, 4.16)	3.6	0.31	−0.6 (−0.97, −0.15)	0.02	1,440,629

CITS = comparative interrupted time series; PCMH = patient-centered medical home.
Note: Comparative interrupted time series regression models were estimated using Ordinary Least Squares for the expenditure outcomes and maximum likelihood logit for the service use outcomes. The difference-in-differences estimates represents the intercept shift associated with PCMH adoption and can be interpreted similarly to a standard difference-in-differences model. The relative difference is the D-in-D estimate expressed as a percentage of the intervention group's pre-intervention period adjusted mean. Standard statistical practice is to use confidence intervals of 90% or higher.

Data source: RTI analysis of AR APC data, 2013–2016.

Table A-1-17. Estimated quarterly effects of early 2014 PCMH adopters on utilization and expenditures using CITS with calendar time, Arkansas commercial plan members, 2013–2016, sample attributed using a one-visit floor

Outcome	2013 adjusted mean, early 2014 PCMH practices	2013 adjusted mean, CG practices	Difference-in-differences estimate (90% confidence interval)	Relative difference (%)	p-value	Change in slope estimate (90% confidence interval)	p-value	Weighted N
Total expenditures	163.0	191.3	−40.6 (−80.88, −0.40)	−24.9	0.10	12.2 (7.29, 17.05)	<0.001	1,440,629
Professional expenditures	69.4	78.5	−6.7 (−14.12, 0.65)	−9.7	0.14	2.5 (1.03, 4.07)	0.01	1,440,629
Pharmaceutical expenditures	41.5	45.5	−14.5 (−26.27, −2.77)	−35.0	0.04	3.8 (2.35, 5.32)	<0.001	1,440,629
Inpatient facility expenditures	18.8	26.8	−12.1 (−39.32, 15.04)	−64.6	0.46	4.1 (0.63, 7.48)	0.05	1,440,629
Outpatient facility expenditures	33.3	40.5	−7.2 (−16.12, 1.64)	−21.7	0.18	1.7 (−0.17, 3.62)	0.13	1,440,629
Inpatient stays per 1,000 member-quarters	5.2	5.8	4.6 (2.32, 6.88)	87.8	0.001	0.7 (0.33, 1.14)	0.003	1,440,629
Primary care visits per 100 member-quarters	50.2	51.0	7.6 (5.54, 9.76)	15.2	<0.001	2.3 (1.81, 2.80)	<0.001	1,440,629
Specialist visits per 100 member-quarters	10.6	10.9	0.3 (−0.97, 1.51)	2.6	0.72	0.2 (−0.04, 0.54)	0.15	1,440,629
Emergency department visits per 1,000 member-quarters	43.4	45.9	16.5 (9.37, 23.61)	38.0	<0.001	2.6 (1.18, 4.04)	0.003	1,440,629

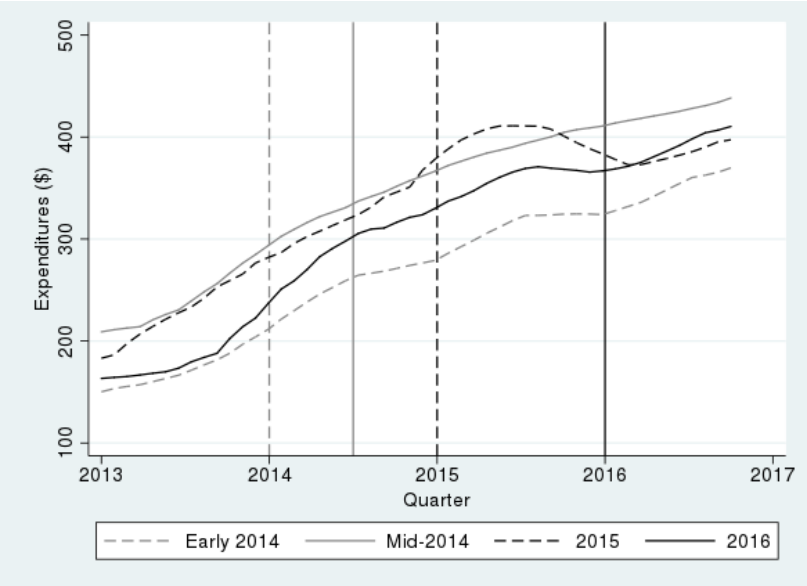
CG = comparison group; CITS = comparative interrupted time series; PCMH = patient-centered medical home.

Note: Comparative interrupted time series regression models were estimated using Ordinary Least Squares for the expenditure outcomes and maximum likelihood logit for the service use outcomes. The difference-in-differences estimates represents the intercept shift associated with PCMH adoption and can be interpreted similarly to a standard difference-in-differences model. The relative difference is the D-in-D estimate expressed as a percentage of the intervention group's pre-intervention period adjusted mean. Standard statistical practice is to use confidence intervals of 90% or higher.

Data source: RTI analysis of AR APC data, 2013–2016.

We also present in ***Section A-1.3.3*** the unadjusted quarterly time trends by PCMH group for the alternate sample; ***Figures A-1-10*** to ***A-1-18*** contain the trends for each of the nine outcomes in this analysis. D-in-D and CITS models are subject to a critical assumption that there are similar pre-treatment trends, or the parallel trends assumption. Looking across ***Figures A-1-10*** to ***A-1-18***, there did not appear to be differential trends among the study outcomes in the common pre-PCMH year of 2013. The graphs also show the increase in expenditures and service utilization across PCMH groups after 2013 and that the one-visit sample had lower expenditures and utilization compared to the core sample.

Figure A-1-10. Unadjusted quarterly total expenditures by PCMH group (2013–2016), sample attributed using a one-visit floor

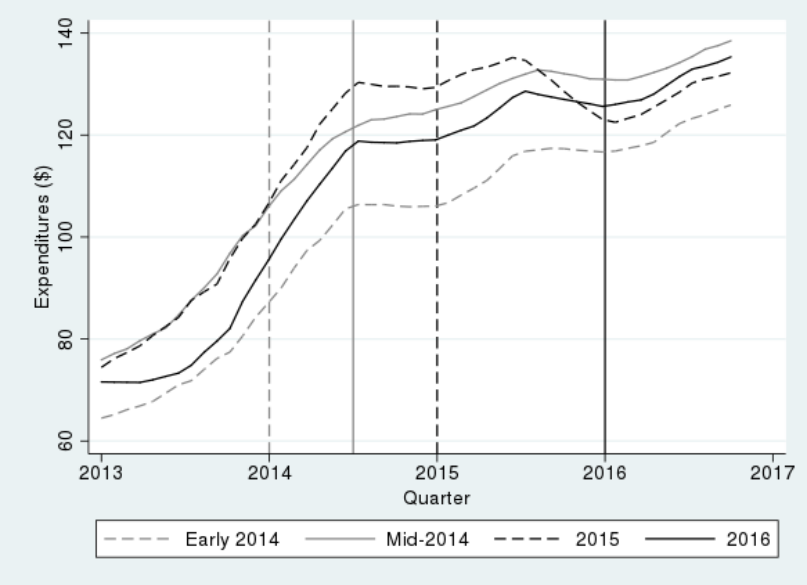


PCMH = patient-centered medical home.

Note: Quarterly trends were smoothed using local polynomial regression with an Epanechnikov kernel.

Data source: RTI analysis of AR APC data, 2013–2016.

Figure A-1-11. Unadjusted quarterly professional expenditures by PCMH group (2013–2016), sample attributed using a one-visit floor

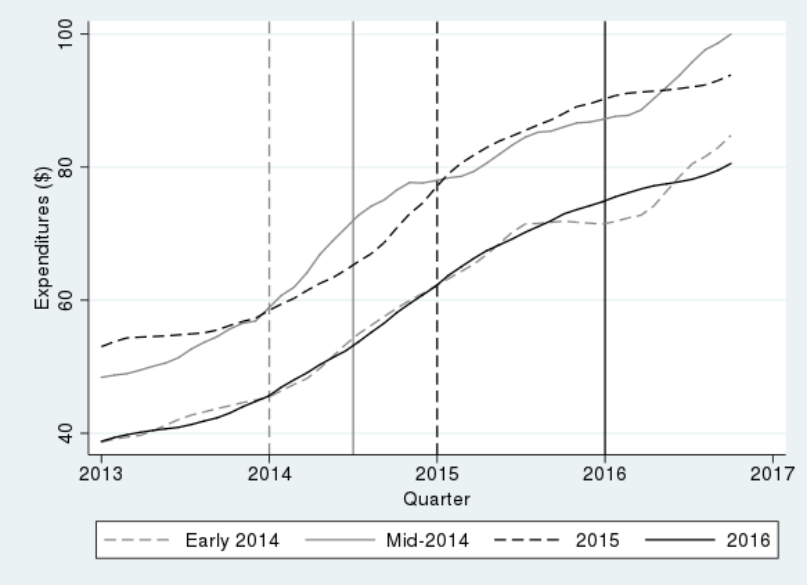


PCMH = patient-centered medical home.

Note: Quarterly trends were smoothed using local polynomial regression with an Epanechnikov kernel.

Data source: RTI analysis of AR APC data, 2013–2016.

Figure A-1-12. Unadjusted quarterly prescription drug expenditures by PCMH group (2013–2016), sample attributed using a one-visit floor

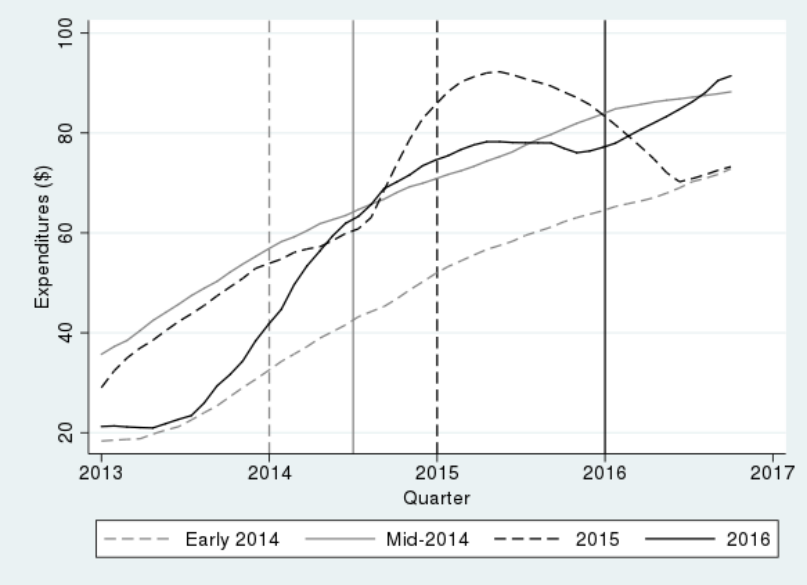


PCMH = patient-centered medical home.

Note: Quarterly trends were smoothed using local polynomial regression with an Epanechnikov kernel.

Data source: RTI analysis of AR APC data, 2013–2016.

Figure A-1-13. Unadjusted quarterly inpatient facility expenditures by PCMH group (2013–2016), sample attributed using a one-visit floor

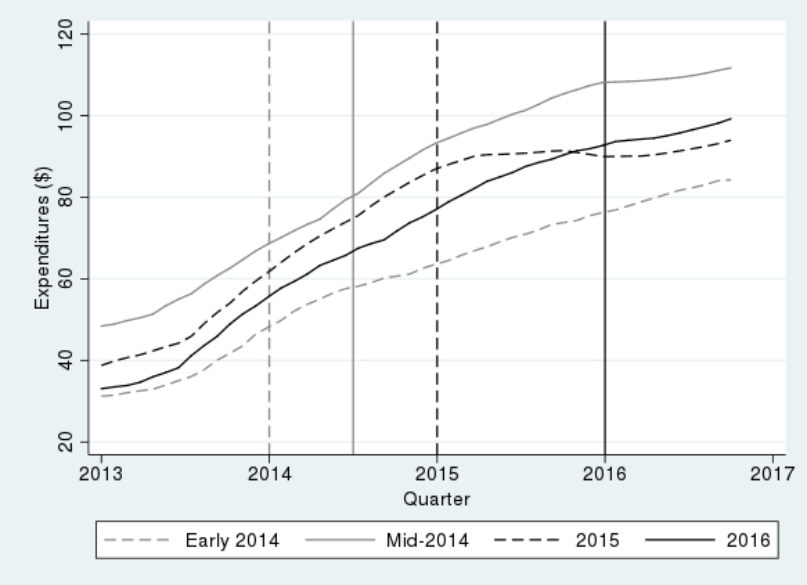


PCMH = patient-centered medical home.

Note: Quarterly trends were smoothed using local polynomial regression with an Epanechnikov kernel.

Data source: RTI analysis of AR APC data, 2013–2016.

Figure A-1-14. Unadjusted quarterly non-inpatient facility expenditures by PCMH group (2013–2016), sample attributed using a one-visit floor

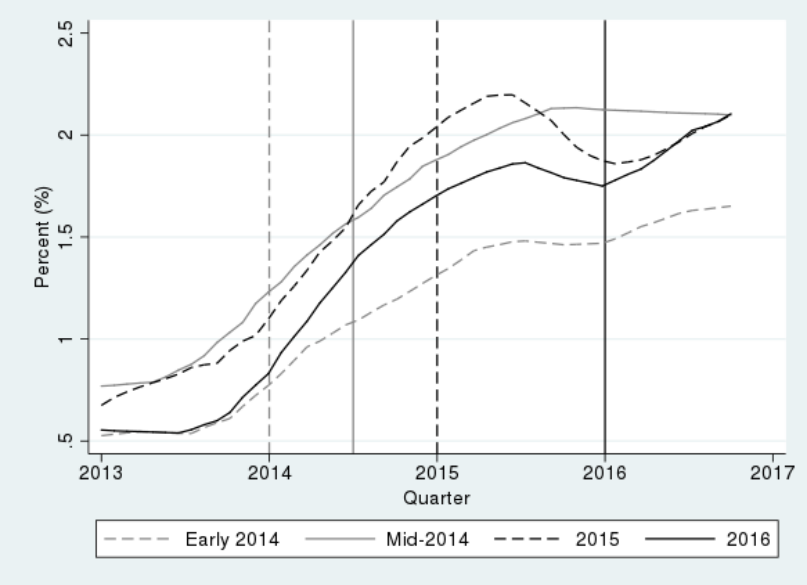


PCMH = patient-centered medical home.

Note: Quarterly trends were smoothed using local polynomial regression with an Epanechnikov kernel.

Data source: RTI analysis of AR APC data, 2013–2016.

Figure A-1-15. Unadjusted quarterly proportion with an inpatient stay, by PCMH group (2013–2016), sample attributed using a one-visit floor

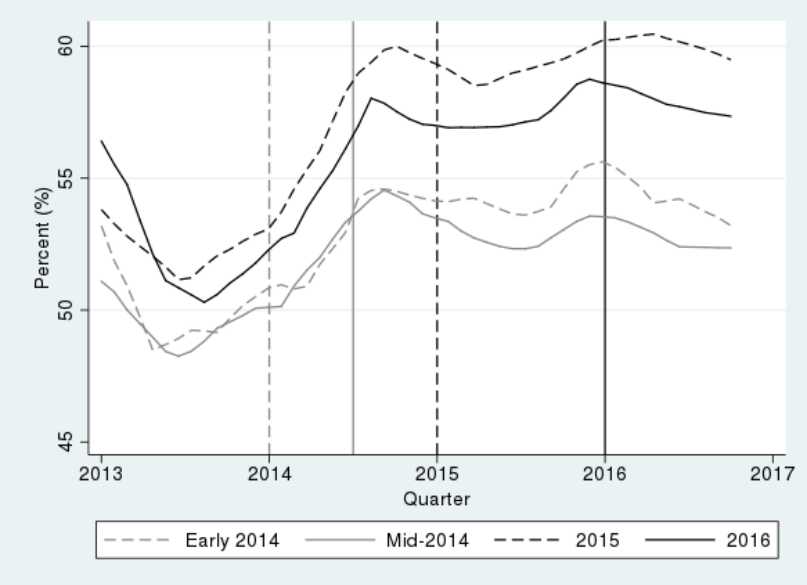


PCMH = patient-centered medical home.

Note: Quarterly trends were smoothed using local polynomial regression with an Epanechnikov kernel.

Data source: RTI analysis of AR APC data, 2013–2016.

Figure A-1-16. Unadjusted quarterly proportion with a primary care visit, by PCMH group (2013–2016), sample attributed using a one-visit floor

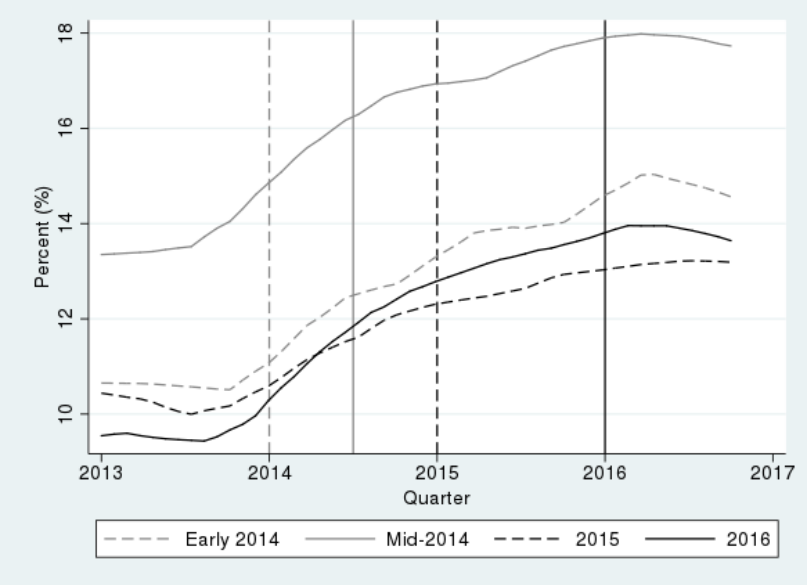


PCMH = patient-centered medical home.

Note: Quarterly trends were smoothed using local polynomial regression with an Epanechnikov kernel.

Data source: RTI analysis of AR APC data, 2013–2016.

Figure A-1-17. Unadjusted quarterly proportion with a specialist visit, by PCMH group (2013–2016), sample attributed using a one-visit floor

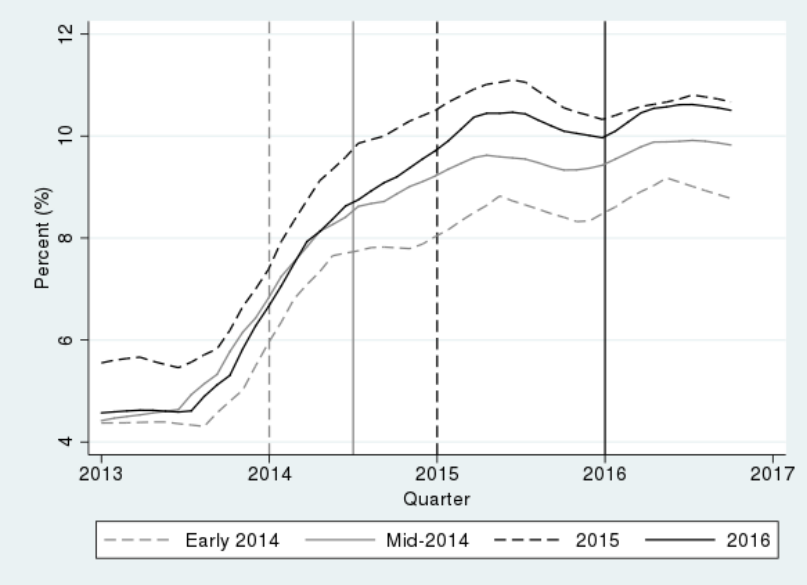


PCMH = patient-centered medical home.

Note: Quarterly trends were smoothed using local polynomial regression with an Epanechnikov kernel.

Data source: RTI analysis of AR APC data, 2013–2016.

Figure A-1-18. Unadjusted quarterly proportion with an ED visit, by PCMH group (2013–2016), sample attributed using a one-visit floor



PCMH = patient-centered medical home.

Note: Quarterly trends were smoothed using local polynomial regression with an Epanechnikov kernel.

Data source: RTI analysis of AR APC data, 2013–2016.

A-1.3.4 Supplementary analysis of the non-Marketplace population for the one-visit sample

In ***Section A-1.3.4***, we present supplementary estimates on the one-visit floor sample that excludes individuals enrolled in the Marketplace. Beginning in 2014, individuals could purchase commercial health insurance through the Arkansas Health Insurance Marketplace, which nearly doubled the sample size. The Marketplace population had much higher expenditures and used more services than the non-Marketplace population. This section presents summary statistics for the non-Marketplace and Marketplace populations and then reestimates the difference-in-differences (D-in-D) for the non-Marketplace sample-only as a sensitivity analysis.

These results are discussed in ***Section A.4.3*** of ***Appendix A. Table A-1-18*** presents summary statistics for the one-visit, non-Marketplace sample. For comparison, this table also includes information on those in the one-visit floor sample whose commercial insurance plan was issued through the Marketplace. We found that both the Marketplace and the non-Marketplace populations experienced an increase in expenditures and utilization after 2013. ***Tables A-1-19*** and ***A-1-20*** show estimates from the D-in-D models using the non-Marketplace one-visit floor sample. The D-in-D methods are discussed in more detail in ***Sub-appendix A-2, Section A-2.3.4*** under *Regression Model.* In ***Table A-1-19*****,** we found a similar pattern of results in the non-Marketplace sample as we did for the full sample where there were no significant effects on the study outcomes. In ***Table A-1-20***, we did not find significant increases in total or professional expenditures, or primary care or specialist visits, unlike the full sample for early 2014 PCMH adopters.

The purpose of this section was to test whether the results in ***Section A-1.3-3*** are significantly influenced by the introduction of the Marketplace in 2014. We see similar directions on the coefficients in ***Tables A-1-19*** and ***A-1-20*****,** and although the magnitude of the coefficients did bounce around relative to the results in ***Tables A-1-14*** and ***A-1-15***, we did not see evidence that suggests the main results are being driven by the Marketplace sample.

Table A-1-18. Weighted annual sample characteristics, PCMH-attributed Arkansas commercial plan members by Marketplace status, 2013–2016, sample attributed using a one-visit floor

Characteristic	Non-Marketplace population annualized by PCMH status		Non-Marketplace population annualized by calendar year				Marketplace-only population annualized by calendar year		
	Pre-PCMH	Post-PCMH	2013	2014	2015	2016	2014	2015	2016
Total expenditures	$1,948	$2,310	$1,982	$2,133	$2,309	$2,619	$5,212	$6,169	$6,422
Professional expenditures	$805	$900	$829	$883	$901	$967	$1,936	$2,061	$2,069
Prescription expenditures	$481	$631	$498	$523	$650	$733	$854	$1,104	$1,199
Inpatient facility expenditures	$251	$284	$246	$259	$273	$353	$1,195	$1,474	$1,518
Other facility expenditures	$412	$495	$410	$467	$485	$566	$1,226	$1,531	$1,635
Any inpatient visit (%)	1.9	2.2	2.0	2.0	2.2	2.6	8.4	10.5	10.3
Any specialist visit (%)	26.9	30.1	27.3	28.7	30.7	31.8	35.6	37.7	38.9
Any ED visit (%)	14.1	15.3	14.2	14.9	15.8	16.3	37.2	38.3	37.9
Age	28.4	29.4	27.1	28.3	30.0	30.6	37.8	38.0	38.2
Female (%)	51.6	51.5	51.6	51.5	51.3	51.6	66.0	63.5	63.8
BH diagnosis (%)	11.8	12.2	12.1	12.1	12.6	12.4	22.3	23.8	25.2
Lives in MSA (%)	55.0	57.2	56.8	53.9	58.0	56.8	49.3	44.7	42.8
Has prescription drug coverage (%)	84.2	82.4	84.2	84.0	81.2	82.3	0.0	0.0	0.0
Marketplace plan (%)	14.9	11.5	14.5	15.1	10.0	10.4	21.6	32.1	36.5
Insurance product type									
PPO (%)	27.6	25.5	27.3	25.4	26.6	25.4	0.0	0.0	0.0
PoS (%)	28.6	29.6	28.0	27.8	30.8	30.3	0.0	0.0	0.0
Other commercial insurance (%)	50.3	53.5	51.9	52.7	53.6	52.3	78.4	67.9	63.5
Insurance market type (%)									
Individual market plan (%)	28.6	29.6	28.0	27.8	30.8	30.3	0.0	0.0	0.0
Large employer plan (%)	41.9	43.0	42.4	41.8	43.4	43.6	0.0	0.0	0.0
Small employer plan (%)	11.7	12.0	11.7	11.7	12.2	11.6	0.0	0.0	0.0
Unweighted N	99,204	173,848	72,434	69,939	63,418	59,480	27,239	39,522	42,445
Weighted N	103,335	180,435	75,497	72,362	65,580	62,134	30,720	42,769	45,551

BH = behavioral health; ED = emergency department; MSA = Metropolitan Statistical Area; PCMH = patient-centered medical home; PoS = point of service; PPO = preferred provider organization.

Data source: RTI analysis of AR APC data, 2013–2016.

Table A-1-19. Estimated quarterly effects of PCMH adoption on utilization and expenditures using difference-in-differences, Arkansas commercial plan members not enrolled through the Marketplace, 2013–2016, sample attributed using a one-visit floor

Outcome	2013 adjusted mean, PCMH	Difference-in-differences estimate (90% confidence interval)	Relative difference (%)	p-value	Weighted N
Total expenditures	171.4	5.1 (−6.57, 16.80)	3.0	0.47	1,030,407
Professional expenditures	71.7	1.8 (−1.33, 4.88)	2.5	0.35	1,030,407
Pharmaceutical expenditures	42.9	3.1 (−0.12, 6.39)	7.3	0.11	1,030,407
Inpatient facility expenditures	21.5	−0.4 (−6.37, 5.50)	−2.0	0.90	1,030,407
Outpatient facility expenditures	35.3	0.6 (−3.97, 5.24)	1.8	0.82	1,030,407
Inpatient stays per 1,000 member-quarters	5.6	0.3 (−0.42, 0.99)	5.0	0.51	1,030,407
Primary care visits per 100 member-quarters	50.5	0.2 (−0.36, 0.76)	0.4	0.55	1,030,407
Specialist visits per 100 member-quarters	10.7	−0.2 (−0.74, 0.31)	−2.0	0.50	1,030,407
Emergency department visits per 1,000 member-quarters	44.3	1.0 (−0.81, 2.84)	2.3	0.36	1,030,407

ACA = Affordable Care Act; PCMH = patient-centered medical home.
Note: Comparative interrupted time series regression models were estimated using Ordinary Least Squares for the expenditure outcomes and maximum likelihood logit for the service use outcomes. The difference-in-differences estimates represents the intercept shift associated with PCMH adoption and can be interpreted similarly to a standard difference-in-differences model. The relative difference is the D-in-D estimate expressed as a percentage of the intervention group's pre-intervention period adjusted mean. Standard statistical practice is to use confidence intervals of 90% or higher.

Data source: RTI analysis of AR APC data, 2013–2016.

Table A-1-20. Estimated quarterly effects of early 2014 PCMH adopters on utilization and expenditures using difference-in-differences, Arkansas commercial plan members not enrolled through the Marketplace, 2013–2016, sample attributed using a one-visit floor

Outcome	2013 adjusted mean, early 2014 PCMH practices	2013 adjusted mean, CG practices	Difference-in-differences estimate (90% confidence interval)	Relative difference (%)	p-value	Weighted N
Total expenditures	163.0	196.7	17.1 (−0.43, 34.59)	10.5	0.11	1,030,407
Professional expenditures	69.4	78.4	7.5 (2.68, 12.30)	10.8	0.01	1,030,407
Pharmaceutical expenditures	41.5	47.3	3.3 (−3.86, 10.39)	7.9	0.45	1,030,407
Inpatient facility expenditures	18.8	29.7	5.7 (−5.16, 16.53)	30.2	0.39	1,030,407
Outpatient facility expenditures	33.3	41.3	0.6 (−4.64, 5.93)	1.9	0.84	1,030,407
Inpatient stays per 1,000 member-quarters	5.2	6.8	−0.2 (−1.05, 0.60)	−4.3	0.65	1,030,407
Primary care visits per 100 member-quarters	50.2	51.4	0.1 (−0.84, 1.06)	0.2	0.85	1,030,407
Specialist visits per 100 member-quarters	10.6	11.2	0.3 (−0.32, 0.84)	2.4	0.47	1,030,407
Emergency department visits per 1,000 member-quarters	43.4	47.1	0.3 (−2.57, 3.19)	0.7	0.86	1,030,407

ACA = Affordable Care Act; CG = comparison group; PCMH = patient-centered medical home.
Note: Comparative interrupted time series regression models were estimated using Ordinary Least Squares for the expenditure outcomes and maximum likelihood logit for the service use outcomes. The difference-in-differences estimates represents the intercept shift associated with PCMH adoption and can be interpreted similarly to a standard difference-in-differences model. The relative difference is the D-in-D estimate expressed as a percentage of the intervention group's pre-intervention period adjusted mean. Standard statistical practice is to use confidence intervals of 90% or higher.

Data source: RTI analysis of AR APC data, 2013–2016.

A-1.4 Arkansas Population-level Health Status Measures, 2013–2016

The Behavioral Risk Factor Surveillance System (BRFSS) is a state-based survey conducted annually by state health departments, guided by the Centers for Disease Control and Prevention. The survey is used to collect data from U.S. residents 18 and older regarding health insurance coverage, health risk behaviors, health status, and preventive health practices. The data summarized here provide some context to trends in the health of Arkansas's population during the time of the SIM Initiative, but which were unlikely to have been affected by Arkansas's SIM

Initiative activities. Because these survey data draw from all low-income adults age 18–64 in the state, these trends illustrate the context in which health care providers participating in Arkansas's Medicaid's delivery system and payment models are working. More detail on the methods used is available in ***Appendix G***.

Table A-1-21 summarizes BRFSS data for the time period (2013 and 2016) and population (low income, non-aged adults) that track as best as possible to Arkansas's SIM Initiative focus for delivery system and payment model change. These data show a positive trend toward greater access to care. Statistically significant differences between 2013 and 2016 were:

- A 21.7 percentage point drop in proportion of low-income adults who reported they do not have health insurance. This is attributable to increased access to Medicaid and other Affordable Care Act-supported coverage.
- A 7.2 percentage point drop in the proportion reporting that they did not have a routine checkup in the last year. This is consistent with the Arkansas focus on coordinated care through implementation of patient-centered medical homes (PCMHs) and episodes of care (EOCs).
- A 5.9 percentage point drop in the proportion reporting that they did not have a personal doctor.

This comparison of changes between 2013 and 2016 controls for the following individual and family characteristics: sex, age, race and ethnicity, educational attainment, marital status, family and household size, employment status, family income, and home ownership). We did not control for health insurance status in these analyses. Because eligibility criteria for Medicaid expanded for low-income adults and the Health Insurance Marketplaces started during this time, it is possible that the improvements in having a personal doctor and a routine checkup in the past year may be a result of these or other reforms implemented during this time period.

Table A-1-21. Regression-adjusted changes in population health for low-income adults 18 to 64 in Arkansas, 2013–2016

Measure	2013	2016	2016–2013 difference
Self-reported health status is fair or poor	27.6%	31.3%	3.6
Any days physical health was not good in last 30 days	44.8%	45.8%	1.0
Number of days physical health was not good in last 30 days	5.8	6.2	0.4
Any days mental health was not good in last 30 days	48.2%	49.0%	0.8
Number of days mental health was not good in last 30 days	6.6	7.3	0.7
Ever diagnosed with diabetes	8.7%	11.1%	2.4
Is obese	37.6%	39.0%	1.3
Current smoker	38.1%	35.1%	−3.0
Current smoker who has not tried to quit in last year	15.4%	14.1%	−1.3
Does not have health insurance	40.5%	18.8%	−21.7**
Does not have a personal doctor	35.4%	29.5%	−5.9*
Did not have a routine checkup in the past year	44.4%	37.2%	−7.2**
Did not have a dental visit in the past year[a]	51.2%	49.1%	−2.2

Source: 2013–2016 BRFSS

Note: Low income is defined as income at or below 138% of the federal poverty level. The sample size is 1,251 for 2013, 948 for 2016, and 4,336 for the 2013–2016 period. */** Significantly different from zero at the 0.10/0.05 level, two-tailed test.

[a] Information on dental visits is not available for 2013; the 2014 measure is used instead.

A-1.5 Arkansas Statewide Claims-based Measures

The data summarized here provide some context to trends in the health care utilization and expenditures for Arkansas's Medicaid and commercially insured populations relative to similar populations in other states during the time of the SIM Initiative. Under the SIM Initiative, Arkansas implemented two payment and delivery models: PCMHs and EOCs. By the end of the SIM Initiative, the PCMH model reached 51 percent of Arkansas's Medicaid population, 15 percent of the commercially insured population, and 12 percent of the self-insured population. The EOC model reached 15 percent of the Medicaid population and 36 percent of the commercially insured population. We present findings on changes in outcomes for the statewide Medicaid population using Medicaid Analytic eXtract (MAX) files and for the commercially insured population using data from MarketScan Research Databases (©2016 from Truven Health Analytics LLC, an IBM Company). The Medicare population was not a targeted population for any of Arkansas's SIM Initiative activities, so we do not present statewide results for the Medicare population in Arkansas.

We summarize the findings from difference-in-differences analyses that compared outcomes for Arkansas relative to the comparison group from before and after the SIM Initiative

started in October 2013. We analyzed Medicaid claims data over 3 years (October 2011 to September 2014) and commercial claims data over 5 years (October 2011 to September 2016). Although the analyses use the SIM Initiative implementation start date to divide the analysis period, these findings are not intended as estimates of SIM-related impacts. The EOC models began before the SIM Initiative and the claims data used in these analyses is not restricted to those touched by the EOC or PCMH models—the data include all Medicaid beneficiaries in the state and the entire commercially insured population that is included in the MarketScan database. As such, the populations studied are at most only incidentally affected by the initiative. In sum, the trends reported here highlight some of the context in which health care providers participating in delivery system and payment models are working and what changes were occurring in health care use and expenditures in the state during the SIM Initiative, whether or not they were directly related to the initiative.

Specifically, we used claims data to derive the following annual outcomes:

- **Care coordination**
  - Percentage of beneficiaries with any physician visits
    - Broken out by primary care and specialty providers for the commercially insured population
  - Percentage of mental illness–related acute inpatient hospital admissions with a mental health follow-up visit within 7 days and 30 days
  - Percentage of acute admissions with a follow-up visit within 14 days
- **Utilization**
  - Inpatient admissions per 1,000 persons
  - Emergency department (ED) visits per 1,000 persons
  - 30-day readmissions per 1,000 discharges
- **Total per member per month (PMPM) expenditures**
- **Quality of care**
  - Rate of hospitalizations for ambulatory care sensitive conditions (avoidable admissions)
  - Flu immunization rates
  - Breast cancer screening rates
  - Well-child visit rates
    - Number by 15 months of age and any for children age 3 to 6 years
  - Initiation and engagement of alcohol and other drug-related treatment

- Asthma medication management
- Depression medication management

Because of inherent differences in utilization patterns, we examined rates of physician visits, inpatient admissions, ED visits, and 30-day readmissions along with total expenditures separately for children and adults. We also examined inpatient admission and ED visit rates (all cause and behavioral health related) and expenditures (total and behavioral health related) separately for persons with behavioral health conditions because this high-risk group may use more health care than the overall population. For each analysis, we use a statistical significance level of $p < 0.10$. Detailed methods on these analyses are presented in the ***Appendix G***.

A-1.5.1 Trends for the Medicaid population in Arkansas 2011–2014

We used Medicaid data from the CMS MAX and Alpha-MAX research files made available through the CCW enclave for Arkansas and its comparison group (Oklahoma and Michigan). The Medicaid MAX data contain all the enrollment and claims information for every Medicaid beneficiary in the state. Because beneficiaries dually enrolled in Medicare and Medicaid do not have complete utilization or expenditure data in the Medicaid claims, we report care coordination, utilization, and quality outcomes for beneficiaries enrolled in Medicaid only. We report the total expenditures for those dually enrolled in Medicare and Medicaid and those only enrolled in Medicaid separately.

In general, the findings for changes in care coordination, utilization, expenditure, and quality of care outcomes between 2011 and 2014 for the Medicaid beneficiaries in Arkansas were mixed. Key statistically significant changes for Arkansas Medicaid beneficiaries relative to the comparison group include the following:

- **Primary care use for children generally improved, although there were some mixed findings**. The percentage of children with any visit to a physician increased, along with the percentage of children who had six or more well-child visits by 15 months of age. However, the percentage of children who did not have any well-child visits by 15 months of age also increased, and the percentage of children age 3 to 6 years of age with any well-child visits in the year declined.
- **Overall the likelihood of a physician visit declined, driven by a decline in the likelihood of a physician visit for adults.**
- **Care coordination, as measured by rates of follow-up within 7 or 30 days after a hospitalization for mental illness, declined.**
- **Inpatient hospital admission rates increased** for the overall population and for children. However, hospital utilization improved for adults. **Among adults, the inpatient admission rate, including rates of admissions for ambulatory care–sensitive conditions and 30-day readmissions, declined**.

- **ED visit rates declined** overall and for adults, although there was no difference in the change in the ED visit rate for children.
- **Quality of care findings were mixed**. Breast cancer screening rates and initiation and engagement of alcohol and other drug treatment improved. Even so, the rate of flu immunizations and asthma medication management declined.
- **There was no difference in the change in total expenditures for children and adults**. However, total expenditures declined for beneficiaries not also eligible for Medicare and increased for beneficiaries dually enrolled in Medicare and Medicaid.
- Among beneficiaries with behavioral health conditions, we found similar findings to the overall population. **Inpatient hospital admission rates (all cause and behaviorally health related) increased** while **ED visits (all cause and behaviorally health related) declined**. **Total expenditures** and **behavioral health–related expenditures also declined**.

A-1.5.2 Trends for the commercially insured population in Arkansas, 2011–2016

We used data from MarketScan Research Databases (©2016 from Truven Health Analytics Inc., an IBM Company), to calculate outcomes for the commercially insured population in Arkansas and its comparison group (Alabama, Kentucky, and Oklahoma). Individuals represented in the database are those age 1 to 64 years who are covered under plan types with a wide variety of delivery and payment types—including fee-for-service, fully and partially capitated plans, and various plan models (such as preferred provider organizations). Although MarketScan is among the largest available data sources for commercial data, the data is a convenience sample of the commercially insured in each state that overrepresents large employers. As such, employer-sponsored insurance is not necessarily accurately represented for each state. Moreover, the sample varies from state to state and year to year depending on which payers choose to participate. In Arkansas, the sample size of commercial plan members in the MarketScan data declines steadily from 2011 to 2016. In 2011, 23 percent of Arkansas's commercial population is included in the sample whereas in 2016, only 14 percent of the commercial population is included.[43]

The overall estimated changes in care coordination, utilization, and quality of care outcomes for the commercially insured population in Arkansas were generally positive. From 2011 to 2016, key statistically significant changes for Arkansas commercial plan members relative to the comparison group include the following:

- **Improvements in primary care use for children** as evidenced by an increase in the percentage of children with any visits to a primary care provider and an increase in

[43] The percentage of the state's commercially insured population included in MarketScan data was calculated by taking the total sample size included in MarketScan in the state in the given year over the number of nonelderly (age 0-64) residents in the state covered by employer sponsored insurance as reported in Kaiser State Health facts (https://www.kff.org)

the percentage of children with six or more well-child visits by 15 months of age. However, **overall primary care use declined** for Arkansas commercial plan members driven by a relative decline for adults.

- **Care coordination**, as measured by the percentage of admissions with a follow-up visit within 14 days, **improved**.
- Inpatient and outpatient hospital utilization improved**, as evidenced by a relative decline in rates of inpatient admissions, including admissions for ambulatory care sensitive conditions, and ED visits.**
- **Quality of care**, as measured by breast cancer screening rates, initiation and engagement of alcohol and other drug treatment, and asthma medication management, **improved**. Even so, the rate of flu immunizations declined for Arkansas commercial plan members.
- Despite relative improvements in care coordination, utilization, and quality metrics, **there was no difference in the change in total expenditures**.
- **We did not observe similar improvements in commercial plan members with behavioral health conditions**, which may indicate that the changes that resulted in improved care for the general population are not impacting this high-risk group.

Appendix B: Maine SIM Initiative Progress and Findings

Maine SIM Initiative

Award
$33 million

Period of performance
October 1, 2013 – September 30, 2017

Pre-SIM Landscape

Patient-Centered Medical Home Model
Piloted a PCMH model with Medicaid and commercial payers in 2010; Medicare joined in 2012 through the Multi-Payer Advanced Primary Care Practice demonstration.

Health Information Exchange
HealthInfoNet, a nonprofit statewide HIE, established by executive order in 2010.

Quality Measure Public Reporting Programs
The Maine Health Management Coalition led public reporting of quality measures, including a website launched in 2011.

Plans for Delivery System Reform
Began planning Medicaid ACOs and Section 2703 HHs and BHHs prior to the SIM Initiative.

Strategies

Symbols represent strategies that build on efforts that pre-date SIM.

Expand delivery system models
Maine developed and expanded three MaineCare delivery and payment reform models: Accountable Communities, BHHs, and HHs.

Support practice transformation
Maine supported primary care and behavioral health providers with in-person learning sessions, site visits, telephone assistance, webinars, and a newsletter.

Expand and develop workforce
Maine expanded the number of diabetes prevention lifestyle coaches, trained providers on the needs of individuals with development disabilities, and piloted a community health worker initiative.

Connect BHHs to the HIE
Maine helped connect behavioral health providers to the HIE to facilitate the exchange of physical and behavioral health data between providers.

Employ data analytics for care management
Maine supported development of event notifications, clinical data dashboards, and risk prediction tools for MaineCare care managers.

Reach

Maine's BHH model reached 4% of the state's total Medicaid population, and the Accountable Communities model reached 20% of this population.

BHHs/HHs
as of September 2017

4% BHHs

18% HHs

Medicaid
21% of state population

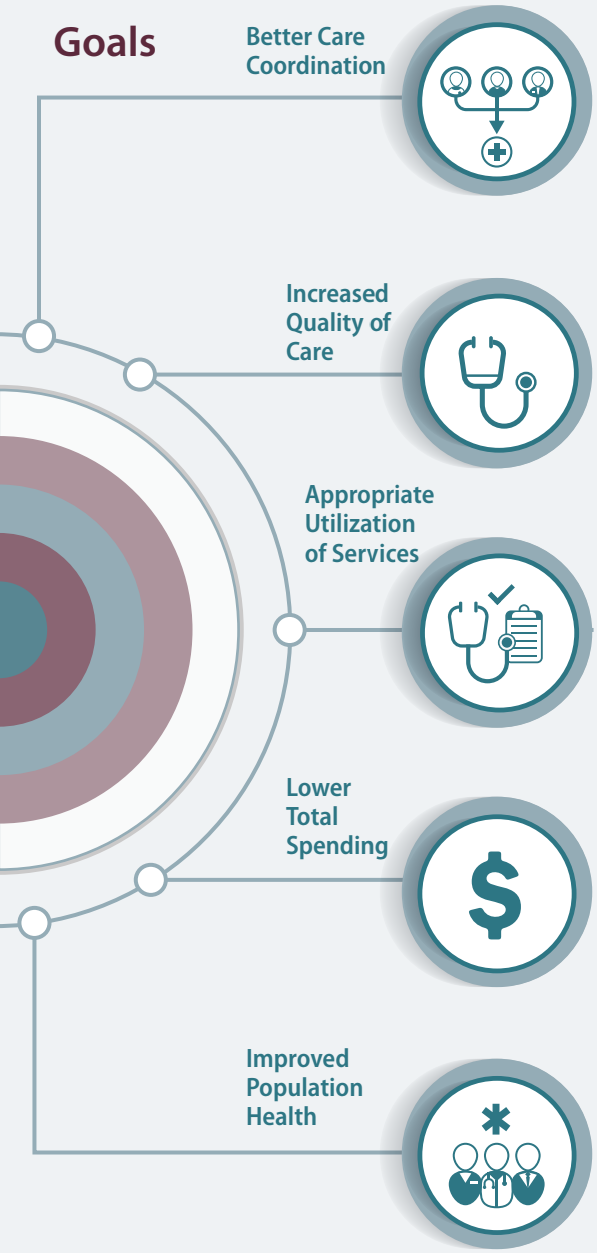
Accountable Communities
as of July 2017

20%

ACO = Accountable Care Organization; BHH = behavioral health home; HH = health home; HIE = health information exchange; PCMH = patient-centered medical home

Impact on Medicaid Population

✅ = Improved from pre- to post-period (BHH) / performed better than the CG (AC)
❌ = Worsened from pre- to post-period (BHH) / performed worse than the CG (AC)
⚫ = No statistically significant change



Goals	BHH	Accountable Communities
Better Care Coordination	✅ Primary care provider visits ✅ Specialty provider visits ⚫ 30-day follow after mental illness hospitalization Increased visits aligned with expectations around care coordination and connecting patients to appropriate resources.	❌ Primary care provider visits The decreased physician visit rate may indicate that AC providers reduced unnecessary outpatient care, but some increases were expected due to AC preventive care measures. ❌ Specialty provider visits ⚫ 30-day follow after mental illness hospitalization
Increased Quality of Care	✅ Antidepressant medication management ❌ Hba1c testing	⚫ Antidepressant medication management ⚫ Hba1c testing
Appropriate Utilization of Services	⚫ ED visits ⚫ Inpatient admissions Efforts to connect patients to timely, needed mental health services may have necessitated inpatient hospital care. ⚫ 30-day readmissions	✅ ED visits ✅ Inpatient admissions ⚫ 30-day readmissions
Lower Total Spending	❌ Inpatient PBPM spending ❌ Total PBPM spending Expenditures may increase as patients connect with needed services. ⚫ Professional PBPM spending	⚫ Inpatient PBPM spending ⚫ Professional PBPM spending ⚫ Total PBPM spending Year Two results were generally more positive than Year One results, suggesting that the AC model may become more effective over time.
Improved Population Health	Under the SIM initative, Maine expanded the National Diabetes Prevention Program by funding the training of 133 lifestyle coaches. Maine also piloted community health workers within primary care practices and health systems at four project sites.	

Limitations

Because the BHH pre-post analysis does not have a CG, results may be impacted by factors other than true changes in outcomes for the BHH population (e.g., secular trends, unobserved changes in the population, the tendency for values to go towards the mean).

Lessons Learned

- ☑ Technical assistance and access to health IT and data analytics tools helped primary care and behavioral health providers transform care in HH and BHH models.
- ☑ Primary care and behavioral health providers relied on real-time EHR and HIE data for care management.
- ☑ Continuous quality improvement was a guiding principle that shaped Maine's SIM activities.
- ☑ Maine refocused SIM Initiative priorities when necessary to ensure efficient and effective use of SIM funding.

AC = Accountable Communities; BHH = behavioral health home; CG = comparison group; ED = emergency department; EHR = electronic health record; HH = health home; HIE = health information exchange; PBPM = per beneficiary per month

B.1 Maine SIM Initiative, 2013–2017

Maine's SIM Initiative ran from October 1, 2013, to September 30, 2017.[44] The state intended to use its SIM funding to strengthen, support, and expand health care transformation efforts already underway within Medicaid and commercial insurers. Maine set out to improve patient quality and satisfaction, improve the health of populations, and reduce health care costs by organizing its SIM activities around six strategic goals (hereafter the SIM pillars, see **Box 1**). To accomplish its goals, Maine focused its SIM Initiative efforts to support practice transformation within primary care and behavioral health care; expand provider use of data to monitor quality, utilization, and cost; align quality measures across payers; promote diabetes prevention to improve population health; and train a workforce to support health system reform.

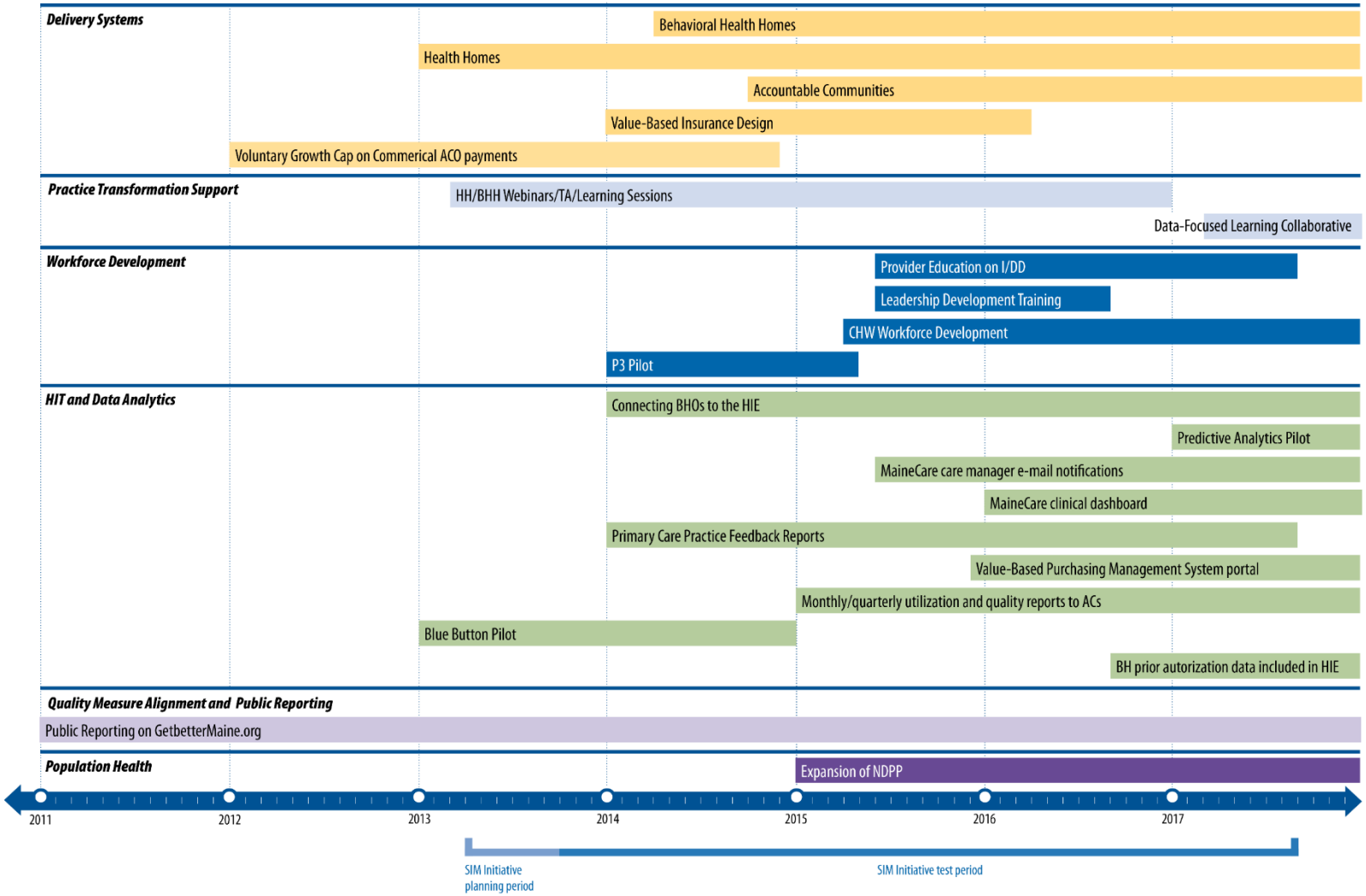
Box 1: Maine SIM Pillars

1. Strengthen primary care
2. Integrate primary care and behavioral health
3. Develop new workforce models
4. Support development of new payment models
5. Use centralized data and analysis to drive change
6. Engage people and communities

This section describes the evolution of Maine's SIM Initiative, beginning with a timeline depicting major health care delivery and payment transformation activities and policies as they pertain to the SIM Initiative (see ***Figure B-1***). The discussion begins with an overview of the health care environment in the state leading up to the SIM award, and then goes on to describe major activities Maine undertook as part of its SIM Initiative, followed by a review of the successes, challenges, and lessons learned during the test period. The section ends with a look forward toward the sustainability of SIM Initiative activities and further progress in the years to come.

[44] The SIM Initiative award began with a 6-month planning period, April–September 2013. Maine received a no-cost extension for the period October 2016–September 2017.

Figure B-1. Highlights from Maine's health care system transformation before, during, and after the SIM Initiative



ACO = Accountable Care Organization, AC = Accountable Community, BH = Behavioral health, BHH = Behavioral Health Home, BHO = Behavioral Health Organization, CHW = Community Health Worker, HH = Health Home, HIE = Health Information Exchange, I/DD = Intellectual/developmental disabilities, P3 = Patient-Provider Partnership, TA = Technical assistance

B.1.1 Setting the stage for the SIM Initiative in Maine

Maine Governor Paul LePage's administration, under the leadership of Health and Human Services Commissioner Mary Mayhew, supported the state's SIM Initiative as one mechanism to further advance transparency and accountability in the state's health system. Additionally, Maine's SIM Initiative represented an opportunity to bring MaineCare, the state's Medicaid program, into alignment with delivery system and payment reform models that had already taken root across the state in both commercial and Medicare markets, including patient-centered medical homes (PCMHs) and accountable care organizations (ACOs; described in further detail below). At the time Maine began its SIM Initiative, in the fall of 2013, MaineCare covered approximately 275,000 people, or about 21 percent of Maine's population. Because Maine did not expand Medicaid during its SIM Initiative, the percentage of the population covered by MaineCare remained relatively consistent throughout the test period. Prior to the SIM test period, Medicaid providers delivered care primarily through a fee-for-service provider payment system. MaineCare was not heavily involved in testing alternative payment models or value-based payment before the SIM test period began.

With its SIM Initiative, Maine built on existing efforts in an environment that was supportive of health system reform. Maine's commitment to stakeholder engagement, along with a history of multi-payer payment and delivery system reform efforts and an established data-sharing and reporting infrastructure, served as a foundation for the state's SIM pillars. Because of these pre-SIM activities, Maine could target its SIM funding to implement new care delivery models in Medicaid and support providers participating in these models without having to start from scratch. These foundational efforts are described below.

PCMH model. Maine began a multi-payer (Medicaid and commercial insurers) PCMH model starting in January 2010 with leadership from Maine Quality Counts, the Maine Health Management Coalition, and funding from the Robert Wood Johnson Foundation. Twenty-five primary care practices participated in the pilot with the goal of implementing the PCMH model statewide. In January 2012, Medicare joined the pilot through the state's participation in the Multi-Payer Advanced Primary Care Practice (MAPCP) demonstration, and the pilot was extended to the end of 2016, Under MAPCP, Maine expanded the PCMH model to 74 practices with federal Medicare, state Medicaid, and commercial payer funding. Under MAPCP participating payers provided care coordination fees to help practices transform into a PCMH; therefore, the PCMH pilot was MaineCare's early start at pursuing value-based payment and served as the foundation for MaineCare's health home (HH) program (discussed below; all MAPCP practices were later designated as HH practices). Moreover, under MAPCP, participating providers received technical assistance from Maine Quality Counts with learning collaborative opportunities and one-on-one practice coaching, so an in-state organization had experience providing practice transformation technical assistance before the SIM Initiative began in Maine.

Health information exchange (HIE). Maine established HealthInfoNet (HIN), the nonprofit statewide HIE, by Executive Order in 2010 (State of Maine, 2010). HIN contains clinical data for the majority of Maine's residents because a large proportion of hospitals, physician practices, health centers, long-term care and home health facilities, behavioral health providers, and laboratories upload clinical data to the HIE.

Public reporting programs. Maine's past commitments to convening stakeholders to reach consensus on public reporting of quality measures positioned the state to expand public reporting with SIM support. In 2011, the Maine Health Management Coalition (MHMC) launched *GetbetterMaine.org*, a public website that compares Maine's hospitals, providers, and medical practice groups on voluntarily reported measures of cost and quality metrics. This effort built on previous work dating to 2002, when MHMC began engaging health care purchasers, providers, consumers, and health plans through its Pathways to Excellence public reporting program to create consensus on reporting measures acceptable to all stakeholders.

ACOs. In 2012 Maine providers began participating in Medicare and commercial-led ACO initiatives, including a Medicare Pioneer ACO and a Medicare Shared Savings ACO, and an ACO agreement between the State Employee Health Commission and major health systems.

HHs. MaineCare received approval in 2013 (prior to the SIM test period) to implement HHs through a Medicaid state plan amendment (SPA). HHs are primary care practices that serve as a PCMH for individuals with two or more chronic conditions and for individuals with one chronic condition who are at risk for another.[45]

Behavioral health homes (BHH). BHHs are behavioral health organizations licensed in the state of Maine to provide behavioral health services to MaineCare adults with serious mental illness and children with severe emotional disturbances. Prior to the launch of the SIM Initiative in 2013, MaineCare was planning the BHH program, which provides an alternative payment model for behavioral health organizations to transform how they provide care to individuals meeting select diagnostic and functional criteria and who are in need of case management services.[46]

B.1.2 Major activities fully or partially supported with SIM funds

Maine received a Round 1 SIM Initiative Model Test award of $33 million, which was used to build on pre-SIM activities and fund new activities to facilitate and accelerate health system change. Even though prior efforts to change health care delivery and payment took a multi-payer approach (Medicaid and the commercial sector), the state focused many of its SIM-related delivery system reforms on accelerating change among Medicaid providers. Although the

[45] MaineCare HH member eligibility requirements can be found in Section 91.04 of the MaineCare Benefits Manual.
[46] MaineCare BHH member eligibility requirements can be found in Section 92 of the MaineCare Benefits Manual.

state's investments in other supporting infrastructure such as health information technology (health IT) and data analytics for feedback reports and dashboards were also primarily focused on clinical providers (e.g., primary care or behavioral health providers) and non-clinical providers (e.g., care mangers) serving the Medicaid population, Maine did take a broader approach and target all providers and users of health care with its quality measure reporting, population health, and workforce training activities. Maine deliberately did not pursue regulatory avenues to require commercial sector participation in various SIM activities; the state instead focused on consensus building across payers to encourage uptake of activities that spanned multiple payers.

Maine's SIM Initiative originated from the Office of the Commissioner of the Department of Health and Human Services. Commissioner Mayhew was a champion of the SIM Initiative, and Maine's SIM Initiative governance structure flowed from her office. The Commissioner appointed 10 individuals to the Maine Leadership Team (MLT), state officials who were responsible for making policy decisions and changes to the SIM work plan and SIM funding allocations.

The Commissioner also appointed a Steering Committee of 22 individuals from diverse backgrounds, such as state officials, medical providers, health plan leaders, and Medicaid enrollees, to set the general direction and priorities of the SIM Initiative and to monitor implementation progress, identify and remove barriers to progress, and provide course corrections. The Steering Committee reported to the MLT and met regularly throughout each year of the SIM Initiative. Operating under the Steering Committee were subcommittees including payment reform, delivery system reform, data infrastructure, and evaluation subcommittees, which were multi-stakeholder groups led by SIM-funded subcontractors (see **Box 2**) that provided strategic oversight and guidance over different aspects of the SIM Initiative.

Box 2: SIM Stakeholder Engagement

Through the MLT, Steering Committee, and subcommittees, Maine solicited stakeholder feedback on all activities, including potential risks and mitigation strategies for proposed activities.

SIM Initiative subcontractors helped shape SIM activities based on their experience undertaking similar activities in prior initiatives and programs. Moreover, their staff chaired the four subcommittees: Maine Health Management Coalition chaired payment reform, Maine Quality Counts chaired delivery system reform, HIN chaired data infrastructure, and the Lewin Group co-chaired evaluation.

As needed, subcommittees formed smaller work groups of providers, purchasers, payers, and consumer representatives to coordinate program design and implementation around specific activities. The subcommittees gave stakeholders the opportunity to raise concerns about planned activities, offer recommendations, and participate in policy discussions regarding the SIM Initiative directly with the state. State officials noted that this avenue was important in ensuring that stakeholders understood the value of their active participation throughout the test period. Because committee members donated their time to attend meetings, participation in the Steering Committee and subcommittees also became a significant source of in-kind investment from thought leaders dedicated to helping Maine's SIM Initiative succeed.

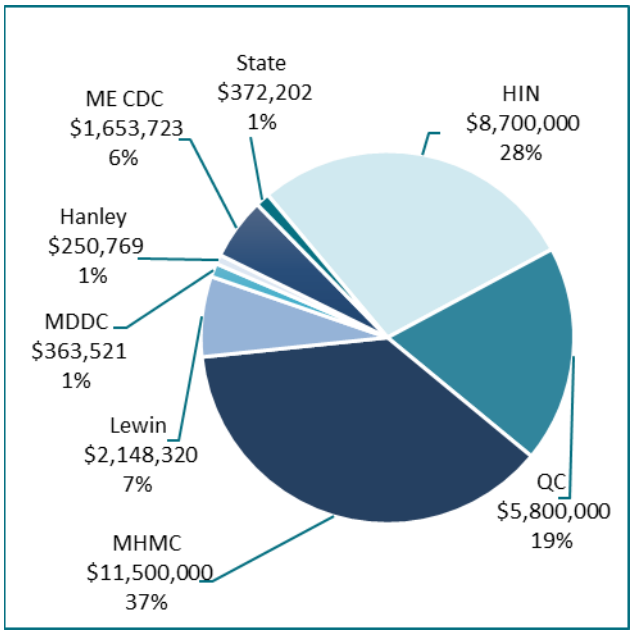
Notably, the state served primarily as the funder of activities, retaining only 1 percent of SIM funding for state operations. Instead, the state contracted with partner organizations with relevant experience, most of which were in-state, to implement the work the SIM Initiative set out to do (see ***Figure B-2*** for a list of subcontractors' activities and SIM funding amounts). Although the state pursued Medicaid SPAs to enable implementation of its delivery system reforms including HHs, BHHs, and ACs, it did not pursue legislation, 1115 waivers or SPAs to sustain progress post-SIM. Instead, Maine pursued strategies that would allow these partner organizations or MaineCare to continue to support the day-to-day operations of specific activities after SIM funding ended.

Central to the state's operation of the SIM Initiative was ongoing assessment of the value and impact of each planned SIM activity. Maine developed a set of activity milestones and implementation targets (known as accountability targets) to track progress, as required by the Center for Medicare and Medicaid Innovation (the Innovation Center). Under the SIM Initiative, Maine also publicly reported on a set of health care utilization metrics tracked annually over time to show whether efforts to catalyze health system transformation statewide led to improvements in care over time for Medicaid, Medicare, and commercially insured individuals.[47] This public reporting tool was known as the SIM Evaluation Dashboard.

[47] Progress on the core measures can be found here: http://www.maine.gov/dhhs/sim/evaluation/index.shtml. Maine tracks nine core measures: developmental screening, well-child visits (ages 3–6 years), children's access to primary care practitioners, all-cause readmissions, hemoglobin A1c testing for individuals with diabetes, follow-up after hospitalization for mental illness, fragmented care, non-emergent emergency department use, and use of imaging for low-back pain. Medicaid and Medicare worked with the Maine SIM Team to establish targets for performance. Commercial payers chose not to establish performance targets.

Figure B-2. Maine's subcontractors' SIM activities and funding

Contractor
Maine Health Management Coalition • Health Care Cost Work Group • Value-based insurance design plan • Data analytics • Claims portal development • Practice feedback reports • Expansion of public reporting
HealthInfoNet • Numerous health IT and data analytics projects
Maine Quality Counts • Technical assistance to Maine's health homes and behavioral health homes
The Lewin Group • State evaluation
Maine Center for Disease Control • National Diabetes Prevention Program • Community Health Worker Pilot
Maine Developmental Disabilities Council • Developmental disability provider training
Daniel Hanley Center for Health Leadership • Leadership development training
State • Staff salaries and other expenses



HIN = HealthInfoNet; MDDC = Maine Developmental Disabilities Council; MD CDC = Maine Center for Disease Control; MHMC = Maine Health Management Coalition; QC = Quality Counts.

Maine recognized the possibility that not all activities would generate expected impacts. Accordingly, the Steering Committee carried out the Strategic Objective Review Team (SORT) process in the summer of 2015, about 2 years into the SIM test period (see **Box 3**). Through SORT, Maine ensured that funding in the latter part of SIM Initiative implementation was allocated to the most promising activities as opposed to other, less effective initiatives. In addition, through the SORT process, Maine allowed remaining funding to be targeted to a clinical condition (diabetes) for which there was a need to advance evidence-based care.

Box 3: The Strategic Objective Review Team Process

The Steering Committee reviewed progress made by the state's payment and delivery reform models in addition to other SIM activities and made recommendations about which activities would continue, which would be discontinued, and which would continue with modifications. The Steering Committee and SIM leadership also chose to modify a couple of practice transformation and workforce development activities to focus specifically on improving care for individuals with diabetes.

Over the course of the SIM Initiative, Maine considered two federal value-based payment and delivery system transformation opportunities with the Innovation Center, but the state ultimately opted not to pursue either of them. Recognizing Medicare's role as a key participant in delivery system reform, the MLT began the SIM Medicare Proposal Oversight Committee (MPOC) in April 2016 to develop a proposal for Medicare participation in Maine's delivery system reform. State officials ultimately discontinued pursuit of Medicare participation and the MPOC after receiving guidance from CMS outlining the parameters under which Medicare might consider participation. Maine determined that it could not meet the required parameters at that time. In addition to the MPOC activity, in 2016 several commercial payers in Maine pursued Medicare as a partner in their own delivery system reforms by applying for a the Innovation Center's Comprehensive Primary Care Plus award. MaineCare decided not to partner with the commercial payers for this initiative because MaineCare wanted to focus on its on-going value-based payment strategies (i.e., HHs, BHHs, and ACs), and as a result of lack of significant scale, the commercial payers were not selected by the Innovation Center to participate.

During Maine's four-year test period, the state accomplished many of its goals. At the start of the initiative, Maine's SIM-related Medicaid delivery system reforms were in their formative, conceptual stages of development, and by the end of the SIM Initiative, these delivery reforms were providing care for 110,000 MaineCare enrollees. Furthermore, the majority of Maine's supporting strategies to accelerate health transformation—such as health IT, data analytics, and practice transformation—targeted providers within these delivery system reform models, encouraging cross-collaboration and synergy among SIM strategies. Brief descriptions of major activities fully or partially funded by the SIM Initiative follow, including delivery system and payment models, activities supporting the delivery and payment models, and activities that reached providers statewide.

Development of MaineCare delivery system and payment models. Maine's SIM Initiative focused on development of three delivery and payment reform models for MaineCare: behavioral health homes (BHHs), Accountable Communities (ACs), and HHs. Driven in large part by Maine's desire to expand its value-based purchasing efforts within Medicaid, and to expand value-based purchasing across all payers, the state used its role as a payer and purchaser of services to foster development and expansion of these models to improve the value, affordability, and quality of health care services, particularly for the state's MaineCare (Medicaid) population. Each delivery model has its own unique payment structure, as described in ***Table B-1***.

Development of HHs. HHs provide clinical care and serve as care coordinators, referring high-needs patients to Community Care Teams (CCTs)[48] for social services, and they partner with BHHs to provide better coordinated physical and behavioral health services. As of March 2016, the time of the most recently available data, 248 providers were participating in 100 HHs. As of September 2017, 50,855 MaineCare beneficiaries, or 18 percent of the total number of MaineCare beneficiaries in 2016 (see ***Addendum Table B-1***), were enrolled in a HH. As discussed above, with SIM funding Maine Quality Counts provided a range of technical support to practices, including in-person and telephonic technical assistance and learning collaboratives to help them transform into patient-centered, team-based organizations. Furthermore, MaineCare provided data feedback reports and data portals for HH providers to monitor their Medicaid patients' health service use, quality, and costs.

BHHs. BHHs are community-based behavioral health organizations (BHOs) licensed in the state of Maine to provide behavioral health services to MaineCare members. BHOs become BHHs if they meet specific BHH program participation requirements as outlined in MaineCare's benefits manual,[49] and MaineCare members can only enroll in the BHH program if they meet very specific diagnostic and functional criteria reflective of serious mental illness for adults and serious emotional disturbance for children. Therefore, not all BHOs elect to become BHHs, and not all patients at a BHH are eligible for the BHH program.

[48] Community Care Teams are multidisciplinary, community-based teams that help HHs provide targeted case management and social support services for high-cost, high-risk patients.
[49] MaineCare BHH provider eligibility requirements can be found in Section 92 of the MaineCare Benefits Manual.

Table B-1. SIM Initiative Medicaid delivery system and payment models in Maine

Delivery system model[a]	Payment model	Retrospective or prospective	Payments based on whom?	Risk	Financial target yes/no	Quality target yes/no	Health Care Payment Learning and Action Network Payment Category[b]
HHs	FFS + $12.00 PMPM to HH practice for care coordination + $129.50 PMPM for CCTs + $15 PMPM to HH practices to coordinate physical health care for BHH members	Retrospective	HH practices receive PMPM for all enrolled patients who meet chronic condition criteria; CCTs receive PMPM in months when services are provided	N/A	No	Yes, but payment is not contingent on meeting quality targets	Category 2 for care coordination fees—foundational payments for infrastructure and operations Category 4 for CCTs—care coordination fees
BHHs	$394.20 PMPM to BHHs for care management for children and adults	Retrospective	BHHs receive PMPM for all enrolled patients who receive at least one service that month; HH practices receive payment for all enrolled patients	N/A	No	Yes, but payment is not contingent on meeting quality targets	Category 2—care coordination fees
ACs (Medicaid ACO)	FFS + shared savings and shared losses (if ACs opt for Model II)	Preliminary prospective attribution and final payment based on retrospective attribution	Assignment based on HH enrollment, plurality of primary care services (for members not in an HH), or plurality of ED visits (for members without a primary care visit in the last 12 months)	Model I: one-sided only—50% of shared savings up to 10% of benchmark expenditure; Model II: two-sided—60% of shared savings up to 15% of benchmark expenditure	Yes	Yes, shared savings and losses (if applicable) based on meeting quality targets	Category 3—alternative payment models built on FFS architecture with shared savings and losses

AC = Accountability Community; ACO = accountable care organization; BHH = behavioral health home; CCT = community care team; ED = emergency department; FFS = fee for service; HEDIS = Healthcare Effectiveness Data and Information Set; HH = health home; health IT = health information technology; N/A = not applicable; NCQA = National Committee for Quality Assurance; PMPM = per member per month.

[a] MaineCare's financial support for HHs (monthly care management payments), BHHs (monthly care management payments), and ACs (shared savings) are not funded through the SIM Initiative. However, SIM funds are used to support HH, BHH, and AC infrastructure by providing training, technical assistance, data analytics, and health IT support.

[b] The Health Care Payment Learning & Action Network framework outlines a four-category payment model classification system to describe provider payment in the context of paying for value, not volume. Additional details about the framework can be found at https://hcp-lan.org/

BHHs provide team-based care, enhanced access to care, population risk stratification and management, and patient/family-directed care plans. In addition, BHHs work to integrate physical and behavioral health, include patients and families in decision making, make connections to community resources when necessary, commit to quality improvement, and build capacity with respect to health IT and clinical data exchange with other health care providers. In essence, BHHs are designed to function like a PCMH would function for individuals with chronic physical health conditions. These BHHs are Maine's approach to integrating physical and behavioral health (see **Box 4** for more details on physical and behavioral health integration). To further support BHHs, MaineCare reimbursed BHHs with a capitated per member per month (PMPM) payment of $394.20 to provide care management services to enrolled patients.[50] The aim of this capitated payment was to grant BHHs more flexibility to craft the package of services and supports an enrollee might need and to coordinate care with other medical providers and community resources. This PMPM payment is a departure from Maine's typical fee-for-service payment, and this was the first time these BHOs were exposed to an alternative payment model within MaineCare.

Box 4: BHHs and Integration of Physical and Behavioral Health

- BHHs are expected to partner with an HH.
- HHs receive $15 per member per month to coordinate care with a BHH if the HH's patient is also enrolled in a BHH.
- Through the HIE, BHHs can view physical health data on their patients, and all providers can view behavioral health prior authorization data for MaineCare patients.
- BHHs and primary care providers can exchange physical health and behavioral health information through the HIE or other means.
- Learning collaboratives and one-on-one technical assistance are provided to train BHHs and HHs on collaboration and integration.

As of March 2016, the time of the most recently available data, 287 providers were participating in 24 BHHs across 102 locations (see ***Addendum Table B-1***). Maine has 159 BHOs providing care to MaineCare enrollees, so 15 percent (24 of 159) of BHOs were participating in the model. Low enrollment in the program (11,271 MaineCare beneficiaries, or 4 percent of all beneficiaries and approximately 17 percent of MaineCare enrollees in need of mental health

[50] When the BHH program was first implemented, BHHs were paid $330 PMPM for adults and $290 PMPM for children to provide care management services to MaineCare patients enrolled in the BHH. Over the SIM test period, the rate increased two times. First, the payment rate was increased to $365.00 PMPM for adults and $322.00 PMPM for children and then increased again to $394.20 PMPM for both adults and children in response to BHH feedback that the original PMPM was not adequate. Behavioral health providers working in BHHs bill MaineCare on a fee-for-service basis for non–care management services provided to a MaineCare patient (e.g., psychotherapy services). Furthermore, MaineCare pays HHs $15 PMPM to work with the BHHs providing behavioral health care to HHs' MaineCare patients. Providers working in HHs also continue to bill MaineCare on a fee-for-service basis for clinical services provided to their patients who are also enrolled in a BHH.

treatment[51]) was in part because of program eligibility rules, which limited program participation to individuals meeting very specific diagnostic and functional criteria.[52]

Through the SIM Initiative, Maine placed an emphasis on developing and expanding the reach and capacity of BHHs—a focus driven by the state's strong desire to improve the quality and coordination of care, better integrate behavioral and physical health care, and reduce expenditures for an especially high-need and high-cost population. The state used a significant amount of SIM funding to support providers participating in BHHs through investments in health IT infrastructure and technical assistance to transform care.

Health IT and data analytics for BHOs, including BHHs. The SIM Initiative allocated funding to HIN to help up to 20 BHOs (18 of which were BHHs) connect to Maine's HIE. HIN subsidized these organizations' subscription fees to the HIE, and HIN worked with BHOs' electronic medical record vendors to coordinate the transfer of clinical data to the HIE. By the end of the test period, the Maine SIM Initiative had met its goal of having all 20 BHOs connected to the HIE, and 13 organizations were able to share mental health records with the HIE, to the benefit of primary care providers (PCPs), specialists, and hospitals seeking their own patients' mental health information. This bidirectional exchange of health data was central to the BHH initiative and one of the key features the initiative offered providers. In addition to subsidizing subscription fees to the HIE, HIN held monthly webinars and provided one-on-one technical assistance to help BHOs send and receive HIE data. HIN also helped BHOs identify best practices for integrating HIE information into their workflows for a range of services, including targeted care management, hospital discharge planning, medication reconciliation, and identification of gaps or overuse in medical care.

Building on the successes of connecting BHOs to the HIE, HIN was funded during Year 4 of the test period (i.e., the no-cost extension period) to incorporate MaineCare's prior authorization data for behavioral health services into the HIE. With these data, HIE-connected providers could view more data about a patient, including additional sociodemographic and social services related information, treatment goals, and the types of behavioral health services a MaineCare enrollee could be receiving. State officials were hopeful these data would give primary care providers and specialists more information upon which to develop appropriate treatment plans. Furthermore, MaineCare provided BHHs with access to a data portal in which providers could access aggregate and individual-level data on BHH enrollees' health service use, quality, and costs.

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[51] Maine served approximately 67,384 Medicaid enrollees through its state mental health program in state fiscal year 2016 (data source: https://www.samhsa.gov/data/sites/default/files/Maine-2016.pdf). We use this estimate as an approximation of the prevalence of MaineCare enrollees with serious mental health conditions, and we divide 11,271 BHH enrollees by 67,384 to arrive at the estimate of 17 percent.

[52] MaineCare member eligibility requirements can be found in Section 92.03 of the MaineCare Benefits Manual.

BHH (and HH) practice transformation. The goal of practice transformation support was to equip BHHs and HHs to successfully transform the delivery of medical care from reactive, fragmented, and uncoordinated, to more patient-centered, team-based, proactive, comprehensive, coordinated, and accountable for quality and costs of care. This transition required BHHs and HHs to change how they managed a patient panel, to establish workflows to deliver health care, to use clinical data and exchanged these data with other providers, and to leverage administrative processes to support practice change.

Specifically, the state partnered with Maine Quality Counts, under the guidance and oversight of the delivery system reform subcommittee, to provide transformation support to BHHs and HHs. Quality Counts' major activities included providing a learning collaborative for quality improvement support; the learning collaborative included in-person learning sessions, webinars, newsletters, in-person site visits, and telephonic technical assistance. Quality Counts initially focused the learning collaborative curriculum on topics identified by BHHs and HHs through quarterly report submissions, such as population management and risk stratification and reducing avoidable hospitalizations (RTI International, 2017). In subsequent years, Quality Counts expanded the scope of the learning opportunities to focus on care management/care coordination, using consultants as part of the behavioral health team, and coordinating care between BHHs and HHs. Quality Counts also shared materials and resources with BHHs and HHs through a newsletter and a website and hosted an annual learning session in which BHH and HH providers shared best practices in behavioral health integration. Attendance at the learning collaboratives was high, averaging participation rates of 90 percent for BHH providers and 65 percent for HH providers (RTI International, 2017). After the MAPCP demonstration ended in December 2016, MAPCP participating practices that were HHs continued to receive the technical assistance opportunities made available through the SIM Initiative.

Based on the 2015 SORT process, Maine's SIM leadership decided to focus SIM practice transformation efforts in the no-cost extension year to improving diabetes care. This limited Quality Counts learning collaborative activities to the data-focused learning collaborative (DFLC). Beginning in March 2017, the DFLC focused on helping HHs improve HbA1c monitoring for patients with diabetes and BHHs improve their HbA1c screening rates for BHH members on certain antipsychotic medications. MaineCare and Quality Counts worked with HHs and BHHs on how to use clinical and claims data to track progress in HbA1c testing rates and monitoring of HbA1c levels and on how to implement quality improvement activities to improve diabetes care.

Development of ACs. ACs are Medicaid ACOs that function as integrated provider organizations that provide comprehensive primary, acute, and chronic health care services. Each AC includes a lead entity (e.g., a regional health system) that forms contractual partnerships with other providers specializing in service areas including chronic conditions (such as a HH), developmental disabilities (DD), and behavioral health, and including rural providers (see

Box 5). Together, AC providers can share in savings generated for an attributed population for meeting certain total cost of care and quality benchmarks or, if their spending exceeds the benchmarks, pay back losses to MaineCare. MaineCare received approval in 2014 to implement ACs through a Medicaid SPA. As of July 2017, the time of the most recently available data, 55,314 MaineCare beneficiaries, or approximately 20 percent of the total MaineCare population, were enrolled in four ACs (see ***Addendum Table B-1***). A total of 80 primary care practices and seven emergency departments (EDs) were participating in an AC. None of the four ACs have opted to take on two-sided risk (see ***Table B-1*** for a definition of two-sided risk). ACs are only sharing in savings, which is contingent on meeting benchmarks for quality care. In sharing in savings only, ACs do not pay back losses to MaineCare if their spending exceeds a financial benchmark. Technical assistance was limited to regularly scheduled calls between MaineCare staff and ACs to discuss operations and dissemination of feedback reports on AC performance on several quality, utilization, and cost outcomes. According to the state's internal assessment, the AC initiative generated savings across Year 1 of the program (August 1, 2014–July 31, 2015) equal to $5.41 million. MaineCare issued shared savings payments to ACs totaling $856,675, resulting in net savings to MaineCare of $4.56 million (State of Maine, 2018).[53]

Box 5: Maine's SIM Initiative Approach to Rural Health

In all of its delivery system reform initiatives and provider supports, Maine was cognizant that it is a large, rural state with sizeable medically underserved areas and was mindful of how to target SIM activities to individuals and providers in these areas.

ACs included rural providers; the Community Health Worker (CHW) program trained CHWs from rural areas; and BHHs, HHs, and CCTs served many rural communities.

Data analytics and health IT to MaineCare care managers and primary care practices. At the start of the SIM Initiative, HIN developed an electronic notification system that sent MaineCare care managers a notice when their MaineCare patients were admitted and discharged from the ED or the hospital. With SIM funding, HIN then augmented the electronic notifications system to create a dashboard (the MaineCare Clinical Dashboard) that merges Medicaid claims data and clinical HIE data. With these combined data, MaineCare care managers could now obtain a better picture of their patients' health to tailor care management and coordination services to meet patients' needs. Under SIM, the state also funded HIN to incorporate MaineCare claims data into its existing predictive analytics platform (a data product that generates patient risk stratification information and supports population management), thereby improving the risk predictions generated from this platform. Then, in January 2017, the SIM Initiative funded a pilot for HIN to work with three primary care sites to implement HIN's improved prediction models to identify MaineCare beneficiaries likely to become high-cost,

[53] The state's calculations of shared savings which measures total costs of care against a benchmark will differ from RTI's evaluation analyses of AC impact presented in ***Section B.3***, which used a difference-in-differences methodology, which is a pre-post design comparing trends in the intervention group relative to a comparison group.

high-use patients. As of the summer of 2017, eight care managers at the three sites were providing care management services to almost 6,000 MaineCare beneficiaries based on the prediction model tool.

Expansion of the National Diabetes Prevention Program (NDPP). The NDPP existed in Maine prior to the SIM Initiative, but SIM funding supported the expansion of the program. Maine Center for Disease Control (CDC) used SIM funding to train 80 lifestyle coaches, who were, in turn, able to hold more NDPP classes statewide. With SIM funding, Maine CDC also developed the Maine NDPP Data Dashboard, an online platform for real-time tracking of NDPP participant class attendance and participant progress in meeting health outcomes. After the 2015 SORT process, Maine CDC received continued SIM funding to train additional lifestyle coaches. By December 2015, Maine CDC had trained 94 coaches, surpassing its original goal of training 80 lifestyle coaches by the end of the SIM Initiative (CMS, 2015). By the end of Maine's third year of SIM implementation (September 2016), Maine had trained 133 lifestyle coaches, and 1,104 individuals at risk for diabetes had completed the program (CMS, 2016b). Throughout the project, Maine CDC also provided technical assistance and support to the trainers in the form of webinars, trainings, and educational materials.

Quality measure alignment and public reporting. One goal of the SIM Initiative was to develop a common measure set capable of monitoring ACO performance across all payers, aligning commercial and public payer performance measures, and reducing provider quality metric reporting burden. An MHMC-led work group reached consensus on a set of 44 quality measures (the majority of which were claims-based) for use in monitoring ACO performance. Uptake of the measure set was voluntary across private payers, and according to state officials, some payers and purchasers operating ACO arrangements were reportedly using these measures to monitor provider performance and calculate savings/losses. Measure uptake may have been limited however, by the voluntary nature of the initiative and payers' business needs to use their own measure sets.

A second goal of the SIM Initiative was to expand voluntary, public reporting of health care cost and quality data, including behavioral health quality of care data. The state's expectation was that shining a public reporting spotlight on providers would be a powerful incentive to spur provider accountability and quality improvement. MHMC was the SIM Initiative's implementing partner for this set of activities, and the MHMC-led Pathways to Excellence work groups succeeded in reaching consensus on a number of quality of care metrics for women's health, oncology, orthopedics, and behavioral health (see **Box 6** for a summary of the behavioral health–related metrics). These metrics have been published on *GetbetterMaine.org* since 2015, along with a designation for whether primary care providers integrate behavioral health services. Notably, the MHMC-led work group in charge of developing a total cost of care index for adult primary care practices also reached consensus on a measure, which has been publicly reported on the website since October 2015.

Multi-payer engagement on growth caps and value-based insurance design (VBID). As part of the state's broader push to reduce the total cost of care in the state, Maine tasked MHMC with spearheading efforts to reach consensus among payers in the state on cost growth. The focus was to facilitate agreement among commercial payers on a voluntary growth cap on annual risk-adjusted total medical costs per person within commercial ACOs, based on the medical and general consumer price index in the state. To ensure payer, purchaser, provider, and consumer engagement in development of this cap, MHMC formed the Health Care Cost Work Group to carry out this work. From 2014 to 2016, Maine and MHMC also worked with commercial payers and other stakeholders (again through an MHMC-led work group) to develop a VBID. VBID is an approach to designing health benefits that incentivizes consumers and providers alike to reduce costs while improving quality. The VBID work group developed a template for benefit design and online provider enrollment application for participation in any VBID initiative a health plan might implement. Uptake of the growth cap and the VBID toolkit was limited, and these activities were discontinued in early 2016 based on the SORT recommendation.

Box 6: Public Reporting of Behavioral Health Quality of Care Metrics for Mental Health, Substance Abuse, and Case Management Providers

- Working to measure person-centered care
- Measuring client functioning and well-being
- Coordinating client care across providers
- Using tools to identify and treat depression or attention-deficit hyperactivity disorder

Providers receive a rating of "good" or "better" for each of these measures.

Workforce development. To support providers actively engaging in Maine's efforts to transform health care, Maine focused on four workforce development projects over the course of its SIM Initiative. None of these projects targeted BHH, AC, or HH providers specifically, but some of these providers were likely touched by one or more of these workforce activities. These initiatives are described below.

Leadership development. The Hanley Center for Health Leadership trained 22 teams of clinicians, administrative staff, and health care leaders to facilitate change management statewide through team-based leadership training. The Hanley Center's leadership training consisted of two in-person meetings, a webinar series focused on leadership and change management, and consultation on individual team projects (RTI International et al., 2018). The Hanley Center also included in its SIM-funded activities a Leadership Development Plan for state officials, which resulted in a voluntary pledge for organizations to express their commitment to leadership development.

DD provider training. The Maine Developmental Disabilities Council (MDDC) used SIM funding to educate 729 medical providers, case managers, direct support staff, guardians, family, and support staff (Maine Department of Health and Human Services, 2016) throughout

the state on pain expression in individuals with DD, with an emphasis on how pain expression in the DD population may present itself as a behavioral health issue. Following the 2015 SORT process's decision to focus on diabetes, MDDC received additional SIM funding in September 2016 to develop online provider training on diabetes in the DD population and a medical home concept to serve the DD population specifically.

P3 pilot. The P3 pilot, operated by Maine Quality Counts, included three distinct pilot projects to help providers share the treatment decision-making process with patients: the "Choosing Wisely" Initiative[54] to engage patients in shared decision making about their care, a shared decision-making program for low back pain treatment, and shared decision-making on medication decisions in behavioral health. In total, 10 primary care or behavioral health practices participated in one of the three pilots, which all ended in Spring 2015.

Community health worker (CHW) pilot. Launched in October 2013, the CHW pilot project was intended to test CHW integration into primary care practices and health systems generally, to improve chronic disease management, preventive screening rates, patient experiences, and appropriate use of health care resources. Maine's goal was to use SIM funds to implement five project sites across the state, and ultimately four were funded during the test period. Collectively these projects hired nine CHWs and provided more than 4,908 client encounters for 1,930 clients as of September 2016 (CMS, 2016b). A long-term goal of the SIM-funded CHW activities was to develop a competent CHW workforce using a uniform, vetted core curriculum. To start this project, the CHW Stakeholder Group under the delivery system reform subcommittee established the CHW Initiative to define core CHW competencies, roles, and responsibilities, and offer training opportunities. By the end of the third year of SIM implementation, the CHW initiative had trained 37 CHWs and 19 CHW supervisors. According to state officials, the financial investment in the pilot was quite minimal, but the return on that investment was substantial given all that the CHW Initiative was able to accomplish in solidifying a CHW curriculum and set of competencies.

Statewide health IT and data analytics activities. In addition to Maine's focused efforts to provide BHHs, HHs, and ACs with actionable clinical and claims data, the state funded several other activities. Over the first 2 years of the test period, HIN piloted a 12-month program, known as the Blue Button Pilot, to connect one health system's patients to their medical information in the HIE. After the pilot ended, the work did not continue. Although HIN reported very positive feedback from the pilot, a key barrier to expanded use beyond the pilot period was the fact that many health systems and providers had their own portals. According to state

[54] The Choosing Wisely Initiative aims to promote patient-provider communication to help patients choose care that is evidence-based, not duplicative of other tests or procedures already received, free from harm, and truly necessary. More information can be found at http://www.choosingwisely.org/

officials, the Maine SIM team did not want to allocate SIM funding to potentially duplicate existing efforts.

MHMC was funded to provide practice feedback reports on cost, utilization, and quality to all primary care practices in the state; this work was continued during the no-cost extension period but with adjustments to the reports to improve their utility to practices. Specifically, MHMC convened meetings to obtain provider feedback on the content of the reports and suggestions for improving their value, and the SIM steering committee recommended a pithier format, as the previous reports were too long, and more focus on a core set of outcome measures. MHMC also compiled data on demographics, health coverage, health status, health service use, quality of care, and costs of care at the county, state, and national levels. This Healthcare Datebook was made widely available to consumers and purchasers of health care to stimulate their engagement in the state's overarching goals to improve health and lower costs. Through the SORT process, Maine elected not to continue that work in the third year of the test period.

B.1.3 How Maine's SIM Initiative changed state health policy: successes, challenges, and lessons learned

The Maine SIM Initiative's efforts to help foster health system change, as described above, achieved much of what the initial SIM plans envisioned for its SIM award. In addition to successes, there were inevitable challenges and important lessons learned, which are covered in the following sections.

Successes

Maine expanded the reach of alternative payment models, covering an estimated 110,000 Medicaid (MaineCare) enrollees by the end of the SIM Initiative. Maine used SIM funding to support three new Medicaid delivery models, HHs, BHHs, and ACs. SIM funding was instrumental in standing up these models through SIM-funded practice transformation and health IT support and data analytics. At the start of the SIM Initiative, the HH initiative was one year underway, and the BHH and AC initiatives were just starting. By the end of the SIM Initiative, there were 24 BHHs at 102 location sites, 100 HHs, and 4 ACs (with 80 primary care practices and 7 EDs affiliated with the ACs). Each model implemented a new way of paying for care that was a departure from MaineCare's fee-for-service payment approach. MaineCare helped participating providers change the way they delivered care to function under these new payment models. By the end of the SIM Initiative in September 2017, an estimated 110,000 MaineCare enrollees (approximately 39 percent of the 280,700 individuals enrolled in MaineCare as of 2016[55]) were in one or more of these alternative payment and delivery models.

[55] Data source found at The Henry J. Kaiser Family Foundation State Health Facts; https://www.kff.org/other/state-indicator/total-population/?state=me&dataView=1

Both providers and state officials viewed the BHH model as a success, with state officials describing it as transformational to Maine's behavioral health delivery system. State officials noted that moving to a capitated payment model to reimburse for case management services was a notable departure from the MaineCare fee-for-service reimbursement model. Capitated payments—in conjunction with SIM-funded health IT support, practice transformation assistance; connection to the state's HIE; and feedback on quality, utilization, and cost measures—significantly altered how the state delivered behavioral health care. During focus groups and interviews, BHH providers repeatedly observed that this model granted them the flexibility to provide better care. In addition, this model introduced behavioral health providers to an alternative payment approach (the PMPM payment) within MaineCare.

> *We are moving more towards the BHH model. It seems to be what is working best for a lot of people. Also, the model, we really believe in. We really believe in the holistic approach and bringing the team together.* —BHH Provider

> *…the BHH can be more of a wellness model… you are not chasing a productivity model, so you can do a lot more programming and communication and coordination of services.* —BHH Provider

State officials, behavioral health providers, and advocates alike viewed the connection of 20 BHOs to the HIE as a great success. The state used SIM funding to address a critical gap in its health IT infrastructure—that behavioral health providers lagged behind PCPs in access to and use of data to better manage patient care. Considerable SIM funding was devoted to ensuring that behavioral health providers had greater access to clinical data by connecting these providers to the HIE. BHH interviewees discussed how they developed work flows to respond to HIE notifications of ED/hospital admissions and how accessing a patient's medical records in the HIE helped them develop and modify behavioral health care plans in a way that improved care coordination with PCPs. That the BHHs found connection to the HIE to be so valuable surprised state officials, who had assumed that the primary HIE benefit would accrue to PCPs being able to view their patients' mental health records.

> *I just love HealthInfoNet. I can tell if my client has been to the emergency room or admitted.*—BHH Provider

> *[The HIE was] helpful in getting a more comprehensive picture of what is happening to individuals and getting us to formulate what support and services will be required for them to be successful.*—BHH Provider

Maine expanded its health IT and data analytics tools. Many state officials and SIM-participating providers viewed health IT and data analytics as a critical component to Maine's

SIM Initiative and a real success story. According to state officials, at the highest levels of leadership (the Governor and the Commissioner), Maine prioritized transparency; provider and payer accountability for costs and quality; data-driven quality improvement; and provision of support to patients, providers, and payers in managing health. Over the test period, Maine recognized new opportunities to enhance the data available to MaineCare providers (BHH, HH, and MaineCare care managers) to help them coordinate and monitor care. Notably, the ED and inpatient notification services established under SIM for MaineCare care managers were integrated into the MaineCare clinical dashboard, which included not only notification information, but also clinical information recorded in claims and HIE data. As another example, toward the end of the test period, HIN had MaineCare behavioral health providers connected to the HIE upload their MaineCare prior authorization data for behavioral health services, thereby expanding the types of behavioral health information available in the HIE, including information on a MaineCare enrollee's treatment goals and the types of behavioral health services he/she could be receiving. HIN was also able to use SIM funding to incorporate Medicaid claims data into an existing analytics tool that generates patient risk stratification information, thus improving the tool's ability to predict which MaineCare beneficiaries would likely become high-cost, high-use patients. Commensurate with these changes, BHH and HH provider participants in focus groups conducted over several years of the test period also discussed incremental progress in integrating these tools into care delivery. Consistent with providers' reported use, Medicaid beneficiaries who participated in focus groups generally thought their care was well coordinated and high quality. As one consumer explained:

> *Yes, my care is coordinated. I know that when I go to one doctor, my paperwork is immediately at the other doctor. I have like a baseball team of 9 and I am the manager. My doctor is up to date. I'll go to Acadia and they will say, 'Did you know that your [blank] levels are high.' They all communicate.*—HH consumer focus group in Bangor

Providers considered technical assistance from HIN and Quality Counts as essential in helping them realize practice transformation. Both HH and BHH providers perceived the technical assistance Quality Counts and HIN provided as instrumental in achieving practice transformation. HIN provided extensive technical assistance to help (1) MaineCare care managers use the MaineCare Clinical Dashboard to more quickly identify patient needs, establish workflows to connect patients to necessary services, and monitor the utilization and overall health of the care managers' patient panels; and (2) HIE-connected BHOs send, receive, and incorporate HIE clinical health data into patient care. The DFLC initiative directed by Quality Counts also received generally positive feedback. BHH and HH providers in focus groups noted that the DFLC helped them improve their capacity to improve patient outcomes, particularly those relating to diabetes monitoring, prevention, and screening. Providers also benefited from the collaboratives' networking component, which allowed them to interact and exchange ideas and best practices with other practitioners in the field.

It [technical assistance from Quality Counts] gave us a partnership in MaineCare for the first time.—HH Provider

Yeah, we had a lot of help, they [HIN] were very, very supportive. I'm thinking of two people in particular that were very helpful, always positive.—BHH Provider

Challenges

Introducing health system reform innovations on a voluntary, multi-payer level proved challenging. At the outset, the SIM delivery system and payment reforms focused primarily on supporting MaineCare's value-based purchasing strategy, even though the state had made a considerable effort to drive value on a multi-payer level through the VBID and commercial ACO voluntary growth cap initiatives. By Year 3 of the test period and through the no-cost extension period, however, the state had suspended its multi-payer initiatives. Payers and state officials agreed that insurers' unwillingness to modify their plans to align with a state-developed design led to limited uptake in VBID. Because the ACO growth cap was voluntary, its impact was also limited. With commercial payers, Maine emphasized voluntary participation in health reform activities, and without regulations or requirements for commercial payers to adopt recommendations stemming from SIM activities, Maine was not able to further commercial sector health system transformation like the state was able to do in MaineCare.

Changing how providers operate their practices and getting them to adapt to new care delivery models and alternative payment models took more time than anticipated. BHH development, for example, was slowed down by provider confusion about differentiating the roles of the required BHH clinical care team (e.g., clinical team leader, peer support specialist, nurse care manager) and how to integrate the different roles into organization workflows. Some BHHs also expressed confusion regarding the BHH capitation rate. Providers were required to bill at least 1 hour per patient per month to receive the capitated payment, but some interpreted this to mean that no services provided after the 1-hour mark would be compensated. AC development was even slower; for example, at the end of the SIM Initiative none of the ACs had elected to take on two-sided performance-based risk (see ***Table B-1*** for definition). Instead, ACs elected to only share in savings relative to their financial benchmarks but not losses. AC administrators explained that they needed more time to learn to better manage costs and quality of care for the MaineCare population before they felt comfortable entering into a two-sided risk arrangement. AC administrators also observed that the ACs functioned somewhat in isolation from Maine's other SIM-supported delivery system models. They did not view the AC initiative as being well-integrated into the SIM Initiative. From their perspective, the SIM Initiative devoted more time and effort to the HH and BHH reform efforts. Moreover, primary care providers who were part of an AC and participating in focus groups were often not aware they were part of an AC. These providers reported that it would be unrealistic to expect that they

would adopt new practice patterns aligned with goals of an alternative delivery model when they were unaware they were in such a model.

Exchange of data alone did not guarantee integration of primary and behavioral health care. State officials expected that the bidirectional exchange of physical health and behavioral health data through the HIE would foster integration of primary and behavioral health care. To further this goal, Quality Counts and HIN provided technical assistance to HHs and BHHs on how best to exchange information to improve patient care. However, the bidirectional exchange of information between BHHs and PCPs through the HIE has remained somewhat limited, according to both BHH stakeholders and primary care providers. Reasons observers gave for the lack of progress include the persistence of old habits (e.g., still using a fax to exchange information rather than the HIE) and inability of behavioral health providers to share some information that primary care providers consider crucial (particularly substance use treatment data because of 42 CFR Part 2). MaineCare did require contractual partnerships between HHs and BHHs and supported these connections through a $15 payment per BHH enrollee per month to HHs for working with BHHs. Nonetheless, integration of these services remains a goal that will require additional effort to achieve.

Stakeholders, including state officials, primary care providers, and behavioral health providers, all described notable challenges to optimizing the use of data. Challenges included practice readiness to use data and optimize work flows around data; high costs for maintaining electronic health records (EHRs) and connections to the HIE; lack of timely data in quarterly claims data feedback reports; inability to see mental health record information in the HIE without patient consent; inability to share substance use treatment–related data between providers because of federal regulation 42 CFR Part 2 (U.S. Department of Health and Human Services, n.d.); and organizing work around multiple points for information (including the EHR, feedback reports, and the HIE). Post-SIM, Maine remains committed to working with providers to ameliorate these data-related problems.

Despite substantial time and effort devoted to quality measure alignment during the SIM Initiative, uptake of these measures by public and private payers remained limited. As some state officials and payers feared from the beginning of the SIM Initiative, commercial payers generally proved unwilling to adopt a common measure set developed just for Maine, at least in part because they had already invested in their own measures for monitoring performance. Some state officials and payers perceived the core set as useful. However, others noted that the return on investment for the amount of work required to reach consensus might have been higher if the adoption of the measure set had been required and not voluntary. Maine emphasized voluntary engagement in quality measure alignment because state officials acknowledged that commercial payers had priorities other than measure alignment, and Maine did not want to require payers to align..

Consumers in focus groups indicated that there were recurring barriers to access to care in Maine despite SIM reforms. Consumers in focus groups who received care from BHHs and HHs reported many barriers impeding their access to care, particularly to specialists and mental health. These barriers included long appointment wait times, transportation issues, inadequate physician supply in certain areas, a large degree of physician turnover within practices, and difficulties associated with obtaining referrals for some specialists. Such factors may have impeded the progress of the SIM Initiative in driving value in health care services throughout Maine and improving patient outcomes.

Lessons learned

The state refocused SIM Initiative priorities when circumstances changed. With limited SIM funding and numerous SIM-funded projects, Maine used the 2015 SORT process to reassess the extent to which SIM-funded projects were successfully advancing payment and delivery system reform and bolstering the overall impact of the SIM Initiative. The SORT process gave Maine a framework for the SIM Steering Committee and the MLT to reach agreement on which activities would be discontinued as of Year 3 and which activities would receive high priority and funding through the no-cost extension year.[56]

Primary care and behavioral health providers relied on EHR and HIE data for care management over claims-based feedback reports and provider portals. Although primary care and behavioral health providers were aware of the provider portals and practice feedback reports, many said data from EHRs and HIE were more useful in coordinating and managing patient care because these data were timelier. Nonetheless, primary care and behavioral health providers did note that their care managers/nurses used data from provider portals and feedback reports to assess the practice's performance on certain utilization and quality of care metrics.

BHH providers would have benefited from more effective communication about the model and its intended implementation. The BHH model, as noted, faced implementation obstacles in part because providers were confused over model design, payment, and clinical care team structure and roles. Clearer communication and implementation goals during the early performance years may have reduced the extent of these challenges. Over the course of the SIM test period, however, technical assistance provided by SIM partners combined with more experience gained by time in the program helped BHH providers overcome implementation obstacles.

Leadership from within Maine state government maximized the impact of the SIM Initiative. Stakeholders described the Commissioner of the Department of Health and Human

[56] The SORT process review process and recommendations can be found here: http://www.maine.gov/dhhs/sim/documents/SIM%20docs/meeting%20materials/SIM%20Steering/January%2015,%202016/Final%20Objective%20Review%20Decisions.pdf

Services, Mary Mayhew, as one key leader who played a critical role in implementing, promoting, and driving the SIM Initiative forward. In addition, Governor Paul LePage's commitment to transparency and accountability in the health system led him and his administration to remain engaged and involved in the SIM Initiative throughout the test period.

Continuous quality improvement was a guiding principle that shaped Maine's SIM activities. Maine's SIM Evaluation Dashboard and the SORT process (discussed in greater detail in ***Section B.1.2***) reflected Maine's commitment to on-going assessment to ensure the state was focused on promising activities that would yield positive provider and patient experience, utilization, and cost results. Interim and final findings from Maine's state-led evaluation were another key tool to help the Maine SIM Steering Committee decide which SIM-funded activities should continue during the SORT process and after the SIM test period ended.

The Steering Committee and subcommittees were an effective form of governance but also caused meeting fatigue. The state viewed its SIM Initiative governance structure as a real asset to successful project implementation because the state invited and encouraged provider, payer, and consumer feedback through the subcommittees and work groups. Although interviewed stakeholders appreciated the opportunity to provide feedback on the SIM Initiative, some found the frequency of work group, subcommittee, and Steering Committee meetings tiring, which made it hard to stay engaged throughout the test period. Also, SIM leadership invited consumers to participate in committee meetings but described attracting consumers with the level of interest in and familiarity with the concepts discussed in the meetings as difficult. Provider participation was strong throughout the SIM Initiative. In the view of some stakeholders, however, this intense provider participation in the committees and work groups was described by some non-provider stakeholders as leading to disproportionate provider influence on SIM activities. Moreover, as the SORT process took hold, SIM partners felt less engaged, and there was a growing perception that the state was taking more control over SIM activities.

B.1.4 Anticipated long-term changes following the SIM Initiative

Maine tested numerous activities to support delivery system reform, and many state officials and SIM partners acknowledged that not all activities would yield a significant return on investment and therefore might not be sustained. Neither the Maine legislature nor the Governor made it a priority to pursue further significant health policy change after the test period, but as noted in ***Table B-2***, many activities may be sustained, because organizations that were responsible for their implementation under the SIM Initiative may carry on some, if not all, of the work they began using their own funding or in-kind resources.

Table B-2. Sustainability of Maine's SIM activities

Activity type	Activity	Plans to sustain	Sustainability mechanism
Delivery / payment system	Behavioral Health Homes	Yes	State investment / Medicaid SPA
	Accountable Communities	Yes	State investment / Medicaid SPA
	Health Homes	Yes	State investment / Medicaid SPA
Population health	Expansion of National Diabetes Prevention Program	Yes	State investment
	Community Health Worker Pilot Project	Yes	State investment
Practice transformation	Webinars, in-person technical assistance, in-person learning sessions for HHs and BHHs	No	
	Data-focused learning collaborative	Yes	State investment
Workforce	Provider education on pain expression in individuals with developmental disabilities	Yes	Partner organization investment
	Leadership development training	Yes	Partner organization investment
Health information technology	Predictive analytics pilot	Yes	State and partner organization investment
	Connecting behavioral health organizations to the health information exchange Lower subscription fees to the health information exchange will be made available for BHH providers	Yes	State and partner organization investment
	E-mail notifications to MaineCare care managers	Yes	State investment
	MaineCare clinical dashboard	Yes	State investment
Data analytics	Primary care practice reports on quality and cost for Medicare, Medicaid, and commercial patient panels	No	
	Portal for HHs and BHHs to access their MaineCare patients' quality, utilization, and cost data	Yes	State investment
	Monthly and quarterly utilization and quality reports to ACs	Yes	State investment

AC = Accountable Community; BHH = behavioral health home; HH = health home; SPA = state plan amendment.

Because only 1 percent of Maine's total SIM award funded salaries for state staff overseeing SIM operations, most were doing so along with their other responsibilities and moved into other state roles or left state government after the test period ended. In considering how to continue health system transformation after the test period, Maine focused on strategies where MaineCare or key partners could continue to support the day-to-day operations of specific activities, rather than pursue legislation or Medicaid SPAs/waivers to sustain progress. Maine

took the approach of contracting with in-state organizations that had already been conducting practice transformation, stakeholder convening, quality measure reporting, health IT development, and data analytics work prior to the SIM Initiative. These in-state organizations will be able to apply lessons learned from their SIM Initiative activities to future health system transformation activities

For example, to sustain the gains made in sharing health information through the HIE, HIN and MaineCare began preparation of a Medicaid Implementation Advance Planning Document Update to access federal funding to further health information exchange among Medicaid providers, and HIN will continue to assist providers in accessing and using the HIE as internal funding allows. MHMC will continue to operate *GetbetterMaine.org*, update the current publicly reported quality measures as new data become available, and add new metrics to the website after the SIM Initiative. Maine did not plan to sustain investments in many of the workforce development activities. However, leadership development and training for DD providers may continue through in-kind resources provided by the Hanley Center and MDDC (RTI International et al., 2018). Furthermore, pleased with the success of the CHW pilot—state officials were surprised by the number of individuals reached through the pilot—Maine CDC continued to operate CHW training initiative into the no-cost extension period (Year 4 of SIM implementation) and plans to continue training CHWs after the SIM Initiative.

MaineCare will also continue the HH, BHH, and AC models under its value-based purchasing strategy after the SIM Initiative ends because state officials decided that each of these efforts helped Maine improve patient quality and satisfaction and population health and reduce health care costs. State officials also recognized the effectiveness of technical assistance in helping BHHs, HHs, and ACs operate under alternative payment models and transform care, so they were exploring ways to provide continued practice transformation support post-SIM by establishing an innovation or practice transformation center for medical providers. Funding for this approach had not been confirmed by the end of the SIM Initiative test period. Maine was also exploring the possibility of bringing HHs and BHHs together again for a second round of the DFLC with a new, yet-to-be-determined topic.

Finally, Maine's citizens passed Medicaid expansion through a ballot referendum in November 2017, yet implementation of expansion may be delayed because the referendum did not specify a funding mechanism. Governor LePage objects to using state funding to support the expansion. However, if implemented, Medicaid expansion is expected to extend care to an additional 70,000–80,000 Mainers, a development that may magnify the impact of the state's Medicaid-focused delivery and payment reforms advanced under the SIM Initiative.

B.1.5 Summary of SIM Initiative implementation

At the end of the Maine SIM Initiative, the state has seen the following:

- **Increased reach of alternative payment models in the Medicaid**, through BHHs, ACs (Medicaid ACOs), and primary care HHs (see ***Addendum Table B-1*** for reach at extent of Medicaid beneficiary participation by the end of the SIM Initiative).
- **Improvements in "whole person," team-oriented care for adults and children with serious mental illness** through Medicaid BHHs.
- **Expanded use of health IT and data analytics tools to coordinate and monitor patient care** by making ED and inpatient notifications and patient health clinical data available to Medicaid care managers and by piloting the use of a tool that would allow providers to better predict which Medicaid beneficiaries are likely to become high cost.
- **More communication and collaboration between payers in the state**, including Medicaid and commercial payers, because the state convened payers around several topics, including value-based design and total cost of care growth caps.
- **Increased electronic health information exchange** between behavioral health and physical health providers by connecting more behavioral health providers to Maine's HIE.
- **Its role as a funder and convener brought together in-state, experienced partner organizations** to implement SIM Initiative activities.
- **Retention of knowledge gained during the SIM Initiative stay within Maine** because the state chose to partner with in-state organizations for practice transformation, stakeholder convening, quality measure reporting, health IT development, and data analytics activities.

Maine's Behavioral Health Homes (BHHs) became one of the most well-known health system reform models in the state during the SIM Initiative. This model, which is implemented through MaineCare (the state's Medicaid program), is therefore a focus for quantitative analyses of the Maine SIM Initiative's early impact on expenditures and key utilization and quality of care outcomes. We analyze the impact of the model using a pre-post study design, which compares utilization, quality, and cost outcomes for the BHH population before and after implementation of the initiative.

Maine's Accountable Communities (ACs), an accountable care organization (ACO) program, was another key health system reform model administered through MaineCare under the SIM Initiative. The wide reach of the model throughout the state makes it another ideal focus for quantitative analyses of the SIM Initiative's impact on expenditures, utilization, and quality of care outcomes. We measure the model's effects against a comparison group of Maine Medicaid enrollees not enrolled in an AC.

Addendum Table B-1. Providers and populations reached by Maine's SIM Initiative–related delivery system and payment models

Maine	Participating payer	Participating providers	Population reached
BHHs	Medicaid	287	4%
HHs	Medicaid	248	18%
ACs	Medicaid	4 ACs	20%[1]

AC = Accountable Community; BHH = behavioral health home; HH = health home.

Note: Counts of providers and practices reached are state reported numbers as of March 2016 for BHHs and HHs (CMS, 2016a) and July 2017 for ACs (Maine Accountable Communities Webpage, 2018). Counts of populations reached are state reported numbers as of July 2017 for ACs (Maine Accountable Communities Webpage, 2018) and September 2017 for BHHs (Maine Department of Health and Human Services, 2017) and HHs (personal communication, June 6, 2018). Denominators used to compute percentage of population reached are Kaiser Family Foundation population estimates based on the Census Bureau's March 2017 Current Population Survey (Kaiser Family Foundation, 2018).

[1] HHs and BHHs could participate in an AC, so MaineCare beneficiaries enrolled in an AC could also be enrolled in HHs and BHHs.

Sections B.2 and ***B.3***, respectively, present the estimated impacts of two of the most far-reaching SIM reform models for Maine—BHHs and ACs. We assess the impact of these models for 3 years before implementation and 2 years after implementation.

B.2 Model-Specific Impact Findings: *Maine's Behavioral Health Homes*

BHHs are community-based behavioral health organizations (BHOs) licensed in the state of Maine to provide behavioral health services to a subset of MaineCare beneficiaries. BHOs become BHHs if they meet specific BHH program participation requirements as outlined in MaineCare's benefits manual,[57] and MaineCare members can only enroll in the BHH program if they meet very specific diagnostic and functional criteria reflective of serious mental illness for adults and serious emotional disturbance for children. Therefore, not all BHOs elect to become BHHs, and not all patients at a BHH are eligible for the BHH program. By March 2016, the time of the most recently available data, there were 287 providers participating in 24 BHHs across 102 locations throughout the state. BHHs can have multiple locations, so although the number of BHHs has not changed since the program began, the number of participating sites has increased to 102 from 51 locations. Not all BHOs in Maine are participating in this model. Maine has 159 BHOs across the state, and 24 decided to participate in this program and become BHHs.

By the end of the SIM Initiative, there were 11,271 MaineCare beneficiaries in the BHH model (2 percent of all MaineCare beneficiaries and approximately 17 percent of MaineCare

[57] MaineCare BHH provider eligibility requirements can be found in Section 92 of the MaineCare Benefits Manual.

enrollees in need of mental health treatment[58]). To be eligible for the program, MaineCare enrollees must meet certain diagnostic and functional criteria and be in need of case management services.[59] Medicare-Medicaid enrollees are included in the BHH program. Potential enrollees identified by the BHH are sent to MaineCare staff for confirmation of their program eligibility, and identified individuals are required to opt into the BHH model. Further, if the potential enrollees were also eligible for other behavioral health services, such as Section 13 targeted case management services, they were required to choose the specific service they wished to receive. Also, enrollees could leave the model at any time. Because of Maine's focus on enrolling individuals who were already receiving care within a BHO, BHH enrollees are expected to be high-cost Medicaid beneficiaries in need of extensive care management.

KEY INSIGHTS

- For MaineCare enrollees with serious mental illness or serious emotional disturbance enrolled in the BHH program, during the 2 years after implementation of the BHH model:
  - Expenditures, including behavioral health–related expenditures, increased
  - Primary care and specialty care use increased
  - Inpatient admissions increased
  - Care coordination, as measured by follow-up after a mental health–related admission, declined or did not change
  - Emergency department (ED) visits declined
  - Claims-based behavioral health–related quality measures improved, but a physical health–related measure declined
- The increase in some types of utilization and overall expenditures may be expected under a model that promotes improved care management and coordination.
- At the same time, some BHH enrollees experienced reductions in ED visits, but these reductions were not great enough to offset the total Medicaid expenditure cost growth.
- BHH enrollees with disabilities experienced a general trend toward lower hospital-related utilization after BHH program implementation, which could indicate that BHHs were effective at targeting particularly high utilizers and working with these patients to reduce unnecessary utilization.
- Taken together, there is some evidence that the model is able to alter patterns of care for this high-needs, medically complex population, as indicated by lower utilization, including in such categories as ED visits.

[58] Maine served approximately 67,384 Medicaid enrollees through its state mental health program in state fiscal year 2016 (data source: https://www.samhsa.gov/data/sites/default/files/Maine-2016.pdf). We use this estimate as an approximation of the prevalence of MaineCare enrollees with serious mental health conditions, and we divide 11,271 BHH enrollees by 67,384 to arrive at the estimate of 17 percent.

[59] See Section 92.03 of the MaineCare Benefits Manual for details on eligibility criteria: http://www.maine.gov/sos/cec/rules/10/144/ch101/c2s092.docx

Like a patient-centered medical home, BHHs are expected to provide team-based care, enhanced access to care, population risk stratification and management, and patient/family-directed care plans. BHHs work to integrate physical and behavioral health, include patients and families in decision making, make connections to community resources when necessary, commit to quality improvement, and build capacity in their health information technology (health IT) infrastructure (e.g., adoption of an electronic health record or connection to HealthInfoNet [HIN], Maine's health information exchange [HIE]). The BHH team consists of a care manager, a nurse, and a peer or family support specialist. BHHs must have a psychiatric consultant and a medical consultant who provides expertise on the development of evidence-based practices and helps lead quality improvement initiatives. BHHs are also required to partner with an enrollee's health home (HH; a primary care practice meeting certain state-specific requirements) provider or primary care provider (PCP) to better manage patients' physical and behavioral health care needs. BHHs also monitor their organization's performance on 19 claims-based physical and behavioral health quality measures.

The capitated payment structure is central to the BHH model. Each BHH receives $394.20 per member per month (PMPM) from MaineCare to provide comprehensive case management. Capitated payments give BHH providers flexibility to craft the package of services and supports an enrollee might need and to coordinate care with other medical providers and community resources. Payment is not tied to performance on any quality metrics or performance goals. The PMPM payments were considered by stakeholders to be a significant departure from the fee-for-service reimbursement model for primary and behavioral health care services, and the payment model was well received. Providers reported during site visits that the payment did indeed give them the flexibility to provide whole-person, comprehensive care.

BHHs leveraged advanced health IT tools and data analytics to better serve their patient population. With support from the SIM Initiative, Maine connected 18 BHHs to the state's HIE, known as HIN. By the end of the SIM test period, 13 BHHs could share mental health records with the HIE, to the benefit of PCPs, specialists, and hospitals seeking to find patients' mental health information. BHHs also used the HIE to communicate with patients' physicians, check medications and lab results, and find out if a patient had been to the ED or hospital. HIN subsidized these organizations' subscription fees to the HIE and worked with BHHs' electronic record vendors to coordinate the transfer of clinical data to the HIE. By the end of the test period, BHH providers uniformly lauded the assistance they received for connecting to the HIE and learning to use it in patient care. In addition, BHHs were given access to individual- and practice-level data on cost, utilization, and quality of care through the MaineCare Value-Based Purchasing Management System portal, with the expectation that BHHs would be able to monitor quality and utilization and make improvements to quality of care when necessary.

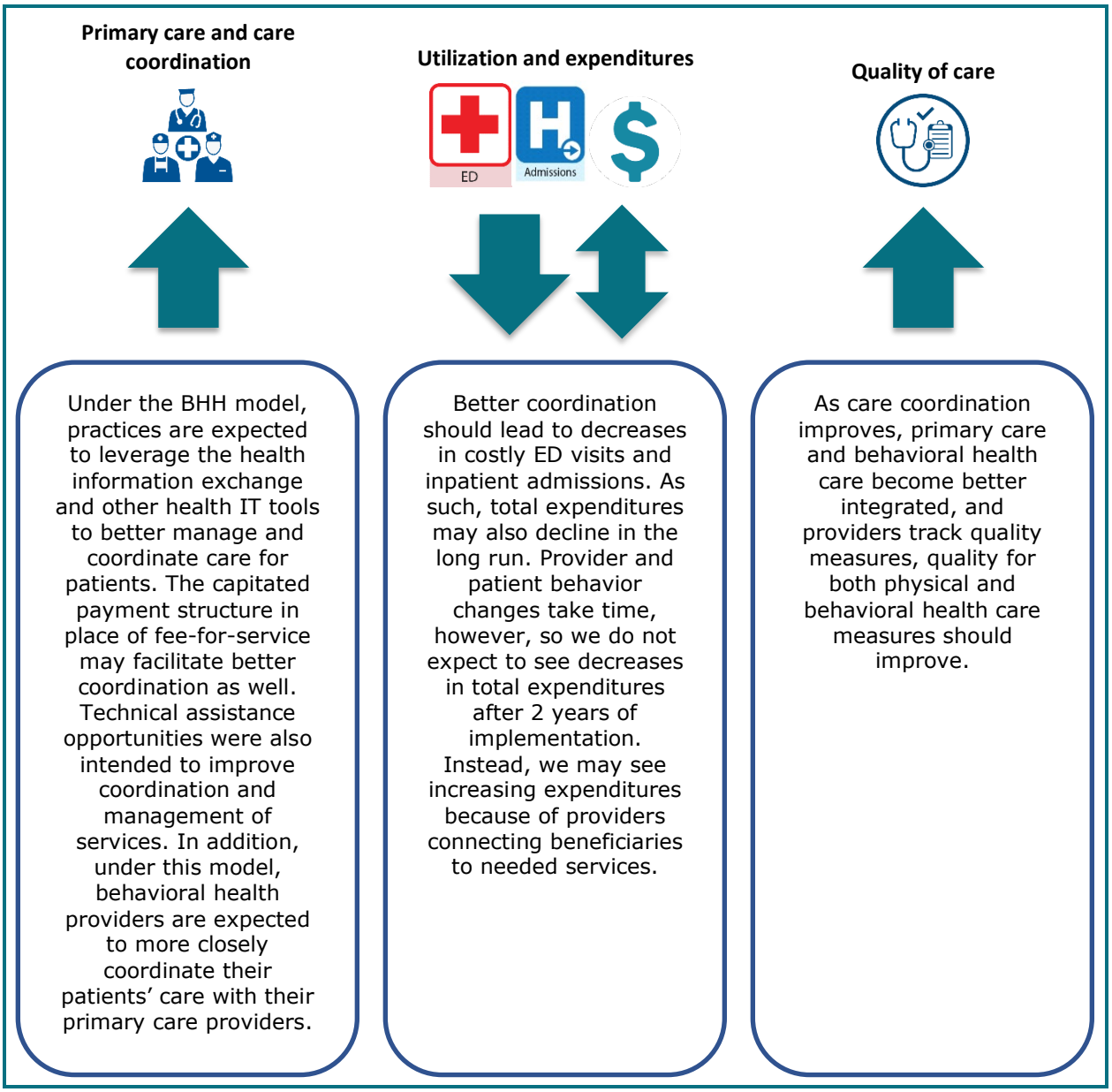
BHHs also received technical assistance from SIM partners HIN and Maine Quality Counts to facilitate practice transformation efforts. HIN sponsored monthly webinars and one-

on-one technical assistance to help BHHs send, receive, and use HIE data. HIN also helped BHHs identify best practices for integrating HIE information into their workflows for a range of services, including targeted care management, hospital discharge planning, medication reconciliation, and identification of gaps or overuse in medical care. Quality Counts administered learning collaboratives (e.g., learning sessions, webinars, newsletters) for BHH and HH providers and quality improvement support through one-on-one in-person or telephonic technical assistance. The learning collaboratives focused on enhancing practices' care coordination capabilities and coordinating behavioral health and primary care. In March 2017, the collaboratives began focusing specifically on improving diabetes quality of care in response to MaineCare's observation that Medicaid enrollees with diabetes had low rates of hemoglobin A1c (HbA1c) testing. The collaboratives took a data-focused approach toward improving HbA1c monitoring for diabetes patients and HbA1c screening rates for patients on antipsychotic medications.[60] Overall, these collaboratives gave BHHs the opportunity to share best practices, engage in peer-to-peer learning, and develop strategies to improve health care outcomes for patients. The technical assistance provided by HIN and Maine Quality Counts was very well received by BHH providers participating in stakeholder interviews and focus groups, and many providers noted that they had learned to change the way they delivered care because of this help.

The state expected several outcomes to change as a result of the BHH model (see ***Figure B-3***). With the SIM Initiative supports in place, Maine anticipated that BHHs would, over time, improve quality of care and coordination of care while reducing ED visits and inpatient admissions (all-cause and behavioral health–related). Impacts on expenditures were expected to be more complex. With expectations for reductions in inpatient admissions, concomitant reductions in inpatient expenditures are possible. If improved care management results in connecting patients to needed services and supports, then increases in professional, behavioral health–related, and pharmacy expenditures could be observed because patients are receiving more care in the short run. Increases in expenditures in these other service categories could be offset by reductions in expenditures from high-cost care such as inpatient admissions and ED visits, resulting in a net decrease in total Medicaid expenditures. However, if reductions in high-cost services are not large enough, we could see increases in total Medicaid expenditures. Increases in the short run do not necessarily mean that long-term reductions in total Medicaid expenditures are unachievable. It often takes significant time for new models of care delivery to become fully functional, and patients need adequate supports to ultimately control high-cost, unnecessary spending.

[60] Because there are metabolic side effects of antipsychotic treatment, including weight gain, dyslipidemia, and increased risk of diabetes, the American Diabetes Association in 2010 recommended adding HbA1c testing for individuals receiving antipsychotics. Monitoring for these risks falls within the scope of the primary care provider and the mental health provider.

Figure B-3. Expected direction of outcome measures of BHH performance



BHH = Behavioral Health Home; ED = emergency department; health IT = health information technology.

To assess the effects of Maine's BHH model for care coordination, utilization, expenditures, and quality of care, we addressed the following research question:

- How did trends in key outcomes for care coordination, utilization, expenditures, and quality of care change among BHH enrollees after implementation of the BHH model?

We used a pre-post analysis to measure the occurrence of specific expenditure, utilization, quality, and care coordination–related outcomes both before and after the

implementation of the BHH model. We used MaineCare claims data to examine the 3 years before BHH implementation (April 2011–March 2014) and 2 years after the start of the BHH model (April 2014–March 2016). The sample comprises MaineCare beneficiaries who were enrolled in BHHs at some point during the first 2 years of implementation of the model (see ***Table B-3*** for characteristics at baseline).

We did not compare the experience of BHH enrollees before and after BHH implementation against a comparison group because we could not select reasonable comparators for several reasons. First, BHHs used functional assessment data to select eligible patients for the program, and the RTI team did not have access to these data to help select a similar comparison group. Second, BHH providers had extensive latitude to decide which enrollees who met the functional and diagnostic criteria should be enrolled in the program, and the RTI team could not imitate providers' selection decisions.

Although the BHH did not target any subset of the BHH enrollees with particular characteristics, certain subpopulations may be impacted by the model differently because they have different inherent utilization patterns. To assess the impact of the BHH on subpopulations, we ran the models for key cost and utilization outcomes (total expenditures, inpatient admissions, ED visits, and 30-day readmissions) separately for the overall, child, and adult populations and for people enrolled in Medicaid because of disability.[61] We include the results for the overall and disabled populations in this chapter; the results for the adult and child subpopulations are summarized in this chapter and the full results are included in ***Sub-appendix B-1***.

This analysis has several limitations. First, because BHH enrollees are likely to be more extensive users of health care, their health care use and commensurate costs will often decrease over time, a phenomenon known as regression to the mean. Without a group of individuals to compare trends in use over time, in a pre-post design, regression to the mean cannot be ruled out as a possible explanation for any reductions in health care use or expenditures we may observe. Second, without a comparison group, we are unable to eliminate the influence of general, secular trends in health care use and expenditures that may be occurring irrespective of participation in the BHH. Third, unobserved characteristics may introduce bias that could be either favorable or unfavorable to the BHH enrollees and cannot be fully accounted for in a pre-post design. For example, once identified by the BHH as a potential participant for the model, Medicaid beneficiaries are given the option to enroll in the program. A willingness to opt in may indicate that a patient is more open and receptive to an alternate way of receiving care and will work with the BHH team to change patterns of utilization and expenditures. Alternatively, those who opt in could have particularly complex situations and be willing to try a new approach, and working with very complex patients to change patterns of care may be particularly challenging for the

[61] Different types of disabilities (physical, emotional, behavioral) can qualify an individual for Medicaid enrollment.

BHH team. Finally, 69 percent of the study sample was exposed to the demonstration for 1 year only. These individuals were enrolled in the first year of the demonstration and then left the demonstration (either left Medicaid or were deemed no longer eligible for BHH services), or they were enrolled later in the demonstration, i.e., in the second year of the demonstration. Individuals exposed to the demonstration for only 1 year may be less likely to realize changes in use and expenditures, given that providers and patients must often work together over time to change longstanding patterns of how patients use health care.

Characteristics of BHH enrollees enrolled in Medicaid before and after BHH program implementation are described in ***Table B-3***. A summary of the analytic methods is included below, and the methods are detailed in ***Sub-appendix B-2***.

Methods Snapshot for Impact Analysis
• **Study design:** Pre-post analysis design using an unbalanced longitudinal panel. • **Population**: The sample comprised 7,560 MaineCare beneficiaries attributed to providers participating in the BHH model from April 2014 through March 2016. • **Data:** MaineCare claims data provided by state. In this report, we used data from the 3 years before (April 2011–March 2014) and the 2 years after (April 2014–March 2016) the start of the BHH model. • **Sample:** Utilization and expenditure measures included beneficiaries of any age. The sample size for care coordination and quality of care measures varied. Medicare-Medicaid enrollees were included in the analysis because they represent about 36 percent of the study sample. We also conducted subpopulation analyses by age group and by disability status. • **Measures:** Care coordination (annual percentage): PCP visits, specialty provider visits, mental health follow-up visits with 7 and 30 days of inpatient admission; quality of care (annual percentage and annual rate): antidepressant medication management, HbA1c testing; utilization (annual rate): inpatient visits (all-cause and behavioral health–related), outpatient ED visits, 30-day readmissions, and expenditures (annual PMPM in dollars): total, behavioral health–related, inpatient facility (all-cause and behavioral health–related), professional, and prescription. • **Statistical analysis:** Logistic regression (binary) and ordinary least squares (expenditures) models weighted by the fraction of time the person was enrolled in MaineCare. Standard errors were clustered at the provider level to account for beneficiary correlation within provider. The models adjusted for beneficiary-level demographic and health status variables, practice-level variables, and county-level socioeconomic variables.

Table B-3. Weighted means prior to and after BHH implementation, BHH-attributed beneficiaries, April 2013–March 2014 and April 2015-March 2016

Characteristic	BHH group in 2014, one year prior to BHH program implementation	BHH group in 2016, Year Two of the BHH program	p-value
N	7,096	7,386	
Individual-level sociodemographic characteristics			
Female (%)	57.7	57.3	0.63
Age 0 (%)	0.1	0.0	0.001
Age 1 to 18 (%)	22.5	20.2	0.001
Age 19 to 64 (%)	71.9	73.1	0.10
Age 65+ (%)	5.5	6.7	0.003
Disabled (%)	53.8	57.0	<0.001
Dual Medicare eligible (%)	36.1	38.6	0.002
Non-white (%)	16.2	16.3	0.86
Race missing (%)	9.9	10.0	0.84
Continuous enrollment (%)	98.8	98.4	0.02
Total months enrolled annually	11.5	11.5	0.26
Unrestricted benefits (%)	86.9	86.6	0.58
Attributed both demonstration years (%)	57.1	53.4	<0.001
Lagged CDPS	1.8	1.8	0.12
County-level characteristics			
Metropolitan status (%)	66.9	67.5	0.44
Uninsured rate at county level (2013)	13.5	13.4	0.24
Median age at county level (2010)	41.9	41.9	0.77
Poverty rate at county level (2013)	14.5	14.4	0.18
Hospital beds per 1,000 persons	3.2	3.2	0.92
Physicians per 1,000 persons	1.1	1.2	0.70
Number of community mental health centers at county level	0.01	0.01	0.75
Health care utilization/expenditures for BHH-attributed beneficiaries			
Total Medicaid PBPM payments, $, mean	1,542.0	1,666.0	0.01
Annual inpatient admissions rate per 1,000 population, mean	189.8	177.1	0.05
Annual 30-day readmissions rate per 1,000 population, mean	209.4	194.6	0.25
Annual emergency department visits per 1,000 population, mean	578.6	577.3	0.88

BHH = Behavioral Health Home; CDPS = Chronic Illness and Disability Payment System (larger CDPS scores correspond with a larger number of comorbidities or a more severe set of comorbidities); PBPM = per beneficiary per month.

B.2.1 Did care coordination change among Medicaid BHH beneficiaries?

KEY INSIGHTS

- There was a **decrease in follow-up visits within 7 days after hospitalization for a mental illness.**
  - Prior to the SIM Initiative, BHH enrollees had fairly high rates of follow-up, which may have been hard to improve upon during the test period.
- BHH enrollees experienced an **increase in the use of primary care and specialty care visits** after the SIM Initiative, which aligns with expectations that BHHs would connect patients to needed care.

In ***Table B-4***, we present the results of the pre-post regression analyses for the following care coordination outcomes: follow-up within 7 or 30 days of discharge from hospitalization for a mental illness, percentage of beneficiaries having a primary care visit, and percentage of beneficiaries having a specialty care visit. We report annual regression pre-post estimates individually for the first 2 years after the implementation of the BHHs, along with an overall pre-post estimate for both years combined.

- BHH enrollees experienced a 3.5 percentage point decrease in **mental health admission discharges that had a follow-up visit** within 7 days (76 percent to 72.5 percent). This decrease was statistically significant for the first 2 years overall ($p = 0.03$). However, there was no statistically significant difference in the 30-day follow-up rate.
  - The decreases in follow-up within 7 days of discharge relative to baseline were contrary to expectations, but follow-up within 7 days of hospitalization discharge was improving slightly within the post-period from Year One (71.5%) to Year Two (73.9%).
  - The BHH group had high rates of follow-up at baseline, particularly for follow-up within 30 days of discharge. Providers may have been challenged to improve on the relatively high rates at the start of the intervention.
- BHH enrollees experienced a slight increase (1.9 percent) in the likelihood of having a **visit to a PCP** and a relatively large increase (4.1 percent) in the likelihood of having a **visit to a specialty care provider**. These increases were statistically significant for the first 2 years overall (PCP visits: $p = 0.004$ and specialty care provider visits: overall $p < 0.001$).
  - The increase over time aligned with expectations as BHHs were encouraged to coordinate care and connect patients to the appropriate resources.

Table B-4. Difference in the pre-post annual change in care coordination for Medicaid beneficiaries in Maine BHHs, first 2 years of implementation (April 2014 through March 2016)

Outcome and time period	Pre-period adjusted mean, BHH	Test-period adjusted mean, BHH	Regression-adjusted pre-post estimate (90% confidence interval)	Relative difference (%)	p-value	N
Follow-up within 7 days of discharge from hospitalization for mental illness (%)						1,987
Year One	76.0	71.5	−4.5 (−8.3, −0.7)	−6.0	0.05	
Year Two	76.0	73.9	−2.1 (−5.4, 1.2)	−2.8	0.29	
Overall	76.0	72.5	−3.5 (−6.0, −0.9)	−4.5	0.03	
Follow-up within 30 days of discharge from hospitalization for mental illness (%)						1,984
Year One	92.4	91.8	−0.6 (−3.1, 1.8)	−0.7	0.66	
Year Two	92.4	91.9	−0.5 (−3.4, 2.5)	−0.5	0.79	
Overall	92.4	91.8	−0.6 (−2.5, 1.3)	−0.6	0.62	
Any visits to a primary care provider (%)						30,580
Year One	69.9	71.0	1.2 (−0.2, 2.5) [Ŧ]	1.7	0.16	
Year Two	69.9	72.6	2.7 (1.0, 4.4)	3.9	0.01	
Overall	69.9	71.7	1.9 (0.8, 2.9)	2.7	0.004	
Any visits to a specialty care provider[1] (%)						30,580
Year One	50.8	52.5	1.7 (0.4, 3.0)	3.4	0.03	
Year Two	50.8	57.9	7.1 (5.1, 9.2)	14.1	<0.001	
Overall	50.8	54.9	4.1 (3.0, 5.3)	8.1	<0.001	

BHH = behavioral health home.

[1]Specialty care providers included specialties for treating chronic and acute conditions, including behavioral health conditions. Examples of specialty care providers included immunology, anesthesiology, dermatology, emergency medicine, internal medicine specialties (e.g., cardiology, hematology, nephrology), pathology, surgery, psychiatry, and neurology.

Note:

How to interpret the findings: A *negative* value corresponds to a *decrease* in the likelihood of a care coordination event in the intervention group. A *positive* value corresponds to an *increase* in the likelihood of a care coordination event in the intervention group. The relative difference is the pre-post estimate as a percentage of the intervention group's baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the difference in likelihood of a care coordination event. The estimates are multiplied by 100 to obtain percentage probabilities.

[Ŧ]Year One's pre-post estimate for any visits to a primary care provider (1.2; 80% confidence interval: 0.1, 2.2) was statistically significant at 80%. Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only.

The following sample sizes represent weighted period-years included in the regression model for the entire study period: mental health follow-up within 7 (30) days of discharge (N = 1,987); visits to a primary care/specialty care provider (N = 30,580).

Data source: RTI analysis of Maine Medicaid data, 2011–2016.

B.2.2 Did utilization change among Medicaid BHH beneficiaries?

KEY INSIGHTS

- BHH enrollees experienced an **increase in all-cause and behavioral health–related inpatient admissions and 30-day readmissions** (not statistically significant)**.**
  - The opposite pattern was observed among the subpopulation of enrollees with disabilities.
- There was a **decrease in ED visits for BHH enrollees** (not statistically significant), and the decrease was primarily driven by a decrease for individuals with disabilities.
  - BHHs' greater use of the HIE to monitor ED use may account for the general downward trends.
- **BHH enrollees with disabilities experienced a general trend toward lower hospital-related utilization** after BHH program implementation, which could indicate that BHHs were effective at targeting particularly high utilizers and working with patients to reduce unnecessary utilization.

In ***Table B-5***, we present the results of the pre-post regression analyses for all-cause acute inpatient admissions, inpatient admissions related to behavioral health, ED visits not leading to hospitalization, and 30-day readmissions per 1,000 beneficiaries. We also provide results for inpatient admissions, behavioral health–related inpatient admissions, and ED visits for children and adults in ***Tables B-1-1*** and ***B-1-2 in Sub-appendix B-1***, and for enrollees with disabilities in ***Table B-6*** below. We report regression adjusted pre-post estimates individually for the first 2 years after the implementation of the BHHs, along with an overall estimate for all years combined.

- **All-cause and behavioral health–related inpatient admissions and 30-day readmissions** increased for all BHH enrollees, but the increases were not statistically significant. Results did not differ by age, both adults and children experienced small increases in all-cause and behavioral health inpatient admissions, and results were not statistically significant (see ***Tables B-1-1*** and ***B-1-2 in Appendix B-1***).
  - Although unexpected, these results may be attributed to BHHs' efforts to improve patients' access to care and connect them to needed mental health services in a timely fashion, even if that necessitates inpatient hospital care.
- In contrast to the experience of all BHH enrollees, **all-cause and behavioral health inpatient admissions** decreased for BHH enrollees with disabilities, but reductions were not statistically significant.

Table B-5. Difference in the pre-post annual change in utilization for Medicaid beneficiaries in Maine BHHs, first 2 years of implementation (April 2014 through March 2016)

Outcome and time period	Pre-period adjusted mean, BHH	Test-period adjusted mean, BHH	Regression-adjusted pre-post estimate (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
Inpatient admissions (per 1,000 beneficiaries)						30,580
Year One	183.7	187.2	3.5 (−5.0, 11.9)	1.9	0.50	
Year Two	183.7	183.5	−0.2 (−17.8, 17.5)	−0.1	0.99	
Overall	183.7	185.5	1.8 (−7.3, 11.0)	1.0	0.74	
Inpatient admissions related to behavioral health (per 1,000 beneficiaries)						30,533
Year One	71.8	78.4	6.5 (−3.3, 16.4)	9.1	0.28	
Year Two	71.8	73.1	1.2 (−13.2, 15.7)	1.7	0.89	
Overall	71.8	76.0	4.2 (−4.2, 12.6)	5.8	0.41	
Emergency department visits not leading to hospitalization (per 1,000 beneficiaries)						30,580
Year One	586.8	570.7	−16.2 (−31.3, −1.1)	−2.8	0.08	
Year Two	586.8	585.1	−1.7 (−18.8, 15.4)	−0.3	0.87	
Overall	586.8	577.1	−9.8 (−21.1, 1.6) ŦŦ	−1.7	0.16	
30-day readmissions (per 1,000 beneficiaries)						8,297
Year One	186.5	203.3	16.8 (−8.8, 42.4)	9.0	0.28	
Year Two	186.5	200.1	13.5 (−9.6, 36.7)	7.3	0.34	
Overall	186.5	201.9	15.4 (−2.3, 33.0) ŦŦ	8.2	0.15	

BHH = behavioral health home.

Note:

How to interpret the findings: A *negative* value corresponds to a *decrease* in utilization rates. A *positive* value corresponds to an increase utilization rates. The relative difference is the pre-post estimate as a percentage of the intervention group's baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The probability estimates are multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries/discharges.

ŦŦ Overall's pre-post estimate for emergency department visits not leading to hospitalization (−9.8; 80% confidence interval: −18.6, −0.9) and overall's pre-post estimate for 30-day readmissions (15.4; 80% confidence interval: 1.6, 29.1) were statistically significant at 80%. Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only.

The following sample sizes represent weighted period-years included in the regression model for the entire study period: all-cause and behavioral health–related inpatient admissions and emergency department visits not leading to hospitalizations (N = 30,580); 30-day readmissions (N = 8,297).

Data source: RTI analysis of Maine Medicaid data, 2011–2016.

Table B-6. Difference in the pre-post annual change in utilization for Medicaid beneficiaries with disabilities in Maine BHHs, first 2 years of implementation (April 2014 through March 2016)

Outcome and time period	Pre-period adjusted mean, BHH	Test-period adjusted mean, BHH	Regression-adjusted pre-post estimate (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
Inpatient admissions (per 1,000 beneficiaries)						16,752
Year One	195.0	197.5	2.6 (−8.8, 14.0)	1.3	0.71	
Year Two	195.0	189.0	−6.0 (−21.0, 9.0)	−3.1	0.51	
Overall	195.0	193.7	−1.2 (−10.4, 8.0)	−0.6	0.83	
Inpatient admissions related to behavioral health (per 1,000 beneficiaries)						16,752
Year One	85.6	86.2	0.6 (−10.0, 11.2)	0.7	0.92	
Year Two	85.6	73.6	−11.9 (−26.6, 2.7)[Ŧ]	−14.0	0.18	
Overall	85.6	80.6	−5.0 (−13.7, 3.8)	−5.8	0.35	
Emergency department visits not leading to hospitalization (per 1,000 beneficiaries)						16,752
Year One	614.2	594.7	−19.5 (−35.7, −3.4)	−3.2	0.05	
Year Two	614.2	598.8	−15.4 (−33.9, 3.1)[Ŧ]	−2.5	0.17	
Overall	614.2	596.5	−17.7 (−29.9, −5.5)	−2.9	0.02	
30-day readmissions (per 1,000 beneficiaries)						5,432
Year One	210.6	222.4	11.8 (−19.1, 42.8)	5.6	0.53	
Year Two	210.6	207.9	−2.7 (−35.7, 30.3)	−1.3	0.89	
Overall	210.6	216.3	5.7 (−17.0, 28.4)	2.7	0.68	

BHH = behavioral health home.

Note:

How to interpret the findings: A *negative* value corresponds to a *decrease* in utilization rates. A *positive* value corresponds to an increase utilization rates. The relative difference is the pre-post estimate as a percentage of the intervention group's baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The probability estimates are multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries/discharges.

[Ŧ] Year Two's pre-post estimate for inpatient admissions related to behavioral health (−11.9; 80% confidence interval: −23.4, −0.5) and Year Two's pre-post estimate for emergency department visits not leading to hospitalization (−15.4; 80% confidence interval: −29.8, −1.0) were statistically significant at 80%. Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only.

The following sample sizes represent weighted period-years included in the regression model for the entire study period: all-cause and behavioral health–related inpatient admissions and emergency department visits not leading to hospitalizations (N = 16,752) and 30-day readmissions (N = 5,432).

Data source: RTI analysis of Maine Medicaid data, 2011–2016.

- There was a non-statistically significant decrease in ED visits for all BHH enrollees, including adults and children, but there was a statistically significant decrease for individuals with disabilities (overall p =0.02). BHH providers reported increased use of the HIE to monitor ED use and follow-up with patients recently discharged, so this observed reduction in ED visits rates could be attributed to subsequent reduction in overall ED rates through the use of health IT to monitor utilization.
  - BHH enrollees with disabilities had higher utilization before the SIM Initiative relative to the overall BHH population, and the general trend toward lower utilization after BHH program implementation may indicate that BHHs were effective at targeting particularly high utilizers and working with these patients to reduce unnecessary utilization.

B.2.3 Did expenditures change among Medicaid BHH beneficiaries?

KEY INSIGHTS

- **Total PBPM Medicaid expenditures increased for all BHH enrollees**, adults, children, and disabled individuals.
- This expenditure growth was driven by nearly every subcategory of expenditure, some of which had significant increases across test years except for professional payments and behavioral health-related expenditures.
- Increases in expenditures were not unexpected given that BHHs are connecting high-cost, high-need patients to needed services.

In ***Table B-7***, we present the pre-post results for the following categories of PBPM Medicaid expenditures: total, inpatient, professional, pharmaceutical, behavioral health, and inpatient behavioral health. We report total PBPM expenditures for BHH enrollees with disabilities separately in ***Table B-8*** and for children and adults ***Tables B-1-3 and B-1-4*** in ***Sub-appendix B-1***. We also report regression-adjusted pre-post estimates individually for the first 2 years after the implementation of the BHHs, along with an overall estimate for all years combined.

- **Total PBPM Medicaid expenditures** increased for BHH enrollees at a statistically significant rate (overall: $169.77 PBPM; $p < 0.001$), and the magnitude of the relative difference is large: 12 percent across the two test years. Adults, children, and BHH enrollees with disabilities also experienced a statistically significant increase in total PBPM expenditures.
- The total PBPM increase was driven by increases in **inpatient, professional, pharmaceutical, and behavioral health–related expenditures**. Inpatient and pharmaceutical expenditures had statistically significant increases, while professional and behavioral-health related expenditures had non-statistically significant increases.

Table B-7. Difference in the pre-post annual change in total PBPM expenditures for Medicaid beneficiaries in Maine BHHs, first 2 years of implementation (April 2014 through March 2016)

Outcome and time period	Pre-period adjusted mean, BHH	Test-period adjusted mean, BHH	Regression-adjusted pre-post estimate (90% confidence interval)	Relative difference (%)	p-value
Total expenditures (PBPM) ($)[1]					
Year One	1461.60	1573.81	112.21 (58.52, 165.90)	7.7	0.001
Year Two	1461.60	1703.52	241.92 (166.67, 317.17)	16.6	<0.001
Overall	1461.60	1631.37	169.77 (124.97, 214.58)	11.6	<0.001
Inpatient expenditures (PBPM) ($)					
Year One	97.26	128.42	31.16 (8.51, 53.80)	32.0	0.02
Year Two	97.26	113.89	16.63 (5.16, 28.10)	17.1	0.02
Overall	97.26	121.97	24.71 (11.12, 38.29)	25.4	0.003
Professional expenditures (PBPM) ($)					
Year One	408.30	417.86	9.56 (−15.35, 34.47)	2.3	0.53
Year Two	408.30	426.19	17.89 (−22.84, 58.61)	4.4	0.47
Overall	408.30	421.56	13.26 (−9.52, 36.03)	3.2	0.34
Pharmaceutical expenditures (PBPM) ($)					
Year One	144.29	177.91	33.62 (21.99, 45.26)	23.3	<0.001
Year Two	144.29	218.00	73.72 (60.39, 87.05)	51.1	<0.001
Overall	144.29	195.70	51.42 (42.65, 60.19)	35.6	<0.001
Behavioral health expenditures (PBPM) ($)					
Year One	933.86	946.44	12.58 (−37.69, 62.86)	1.3	0.68
Year Two	933.86	1000.84	66.98 (−13.65, 147.61)[ŦŦ]	7.2	0.17
Overall	933.86	970.58	36.72 (−8.69, 82.14)[ŦŦ]	3.9	0.18
Inpatient behavioral health expenditures (PBPM) ($)					
Year One	32.64	34.92	2.28 (−2.16, 6.72)	7.0	0.40
Year Two	32.64	33.02	0.39 (−7.00, 7.77)	1.2	0.93
Overall	32.64	34.08	1.44 (−2.66, 5.55)	4.4	0.56

BHH = behavioral health home; PBPM = per beneficiary per month.

[1]Total PBPM expenditures do not include the BHH monthly capitation payment.

How to interpret the findings: A *negative* value corresponds to a *decrease* in payments. A *positive* value corresponds to an increase in payments. The relative difference is the pre-post estimate as a percentage of the intervention group's baseline period adjusted mean.

Methods: An ordinary least square model was used to obtain estimates for differences in expenditures.

[ŦŦ] Year Two's pre-post estimate for behavioral health expenditures (66.98; 80% confidence interval: 4.16, 129.80) and overall's pre-post estimate for behavioral health expenditures (36.72; 80% confidence interval: 1.35, 72.10) were statistically significant at 80%. Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only.

The following sample size represents weighted period-years included in the regression model for the entire study period: (N = 30,580).

Data source: RTI analysis of Maine Medicaid data, 2011–2016.

Table B-8. Difference in the pre-post annual change in total PBPM expenditures for Medicaid beneficiaries with disabilities in Maine BHHs, first 2 years of implementation (April 2014 through March 2016)

Outcome and time period	Pre-period adjusted mean, BHH	Test-period adjusted mean, BHH	Regression-adjusted pre-post estimate (90% confidence interval)	Relative difference (%)	p-value
Total expenditures (PBPM) ($)					
Year One	1772.92	1836.08	63.16 (−17.69, 144.01)[Ŧ]	3.6	0.20
Year Two	1772.92	1949.72	176.80 (75.87, 277.74)	10.0	0.004
Overall	1772.92	1886.48	113.56 (50.09, 177.03)	6.4	0.003

BHH = behavioral health home; D-in-D = difference-in-differences; PBPM = per beneficiary per month.

Note:

How to interpret the findings: A *negative* value corresponds to a *decrease* in payments. A *positive* value corresponds to an increase in payments. The relative difference is the pre-post estimate as a percentage of the intervention group's baseline period adjusted mean.

Methods: An ordinary least square model was used to obtain estimates for differences in expenditures. The year-specific regression-adjusted D-in-D may not match the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights across these figures. See *Sub-appendix B-2* for additional detail.

[Ŧ] Year One's pre-post estimate for total payments (63.16; 80% confidence interval: 0.17, 126.15) was statistically significant at 80%. Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only.

The following sample size represent weighted period-years included in the regression model for the entire study period: (N = 16,752).

Data source: RTI analysis of Maine Medicaid data, 2011–2016.

- The increase in expenditures is not wholly unexpected. Under the BHH model, BHHs are expected to conduct a thorough assessment of patient need, create care plans, and facilitate access to and coordinate care with the services a patient needs. If BHHs are succeeding in doing so, then behavioral health–related and professional expenditures may increase as patients connect with needed services.
- The post-BHH increase in Year Two was larger than that in Year One for total, professional, pharmaceutical, and behavioral health–related expenditures. This could be partially explained by a greater understanding of exactly what BHHs were supposed to be doing to improve care for patients. This is a possibility supported by reports from BHH providers who believed they were moving up the "learning curve" as they became more familiar with the goals of the BHH program and as they received more technical assistance from Maine Quality Counts and HIN. This finding could also be partially explained by the fact that 45 percent of BHH enrollees entered the program in Year Two; increased demand for new or different services within a large group of new enrollees could drive expenditures higher.

B.2.4 Did quality of care change among Medicaid BHH beneficiaries?

KEY INSIGHTS

- After 2 years, there **were no improvements in the rate of receipt of HbA1c tests among BHH enrollees with diabetes**. Receipt of HbA1c tests declined for BHH enrollees.
  - Moreover, the declining rates of HbA1c testing rates were known to the Maine SIM team and were a motivating factor for the Maine SIM Initiative to begin the data-focused learning collaborative to improve testing rates for BHH enrollees.
- After 2 years, **adherence to antidepressant medication for at least 84 days and 180 days increased** for BHH enrollees with depression, as hypothesized.
- Improvements in behavioral health–related measures but not the physical health measure may not be completely unexpected considering BHH's focus on behavioral health care.

In ***Table B-9***, we present the results of the pre-post regression analyses for our quality of care measures: proportion of the population diagnosed with diabetes receiving an HbA1c test and proportion of the population adhering to antidepressant medication both 84 days and 180 days after diagnosis of depression. We report regression adjusted annual estimates individually for the first 2 years after the implementation of the BHH, along with an overall estimate for all years combined.

- Among Medicaid enrollees aged 18–75 years with diabetes, **HbA1c testing rates** significantly declined for BHH enrollees by 7 percent ($p < 0.001$).
  - We included this measure to explore if testing rates were impacted by Maine's overarching focus on improving partnerships between BHHs and PCPs to integrate and co-manage patients' physical and behavioral health needs.
  - The declining rates of HbA1c testing were known to the Maine SIM team and were a motivating factor for the Maine SIM Initiative to begin the data-focused learning collaborative to improve coordination between BHHs and HHs to increase testing rates for BHH enrollees. However, this initiative began in March 2017, after this analysis period ended. The expectation is that with the technical assistance from the collaborative, testing rates will improve for BHH enrollees over time.
- Among Medicaid enrollees aged 18 years or older with depression, the percentage who remained on **antidepressant medication** for at least 84 days significantly increased by 4 percent ($p = 0.02$), and the percentage who remained on antidepressant medication for at least 180 days significantly increased by 2.3 percent ($p=0.072$).
  - Given the BHH focus on care management, results suggest that BHHs have been able to work with enrollees directly to manage medication adherence, if BHH providers have prescribing rights, or BHHs have been successful in partnering with enrollees' PCPs if BHH providers cannot prescribe antidepressants.

Table B-9. Difference in the pre-post annual change in quality of care for Medicaid beneficiaries in Maine BHHs, first 2 years of implementation (April 2014 through March 2016)

Outcome and time period	Pre-period adjusted mean, BHH	Test-period adjusted mean, BHH	Regression-adjusted pre-post estimate (90% confidence interval)	Relative difference (%)	p-value	N
Among enrollees with diabetes, receipt of HbA1c test (%)						4,559
Year One	86.0	79.1	−6.9 (−9.4, −4.3)	−8.0	<0.001	
Year Two	86.0	78.8	−7.1 (−9.7, −4.6)	−8.3	<0.001	
Overall	86.0	79.0	−7.0 (−8.8, −5.2)	−8.1	<0.001	
Patients who remained on antidepressant medication for at least 84 days (%)						2,958
Year One	58.1	61.3	3.2 (−0.1, 6.5)	5.5	0.11	
Year Two	58.1	63.2	5.1 (0.2, 9.9)	8.7	0.08	
Overall	58.1	62.2	4.0 (1.2, 6.8)	6.9	0.02	
Patients who remained on antidepressant medication for at least 180 days (%)						2,958
Year One	44.7	46.3	1.6 (−1.4, 4.7)	3.7	0.37	
Year Two	44.7	47.8	3.1 (0.3, 6.0)	7.0	0.07	
Overall	44.7	47.0	2.3 (0.2, 4.4)	5.1	0.07	

BHH = behavioral health home.

Note:

How to interpret the findings: A *negative* value corresponds to a *decrease* in the likelihood of a quality of care event in the intervention group. A *positive* value corresponds to an *increase* in the likelihood of a quality of care event in the intervention group. The relative difference is the pre-post estimate as a percentage of the intervention groups baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the difference in likelihood of a quality of care event. The estimates are multiplied by 100 to obtain percentage probabilities. The following sample sizes represent weighted period-years included in the regression model for the entire study period: receipt of HbA1c test (N = 4,559); patients who remained on antidepressant medication for at least 84 days (N = 2,958); patients who remained on antidepressant medication for at least 180 days (N = 2,958).

Data source: RTI analysis of Maine Medicaid data, 2011–2016.

B.2.5 Discussion and limitations

Under the BHH model, community mental health organizations adopted principles of care coordination, care management, and population management for Medicaid enrollees with serious mental illness or serious emotional disturbance. The expectation was that this new model of delivering care would improve care coordination and quality of care, and alter patterns of utilization and expenditures, with the goal of lowering the use of high-dollar services, such as inpatient and ED care, and associated expenditures.

Contrary to expectations that improvements in care coordination and care management might alter utilization of expensive services, over the first 2 years of BHH implementation,

MaineCare enrollees attributed to BHHs experienced small increases in inpatient admissions (all-cause, behavioral health–related, and readmissions), although the increases were not statistically significantly different from admission rates prior to the intervention. In contrast, BHH enrollees had a decrease in ED visits; although the decrease was not statistically significant for the population overall, the decrease was significant for enrollees with disabilities. Rates of inpatient admissions (both all cause-and behavioral health related) also decreased, though not significantly, for the BHH enrollees with disabilities.

Reductions in ED visits may be attributable to Maine's efforts to connect BHHs to HIN. With this connection, BHHs can see when attributed patients were admitted to an ED and conduct the necessary outreach to potentially prevent future visits for non-emergent care. Interviews with BHH providers confirmed that providers were using HIN to track hospital and ED use and subsequently reaching out to patients to discuss why the visit happened and appropriate use of the ED. Although the hope was that HIN would also help BHHs effect change in hospital use, BHH providers may be more challenged to quickly effect change in inpatient care in a high-needs population. However, reductions in ED visits may signal that inpatient admissions could eventually come down as BHH enrollees make less frequent trips to the hospital.

BHH enrollees experienced an increase in most expenditure categories, including total Medicaid (total payments do not include the BHH capitation payment), inpatient, prescription, behavioral health–related total Medicaid, and behavioral health–related inpatient expenditures. The increase in total Medicaid expenditures was primarily driven by increases in total behavioral health–related expenditures (i.e., both inpatient and outpatient). These increases in expenditures are not completely unexpected. If BHHs were successful in assessing patient needs and connecting them to additional behavioral health and non–behavioral health services, then costs may grow. We heard from BHH providers in focus groups and interviews that they believed their ability to provide needed services was improving under the model because they had more flexibility to provide additional services. For example, under the model, care managers or peer support staff could make more home visits, accompany BHH patients to the patients' medical appointments, and work with patients on improving activities of daily living. It is also worth noting that by design BHH enrollees are very high-need, high-cost patients; average total PBPM expenditures for the BHH enrollees was $1,461 before the test period. Realizing significant reductions in total expenditures in the short-run for high-needs patients can be challenging because their health needs are persistent, chronic, and often costly to treat.

Contrary to expectations, the two measures of care coordination, percentage of enrollees who had a follow-up visit with a mental health practitioner within 7 or 30 days after an inpatient admission for mental illness, did not improve over time for the BHH enrollees. Rates of follow-up were high during the baseline period (e.g., 76 to 92 percent), and improving on relatively high rates can be challenging. Further, the coordination expected under this model spreads beyond

that required after a mental health–related inpatient admission. For example, BHH providers would refer patients to needed social services and work directly with those providers to ensure that patients received needed services. Therefore, these claims-based measures are not comprehensive enough to reflect the breadth of other coordination activities that were occurring under this model. The likelihood of having primary and specialty care visits did significantly increase after BHH enrollment, which aligns with BHHs' reports that they were connecting patients to additional services, so by this measure of coordination, the BHHs were meeting expectations.

Improvements in quality of care were mixed. The percentage of individuals with diabetes who received an HbA1c test decreased over time for BHH enrollees, contrary to expectations that BHHs would coordinate with PCPs to ensure high-quality physical health care. In contrast, there were significant improvements in medication management for BHH enrollees with depression. BHHs were tasked with improving quality of care, and the fact that there were improvements in a behavioral health–related measure but not a physical health measure may not be completely unexpected given that BHHs are focused on providing behavioral health care. However, the BHH model emphasizes a more holistic approach to health, and we heard from BHH providers during site visits about how they were learning to pay attention to and address physical health needs. Shifting focus and learning to implement care processes to address physical health in partnership with an enrollee's PCP takes time, so improving disease management for diabetes after 2 years may be an unrealistic expectation. Providers did report that effective exchange of health information and partnerships between BHH and PCPs were improving, but that there was still more to do. Furthermore, as previously mentioned, during Maine's SIM no cost extension period, the state focused on improving diabetes care among Medicaid beneficiaries. Maine began working with BHH and HH providers through data-focused learning collaboratives to improve diabetes care, which included implementing best practices for improving HbA1c testing rates and monitoring HbA1c levels. However, this collaborative work began in March 2017, after this analysis period ended.

The findings presented here are somewhat similar to findings from Maine's self-evaluation (The Lewin Group, 2016). Maine analyzed trends in expenditures, utilization, and quality using a 1-year baseline (April 2013–March 2014) and 1-year test period (2015) for 1,100 Medicaid beneficiaries enrolled in a BHH for at least 6 months in 2015 and a matched comparison group. The self-evaluation found that total medical expenditures (excluding the BHH care management fee) increased for BHH and comparison group enrollees, although the increase was slower for BHH enrollees relative to the comparison group. The self-evaluation also found reductions in ED visits and receipt of HbA1c tests for BHH and comparison group enrollees that were not statically significantly different between groups. In contrast to the findings presented here, the self-evaluation found improvements in follow-up after a mental illness hospital admission for BHH and comparison group enrollees, although improvements were not statistically different between groups, and it was unclear if the measure distinguished between

follow-up at 7 days and follow-up at 30 days. The self-evaluation also found that some categories of behavioral health expenditures decreased for BHH enrollees, while we found non-significant increases in behavioral health–related expenditures. Professional behavioral health services and case management expenditures decreased for BHH and comparison group enrollees, although the decrease was larger for BHH enrollees. Facility outpatient therapy expenditures increased for both groups, but expenditures for BHH enrollees increased more slowly relative to the comparison group. Differences in the self-evaluation expenditure findings and the ones presented here could be explained by differences in how measures were operationalized. The state considered more specific categories of behavioral health expenditures, while we examined a more general measure.

There are several factors to take into consideration in regard to this analysis. First, the BHH initiative began in April 2014. After 1 year of implementation, approximately 22 BHHs were practicing at 51 sites, and by September 2016, 24 BHHs were participating at 102 sites. Not all MaineCare enrollees receiving care at these BHHs are eligible to receive BHH services. There are diagnostic, functional, and service utilization criteria for enrollment, and potential enrollees need to opt into the BHH model if they are also eligible for other behavioral health services (e.g., MaineCare's Section 13 targeted case management services). These requirements limit the number of individuals who can be attributed to a BHH. Moreover, some BHH providers reported confusion early on during program roll-out about the patient's opt-in requirements, and some state officials were concerned that provider confusion led to suboptimal recruitment efforts. Targeted enrollment within a BHH coupled with a maximum of 24 BHHs limits the total number of MaineCare enrollees eligible for analysis. Detecting significant changes in utilization, expenditures, and quality over time can be difficult with smaller sample sizes such as these. Further, for Medicare-Medicaid enrollees in the analysis, results are limited to impacts on Medicaid only; we did not include utilization or expenditures payed by Medicare.

Second, we employed a pre-post study design because of the difficulties selecting a reasonable comparison group. Therefore, we cannot rule out regression to the mean, account for secular trends in health care use and expenditures, or adequately control for unobserved characteristics of BHH enrollees that may change over the course of this study period, thereby biasing results. To better understand the context in which BHH enrollees' trends in utilization and expenditure were happening, we examined trends in select utilization and expenditure measures for the entire MaineCare population for 3 years prior to Maine's SIM Initiative (2011–2013) and 1 year after implementation (2014). After SIM Initiative implementation, there were reductions in regression-adjusted, total Medicaid expenditures, behavioral health–related Medicaid expenditures, ED visits, all-cause inpatient admissions, and 30-day readmissions for the general MaineCare population not also enrolled in Medicare. For the MaineCare population

not in Medicare with BH conditions,[62] there are also reductions in regression-adjusted total Medicaid expenditures, ED visits, all-cause inpatient admissions, and 30-day readmissions. That these MaineCare populations were in general experiencing decreases in costs and utilization while the BHH enrollees were by and large experiencing increases in utilization and costs suggests that the trends we observed cannot be entirely explained by secular trends happening in the MaineCare population at large. The BHHs may be associated with increased use and costs, at least in the near term, but as already discussed, this may be expected and appropriate, in some cases.

Moreover, with the pre-post study design, we included in the analysis 417 BHH enrollees who had no pre-implementation data (5.5% of the entire study sample); that is, their first experience in Medicaid coincided with enrollment into the BHH program. To explore the impact of these individuals on select expenditure outcomes, we removed these individuals from the study sample. Results still showed significant increases in total and behavioral health-related expenditures (pre-post estimate of $158, $p < 0.001$ for total expenditures and $33 for behavioral health-related expenditures, $p = 0.25$).

Finally, the BHH model is relatively new, and 2 years may not be enough time for sustained patterns of care to emerge. Program startup takes a significant amount of time, so for the first year or more BHHs may not be operating with all the policies, procedures, and work flows in place necessary to ensure optimal functionality. Furthermore, over the course of the study period, the number of sites enrolled in the BHH model doubled, and the newer sites were likely not as effective as those that enrolled at the outset of the model. The new sites were still doing the foundational work to transition to the BHH model and were receiving extensive technical assistance from Maine Quality Counts on how to meet practice transformation expectations. As a result of this mix of more and less experienced sites in the study sample, some measures may trend in directions that result in null or unexpected findings. Further, 69 percent of the study sample was exposed to the demonstration for 1 year only. Individuals exposed to the demonstration for only 1 year may be less likely to realize changes in use and expenditures compared to those who have had sustained exposure to the intervention.

In summary, expenditures and some utilization measures such as primary care and specialty care increased after MaineCare enrollees with serious mental illness or serious emotional disturbance enrolled in the BHH program, yet this finding may be expected under a model that promotes improved care management and coordination. At the same time, some BHH enrollees experienced reductions in ED visits, but these reductions were not great enough to offset the total Medicaid expenditure cost growth. Claims-based measures of behavioral health–related quality of care did improve, yet our limited measures of care coordination did not. Taken

[62] The behavioral health population for the entire MaineCare population includes beneficiaries with at least one mental health or chemical dependency diagnosis during the analytic year.

together, there is some evidence that the model is able to alter patterns of care for this high-needs, medically complex population.

B.3 Model-Specific Impact Findings: *Maine's Accountable Communities*

ACs are statewide MaineCare (Medicaid) ACOs. Four ACs operate in Maine: Beacon Health LLC, Maine Health ACO, Kennebec Region Health Alliance, and Community Care Partnership of Maine. As of July 2017, the time of the most recently available data, these ACs had a total of 80 primary care practices (PCPs) participating and seven emergency departments (EDs).[63] There were 55,314 MaineCare beneficiaries enrolled in these ACs, or approximately 19 percent of the total MaineCare population.

ACs are integrated provider organizations that offer care coordination and administrative support to providers to ensure that comprehensive primary, acute, and chronic health care services are made available to an attributed population. Each AC includes a lead entity, such as a regional health system, that forms contractual partnerships with providers. ACs must contract with providers that serve patients with chronic conditions (such as an HH), developmental disabilities, and behavioral health needs. ACs were given flexibility in what types of care management, care coordination, and quality improvement activities to implement, populations to target (e.g., individuals with certain clinical conditions, high utilizers) and providers to recruit into the network.

KEY INSIGHTS

- After 2 years of implementation, enrollment of MaineCare enrollees into the AC model was associated with decreases in key utilization measures (inpatient admissions and ED visits), possibly driven by the inclusion of both of these measures as AC performance measures.
- In contrast to expectations, both AC and comparison group enrollees experienced an increase in most expenditure categories, indicating that reduced utilization had not yet translated into anticipated cost savings.
- Some utilization and expenditure measures were more positive in Year Two than Year One, highlighting promising trends across key measures and underscoring the fact that changes in care delivery take time to realize.
- To date, the model has shown no impact on claim-based quality of care measures and mixed impact on care coordination.
- Subpopulation analyses of AC enrollees with behavioral health conditions and enrollees also participating in the HH program found similar outcomes as the overall AC analysis, indicating that the model was able to similarly impact higher needs, higher cost individuals.
- Overall, there is evidence that the AC model is able to positively alter some patterns of care, but these changes have not translated to reduced cost.

[63] See http://www.maine.gov/dhhs/oms/pdfs_doc/vbp/AC/Accountable-Communities-Providers-and-Number-of-Members.pdf

MaineCare enrollees with 6 months of continuous Medicaid eligibility or 9 months of non-continuous eligibility are attributed to an AC through a three-step process. First, attribution occurs for anyone enrolled in the HH program with a primary care practice that is part of an AC.[64] Among members not captured through the HH criteria, MaineCare then attributed their members who had a plurality of primary care visits with a PCP that is part of an AC. Among members not captured through HH or plurality of primary care visits, MaineCare then selected members who have three or more ED visits with a hospital that is part of an AC. Sixty-one percent of AC enrollees included in this analysis were attributed through plurality of primary care visits, 38 percent through HH enrollment, and 0.7 percent through ED visits. Some Medicare-Medicaid enrollees are included in the AC program.

Attribution is processed on a preliminary prospective and final retrospective basis. That is, ACs receive an initial list of attributed beneficiaries at the beginning of the year. MaineCare then updates this list on a quarterly basis based on changes in beneficiary care patterns to form a final attribution list for each AC for the performance year.[65]

A key characteristic of the AC model is the shared savings and losses structure, which resembles that of other ACO programs such as the Medicare Shared Savings Program. Each AC receives a financial benchmark, which is based on the AC's historical total MaineCare fee-for-service expenditures for its attributed population. On an annual basis, the benchmark is adjusted based on policy changes, the risk profile of the attributed population, and general trends in cost growth. Beneficiaries who are exceptionally high expenditure outliers will not be included in benchmark cost of care calculations. MaineCare then compares the AC's total actual Medicaid fee-for-service expenditures for the attributed population for a given performance year to the benchmark total cost of care. If the AC's actual expenditures are lower than the benchmark, then the AC will share in the savings it produces. Conversely, if the AC's actual expenditures exceed the benchmark, the AC will owe shared losses to MaineCare. The amount that the AC either saves or owes to MaineCare is contingent on its performance on 16 physical and behavioral health care quality measures and three additional measures of an AC's choosing. The better the AC performs on these measures, the more it will share in savings or the less it would pay back to MaineCare if it owes losses.

The specifications of this arrangement depend on the AC's choice of one of two payment models, Model I or Model II. Under Model I, ACs only share in savings, and under Model II, ACs initially share in savings for performance Year One but then start to share in losses as well in performance Year Two. Under Model II, the amount of shared savings is greater because the AC is willing to also take on the risk of potentially sharing in losses. Currently, all four ACs are

[64] The MaineCare Health Home program is a medical home program for Medicaid enrollees with multiple chronic conditions.
[65] See http://www.maine.gov/dhhs/oms/pdfs_doc/vbp/AC/Maine_Accountable_Communities_Member_Attribution_v17.pdf

operating under the one-sided model, or Model I, and are only sharing in savings, not losses. Consequently, ACs do not have as strong an incentive to reduce expenditures as they would have had they participated in Model II. During site visit interviewees, AC stakeholders attributed the decision to participate in Model I to a lack of experience managing the care of MaineCare beneficiaries; once they believe they are more capable of managing the health of Medicaid enrollees, they may be more amenable to taking on additional risk.

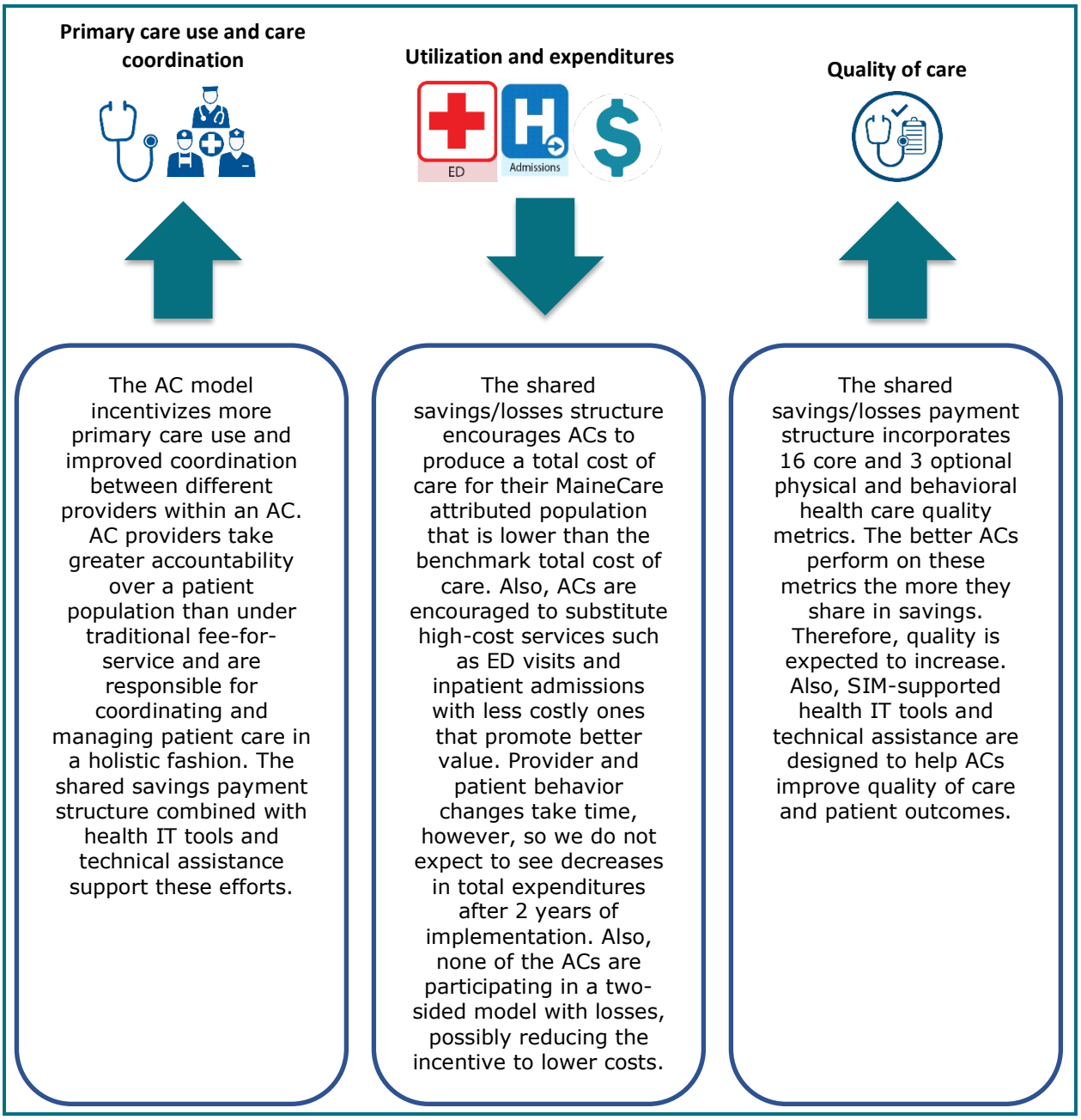
Under the SIM Initiative, Maine supported ACs through technical assistance and development of health IT tools to help them better coordinate care. MaineCare provided ACs with access to individual-level and aggregated quarterly feedback reports on cost, utilization, and quality of care. MaineCare also held regularly scheduled calls with ACs to discuss operational and technical issues. In addition, the HHs that participate in ACs received practice transformation and quality improvement technical assistance from Maine's SIM partner Maine Quality Counts, which could positively contribute to overall AC performance.

Several outcomes are expected as a result of the AC model (see ***Figure B-4***). ACs encourage providers within the model to better coordinate and manage care for attributed MaineCare beneficiaries relative to a pure fee-for-service reimbursement model. ACs also incentivize greater usage of primary care and reductions in the amount of services provided to patients in higher cost, more intensive settings, such as EDs or through inpatient hospitalizations. In addition, ACs can receive shared savings payments if they reduce their MaineCare total cost of care below financial benchmarks and meet performance targets on those quality of care metrics. The net effect of the model then should be improved coordination of care, greater primary care use and health care quality, combined with lower expenditures. However, it often takes significant time for new models of care delivery to become fully functional, and providers require assistance and time to learn how to help their patients control high-cost, unnecessary utilization. Furthermore, ACs are not taking the additional risk under Model II, which may limit the model's potential to reduce costs.

To assess the effects of Maine's AC model for care coordination, utilization and expenditures, and quality of care, we addressed the following research question:

- How did trends in key outcomes for care coordination, utilization, expenditures, and quality of care change among AC enrollees after implementation relative to a comparison group?

Figure B-4. Expected direction of outcome measures of AC performance



AC = Accountable Community; ED = emergency department; health IT = health information technology.

To address the research question, we used a difference-in-differences (D-in-D) quasi-experimental design, incorporating a comparison group to control for underlying changes in the health care environment in Maine. We used MaineCare claims data to examine the 3 years before AC implementation (August 2011–July 2014) and the 2 years after the start of the AC model (August 2014–July 2016). The intervention group comprises beneficiaries who were attributed to providers associated with the AC model at some point during the first 2 years of implementation.

The comparison group comprises MaineCare beneficiaries who met similar attribution criteria in each of the 2 years but were not enrolled in an AC because their HH, primary care doctor, or ED was not participating in the AC.

Although the ACs do not have strict geographic boundaries, their attributed Medicaid enrollees are more likely to be from areas clustered around the AC's participating PCPs, so comparison group enrollees may be more likely to reside in areas farther from AC participating practices. To the extent that there is geographic variation in health care use, we could introduce bias. To mitigate this risk, the comparison group was restricted to individuals residing in the same zip codes as AC enrollees.

Although ACs were not required to target AC activities to Medicaid enrollees with particular characteristics, certain subpopulations may be impacted by the model differently because they have different care needs and health care utilization patterns. To assess the impact of the AC on subpopulations, we ran the models for key cost and utilization outcomes (total expenditures, inpatient admissions, ED visits, and 30-day readmissions) separately for the child, and adult populations, and for persons diagnosed with behavioral health conditions. We also considered the fact that many AC enrollees were also in a HH and because of this had multiple chronic conditions. Estimates from the full study sample represent the combined effect of AC in the presence of the HH program, not the isolated effect of the AC without HHs; so we conducted a subpopulation analysis on individuals enrolled in HHs. Moreover, the main analysis assesses the combined impact of the four ACs participating in the AC program. To assess whether individual ACs had different findings that were masked by the combined analysis, we also conducted a sensitivity analysis to examine the impact of each AC. We include most results in this chapter. Results for children, adults, and each separate AC are summarized in this chapter, but the full results are included in ***Sub-appendix B-1***.

Following comparison group selection, we constructed annual person-level propensity score weights to balance the AC group and comparison group on individual and county characteristics. The intervention group and weighted comparison group were similar at baseline on key demographic characteristics (***Table B-10***). A summary of the analytic methods is included below, and the methods are detailed in ***Sub-appendix B-2***.

Methods Snapshot for Impact Analysis

- **Study design:** D-in-D quasi-experimental design using an unbalanced longitudinal panel.
- **Population**: The intervention group comprised MaineCare beneficiaries attributed to providers participating in the AC model from August 2014 through July 2016. The comparison group comprised similar MaineCare beneficiaries attributed to providers who did not participate in the AC model.
- **Data:** MaineCare claims data provided by state. In this report, we used data from 3 years before (July 2011–August 2014) and the 2 years after (July 2014–August 2016) the start of the AC model.
- **Sample:** Medicaid beneficiaries enrolled annually for 6 continuous months or 9 non-continuous months. Medicare-Medicaid enrollees were included in the analysis. Utilization and expenditure measures included beneficiaries of any age. The sample size for care coordination and quality of care measures varied. We also conducted subpopulation analyses by age group, for beneficiaries diagnosed with behavioral health conditions, for beneficiaries also enrolled in an HH, and by AC model.
- **Measures:** Care coordination (annual percentage): PCP visits, specialty provider visits, mental health follow-up visits with 7 and 30 days of inpatient admission; quality of care (annual percentage): antidepressant medication management, Hba1c testing; utilization (annual rate): inpatient visits, outpatient ED visits, 30-day readmissions; and expenditures (annual per beneficiary per month (PBPM) in dollars): total, inpatient facility, professional, and prescription.
- **Statistical analysis:** Logistic regression (binary) and ordinary least squares (expenditures) models weighted by the propensity score times the fraction of time the person was enrolled in MaineCare. Standard errors were clustered at the provider level to account for beneficiary correlation within providers. The models adjusted for demographic and health status variables and socioeconomic county-level variables. The models for total PBPM, inpatient admissions, ED visits, and 30-day readmissions were run separately for the overall, child, and adult populations, persons with behavioral health conditions, persons enrolled in a HH, ad for each AC.

Table B-10. Weighted means and standardized differences prior to AC implementation, AC and comparison groups, 2013

Characteristic	Weighted			
	Medicaid AC group	Comparison group	Standardized difference[a]	p-value
Weighted N	43,994	44,476		
Individual-level sociodemographic characteristics				
Female (%)	57.3	56.8	1.3	0.06
Age, mean	27.3	26.8	2.3	<0.001
Age squared, mean	1,212.6	1,177.2	2.2	<0.001
Age < 1 year (%)	2.7	2.0	4.7	<0.001
Age 1–18 years (%)	43.1	45.2	4.1	<0.001
Age 19–64 years (%)	47.7	46.2	3.0	<0.001

(continued)

Table B-10. Weighted means and standardized differences prior to AC implementation, AC and comparison groups, 2013 (continued)

Characteristic	Weighted			
	Medicaid AC group	Comparison group	Standardized difference[a]	p-value
Age ≥ 65 years (%)	6.5	6.6	0.5	0.45
Enrolled in Medicaid because of disability (%)	23.2	22.5	1.7	0.01
Medicare-Medicaid enrollee (%)	18.7	18.0	1.8	0.01
Nonwhite (%)	18.8	19.1	0.6	0.35
Missing race (%)	12.9	13.1	0.5	0.51
Continuously enrolled in Medicaid (%)	98.5	98.4	0.4	0.56
Months enrolled in a year, mean	11.2	11.2	0.9	0.17
Attributed to AC or comparison group because enrolled in a MaineCare Health Home (%)	42.9	43.9	2.0	<0.001
Attributed to AC or comparison group because of the number of visits to an ED (%)	0.6	0.6	0.9	0.18
Receives full Medicaid benefits (%)	91.3	91.5	0.6	0.36
Enrolled in AC or comparison group for 2 years (%)	42.4	42.2	0.2	0.67
CDPS risk score in the prior year, mean	1.3	1.3	0.5	0.44
County-level characteristics				
Metropolitan status (%)	50.6	52.2	3.1	<0.001
Uninsured rate (%)	14.0	13.8	12.4	<0.001
Median age, mean	42.2	42.9	28.0	<0.001
Poverty rate (%)	15.4	14.6	39.6	<0.001
Hospital beds per 1,000 population	3.7	2.9	58.5	<0.001
Physicians per 1,000 population	1.2	1.0	37.1	<0.001
Community mental health centers per 1,000 population	3.1	4.5	1.1	0.09
Health care utilization/expenditures for beneficiaries				
Total annual Medicaid expenditures in the prior year, $	5,975.0	6,020.0	0.2	0.67
Inpatient admissions in the prior year, mean	0.1	0.1	0.2	0.82
ED visits in the prior year, mean	1.0	1.0	0.3	0.64

AC = Accountable Community; CDPS = Chronic Illness and Disability Payment System (CDPS score is a risk-adjustment score calculated from ICD9 and ICD10 diagnosis codes included on hospital and outpatient claims, with larger CDPS scores corresponding to a larger number of comorbidities or a more severe set of comorbidities); ED = emergency department.

[a] Absolute standardized differences (SDs) are expressed as percentages. <10% SD is ideal for inferring balance between groups. To balance the population characteristics for the claims-based analyses, we estimated propensity scores for all individuals from the comparison group for each year of the analysis. After propensity score weighting, the SDs between the weighted comparison group means and intervention group means were all well under the standard 10% threshold for individual-level variables; however, a few county-level variables exceed the threshold. Nonetheless, the differences in the county-level means is still quite small. County-level variables are shown here to provide context. Because there was little variation in county-level characteristics, balancing on these variables difficult. Therefore, to optimize the balance and avoid extreme weights, county-level covariates were excluded from the propensity score model.

Data source: RTI analysis of Maine Medicaid data, 2011–2016.

B.3.1 Did care coordination change among Medicaid AC beneficiaries?

KEY INSIGHTS

After 2 years of AC implementation:

- **Follow-up after hospitalization for a mental illness did not change.**
  - AC enrollees had fairly high rates of follow-up prior to the SIM Initiative, which may have been hard to improve upon during the test period.
- **Primary care and specialty care visits remained unchanged for AC enrollees and increased for the comparison group.**
  - This finding may indicate that AC providers successfully reduced unnecessary outpatient care; however, we expected some increases in primary care because some AC performance measures included preventive care such as well-child visits.

In ***Table B-11***, we present the results of the D-in-D regression analyses for the following care coordination outcomes: percentage follow-up within 7 (and separately, within 30) days of discharge from hospitalization for mental illness, percent of beneficiaries with any visit to a primary care provider, and percent of beneficiaries with any visit to a specialty care provider. We report annual regression adjusted D-in-D estimates individually for the first 2 years after the implementation of the ACs, along with an overall D-in-D estimate for both years combined.

- There were no statistically significant differences in the percentage of **follow-up within 7 or 30 days of discharge from hospitalization for mental illness** for AC enrollees relative to the comparison group.
  - Rates of follow-up within 30 days for both groups were high (about 90 percent), so improving on relatively high baseline rates is a challenge.
- Overall, the likelihood of having a primary care visit remained unchanged for AC enrollees but increased for the comparison group. As a result, the percentage of beneficiaries with a **primary care visit** declined by 5.8 more percentage points (10 percent) for the AC group relative to the comparison group, and the difference between groups was statistically significant ($p = 0.004$).
- Overall, the likelihood of having a specialty care visit remained unchanged for AC enrollees but increased slightly for the comparison group. As a result, the percentage of beneficiaries with a **specialty care visit** increased by 1.1 fewer percentage points (4 percent) for the AC group relative to the comparison group, and the difference between groups was statistically significant ($p = 0.001$).
  - Interpretation of these findings is challenging. On one hand, little movement in primary care and specialist visits may indicate that AC-affiliated providers were successful in preventing unnecessary use of outpatient care. On the other hand, AC performance measures used to calculate shared savings did include well-child and adolescent well-care visits, so some change in primary care use was expected.

Table B-11. Difference in the pre-post annual change in care coordination for Medicaid beneficiaries in Maine ACs relative to the comparison group, first 2 years of implementation (August 2014 through July 2016)

Outcome and time period	Pre-period adjusted mean, AC	Pre-period adjusted mean, CG	Test-period adjusted mean, AC	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	N
Follow-up within 7 days of discharge from hospitalization for mental illness (%)								4,591
Year One	70.3	74.1	71.2	73.6	1.4 (−4.4, 7.2)	2.0	0.69	
Year Two	70.3	74.1	68.8	76.5	−4.2 (−9.5, 1.1) [†]	−6.0	0.19	
Overall	70.3	74.1	70.1	74.8	−1.2 (−5.2, 2.7)	−1.7	0.61	
Follow-up within 30 days of discharge from hospitalization for mental illness (%)								4,591
Year One	90.1	90.9	88.6	89.7	−0.3 (−4.3, 3.7)	−0.3	0.90	
Year Two	90.1	90.9	90.2	91.7	−0.8 (−4.1, 2.4)	−0.9	0.67	
Overall	90.1	90.9	89.4	90.6	−0.6 (−3.2, 2.1)	−0.6	0.73	
Percentage of beneficiaries with any visit to a primary care provider (%)								394,589
Year One	57.4	63.6	55.2	62.3	−0.9 (−7.3, 5.6)	−1.5	0.82	
Year Two	57.4	63.6	57.4	71.9	−9.1 (−12.4, −5.7)	−15.8	<0.001	
Overall	57.4	63.6	56.5	66.8	−5.8 (−9.1, −2.5)	−10.1	0.004	
Percentage of beneficiaries with any visit to a specialty care provider (%)								394,589
Year One	30.2	29.6	29.5	29.5	−0.5 (−1.4, 0.5)	−1.6	0.41	
Year Two	30.2	29.6	31.8	32.7	−1.5 (−2.2, −0.8)	−5.0	<0.001	
Overall	30.2	29.6	30.9	31.0	−1.1 (−1.7, −0.5)	−3.6	0.001	

AC = Accountable Community; CG = comparison group; D-in-D = difference-in-differences.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in the likelihood of a care coordination event in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in the likelihood of a care coordination event in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention groups baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the difference in likelihood of a care coordination event. The estimates are multiplied by 100 to obtain percentage probabilities. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix B-2* for additional detail.

[†]The 80% confidence interval for the percentage of follow-up within 7 days of discharge from hospitalization for mental illness in Year Two is (−8.3, −0.1). Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only.

The following sample sizes represent weighted period-years included in the regression model for the entire study period: mental health follow-up within 7 (30) days of discharge (N = 4,591); number of visits to a primary care provider and number of visits to a specialty care provider (N = 394,589).

Data source: RTI analysis of Maine Medicaid data, 2011–2016.

B.3.2 Did utilization change among Medicaid AC beneficiaries?

KEY INSIGHTS

After 2 years of AC implementation:

- For AC enrollees, **inpatient admissions and ED visits declined more** relative to the comparison group.
  - Both potentially avoidable inpatient admissions and non-emergent ED use were AC performance measures used in the calculation of shared savings, which may have motivated ACs to focus on activities to improve performance.
- There were **no changes in 30-day readmissions** for AC enrollees relative to the comparison group (not statistically significant).
  - However, we expected 30-day readmissions to decline because it was an AC performance measure.

In ***Table B-12***, we present the results of the D-in-D regression analyses for inpatient admissions, ED visits not leading to a hospitalization, and 30-day readmissions per 1,000 beneficiaries. We also provide utilization measure results for children in ***Table B-1-5*** and adults in ***Table B-1-6*** in ***Sub-appendix B-1***. We report annual regression-adjusted D-in-D estimates individually for the first 2 years after the implementation of the ACs, along with an overall D-in-D estimate for both years combined.

- Overall, **inpatient admissions and ED visits** declined for AC enrollees and comparison group enrollees, but the decline was statistically significantly greater for AC enrollees (6.8 admissions; $p = 0.01$ and 12.4 ED visits; $p = 0.001$).
  - The magnitude of the relative decline for both measures increased over time; this may be expected given the significant amount of time that it may take for the model to become fully effective and operationalized.
  - Significant declines in inpatient admissions were driven by significant declines in adults, and the declines in ED visits were driven by significant declines in both children and adults (see ***Tables B-1-5*** and ***B-1-6*** in ***Sub-appendix B-1***).
  - Both potentially avoidable inpatient admissions and non-emergent ED use were AC performance measures, which may have motivated AC lead entities to focus on activities to improve performance on these measures. Further, these results align with expectations that improved care coordination by AC-affiliated providers will shift enrollees away from avoidable, high-cost hospital care.
- Overall, **30-day readmissions** increased at similar rates for AC enrollees relative to the comparison group, and the difference in the change in readmissions was not statistically significant.
  - We expected 30-day readmissions to decline for AC enrollees, however, particularly because readmissions were an AC performance measure.

Table B-12. Difference in the pre-post annual change in utilization for Medicaid beneficiaries in Maine ACs and the comparison group, first 2 years of implementation (August 2014 through July 2016)

Outcome and time period	Pre-period adjusted mean, AC	Pre-period adjusted mean, CG	Test-period adjusted mean, AC	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
Inpatient admissions (per 1,000 beneficiaries)								394,589
Year One	99.9	97.5	100.1	94.6	3.1 (−3.5, 9.7)	3.1	0.44	
Year Two	99.9	97.5	86.4	97.2	−13.3 (−18.4, −8.2)	−13.3	<0.001	
Overall	99.9	97.5	91.9	95.8	−6.8 (−10.8, −2.7)	−6.8	0.01	
Emergency department visits not leading to hospitalization (per 1,000 beneficiaries)								394,589
Year One	420.0	405.3	398.5	393.0	−9.1 (−20.0, 1.8) [†]	−2.2	0.17	
Year Two	420.0	405.3	411.7	411.6	−14.6 (−21.9, −7.3)	−3.5	0.001	
Overall	420.0	405.3	406.4	401.7	−12.4 (−18.6, −6.2)	−3.0	0.001	
30-day readmissions (per 1,000 beneficiaries)								43,840
Year One	134.3	128.5	160.7	147.7	6.4 (−15.1, 27.8)	4.7	0.63	
Year Two	134.3	128.5	159.7	153.9	−1.2 (−22.4, 20.0)	−0.9	0.93	
Overall	134.3	128.5	160.1	150.7	2.0 (−13.2, 17.2)	1.5	0.83	

AC = Accountable Community; CG = comparison group; D-in-D = difference-in-differences.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in the rate of utilization in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in the rate of utilization in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention groups baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The probability estimates are multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries/discharges. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix B-2* for additional detail.

[†]The 80% confidence interval for ED visits in Year One is (−17.6, −0.6). Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only.

The following sample sizes represent weighted period-year a included in the regression model for the entire study period: inpatient admissions and emergency department visits not leading to hospitalizations (N = 394,589); 30-day readmissions (N = 43,840).

Data source: RTI analysis of Maine Medicaid data, 2011–2016.

B.3.3 Did expenditures change among Medicaid AC beneficiaries?

KEY INSIGHTS

After 2 years of AC implementation:

- **Total Medicaid expenditures increased** faster for AC enrollees relative to the comparison group, but the difference between groups **was not statistically significant**.
- Likewise**, AC and comparison group enrollees experienced an increase** in other expenditure categories, including inpatient and prescription expenditures, **but there were no statistically significant differences** between the AC and comparison group.
  - **Year Two results were generally more positive than Year One results**, suggesting that the AC model may become more effective over time as ACs solidify their approach to managing utilization for Medicaid enrollees.
  - Further, ACs may have had more incentive to impact expenditures if they adopted a risk-sharing arrangement that shared in losses and not just savings.

In ***Table B-13***, we present the results of the D-in-D regression analyses for total, inpatient, professional, and pharmaceutical Medicaid PBPM expenditures. We also provide results for total Medicaid PBPM expenditures for children in ***Table B-1-7*** and adults in ***Table B-1-8*** in ***Sub-appendix B-1***. We report annual regression adjusted D-in-D estimates individually for the first 2 years after implementation of the ACs, along with an overall D-in-D estimate for both years combined. In ***Figure B-5***, we present the individual estimates for the first 2 years of the ACs.

- Overall, **total Medicaid expenditures** increased faster for AC enrollees relative to the comparison group, but the difference between groups was not statistically significant.
  - The same pattern can be seen among adults. In contrast, total Medicaid expenditures for children increased at a slower rate relative to the comparison group, and the difference was statistically significant (−$21.54 PMPM, p = 0.02) (see ***Table B-1-7*** in ***Sub-appendix B-1***).
- Overall, AC and comparison group enrollees experienced similar increases in the **other expenditure categories, including inpatient and prescription expenditures**. There were no statistically significant differences between the AC and comparison group for any expenditure category.
  - However, expenditures may be trending toward desired results. Year Two results were more positive than Year One results, with total and inpatient expenditures increasing but at a slower rate relative to the comparison group in Year Two.

Table B-13. Difference in the pre-post annual change in PBPM expenditures for Medicaid beneficiaries in Maine ACs relative to the comparison group, first 2 years of implementation (August 2014 through July 2016)

Outcome and time period	Pre-period adjusted mean, AC	Pre-period adjusted mean, CG	Test-period adjusted mean, AC	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value
Total expenditures (PBPM) ($)							
Year One	679.48	682.30	744.61	689.56	57.86 (−7.24, 122.97) †	8.5	0.14
Year Two	679.48	682.30	720.20	746.45	−23.43 (−53.72, 6.85)	−3.4	0.20
Overall	679.48	682.30	729.92	716.13	8.94 (−22.75, 40.63)	1.3	0.64
Inpatient expenditures (PBPM) ($)							
Year One	59.58	57.54	62.84	58.49	2.31 (−6.92, 11.54)	3.9	0.68
Year Two	59.58	57.54	62.11	65.50	−5.43 (−14.35, 3.48)	−9.1	0.32
Overall	59.58	57.54	62.40	61.76	−2.35 (−8.85, 4.15)	−3.9	0.55
Professional expenditures (PBPM) ($)							
Year One	242.03	261.75	233.41	252.70	0.44 (−23.09, 23.96)	0.2	0.98
Year Two	242.03	261.75	246.93	266.65	0.005 (−17.58, 17.59)	0.0	1.00
Overall	242.03	261.75	241.54	259.21	0.18 (−13.96, 14.31)	0.1	0.98
Pharmaceutical expenditures (PBPM) ($)							
Year One	79.81	73.18	91.21	89.34	−4.75 (−10.57, 1.07) †	−6.0	0.18
Year Two	79.81	73.18	109.38	101.61	1.14 (−5.53, 7.81)	1.4	0.78
Overall	79.81	73.18	102.14	95.07	−1.21 (−5.84, 3.43)	−1.5	0.67

AC = Accountable Community; CG = comparison group; D-in-D = difference-in-differences; PBPM = per beneficiary per month.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in expenditures in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in expenditures in the intervention group relative to the comparison group. The regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. The relative difference is the D-in-D estimate as a percentage of the intervention groups baseline period adjusted mean.

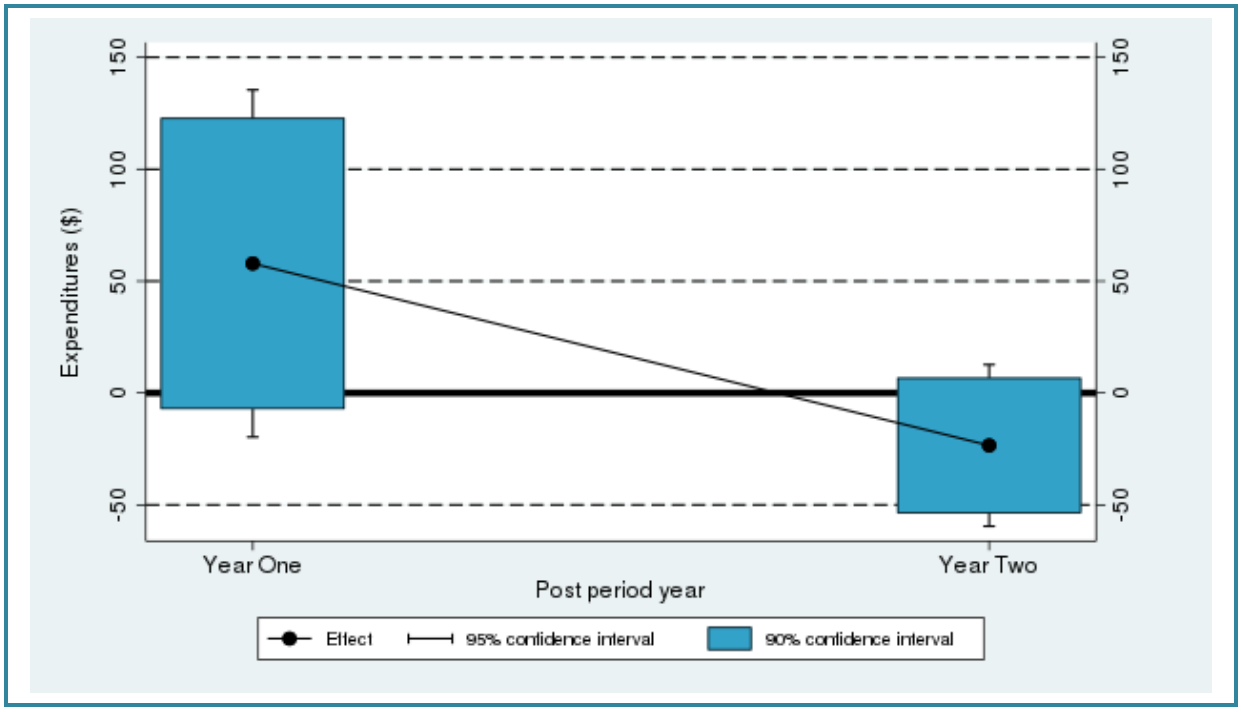
Methods: An ordinary least square model was used to obtain estimates for differences in expenditures. The year-specific regression-adjusted D-in-D may not match the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights across these figures. See *Sub-appendix B-2* for additional detail.

†The 80% confidence interval for total expenditures in Year One is (7.13, 108.60). The 80% confidence interval for pharmaceutical expenditures in Year One is (−9.29, −0.22). Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only.

The following sample size represent weighted period-years included in the regression model for the entire study period: total expenditures (N = 394,589).

Data source: RTI analysis of Maine Medicaid data, 2011–2016.

Figure B-5. Annual difference in the pre-post change in total PBPM expenditures for AC beneficiaries and the comparison group, first 2 years of AC implementation



AC = Accountable Community; PBPM = per beneficiary per month.

Bars indicate 90% confidence intervals (CIs), and lines that extend beyond the bars indicate 95% CIs. CIs that do not cross the origin on the x-axis indicate statistically significant effect estimates; CIs that cross the origin denote statistically insignificant effects.

- These results may indicate that the AC model becomes more effective over time, and that it takes at least several years for ACs to lower expenditure growth trends, if not decrease net expenditures. With additional years of test data, the expectation cost growth will continue to decrease for AC enrollees relative to the comparison group.
- Also, all ACs are only sharing in savings, not losses, which may reduce their incentive to turn their primary focus to slowing cost growth.

B.3.4 Did quality of care change among Medicaid AC beneficiaries?

KEY INSIGHTS

After 2 years of AC implementation:

- **AC and comparison group enrollees with diabetes experienced a similar decrease in HbA1c testing rates,** and there was no statistically significant difference between the groups.
  - Declining rates of HbA1c testing within the Medicaid population were known to the Maine SIM team and were a motivating factor for the SIM team to subsequently implement quality improvement efforts to improve testing rates, though these efforts began after this study period.
- There **were no statistically significant differences** between AC and comparison group enrollees in **depression medication management.**
  - Monitoring depression medication management was not a required AC performance measure for calculating shared savings, so AC providers may not have made improvement of this measure a focus of AC activities.
- ACs were held to numerous quality measures for calculation of shared savings. Performance on the measures presented here is not reflective of overall quality of care delivered through this model.

In ***Table B-14***, we present the results of the D-in-D regression analyses for our quality of care measures: proportion of the population diagnosed with diabetes receiving an HbA1c test and proportion of the population adhering to antidepressant medication both 84 days and 180 days after diagnosis of depression. We focus on these two measures, but we note that ACs were held to numerous other quality measures for calculation of shared savings. Performance on the measures presented here is not reflective of overall quality of care delivered through this model. We report regression-adjusted D-in-D annual estimates individually for the first 2 years after the implementation of ACs, along with an overall D-in-D estimate for all years combined.

- Among Medicaid enrollees aged 18–75 years with diabetes, **Hba1c testing rates** declined for both the AC and comparison group, and there were no statistically significant differences between groups.
  - Declining rates of HbA1c testing within the Medicaid population were known to the Maine SIM team and were a motivating factor for the SIM team to subsequently implement a program, the data-focused learning collaborative, for HHs and BHHs to improve testing rates. This initiative began in March 2017, after this analysis period ended. The expectation was that with the technical assistance from the collaborative, testing rates would improve over time for HH and BHH enrollees also participating in an AC.
  - Furthermore, monitoring HbA1c testing rates was an optional, not required, measure ACs could choose when tracking enrollee quality of care, so providers may have been less motivated to make it a concern.

Table B-14. Difference in the pre-post annual change in quality of care for Medicaid beneficiaries in Maine ACs relative to the comparison group, first 2 years of implementation (August 2014 through July 2016)

Outcome and time period	Pre-period adjusted mean, AC	Pre-period adjusted mean, CG	Test-period adjusted mean, AC	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	N
Among enrollees with diabetes, receipt of HbA1c test (%)								12,141
Year One	85.3	83.3	78.5	76.4	−0.6 (−5.6, 4.5)	−0.7	0.86	
Year Two	85.3	83.3	79.5	76.8	0.1 (−4.3, 4.5)	0.1	0.97	
Overall	85.3	83.3	79.1	76.6	−0.2 (−3.5, 3.1)	−0.2	0.93	
Patients who remained on antidepressant medication for at least 84 days (%)								10,677
Year One	55.5	54.8	56.2	57.6	−2.2 (−6.3, 1.9)	−4.0	0.38	
Year Two	55.5	54.8	57.8	54.9	2.1 (−1.7, 5.8)	3.7	0.36	
Overall	55.5	54.8	57.1	56.4	0.3 (−2.5, 3.1)	0.6	0.85	
Patients who remained on antidepressant medication for at least 180 days (%)								10,677
Year One	41.1	39.3	40.2	40.0	−1.7 (−4.9, 1.5)	−4.2	0.38	
Year Two	41.1	39.3	40.0	36.6	1.6 (−1.9, 5.2)	4.0	0.44	
Overall	41.1	39.3	40.1	38.6	0.3 (−2.2, 2.7)	0.6	0.86	

AC = Accountable Community; CG = comparison group; D-in-D = difference-in-differences.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in the likelihood of a quality of care event in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in the likelihood of a quality of care event in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention groups baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the difference in likelihood of a quality of care event. The estimates are multiplied by 100 to obtain percentage probabilities, or in the case of a PQI admission, multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix B-2* for additional detail.

Standard statistical practice is to use confidence intervals of 90% or higher. The following sample sizes represent weighted period-years included in the regression model for the entire study period: receipt of HbA1c test (N = 12,141); patients who remained on antidepressant medication for at least 84 days (N = 10,677); patients who remained on antidepressant medication for at least 180 days (N = 10,677).

Data source: RTI analysis of Maine Medicaid data, 2011–2016.

- Among Medicaid enrollees aged 18 years or older with depression, overall there were slight improvements in the 84-day **antidepressant medication** measure and little change in the 180-day measure for AC enrollees and the comparison group, but there were no statistically significant differences between groups.
  - We included this measure to explore whether Maine's overarching focus on improved quality of behavioral health care, and its AC requirements to include behavioral health providers in their networks, had spillover effects on antidepressant medication management. However, monitoring depression medication management was not a required AC performance measure for calculating shared savings, so AC providers may not have made improvement of this measure a focus of AC activities, which could explain the lack of significant change.

B.3.5 Did expenditures and utilization change among Medicaid AC beneficiaries with behavioral health conditions?

KEY INSIGHTS

After 2 years of AC implementation:

- **ED visits and behavioral health-related Medicaid expenditures decreased** more for AC enrollees relative to the comparison group.
- **In Year Two, inpatient admissions decreased more** for AC enrollees relative to the comparison group.
- There was no difference between AC enrollees and the comparison group in rates of behavioral health–related inpatient admissions, 30-day readmissions, behavioral health-related inpatient expenditures, or total Medicaid expenditures.
  - However, these measures were decreasing faster in Year Two for AC enrollees relative to the comparison group, suggesting promising future results as ACs gain experience managing the health care needs of individuals with behavioral health conditions.
- Given these positive findings, overall care management strategies may have had a strong impact on both the full population and the higher risk behavioral health subpopulation.

Because of Maine's focus on improving the quality of behavioral health care within BHHs and HHs in conjunction with AC requirements to include behavioral health providers in their networks, we expected that ACs may focus some care coordination and quality improvement activities on high-cost, high-users with behavioral health conditions. Therefore, AC's may have made a stronger impact on outcomes within this specific subgroup and for specific measures pertaining to this high-cost population. In ***Table B-15***, we present the results of the D-in-D regression analyses for all-cause and behavioral health–related inpatient admissions, ED visits, 30-day inpatient readmissions, total Medicaid PBPM expenditures, behavioral health–related PBPM expenditures, and behavioral health inpatient admission expenditures. We examine behavioral health–related inpatient admissions or expenditures only among individuals

Table B-15. Difference in the pre-post annual change in utilization and expenditures for Medicaid beneficiaries with behavioral health conditions in Maine ACs relative to the comparison group, first 2 years of implementation (August 2014 through July 2016)

Outcome and time period	Pre-period adjusted mean, AC	Pre-period adjusted mean, CG	Test-period adjusted mean, AC	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value
All-cause inpatient admissions (per 1,000 beneficiaries)							
Year One	128.3	124.2	122.8	113.1	6.2 (−2.9, 15.3)	4.8	0.26
Year Two	128.3	124.2	108.0	114.2	−10.3 (−18.1, −2.5)	−8.0	0.03
Overall	128.3	124.2	114.2	113.6	−3.4 (−9.4, 2.5)	−2.7	0.34
Behavioral health–related inpatient admissions (per 1,000 beneficiaries)							
Year One	34.7	36.0	36.1	32.2	5.1 (1.4, 8.8)	14.6	0.02
Year Two	34.7	36.0	25.0	28.2	−2.0 (−5.6, 1.6)	−5.8	0.36
Overall	34.7	36.0	29.6	30.4	0.9 (−1.7, 3.5)	2.7	0.55
Emergency department visits (per 1,000 beneficiaries)							
Year One	507.1	493.6	462.0	461.5	−13.0 (−27.0, 1.0) †	−2.6	0.13
Year Two	507.1	493.6	475.6	468.4	−6.4 (−17.6, 4.8)	−1.3	0.35
Overall	507.1	493.6	469.9	464.6	−9.1 (−17.9, −0.4)	−1.8	0.09
30-day readmissions							
Year One	160.6	140.7	194.8	157.6	15.7 (−11.7, 43.1)	9.8	0.34
Year Two	160.6	140.7	176.7	154.4	0.8 (−34.0, 35.5)	0.5	0.97
Overall	160.6	140.7	184.9	156.2	7.6 (−15.1, 30.2)	4.7	0.58
Total expenditures (PBPM) ($)							
Year One	1138.80	1128.57	1160.82	1115.20	35.39 (−38.28, 109.05)	3.1	0.43
Year Two	1138.80	1128.57	1132.33	1180.91	−58.82 (−121.72, 4.08) †	−5.2	0.12
Overall	1138.80	1128.57	1144.19	1144.78	−19.62 (−67.46, 28.22)	−1.7	0.50
Behavioral health–related expenditures (PBPM) ($)							
Year One	496.32	486.01	499.72	483.60	5.79 (−20.12, 31.70)	1.2	0.71
Year Two	496.32	486.01	457.88	510.57	−63.01 (−101.11, −24.92)	−12.7	0.01
Overall	496.32	486.01	475.29	495.74	−34.38 (−59.10, −9.67)	−6.9	0.02
Behavioral health–related inpatient expenditures (PBPM) ($)							
Year One	24.43	29.12	35.68	30.45	9.93 (−6.96, 26.81)	40.6	0.33
Year Two	24.43	29.12	19.62	26.78	−2.47 (−7.89, 2.96)	−10.1	0.45
Overall	24.43	29.12	26.30	28.80	2.69 (−5.02, 10.40)	11.0	0.57

AC = Accountable Community; CG = comparison group; D-in-D = difference-in-differences; PBPM = per beneficiary per month.

Note: The probability estimates are multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries/discharges.

(continued)

Table B-15. Difference in the pre-post annual change in utilization and expenditures for Medicaid beneficiaries with behavioral health conditions in Maine ACs relative to the comparison group, first 2 years of implementation (August 2014 through July 2016) (continued)

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in utilization of services/expenditures in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in utilization of services/expenditures for the intervention group relative to the comparison group.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. The year-specific regression-adjusted D-in-D may not match the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights across these figures. See *Sub-appendix B-2* for additional detail.

The relative difference is the D-in-D estimate as a percentage of the intervention group's baseline period adjusted mean.

[†]The 80% confidence interval for total expenditures in Year Two is (−107.84, −9.80). The 80% confidence interval for ED visits in Year One is (−24.0, −2.1). Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only.

The total number of weighted person-years included in the regression model for the entire study period is 156,313 (for 30-day readmissions, N = 24,976).

Data Source: RTI analysis of Maine's Medicaid data from 2011–2016.

with behavioral health conditions, not among the full population because the impact on these outcomes would likely be diluted when including the full sample in the denominator. Beneficiaries with behavioral health conditions were defined as individuals with at least one inpatient admission with a primary behavioral health diagnosis or at least two outpatient visits with a primary behavioral health diagnosis in the year prior to entering the AC or comparison group, (35 percent of AC enrollees and 29 percent of comparison group enrollees were identified as having a behavioral health condition; in addition; 8 percent of the AC enrollees with behavioral health conditions and 7 percent of comparison group enrollees with behavioral health conditions were also enrolled in a BHH). We report regression adjusted D-in-D annual estimates individually for the first 2 years after the implementation of ACs, along with an overall D-in-D estimate for all years combined.

- Overall, among Medicaid enrollees with behavioral health conditions, **there were statistically significant decreases** for AC enrollees relative to the comparison group for **behavioral health–related expenditures** (−$34.38; p = 0.02) and **ED visits** (−9.1 visits per 1,000 beneficiaries; p=0.086).
- In **Year Two, all-cause inpatient admissions decreased significantly more** for AC enrollees with behavioral health conditions relative to the comparison group (−10.3 admissions per 1,000 beneficiaries; p = 0.03).

- There were **no statistically significant differences** overall between AC and comparison group enrollees in **behavioral health–related inpatient admissions, 30-day readmissions, behavioral health-related inpatient expenditures, or total Medicaid expenditures**.
  - However, these measures were decreasing faster in Year Two for AC enrollees relative to the comparison group, suggesting promising future results if these reductions continue as ACs gain more experience managing the health care needs of individuals with behavioral health conditions.
- Declining ED visits and inpatient admissions for individuals with behavioral health conditions reflects similar trends of AC impact within the full study sample. However, declines in ED visits among the full sample demonstrated stronger impacts (3 percent relative decline in the full sample and a 1.8 percent relative decline in this subpopulation), as did declines in all-cause inpatient admission in Year Two (13 percent relative decline in the full sample and an 8 percent relative decline in this subpopulation).
- While ACs did not significantly impact total Medicaid expenditures in the full sample, significant reductions occurred in behavioral-health related expenditures among this subpopulation.

B.3.6 Did expenditures and utilization change among Medicaid AC beneficiaries also enrolled in MaineCare Health Home?

KEY INSIGHTS

After 2 years of AC implementation:

- **Overall, ED visits and the percentage of beneficiaries with a visit to a primary care provider decreased** more for AC/HH enrollees relative to the comparison group.
- Inpatient admissions decreased for AC/HH enrollees relative to the comparison group (not statistically significant).
- **Overall, total Medicaid expenditures increased**.
  - Intervening on a comorbid population may result in increased costs in the short-term, as care coordination activities uncover conditions that require testing and treatment.
  - Moreover, increases in Year 2 were not significantly different from the comparison group, suggesting that shifting expenditure to lower costs among complex patient populations likely takes time.
- The general trends toward reductions in health care use align with expectations that exposure to two interventions (HHs and ACs) designed to improve care coordination and management can effect positive changes in utilization for individuals with multiple chronic conditions.

The AC program was designed to complement existing value-based delivery strategies in MaineCare, including the HH program. The MaineCare HH program began in January 2013; primary care practices participating in the HH program serve as a patient-centered medical home for individuals with multiple chronic conditions. Of the 70 primary care practices enrolled in the AC in our study sample, 51 were also designated as HHs. Thirty-eight percent of the AC members and 25 percent of comparison group members were enrolled in a HH. We would expect to see stronger impacts, in relation to the full sample, on outcomes among this subsample that had more health care need as well as more exposure to the state's interventions. In ***Table B-16***, we present the results of the D-in-D regression analyses for all-cause inpatient admissions, ED visits, likelihood of having a primary care or specialist visit, and total Medicaid PBPM expenditures. We report regression adjusted D-in-D annual estimates individually for the first 2 years after the implementation of ACs, along with an overall D-in-D estimate for all years combined.

- Overall, the percentage of beneficiaries with a **visit to a primary care provider** decreased significantly more for AC/HH enrollees relative to the comparison group (−4.3 percent; $p = 0.004$).
- Overall, the percentage of beneficiaries with a **visit to a specialty care provider** remained the same for AC/HH enrollees, but the percentage for the comparison group increased, resulting in a statistically significant difference between groups (−1.9 percent; $p < 0.001$).
- Overall, **ED visits** also decreased more for the AC/HH enrollees relative to the comparison group (−11.2 ED visits; $p = 0.02$).
- The general trends toward reductions in health care use align with expectations that enrollees exposed to two interventions (HHs and ACs) designed to improve care coordination and management should see positive outcomes.
  - Moreover, declines in primary care, specialist, and ED visits among this subgroup mirror results for the full sample, suggesting that the ACs are effecting positive changes in utilization for individuals with multiple chronic conditions.
- **Inpatient admissions** decreased in Year Two and overall for AC/HH enrollees (non-significantly within the home health enrollee subgroup but significantly for the full sample), suggesting that more experience operating within the AC model may eventually yield more positive results.
- **Total Medicaid expenditures** significantly increased in Year 1 ($75.80, $p = 0.003$) and overall ($42.73; $p = 0.01$), although increases in Year 2 were not significantly different from the comparison group. This suggests that the ACs may be heading in the right direction but shifting expenditure trajectories to lower costs among complex patient populations likely takes more than 2 years.

Table B-16. Difference in the pre-post annual change in utilization and expenditures for Medicaid beneficiaries in Maine Health Homes and ACs relative to the comparison group, first 2 years of implementation (August 2014 through July 2016)

Outcome and time period	Pre-period adjusted mean, AC	Pre-period adjusted mean, CG	Test-period adjusted mean, AC	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value
Percentage of beneficiaries with any visit to a primary care provider (%)							
Year One	55.2	61.3	49.2	59.3	−4.0 (−8.4, 0.4) †	−7.3	0.13
Year Two	55.2	61.3	52.8	63.2	−4.4 (−7.4, −1.5)	−8.0	0.01
Overall	55.2	61.3	51.4	61.2	−4.3 (−6.7, −1.8)	−7.7	0.004
Percentage of beneficiaries with any visit to a specialty care provider (%)							
Year One	34.2	33.5	32.4	33.4	−1.7 (−2.8, −0.6)	−4.9	0.01
Year Two	34.2	33.5	34.9	36.2	−2.0 (−3.0, −1.0)	−5.9	0.001
Overall	34.2	33.5	34.0	34.8	−1.9 (−2.6, −1.1)	−5.5	<0.001
Inpatient admissions (per 1,000 beneficiaries)							
Year One	98.3	107.6	98.2	104.1	3.4 (−1.3, 8.1)	3.4	0.24
Year Two	98.3	107.6	94.9	111.0	−7.0 (−14.4, 0.4) †	−7.1	0.12
Overall	98.3	107.6	96.1	107.4	−3.1 (−8.0, 1.9)	−3.1	0.31
Emergency department visits (per 1,000 beneficiaries)							
Year One	423.5	439.9	403.4	429.8	−10.2 (−23.5, 3.1)	−2.4	0.21
Year Two	423.5	439.9	418.3	446.5	−11.9 (−22.3, −1.4)	−2.8	0.06
Overall	423.5	439.9	412.6	437.9	−11.2 (−19.4, −3.0)	−2.6	0.02
Total expenditures (PBPM)							
Year One	488.86	604.58	564.19	604.11	75.80 (34.38, 117.22)	15.5	0.003
Year Two	488.86	604.58	555.53	648.86	22.40 (−13.99, 58.79)	4.6	0.31
Overall	488.86	604.58	558.83	625.71	42.73 (15.23, 70.24)	8.7	0.01

AC = Accountable Community; CG = comparison group; D-in-D = difference-in-differences; PBPM = per beneficiary per month.

Note: The probability estimates are multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries/discharges.

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in use/expenditures in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in use/expenditures for the intervention group relative to the comparison group.

(continued)

Table B-16. Difference in the pre-post annual change in utilization and expenditures for Medicaid beneficiaries in Maine Health Homes and ACs relative to the comparison group, first 2 years of implementation (August 2014 through July 2016) (continued)

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. The year-specific regression-adjusted D-in-D may not match the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights across these figures. See *Sub-appendix B-2* for additional detail.

[†]The 80% confidence interval for percent of beneficiaries with a primary care visit in Year One is (−7.4, −0.6). The 80% confidence interval for inpatient admissions in Year Two is (−12.8, −1.2). Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only.

The following sample size represent weighted period-years included in the regression model for the entire study period: total expenditures, all-cause acute inpatient admissions, emergency department visits, use of a primary care provider, and use of a specialty care provider (N = 170,635).

Data Source: RTI analysis of Maine Medicaid data from 2010–2015.

- Intervening on a sicker population may result in increased costs in the short-term, as care coordination activities uncover conditions that require testing and treatment.
- This finding also aligns with the trend toward increasing, but non-significant, total Medicaid expenditures in the full study sample ($8.94; p = 0.64).

B.3.7 Did expenditures and utilization change for each AC?

The primary analysis examined the impact of the AC program across all four ACs combined. To assess whether each AC had different findings that were masked by the combined analysis, we conducted a sensitivity analysis to examine the impact of each AC relative to the full comparison group. We examined four key outcomes: total Medicaid expenditures, acute inpatient admission, ED visits, and 30-day readmissions. After 2 years of AC implementation, ACs showed similar results. All ACs were trending toward less use of high-cost services, except for hospital readmissions, and each AC had not yet experienced a statistically significant change in total expenditures relative to the comparison group. Detailed results can be found in ***Sub-appendix B-1***.

B.3.8 Discussion and limitations

Under the AC model, lead AC organizations adopted principles of care coordination, care management, and utilization and cost management for Medicaid enrollees attributed to the ACO. The overarching expectation was that this approach to care delivery would improve care coordination and quality of care, and alter patterns of utilization and expenditures, with the goal

of lowering the use of high-dollar services, such as inpatient and ED care, and associated expenditures. However, during focus groups conducted in March 2017, PCPs participating in the ACs reported that they were unaware they were enrolled in the AC. Without being aware they are in an initiative designed to impact quality, use, and costs, providers likely had little motivation to change behavior to align with AC program goals. That said, AC providers may very well have been working with patients to change health care–seeking behaviors but in response to more visible initiatives for the provider, like the MaineCare HHs or other public or private payer or health system care coordination initiatives.

Over the course of 2 years of AC implementation, there were few changes in the handful of care coordination and quality outcomes we examined. AC enrollees experienced little change in the percentage of beneficiaries who had any visits to a primary care or specialist provider, whereas the comparison group experienced increases. From one perspective, little movement in primary care and specialist visits may indicate that AC-affiliated providers were successful in coordinating care to prevent unnecessary use of outpatient care. From another perspective, AC performance measures used to calculate shared savings included well-child and adolescent well-care visits, which require primary care visits, so the lack of change among AC enrollees could signal that AC providers were not as diligent as they could have been in coordinating their patients' care and managing population health. There were no significant improvements in follow-up after a mental health inpatient admission, receipt of an HbA1c test for diabetics, and antidepressant medication management for individuals diagnosed with depression. Lack of change, however, may not be indicative of quality concerns. ACs chose numerous projects to implement to meet quality and cost containment goals, and the projects chosen may have led to improvements in outcomes not examined here.

Utilization and expenditure findings were mixed. AC enrollees experienced significant reductions in inpatient admissions and ED visits, both of which align with expectations that ACs would focus on reducing use of high-cost care. Inpatient admissions, specifically those that are preventable, and non-emergent ED use, were both AC performance measures, and a survey of ACs fielded by Maine's evaluator, The Lewin Group, found that ACs were focused on reducing ED visits and reducing/avoiding hospitalizations (The Lewin Group, 2016). With these decreases in high-cost services, we expected to see decreases in expenditures, although this reduction did not occur. Both AC and comparison group enrollees experienced an increase in most expenditure categories, including total Medicaid, inpatient, and prescription expenditures. Increases were not statistically different from changes in the comparison group, except among children, where the increase in total Medicaid expenditures significantly smaller than the increase in for the comparison group. With an increased focus on care coordination under the AC model, we can hypothesize that decreases in high-cost services were not enough to offset changes in increases in other types of care (e.g., services that improve quality), leading to the lack of cost reductions at least in the short-run.

If reductions in high-cost use can be sustained under this model in future years, then Maine could be on a positive trajectory to reduce expenditures because results are trending is a positive direction. The magnitude of reductions in ED and inpatient admissions were larger in Year Two relative to Year One, and increases in some expenditure categories were smaller in Year Two relative to Year One. Some AC stakeholders reported during site visit interviews that they needed to time to learn to manage a Medicaid population before adopting upside (or two-sided) risk arrangements. Therefore, the more positive trends observed in Year Two may support this notion that ACs need time to learn Medicaid population management and only then are positive impacts possible.

We conducted additional analyses on two populations that we hypothesized ACs may have been able to make a stronger impact, MaineCare enrollees with behavioral health conditions and enrollees also participating in the HH program. While both groups experienced reductions in ED and inpatient admissions (similar to the full study sample), only the individuals with behavioral health conditions experienced reductions in total Medicaid and behavioral health related expenditures. HH enrollees experienced a significant increase in total Medicaid expenditures. Given that both HH enrollees and individuals with behavioral health conditions are high-cost, high-needs populations, the discrepant expenditure results are difficult to reconcile. We can conjecture, however, that intensity of an intervention could play a role. HH enrollees were exposed to two overlapping interventions to improve care coordination and care management, and this intense scrutiny could have increased costs as gaps in care and unmet needs were addressed. Under the AC model alone, individuals with behavioral health conditions may have been exposed to less intensive service provision but better care coordination, as required under the AC model, which may have resulted in the small but positive changes in expenditures.

The findings presented here are somewhat similar to findings from Maine's self-evaluation (The Lewin Group, 2016). Maine analyzed trends in expenditures, utilization, and quality using a 1-year baseline (April 2013–March 2014) and 1-year test period (calendar year 2015) for 23,424 Medicaid beneficiaries enrolled only in an AC and not an HH and for 12,973 Medicaid beneficiaries enrolled in an AC and HH for at least 6 months in 2015 and a matched comparison group. For individuals enrolled only in an AC and not an HH, the evaluator's results were generally similar to the RTI team's full study sample results in terms of direction and statistical significance. Like our results, The Lewin Group found the following non-statistically significant changes for the AC enrollees relative to a comparison group: increases in total Medicaid expenditures, reductions in HbA1c testing rates, and increases in readmission rates. Lewin found a non-statistically significant reduction in ED visits; whereas RTI found a significant reduction in visits. For AC and HH enrollees, the evaluators also found non-statistically significant lower total Medicaid expenditures; whereas we found a statistically significant increase in total expenditures. Differences in sample size and follow-up (the RTI analysis included more individuals and longer follow-up) could account for the discrepancy in

RTI's and the Lewin Group's findings for total expenditures. Both Lewin's results and our results also found statistically significant reductions in ED visits for AC/HH enrollees relative to the comparison group.

Furthermore, according to the state's internal assessment, the ACs were able to meet quality, cost and utilization targets to generate shared savings, so ACs were achieving improvements in care delivery. The AC initiative generated savings across Year 1 of the program (August 1, 2014–July 31, 2015) equal to $5.41 million, and MaineCare issued shared savings payments to ACs totaling $856,675.

There are several limitations to this analysis to consider. First, the AC model is relatively new, and 2 years may not be enough time for sustained patterns of care to emerge. Program startup takes a significant amount of time, so for the first year or more AC participant providers may not be operating with all the policies, procedures, and work flows in place necessary to ensure optimal functionality. Over the course of the study period, the number of AC-affiliated primary care practices increased, from 28 in Year One to 66 in Year Two because of a couple of ACs expanded their provider networks. With this mix of more and less experienced sites in the study sample, some measures may trend in directions that result in null findings. Further, 60 percent (31,702 enrollees) of the AC study sample was exposed to the intervention for only 1 year, so expectations for significant change should be somewhat tempered given the minimal exposure time experienced by more than half the study sample. Finally, for Medicare-Medicaid enrollees in the analysis, results are limited to impacts on Medicaid only; we did not include utilization or expenditures payed by Medicare.

In summary, enrollment of MaineCare enrollees into the AC model was associated with decreases in key utilization measures (inpatient admissions and ED visits). In contrast to expectations, both AC and comparison group enrollees experienced an increase in most expenditure categories (though the increases were not statistically significant), indicating that reduced utilization had not yet translated into anticipated cost savings. It is notable that some utilization and expenditure measures were more positive in Year Two than Year One, highlighting promising trends across key measures and underscoring the fact that changes in care delivery take time to realize. A 2-year analysis period may be insufficient to capture the full extent of the AC model impact. To date, the model has shown little impact on a limited set claim-based quality of care and care coordination measures, but there could be significant quality improvements in outcomes not examined here. A sub-analysis of AC enrollees with behavioral health conditions and enrollees also participating in the HH program found similar outcomes as the overall AC analysis, indicating that the model was able to similarly impact higher needs, higher cost individuals. Overall, there is evidence that the AC model can alter patterns of care.

B.4 Discussion

The SIM Initiative in Maine began in October 2013 and ended 4 years later in September 2017. Maine's goal was to strengthen, support, and expand health care transformation efforts already underway within Medicaid and commercial insurance through a variety of efforts: supporting practice transformation within primary care and behavioral health care; expanding provider use of data to monitor quality, utilization, and costs; aligning quality measures across payers; promoting diabetes prevention to improve population health; and training a workforce to support health system reform. Over the course of the SIM Initiative, Maine made significant progress across all efforts, in part because Maine committed to continuous quality improvement and refocused SIM activities when necessary to ensure the efficient and effective use of funding.

Expansion and support of three Medicaid delivery system and alternative payment models—behavioral health homes (BHHs), Accountable Communities (ACs), and health homes (HHs)—was a central focus of Maine's SIM Initiative. Each model represented a departure from Maine's fee-for-service approach to reimbursing Medicaid providers. At the end of the SIM Initiative, these models collectively covered an estimated 110,000 of the 280,000 MaineCare enrollees. The state helped HHs and BHHs participating in these models advance practice transformation by providing in-depth technical assistance, which was well received by providers.

Notably, development of the BHHs in particular was seen by both providers and state officials as transformative to the state's behavioral health care system. Capitated payments—in conjunction with SIM-funded health information technology (IT) support; practice transformation assistance; connection to HealthInfoNet (the state's health information exchange); and feedback on quality, utilization, and cost measures—significantly altered how providers delivered behavioral health care. For example, BHHs noted improvements in how they followed up after hospital use and how they identified patients' clinical and social needs and worked with patients to fill gaps in care.

Improving health IT and data analytics was another key component to Maine's SIM Initiative because Maine prioritized transparency, provider and payer accountability for costs and quality, and data-driven quality improvement. Maine used SIM funding for a variety of activities, including connecting behavioral health providers to HealthInfoNet to improve exchange of clinical data between physical and behavioral health providers, developing event notification and clinical data dashboards for Medicaid care managers, and testing a new tool to predict high-cost, high-use Medicaid patients. Provider uptake of these tools was a significant success story.

To complement these targeted delivery system and health IT reforms, Maine implemented several workforce initiatives. Maine expanded the number of diabetes prevention lifestyle coaches, trained providers on the needs of individuals with development disabilities, and piloted a community health worker initiative. State officials were pleased with the early progress made in these projects and continued to fund them throughout the SIM Initiative.

Key challenges over the course of the SIM Initiative included provider struggles and delays in adaption to new care delivery models and alternative payment models, varying levels of practice readiness to analyze and act on clinical data, and limited engagement among commercial payers to align quality measures with a common measure set. Although these challenges highlight the inherently slow pace of health system transformation, they also underscore the value of training, technical assistance, and prioritization of stakeholder buy-in when shifting to new delivery models.

Impact analyses were conducted on two of Maine's most far-reaching SIM reform models, BHHs and ACs, and changes in utilization and expenditures were quite modest. The BHH analysis (conducted using a pre-post study design because of comparison group limitations) found that after 2 years of implementation, Medicaid expenditures—including behavioral health–related expenditures—and some utilization measures such as primary and specialty care use increased, which may be expected under a model that promotes improved care management and coordination for a high-needs population. At the same time, some BHH enrollees experienced reductions in emergency department (ED) visits. Claims-based behavioral health-related quality measures also improved, such as patient adherence to antidepressant medication. Providers noted that connections to HealthInfoNet and technical assistance to redesign workflows to identify and fill gaps in care were instrumental in changing care delivery and effecting change in patients' health care utilization of services.

The AC analysis (conducted by measuring the model's effects against a MaineCare comparison group) found that after 2 years of implementation, inpatient admissions and ED visits significantly decreased but most expenditures increased, although the increases were not statistically significantly different from the comparison group. Reductions in high-cost services did not translate into cost savings. Some utilization and expenditure measures showed more positive results in the second analysis year, suggesting that promising trends may be realized over time. Although no significant changes in claims-based quality or care coordination measures were found, improvements in quality for other AC priority areas is likely.

Concurrent with the implementation of AC and BHH models in Medicaid, trends in statewide population health for Maine's low-income adults demonstrate the challenges providers face in addressing health and behavioral health needs. The proportion of Maine low-income adults reporting poor mental health in the last 30 days increased significantly between 2013 and 2016, from 48.5 to 55.0 percent. There was also a 5.4 percentage point increase in the proportion reporting any days of "not good" physician health in the last 30 days (see ***Table B-1-10*** in ***Sub-appendix B-1*** for details). Additionally, relative to comparison group states, in the first year of the SIM Initiative, the statewide Medicaid population had mixed outcomes. Relative changes in the undesired direction included a decline in the rate of physician visits coupled with an increase in the inpatient admission rate, including admissions for ambulatory care sensitive conditions. However, more positively, Maine Medicaid beneficiaries had a relative decline in the rates of ED

visits and 30-day readmissions (also reported in ***Sub-appendix B-1***). Although these trends are unrelated to the BHH and AC payment models, which reached a relatively small percentage of Medicaid beneficiaries, they demonstrate room for improvement in Maine's statewide health care transformation efforts.[66]

Although Maine did not pursue significant health policy-related legislation during or after the SIM Initiative, Medicaid decided it will continue the HH, BHH, and AC models and will sustain its health IT and data analytics advancements. Maine determined that these models have demonstrated their ability to improve quality of care, provider satisfaction, and reduce some health care utilization, which may translate into net cost savings over time.

B.5 References

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[66] Among Medicare beneficiaries in Maine statewide, after 3 years of the SIM Initiative, the only measures in which Maine performed better than its comparison group was in the percentage of patients seen for a visit who were screened for tobacco use and received cessation counseling if needed and in a relative decline in total expenditures per beneficiary per month. Care coordination measures and other utilization measures showed relative worse performance, as did several quality of care measures—with the remainder of measures showing no difference between Maine and comparison group states (see more detailed description of results in ***Sub-appendix B-1***).

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Sub-appendix B-1. Supplementary Results

This sub-appendix contains additional data relevant to Maine during the SIM Initiative. ***Sections B-1.1*** and ***B-1.2*** describe results from additional analyses to test the impact of the behavioral health homes (BHH) and Accountable Communities models, respectively. ***Section B-1.3*** presents population-level health status data drawn from a statewide survey, to offer some context of changes in the overall population health during the period of the SIM Initiative.

Section B-1.4 presents results from analyses of Medicaid-insured population, comparing the Maine statewide population to statewide populations in a comparison group not participating in the SIM Initiative. These analyses test whether the SIM Initiative activities in Maine offered enough leverage to change the trajectory of utilization and expenditure outcomes throughout different types of populations statewide. This leverage would occur via two primary mechanisms: first, providers likely make changes in care delivery for all patients, not just those participating in a payment model; second, the state built some infrastructure under the SIM Initiative that could assist a range of providers statewide in improving care.

B-1.1 Supplementary Results for the Maine BHH Impact Analysis

In ***Table B-1-1*** and ***Table B-1-2***, we present the results of the pre-post analyses for inpatient admissions, emergency department (ED) visits not leading to a hospitalization, and 30-day readmissions per 1,000 beneficiaries for children and adults, respectively. In ***Table B-1-3*** and ***Table B-1-4***, we present the results of the pre-post regression analyses for total Medicaid per beneficiary per month (PBPM) expenditures for children and adults, respectively. We report annual regression adjusted pre-post estimates individually for the first 2 years after the implementation of BHHs, along with an overall pre-post estimate for both years combined. These results are summarized in ***Appendix B, Section B.2***.

Table B-1-1. Difference in the pre-post annual change in utilization for child Medicaid beneficiaries in Maine BHHs, first 2 years of implementation (April 2014 through March 2016)

Outcome and time period	Pre-period adjusted mean, BHH	Test-period adjusted mean, BHH	Regression-adjusted pre-post estimate (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
Inpatient admissions (per 1,000 beneficiaries)						6,732
Year One	100.6	97.1	−3.5 (−20.3, 13.4)	−3.5	0.73	
Year Two	100.6	118.2	17.6 (−18.9, 54.0)	17.5	0.43	
Overall	100.6	106.5	5.9 (−12.8, 24.7)	5.9	0.60	
Inpatient admissions related to behavioral health (per 1,000 beneficiaries)						6,667
Year One	64.5	70.1	5.6 (−11.4, 22.6)	8.6	0.59	
Year Two	64.5	94.8	30.3 (−2.4, 63.1)[Ŧ]	47.0	0.13	
Overall	64.5	81.1	16.6 (−0.8, 34.0)[Ŧ]	25.8	0.12	
Emergency department visits not leading to hospitalization (per 1,000 beneficiaries)						6,732
Year One	435.8	416.2	−19.6 (−40.5, 1.3)[Ŧ]	−4.5	0.12	
Year Two	435.8	431.6	−4.2 (−34.6, 26.2)	−1.0	0.82	
Overall	435.8	423.0	−12.8 (−30.6, 5.1)	−2.9	0.24	

BHH = behavioral health home; CI = confidence interval.

Note:

Thirty-day readmissions are not calculated for children given the small sample number of children eligible for the measure.

How to interpret the findings: A *negative* value corresponds to a *decrease* in utilization rates. A *positive* value corresponds to an increase utilization rates. The relative difference is the pre-post estimate as a percentage of the intervention group's baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The probability estimates are multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries/discharges.

[Ŧ] Year Two's pre-post estimate for inpatient admissions related to behavioral health (30.3; 80% CI: 4.8, 55.8), overall's pre-post estimate for inpatient admissions related to behavioral health (16.6; 80% CI: 3.1, 30.2), and Year One's pre-post estimate for emergency department visits not leading to hospitalization (−19.6; 80% CI: −35.9, −3.3) were statistically significant at 80%. Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only.

The following sample sizes represent weighted period-years included in the regression model for the entire study period: all-cause and behavioral health–related inpatient admissions and emergency department visits not leading to hospitalizations (N = 6,732).

Data source: RTI analysis of Maine Medicaid data, 2011–2016.

Table B-1-2. Difference in the pre-post annual change in utilization for adult Medicaid beneficiaries in Maine BHHs, first 2 years of implementation (April 2014 through March 2016)

Outcome and time period	Pre-period adjusted mean, BHH	Test-period adjusted mean, BHH	Regression-adjusted pre-post estimate (90% confidence interval)	Relative difference (%)	p-value
Inpatient admissions (per 1,000 beneficiaries)					
Year One	207.3	213.1	5.9 (−2.5, 14.3)	2.8	0.25
Year Two	207.3	202.7	−4.6 (−21.5, 12.3)	−2.2	0.66
Overall	207.3	208.5	1.2 (−7.6, 10.1)	0.6	0.82
Inpatient admissions related to behavioral health (per 1,000 beneficiaries)					
Year One	74.0	80.6	6.6 (−3.4, 16.5)	8.9	0.28
Year Two	74.0	67.6	−6.4 (−18.2, 5.3)	−8.7	0.37
Overall	74.0	74.8	0.8 (−6.8, 8.4)	1.1	0.86
Emergency department visits not leading to hospitalization (per 1,000 beneficiaries)					
Year One	629.3	615.7	−13.6 (−31.7, 4.5)	−2.2	0.22
Year Two	629.3	630.2	0.9 (−17.1, 19.0)	0.1	0.93
Overall	629.3	622.1	−7.1 (−20.0, 5.7)	−1.1	0.36

BHH = behavioral health home.

Note:

How to interpret the findings: A *negative* value corresponds to a *decrease* in utilization rates. A *positive* value corresponds to an increase utilization rates. The relative difference is the pre-post estimate as a percentage of the intervention group's baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The probability estimates are multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries/discharges. The following sample size represents weighted period-years included in the regression model for the entire study period: (N = 23,847).

Data source: RTI analysis of Maine Medicaid data, 2011–2016.

Table B-1-3. Difference in the pre-post annual change in total PBPM expenditures for child Medicaid beneficiaries in Maine BHHs, first 2 years of implementation (April 2014 through March 2016)

Outcome and time period	Pre-period adjusted mean, BHH	Test-period adjusted mean, BHH	Regression-adjusted pre-post estimate (90% confidence interval)	Relative difference (%)	p-value
Total expenditures (PBPM) ($)					
Year One	1472.74	1649.74	177.00 (56.72, 297.29)	12.0	0.02
Year Two	1472.74	1774.91	302.17 (130.06, 474.28)	20.5	0.004
Overall	1472.74	1705.66	232.92 (131.23, 334.61)	15.8	<0.001

BHH = behavioral health home; PBPM = per beneficiary per month.

Note:

How to interpret the findings: A *negative* value corresponds to a *decrease* in payments. A *positive* value corresponds to an increase in payments. The relative difference is the pre-post estimate as a percentage of the intervention group's baseline period adjusted mean.

Methods: An ordinary least square model was used to obtain estimates for differences in expenditures. The following sample size represent weighted period-years included in the regression model for the entire study period: (N = 6,733).

Data source: RTI analysis of Maine Medicaid data, 2011–2016.

Table B-1-4. Difference in the pre-post annual change in total PBPM expenditures for adult Medicaid beneficiaries in Maine BHHs, first 2 years of implementation (April 2014 through March 2016)

Outcome and time period	Pre-period adjusted mean, BHH	Test-period adjusted mean, BHH	Regression-adjusted pre-post estimate (90% confidence interval)	Relative difference (%)	p-value
Total expenditures (PBPM) ($)					
Year One	1455.55	1555.54	99.99 (38.95, 161.04)	6.9	0.01
Year Two	1455.55	1689.11	233.56 (158.02, 309.10)	16.0	<0.001
Overall	1455.55	1614.71	159.16 (111.45, 206.87)	10.9	<0.001

BHH = behavioral health home; PBPM = per beneficiary per month.

Note:

How to interpret the findings: A *negative* value corresponds to a *decrease* in payments. A *positive* value corresponds to an increase in payments. The relative difference is the pre-post estimate as a percentage of the intervention group's baseline period adjusted mean.

Methods: An ordinary least square model was used to obtain estimates for differences in expenditures. The following sample size represent weighted period-years included in the regression model for the entire study period: (N = 23,847).

Data source: RTI analysis of Maine Medicaid data, 2011–2016

B-1.2 Supplementary Results for the Maine AC Impact Analysis

B-1.2.1 Did expenditures and utilization change for child and adult subpopulations served by the AC?

In ***Table B-1-5*** and ***Table B-1-6***, we present the results of the D-in-D regression analyses for inpatient admissions and ED visits not leading to a hospitalization for adults, respectively. We present 30 day readmissions per 1,000 discharges for adults only because the measure is for persons age 18 years and older. In ***Table B-1-7*** and ***Table B-1-8***, we present the results of the D-in-D regression analyses for total Medicaid PBPM expenditures for children and adults, respectively. We report annual regression adjusted D-in-D estimates individually for the first 2 years after the implementation of the ACs, along with an overall D-in-D estimate for both years combined. These results are summarized in ***Appendix B, Section B.3***.

Table B-1-5. Difference in the pre-post annual change in utilization for child Medicaid beneficiaries in Maine ACs relative to the comparison group, first 2 years of implementation (August 2014 through July 2016)

Outcome and time period	Pre-period adjusted mean, AC	Pre-period adjusted mean, CG	Test-period adjusted mean, AC	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value
Inpatient admissions (per 1,000 beneficiaries)							
Year One	48.7	48.9	44.4	43.5	1.0 (−2.3, 4.4)	2.1	0.60
Year Two	48.7	48.9	34.3	31.7	2.4 (−0.1, 4.8) †	4.8	0.12
Overall	48.7	48.9	38.5	38.0	1.8 (−0.2, 3.8) †	3.7	0.14
Emergency department visits not leading to hospitalization (per 1,000 beneficiaries)							
Year One	336.9	338.4	301.5	328.3	−25.3 (−39.1, −11.5)	−7.5	0.003
Year Two	336.9	338.4	323.4	333.8	−8.8 (−19.0, 1.4) †	−2.6	0.15
Overall	336.9	338.4	314.4	330.9	−15.6 (−23.9, −7.4)	−4.6	0.002

AC = Accountable Community; CG = comparison group; D-in-D = difference-in-differences.

Note:

30-day readmissions are not calculated for children given the small sample number of children eligible for the measure.

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in the rate of utilization in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in the rate of utilization in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention groups baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The probability estimates are multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries/discharges. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix B-2* for additional detail.

†The 80% confidence interval for inpatient admissions in Year Two is (0.4, 4.3) and overall is (0.3, 3.4). The 80% confidence interval for ED visits in Year Two is (−16.7, −0.9). The 80% confidence interval for inpatient admissions in Year Two is (−12.8, −1.2). Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only.

The following sample sizes represent weighted period-years included in the regression model for the entire study period: inpatient admissions and emergency department visits not leading to hospitalizations (N = 177,280).

Data source: RTI analysis of Maine Medicaid data, 2011–2016.

Table B-1-6. Difference in the pre-post annual change in utilization for adult Medicaid beneficiaries in Maine ACs relative to the comparison group, first 2 years of implementation (August 2014 through July 2016)

Outcome and time period	Pre-period adjusted mean, AC	Pre-period adjusted mean, CG	Test-period adjusted mean, AC	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
Inpatient admissions (per 1,000 beneficiaries)								218,132
Year One	145.2	138.9	148.6	136.7	5.7 (−5.4, 16.8)	3.9	0.40	
Year Two	145.2	138.9	131.0	155.1	−31.0 (−39.5, −22.5)	−21.4	<0.001	
Overall	145.2	138.9	137.8	145.3	−16.8 (−23.6, −10.0)	−11.6	<0.001	
Emergency department visits not leading to hospitalization (per 1,000 beneficiaries)								218,132
Year One	490.3	462.4	480.5	448.6	4.2 (−7.5, 15.8)	0.8	0.56	
Year Two	490.3	462.4	484.6	480.4	−23.8 (−32.5, −15.0)	−4.8	<0.001	
Overall	490.3	462.4	483.0	463.6	−13.0 (−20.0, −6.0)	−2.6	0.002	
30-day readmissions (per 1,000 beneficiaries)								44,857
Year One	136.0	133.1	163.4	153.4	6.7 (−14.8, 28.2)	4.9	0.61	
Year Two	136.0	133.1	161.8	155.8	2.5 (−19.1, 24.1)	1.8	0.85	
Overall	136.0	133.1	162.5	154.5	4.3 (−11.1, 19.7)	3.1	0.65	

AC = Accountable Community; CG = comparison group; D-in-D = difference-in-differences.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in the rate of utilization in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in the rate of utilization in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention groups baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The probability estimates are multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries/discharges. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix B-2* for additional detail.

The following sample sizes represent weighted person-years included in the regression model for the entire study period: inpatient admissions and emergency department visits not leading to hospitalizations (N = 218,132) and 30-day readmissions (N = 44,857).

Data source: RTI analysis of Maine Medicaid data, 2011–2016.

Table B-1-7. Difference in the pre-post annual change in total PBPM expenditures for child Medicaid beneficiaries in Maine ACs relative to the comparison group, first 2 years of implementation (August 2014 through July 2016)

Outcome and time period	Pre-period adjusted mean, AC	Pre-period adjusted mean, CG	Test-period adjusted mean, AC	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value
Total expenditures (PBPM) ($)							
Year One	365.91	359.58	371.92	376.55	−10.97 (−27.29, 5.34)	−3.0	0.27
Year Two	365.91	359.58	388.86	411.48	−28.96 (−51.38, −6.54)	−7.9	0.03
Overall	365.91	359.58	381.86	392.77	−21.54 (−36.32, −6.75)	−5.9	0.02

AC = Accountable Community; CG = comparison group; D-in-D = difference-in-differences; PBPM = per beneficiary per month.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in expenditures in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in expenditures in the intervention group relative to the comparison group. The regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. The relative difference is the D-in-D estimate as a percentage of the intervention groups baseline period adjusted mean.

Methods: An ordinary least square model was used to obtain estimates for differences in expenditures. The year-specific regression-adjusted D-in-D may not match the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights across these figures. See *Sub-appendix B-2* for additional detail.

The following sample size represent weighted period-years included in the regression model for the entire study period: total expenditures (N = 177,280).

Data source: RTI analysis of Maine Medicaid data, 2011–2016.

Table B-1-8. Difference in the pre-post annual change in total PBPM expenditures for adult Medicaid beneficiaries in Maine ACs relative to the comparison group, first 2 years of implementation (August 2014 through July 2016)

Outcome and time period	Pre-period adjusted mean, AC	Pre-period adjusted mean, CG	Test-period adjusted mean, AC	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value
Total expenditures (PBPM) ($)							
Year One	943.88	959.03	1055.25	956.10	114.37 (6.17, 222.57)	12.1	0.08
Year Two	943.88	959.03	1000.97	1037.08	−20.88 (−76.25, 34.49)	−2.2	0.53
Overall	943.88	959.03	1021.94	994.18	31.37 (−22.50, 85.24)	3.3	0.34

AC = Accountable Community; CG = comparison group; D-in-D = difference-in-differences; PBPM = per beneficiary per month.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in expenditures in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in expenditures in the intervention group relative to the comparison group. The regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. The relative difference is the D-in-D estimate as a percentage of the intervention groups baseline period adjusted mean.

Methods: An ordinary least square model was used to obtain estimates for differences in expenditures. The year-specific regression-adjusted D-in-D may not match the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights across these figures. See *Sub-appendix B-2* for additional detail.

The following sample size represent weighted period-years included in the regression model for the entire study period: total expenditures (N = 218,132).

Data source: RTI analysis of Maine Medicaid data, 2011–2016.

B-1.2.2 Did expenditures and utilization change for each AC?

The primary analysis examined the impact of the AC program across all four ACs combined. However, the number of unique individuals enrolled in each AC differed. One AC had large enrollment, so findings from the combined analysis reflect, in part, the findings from this one AC. To assess whether other ACs had different findings that were masked by the combined analysis, we conducted a sensitivity analysis to examine the impact of each AC relative to the full comparison group.[67] These results are summarized in ***Appendix B, Section B.3***. At the time of this analysis, MaineCare did not publicly disclose AC-specific performance, so we de-identified each AC when presenting results. We examined four key

[67] We ran four separate models for each study outcome, comparing each AC to the full comparison group. For example, the overall model (combining the two post period years) for AC: D included 2,354 enrollees and 89,037 comparison group enrollees. The model for AC: A included 37,303 enrollees and 89,307 comparison group enrollees.

outcomes, and we present the results of the D-in-D regression analyses for total Medicaid PBPM expenditures, acute inpatient admission, ED visits, and 30-day readmissions in ***Table B-1-9***.

Table B-1-9. Difference in the pre-post annual change in utilization and expenditures for Medicaid beneficiaries in each Maine AC relative to the comparison group, first 2 years of implementation (August 2014 through July 2016)

Outcome	AC: A	AC: B	AC: C	AC: D[1]
Inpatient admissions (per 1,000 beneficiaries)				
Year One	6.5 (0.36)	−4.0 (0.22)	−24.9* (<0.001)	−0.5 (0.86)
Year Two	−9.3* (0.01)	−16.6* (<0.001)	−37.8* (<0.001)	−9.4* (<0.001)
Overall	−4.1 (0.23)	−10.1* (<0.001)	−31.3* (<0.001)	−5.0* (0.001)
Emergency department visits not leading to hospitalization (per 1,000 beneficiaries)				
Year One	−30.8* (0.004)	9.1 (0.16)	1.7 (0.88)	10.3* (0.01)
Year Two	−10.0 (0.12)	−33.9* (<0.001)	−36.1* (<0.001)	−3.9 (0.20)
Overall	−16.8* (0.003)	−11.9* (0.004)	−17.1 (0.02)	3.1 (0.23)
30-day readmissions (per 1,000 beneficiaries)				
Year One	76.4* (0.001)	−11.0 (0.70)	−21.1 (0.61)	–
Year Two	22.5 (0.35)	−15.9 (0.68)	−0.30 (0.99)	–
Overall	44.7* (0.01)	−13.2 (0.57)	−13.1 (0.65)	–
Total expenditures (PBPM) ($)				
Year One	143.10* (0.08)	12.62 (0.52)	−17.67 (0.47)	−28.94* (<0.001)
Year Two	−33.37 (0.18)	−10.49 (0.61)	−6.58 (0.83)	30.73* (0.01)
Overall	24.41 (0.44)	1.37 (0.92)	−12.16 (0.54)	1.13 (0.87)

AC = Accountable Community.

[1] The 30-day inpatient readmission regression model for AC: D did not converge because of small sample size.

* The difference-in-differences estimate is statistically significant at 90%.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in expenditures or in the rate of utilization in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in expenditures or in the rate of utilization in the intervention group relative to the comparison group.

(continued)

Table B-1-9. Difference in the pre-post annual change in utilization and expenditures for Medicaid beneficiaries in each Maine AC relative to the comparison group, first 2 years of implementation (August 2014 through July 2016) (continued)

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The probability estimates are multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries/discharges. An ordinary least square model was used to obtain estimates for differences in expenditures.

The following sample sizes represent weighted period-years included in the regression model for the entire study period for AC: D: total expenditures, inpatient admissions, emergency department visits not leading to hospitalizations (N = 203,592). The following sample sizes represent weighted period-years included in the regression model for the entire study period for AC: A: total expenditures, inpatient admissions, emergency department visits not leading to hospitalizations (N = 312,365); 30-day readmissions (N = 28,677). The following sample sizes represent weighted period-years included in the regression model for the entire study period for AC: B: total expenditures, inpatient admissions, emergency department visits not leading to hospitalizations (N = 246,992); 30-day readmissions (N = 24,247). The following sample sizes represent weighted period-years included in the regression model for the entire study period for AC: C: total expenditures, inpatient admissions, emergency department visits not leading to hospitalizations (N = 219,808); 30-day readmissions (N = 23,053).

Data source: RTI analysis of Maine Medicaid data, 2011–2016.

All ACs were trending toward less use of high-cost services, except for hospital readmissions, and each AC had not yet experienced a statistically significant change in total expenditures relative to the comparison group. Sensitivity results reveal some variation in outcomes by AC type:

- Three of the ACs experienced statistically significant declines in acute **inpatient admissions** relative to the comparison group, with similar non-significant declining trends among AC: A.
- **ED visits** were significantly declining for three of the ACs, however there were nonsignificant increases among AC: D enrollees.
- For **30-day readmissions**, only AC: A had statistically significant changes, showing large increases relative to the comparison group. Both AC: B and AC: C showed declining trends in 30-day readmission; however, these were not statistically significant.
- **Total Medicaid expenditures** were increasing (not statistically significant) for three ACs: A, B, and D; AC: C experienced a decrease in expenditures (not statistically significant).
- Most ACs saw reductions in inpatient admissions and ED visits and increases in total Medicaid expenditures, which is similar to the findings when all ACs were combined in the full study sample.
- AC:A's increased readmissions were similar to the overall findings that combined all ACs into the full study sample.

B-1.3 Maine Population-level Health Status Measures, 2013–2016

The Behavioral Risk Factor Surveillance System (BRFSS) is a state-based survey conducted annually by state health departments, guided by the Centers for Disease Control and Prevention (CDC). The survey is used to collect data from U.S. residents 18 and older and older regarding health insurance coverage, health risk behaviors, health status and preventive health practices. The data summarized here provide some context to trends in the health of Maine's population during the time of the SIM Initiative, but which were unlikely to have been affected by Maine's SIM Initiative activities. Because these survey data draw from all low-income adults age 18–64 in the state, these trends illustrate the context in which health care providers participating in Maine Medicaid's delivery system and payment models are working. More detail on the methods used is available in ***Appendix G***.

Table B-1-10 summarizes BRFSS data for the time period of the SIM Initiative (2013 and 2016) and for low-income, non-aged adults. We chose to look specifically at low-income, non-aged adults because the Maine SIM Initiative made changes to payment models in Medicaid, which serves a portion of this population. In general, there are only small (and generally statistically insignificant) changes in health-related measures of interest. Statistically significant differences between 2013 and 2016 included the following:

- A 6.5 percentage point increase in the proportion of the low-income adult population reporting poor mental health in the last 30 days (from 48.5% in 2013 to 55.0% in 2016).
- A 5.4 percentage point increase in the proportion reporting any days of 'not good' physical health in the last 30 days.
- A 0.9-day increase in the number of days physical health was not good in last 30 days.

This comparison of changes between 2013 and 2016 controls for the following individual and family characteristics: sex, age, race and ethnicity, educational attainment, marital status, family and household size, employment status, family income, and home ownership). We did not control for health insurance status in these analyses, and the change in health insurance status was not statistically significant for this population in Maine during this time period, despite the Health Insurance Marketplace available beginning in 2014.

Table B-1-10. Regression-adjusted changes in population health for low-income adults 18 to 64 in Maine, 2013–2016

Measure	2013	2016	2016–2013 Difference
Self-reported health status is fair or poor	20.3%	22.7%	2.4
Any days physical health was not good in last 30 days	45.5%	50.9%	5.4**
Number of days physical health was not good in last 30 days	5.3	6.2	0.9*
Any days mental health was not good in last 30 days	48.5%	55.0%	6.5**
Number of days mental health was not good in last 30 days	6.5	7.2	0.7
Ever diagnosed with diabetes	7.8%	7.7%	−0.1
Is obese	28.2%	31.6%	3.5
Current smoker	34.2%	34.5%	0.3
Current smoker who has not tried to quit in last year	12.7%	14.2%	1.5
Does not have health insurance	20.3%	17.5%	−2.8
Does not have a personal doctor	20.5%	17.9%	−2.6
Did not have a routine checkup in the past year	36.1%	34.9%	−1.1
Did not have a dental visit in the past year[a]	51.4%	48.5%	−2.9

Source: 2013–2016 BRFSS

Note: Low-income is defined as income at or below 138% of the federal poverty level. The sample size is 1,579 for 2013, 1,748 for 2016, and 6,508 for the 2013–2016 period.

[a] Information on dental visits is not available for 2013; the 2014 measure is used instead.

*/** Significantly different from zero at the 0.10/0.05 level, two-tailed test.

B-1.4 Maine Statewide Claims-based Measures

The data summarized here provide some context to trends in the health care utilization and expenditures of Maine's Medicaid and Medicare populations relative to similar populations in other states during the time of the SIM Initiative. Under the SIM Initiative, Maine implemented two Medicaid payment and delivery models: Accountable Communities (ACs) starting in August 2014, and Behavioral Health Homes (BHHs) starting in April 2015. Moreover, the BHH model built on a pre-existing patient centered medical home model in Maine, the Health Home (HH) model. By the end of the SIM Initiative, the BHH, HH and AC models reached 4, 18, and 20 percent of the state's Medicaid population, respectively, but only the HH model was implemented for the entire post-period for analysis presented in this section. The commercially insured and Medicare populations were not a targeted population for any of Maine's SIM Initiative activities, however, some Medicaid-Medicare beneficiaries were included in Maine's BHH, HH, and AC models.

We present findings on changes in outcomes for the statewide Medicaid population using Maine Medicaid data obtained from the state and comparison group data obtained from the

Medicaid Analytic eXtract (MAX) files and for the Medicare population using Medicare fee-for-service (FFS) claims. We present the statewide data for the Medicare population for context, but we do not present any data for the commercially insured population in Maine. Because the claims data used in these analyses include only one year of Medicaid data after the start of the SIM Initiative, and the reach of the BHH, HH, and AC models within the Medicaid population was limited, these trends are not influenced by the SIM payment and delivery models in Maine. However, these trends illustrate the context in which health care providers participating in delivery system and payment models are working and what changes were occurring in health care use and expenditures for Medicaid and Medicare beneficiaries in the state during the SIM Initiative.

We summarize the findings from D-in-D analyses that compared outcomes for Maine relative to the comparison group from three years prior (October 2011 to September 2013) to one year after (October 2013 to September 2014) the SIM Initiative started for the Medicaid population and for the three years after (October 2013 to September 2016) for the Medicare population. We used claims data to derive the following annual outcomes:

- **Care coordination**
  - Percentage of beneficiaries with any physician visits (broken out by primary care and specialty care providers for Medicare)
  - Percentage of mental illness–related acute inpatient hospital admissions with a mental health follow-up visit within 7 days and 30 days
  - Percentage of acute admissions with a follow-up visit within 14 days
- **Utilization**
  - Inpatient admissions per 1,000 persons
  - ED visits per 1,000 persons
  - 30-day readmissions per 1,000 discharges
- **Total per member per month (PMPM) expenditures**
- **Quality of care**
  - Rate of hospitalizations for ambulatory care sensitive conditions
  - Flu immunization rates
  - Breast cancer screening rates
  - Well-child visit rates
    - Number by 15 months of age and any for children age 3 to 6 years
  - Initiation and engagement of alcohol and other drug-related treatment
  - Asthma medication management

- Depression medication management
- Tobacco screening rates (for Medicare only)

Because of inherent differences in utilization patterns, we examined rates of inpatient admissions, ED visits, and 30-day readmissions along with total expenditures separately for child and adult Medicaid beneficiaries. We also examined these core outcomes separately for Medicare beneficiaries dually enrolled in Medicare and Medicaid and those enrolled in Medicare only. In addition, we examined inpatient admission and ED visit rates (all cause and behavioral health related) and expenditures (total and behavioral health related) separately for Medicaid beneficiaries with behavioral health conditions because this high-risk group may use more health care than the overall population. Detailed methods on these analyses are presented in ***Appendix G***.

B-1.4.1 Trends for the Maine Medicaid population, 2011–2014

Because MAX files were not available for Maine, we used Maine Medicaid data from the state. These data contain enrollment and claims data for all Maine Medicaid beneficiaries. We used MAX files made available through the CCW enclave for Maine's comparison group (Connecticut and Michigan). The MAX data contains all the enrollment and claims information for every Medicaid beneficiary in the state. Because beneficiaries dually enrolled in Medicare and Medicaid do not have complete utilization or expenditure data in the Medicaid claims, we report care coordination, utilization, and quality outcomes for beneficiaries enrolled in Medicaid only. We report the total expenditures for beneficiaries dually enrolled in Medicare and Medicaid and those only enrolled in Medicaid separately.

In general, the findings for care coordination, utilization, expenditure, and quality of care outcomes for the Medicaid beneficiaries in Maine were mixed. By 2014, key statistically significant changes for Maine Medicaid beneficiaries relative to the comparison group include:

- **The likelihood of having a physician visit declined for the overall, child and adult populations.** However, there was some evidence of improved primary care use as the percentage of **children age 3 to 6 years of age with any well-child visits in the year increased.**
- **Care coordination, as measured by rates of follow-up within 14 days after a hospitalization, declined.**
- Inpatient hospital utilization results were generally not in line with the goals of the SIM Initiative. **Inpatient hospital admission rates increased** for the overall, child and adult populations. Likewise, **rates of admissions for ambulatory care sensitive conditions increased for adults**. In contrast, **the overall 30-day readmission rate declined**, driven by a decline for the adult population.
- In contrast to the inpatient utilization findings, **ED visit rates declined** for the overall, child, and adult populations.

- There were few changes in quality outcomes, but the few **quality of care findings were mixed.** Breast cancer screening rates improved. Even so, the rate of flu immunizations and engagement of alcohol and other drug treatment declined.
- **There was no difference in the change in total expenditures.**
- Among beneficiaries with behavioral health conditions, we found similar findings to the overall population. **Behavioral health related inpatient hospital admission rates increased** while **all cause outpatient ED visits declined.** However, there was no difference in the change in the rate of all cause inpatient admissions or behaviorally health related ED visits. Unlike the full population, **total expenditures** and **behavioral health related expenditures declined.**

B-1.4.2 Trends for the Maine Medicare population, 2011–2016

We used Medicare claims and enrollment data from the CCW. These data include complete enrollment and claims data for Medicare fee-for-service beneficiaries for Maine and its comparison group (New Hampshire, Rhode Island, and Connecticut). Although these analyses use the SIM implementation date to divide the analysis period into a pre- and post-period, these findings are not intended to represent estimates of SIM Initiative impacts because the Medicare population was, at most, only incidentally affected by SIM Initiative-related activities.

The overall estimated changes in care coordination, utilization, and quality of care outcomes for the Medicare beneficiaries in Maine were generally not in line with the goals of the SIM Initiative, although total expenditures did decline. By 2016, key statistically significant changes for Maine Medicare beneficiaries relative to the comparison group include the following:

- The likelihood of a physician visit changed in the undesired direction—that is, **the likelihood of a visit to a primary care provider declined while the likelihood of a visit to a specialty care provider increased.**
- **Care coordination**, as measured by the percentage of admissions with a follow-up visit within 14 days, **declined**.
- **Inpatient and outpatient hospital utilization increased.** Inpatient admission rates and ED visit rates increased for the overall population and for beneficiaries who were and who were not dually enrolled in Medicare and Medicaid. Likewise, the overall **rate of admissions for ambulatory care sensitive conditions increased.**
- **Quality of care**, as measured by breast cancer screening and flu immunization rates, **declined**. Even so, the tobacco screening rate improved.
- Despite relative increases in avoidable and more expensive types of utilization, **total expenditures declined.**

Appendix C: Massachusetts SIM Initiative Progress and Findings

Massachusetts SIM Initiative

Award
$44 million

Period of performance
October 1, 2013 – April 14, 2018

Pre-SIM Landscape

Health Insurance Individual Mandate
State residents required to have a minimum level of insurance coverage in 2006; those earning <150 percent FPL are eligible for free insurance.

PCMH Model ❖
Medicaid participated in 46 PCMH sites between 2011 and 2014.

APM Legislation
The State enacted legislation in 2012 to control health spending and expand APMs.

Commercial Insurer Activity in APMs
FFS was the primary payment method, but some private payers reported high provider participation in APMs.

Health Information Exchange
The statewide health information exchange, Mass HIway, launched in 2012.

Strategies

Symbols represent strategies that build on efforts that pre-date SIM.

Develop Primary Care Payment Reform Initiative ❖
Massachusetts Medicaid (MassHealth) built on prior multi-payer PCMH initiative to increase providers' accountability for total cost of care under PCPRI, 2014-2016.

Establish ACO model
In 2016, the State piloted a Primary Care ACO model among Medicaid beneficiaries. In 2018, MassHealth expanded to three ACO model types and contracted with 17 ACOs.

Create e-Referral system
Massachusetts created a bidirectional electronic referral system to facilitate referrals from primary care to community resources who then send feedback to primary care.

Develop community LTSS partnerships
As part of the ACO model, MassHealth procured behavioral health and LTSS partners to ensure specialized patients receive appropriate community-based care.

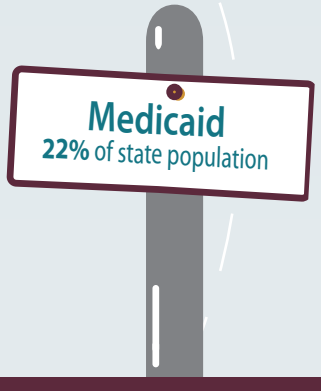
Expand Massachusetts Child Psychiatry Access Project
The SIM Initiative award helped expand behavioral health consultation services to pediatricians and perinatal providers statewide to support children and postpartum mothers.

Reach

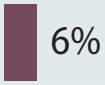
as of March 2018

More than half (56%) of Massachusetts' total Medicaid population was served by ACOs.

Accountable Care Strategy



Primary Care Payment Reform Initiative



ACO = accountable care organization; APM = alternative payment method; FFS = fee-for-service; FPL = federal poverty level; LTSS= long term services and supports; PCMH = patient-centered medical home; PCPRI = Primary Care Payment Reform Initiative

Target Impact of ACO Model

PCPRI increased access to behavioral health providers and gave providers experience with alternative payment models prior to joining the full scale ACO, but did not lead to improvements in outcomes.

Goals

Better Care Coordination

The Community Partner model leverages capacity of behavioral health and LTSS providers to coordinate care for individuals with SMI and LTSS needs. Community Partners receive care coordination payments and funding to support infrastructure such as connection to Mass Hlway and care coordination IT systems. The state requires ACOs to contract and work with the Community Partners within their service areas.

Increased Quality of Care

ACOs are held financially accountable for their attributed patients' performance on a set of 23 quality measures, including breast cancer screening rates and antidepressant medication management, with the goal of improving quality of care.

Appropriate Utilization of Services

Participating providers are also held financially accountable for their attributed patients' health care utilization with the goal of reducing unnecessary utilization. MassHealth provides quarterly reports to the ACOs with information on their highest utilizers to aid ACOs in managing utilization rates.

Lower Total Spending

The ACO model's focus on appropriate, high quality, coordinated care is aimed at controlling system-wide costs. Given the targeted focus of care coordination efforts, ACOs reported expected reductions in mental health and substance use disorder-related expenditures in the long-term.

Improved Population Health

The state is planning to build capacity within providers aimed at addressing social determinants of health, such as housing and employment.

Lessons Learned

- ☑ The State's iterative approach to delivery and payment reform allowed for continued learning and model enhancements based on lessons learned.
- ☑ Massachusetts state leadership found high value in the flexibility of the SIM funding.
- ☑ The ACO pilot allowed Massachusetts to address operational challenges before full implementation, and served as an opportunity to create trust among providers.
- ☑ Success of the e-Referral system was dependent on the system's technological capabilities as well as availability of affordable services for patients by the Community Partners.

ACO = accountable care organization; LTSS = long-term services and supports; PCPRI = Primary Care Payment Reform Initiative; SMI = serious mental illness

C.1 Massachusetts' SIM Initiative, 2013–2018

Massachusetts' SIM Initiative test period ran from October 1, 2013, to April 14, 2018.[68] At the start, SIM Initiative leaders intended to use the SIM award to reduce overall health care costs while ensuring accessible, quality, affordable health care for residents. To accomplish its goals, the state focused its SIM Initiative efforts on redesigning the health care system to become an integrated model to deliver higher quality, person-centered care; payment reform that aligns payment methods with desired outcomes; enhancing health information technology (health IT) infrastructure; and promoting consumer engagement in wellness and chronic care.

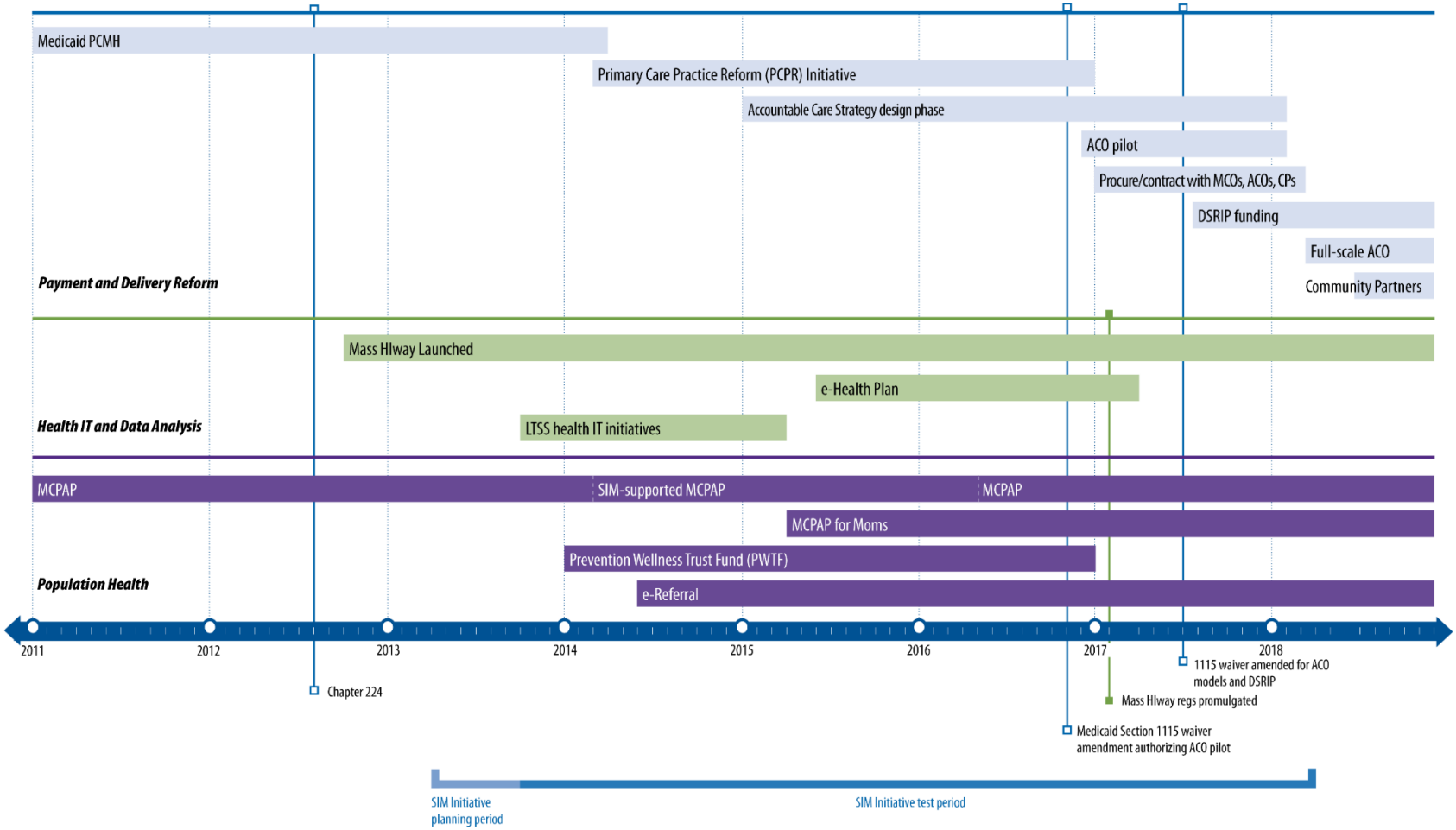
In 2015 MassHealth, the Massachusetts Medicaid agency, began shifting from its initial payment and delivery reform initiative, the Primary Care Payment Reform Initiative (PCPRI), to the Accountable Care Strategy (ACS). The initial strategy, PCPRI, engaged primary care practices that were held responsible for the total cost of care (TCOC) of their attributed members (i.e., Massachusetts Medicaid beneficiaries). The ACS—whose major components were (1) an accountable care organization (ACO) model, and (2) Community Partners (CPs), a strategy to use community organizations to coordinate care for patients with long-term services and supports (LTSS) and behavioral health needs—focused on controlling TCOC while improving quality and member experience but included a wider array of providers outside primary care. The ACO model had three variants (Accountable Care Partnership Plan, Primary Care ACO, and MCO-Administered ACO) that differed somewhat in their partnership structure, membership restrictions, and risk sharing.

MassHealth launched a pilot test of the Primary Care ACO ("Pilot ACO") in December 2016—serving 160,000 Medicaid beneficiaries—while concurrently procuring ACOs for the full-scale launch (Full ACO) in March 2018, to serve approximately 850,000 beneficiaries. The Massachusetts SIM Initiative also supported additional investments to complement the ACS. These included initiatives to increase use of the state's health information exchange (HIE) for sharing records among providers; behavioral health integration with primary care through the Massachusetts Child Psychiatry Access Project (MCPAP) and MCPAP for Moms; and expansion of e-Referral, an electronic service to facilitate referrals by primary care clinicians to community services.

This section describes the evolution of Massachusetts' SIM Initiative, beginning with a timeline depicting major health care delivery and payment transformation activities and policies as they pertain to the SIM Initiative (see ***Exhibit C-1***). An overview of the health policy environment in Massachusetts leading up to the SIM Initiative begins the discussion. The section

[68] The SIM Initiative award began with a 6-month planning period, April to September 2013. Massachusetts received a no-cost extension to its original 3-year test period, from October 2016 to April 2018.

Figure C-1. Highlights from Massachusetts health care system transformation before, during, and after the SIM Initiative



ACO = accountable care organization; CPs = Community Partners; DSRIP = Delivery System Reform Incentive Program; IT = information technology; LTSS = long-term services and supports; MCOs = managed care organizations; MCPAP = Massachusetts Child Psychiatry Access Project; PCMH = patient-centered medical home.

goes on to describe major activities under the SIM Initiative, followed by a review of the successes, challenges, and lessons learned during the test period. The section ends with a look forward to issues of sustainability and further progress in Massachusetts' health system transformation. ***Section C.2*** gives a more detailed description of state officials' and other stakeholders' perspectives of the ACS as observed in January 2018.

C.1.1 Setting the stage for the SIM Initiative in Massachusetts

Prior to the SIM Initiative, Massachusetts had a long history of investing in its health care programs and seeking opportunities to leverage federal funding to support its goals of providing residents with quality, affordable health coverage. A prime example of Massachusetts' commitment to health is the 2006 state reform initiative. That reform expanded Medicaid coverage and also created the nation's first Health Insurance Exchange to offer insurance premium subsidies to individuals within a certain income range. This initiative was supported with some state funds, but also through crafting and gaining approval for a Medicaid Section 1115 demonstration waiver that allowed the state to target its federal Medicaid matching dollars toward an expanded population. As a result, Massachusetts was successful in reducing its uninsured rate because more individuals were able to enroll in subsidized coverage. With enactment of the Affordable Care Act, the state's covered population was projected to grow even greater and finding opportunities to tame health care costs while providing quality care became increasingly important. The state's Executive Office of Health and Human Services (EOHHS) identified Medicaid enrollment as a primary driver of spending growth, which increased by 30 percent from 2007 to 2012 (when the state passed a law to address health care cost) and continued to climb as enrollment increased (Blue Cross Blue Shield of Massachusetts Foundation, 2012).

Patient-centered medical homes (PCMHs). The Massachusetts Medicaid program, known as MassHealth, collaborated with other payers to design and implement the PCMH Initiative aimed at supporting primary care practice transformation across the state. This 3-year demonstration ran from 2011 to 2014, with 46 practice sites participating. Payers included Medicaid managed care organizations (MCOs) and Medicaid's Primary Care Clinician (PCC) Plan, state employee plans, and some private payers. The payment model selected by most practices included per member per month payments for medical home activities and clinical care management, shared savings, and startup infrastructure payments (EOHHS, 2012).

Although the PCMH Initiative included Medicaid managed care (MCOs and the PCC), MassHealth lagged behind other payers in implementation of alternative payment methods; in 2012, 83 percent of beneficiaries in Medicaid managed care received services under fee-for-service (FFS) arrangements (EOHHS, 2012). In the commercial market, payers were contracting with provider organizations to assume accountability for TCOC through initiatives such as Blue Cross Blue Shield of Massachusetts' Alternative Quality Contract, which was implemented in

2009 on a voluntary basis for providers. Providers also participated in CMS initiatives such as the Medicare Shared Savings Program and the Pioneer ACO Model (EOHHS, 2012).

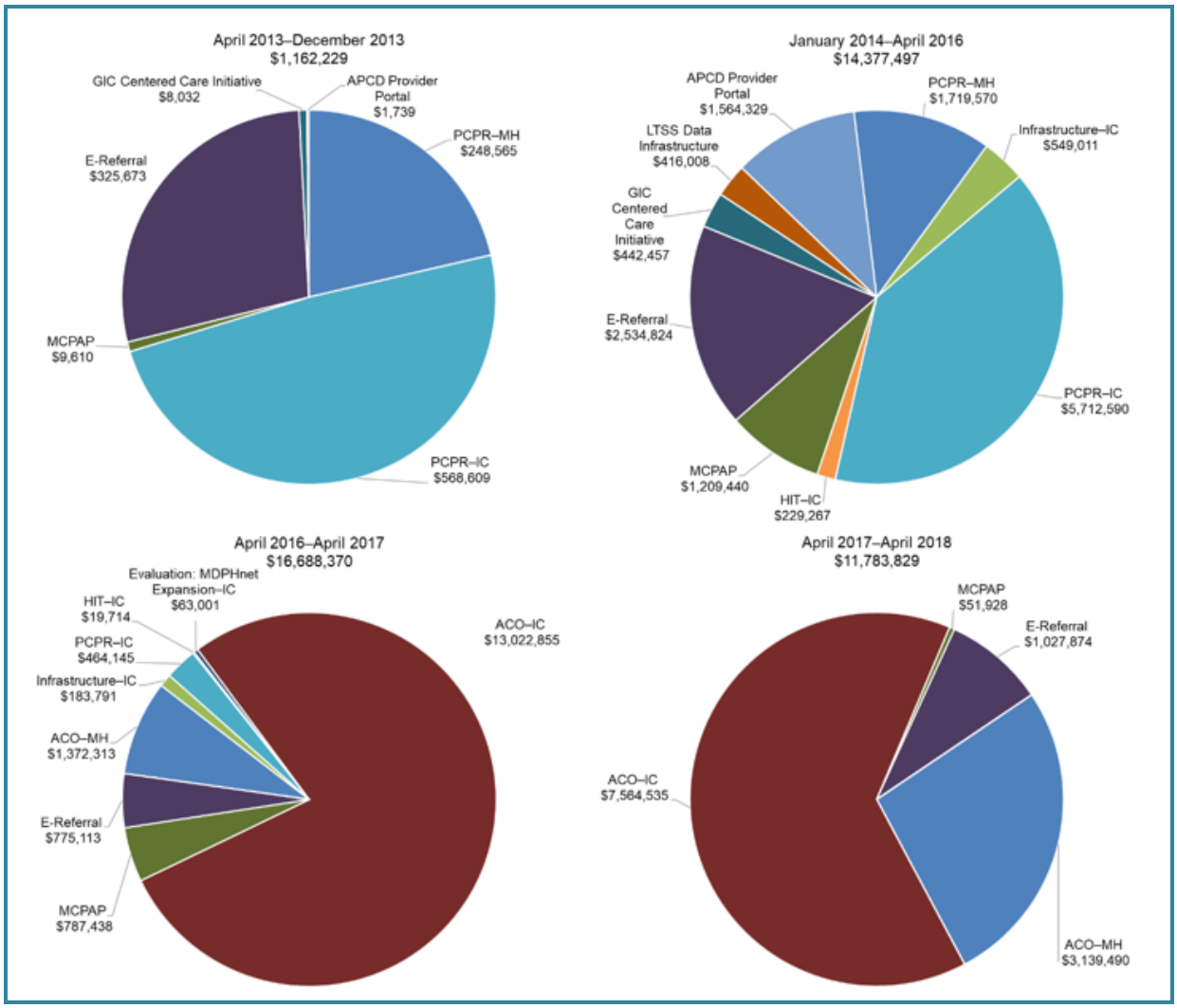
Chapter 224. In 2012 state legislation (Chapter 224 of the Acts of 2012) was enacted to provide a framework to control health care spending by setting spending benchmarks—requiring alternative payment models, expanding use of health IT, and improving population health. Chapter 224 also added new policy levers to help achieve its goals, including establishment of two new state agencies—the Health Policy Commission (HPC) and the Center for Health Information and Analysis (CHIA)—charged with (1) monitoring and enforcing health care cost trends, price variation, and cost growth at individual health care entities; and (2) scrutinizing health care market power. For MassHealth, the law set an ambitious goal, requiring that 80 percent of Medicaid beneficiaries receive care under alternative payment contracts by July 1, 2015 (Blue Cross Blue Shield of Massachusetts Foundation, 2012).

Another Chapter 224 provision mandated that all providers have interoperable electronic health record (EHR) systems connected to the state's HIE by January 1, 2017. The law moved governance of the HIE, known as the Mass HIway, to EOHHS from another state agency and provided funding to help providers adopt EHR systems and fund state agency efforts to implement provisions of the law (Blue Cross Blue Shield of Massachusetts Foundation, 2012, pp.11–12). Even before passage of Chapter 224, EOHHS made infrastructure and capacity-building grants to hospitals and other providers to finance changes to support delivery system reform, including implementation of health IT.

C.1.2 Major activities fully or partially supported by SIM funding

Massachusetts received a Round 1 SIM Initiative Model Test award of up to $44 million, which helped fund efforts that evolved throughout the test period in support of the state's vision to control costs and invest in technology to better integrate care. Although its prior efforts to change health care delivery and payment used a multi-payer approach, the state focused SIM Initiative resources on accelerating change in Medicaid, which lagged behind other payers in development of alternative payment strategies. There was an effort to coordinate the ACS with other payers in the state through quality metric alignment with all Health Policy Commission-certified ACOs. The state's investments in other supporting infrastructure focused on improving data sharing and connecting primary care physicians with community resources. ***Figure C-2*** shows the categories of funding during different periods of the SIM award in Massachusetts. The majority of funds were spent on independent contractors over the period, and the dominant funding area shifted from PCPRI to ACO after April 2016.

Figure C-2. Massachusetts SIM award spending April 2013–April 2018



"—IC" = independent contractor expenditures; "—MH" = MassHealth expenditures; ACO = accountable care organization; APCD = all-payer claims database; E-Referral = electronic referral; GIC = Group Insurance Commission; HIT = health IT; LTSS = long-term services and supports; MCPAP = Massachusetts Child Psychiatry Access Program; MDPHnet = a disease surveillance and distributed health data analytics software system; PCPR = Primary Care Payment Reform Initiative. Dollar amounts may not sum to total because of rounding.

MassHealth took the lead in managing the SIM Initiative activities, under the direction of EOHHS, and devoted a significant share of SIM Initiative funding to redesigning the Medicaid delivery and payment systems. Because parts of the state's plans for these delivery and payment models relied on integration of behavioral health and LTSS to provide quality, person-centered care while addressing cost, MassHealth considered the Departments of Mental Health and Elder Affairs, and HPC and CHIA, to be strategic implementation partners. Legal and technology partners also provided critical support (EOHHS, 2013). Throughout the SIM test period, MassHealth played a combination of roles that included designer of the reforms, payer, purchaser, funder, and convener of multiple groups of stakeholders to solicit input on reforms. In partnership with sister agencies, MassHealth also required certain certifications for providers to participate in reforms implemented throughout the SIM Initiative.

Massachusetts also pursued additional federal funding opportunities during its SIM test period—most significantly renewal of its Medicaid Section 1115 demonstration waiver, which includes a Delivery System Reform Incentive Program (DSRIP) protocol (EOHHS, 2017b). Approval of this waiver in November 2016 secured Massachusetts an additional $1.8 billion over 5 years in funding to support its ACS—the new model the SIM Initiative introduced in 2015, with a Medicaid ACO structure and CPs to coordinate care for members with complex behavioral health and LTSS needs. The waiver also provided an additional $6 billion for safety-net hospitals providing services to the uninsured.

Brief descriptions of major activities fully or partially funded by the SIM Initiative follow, beginning with delivery system and payment models and the specific infrastructure supporting model participants, followed by activities that reached providers statewide.

Primary Care Payment Reform Initiative. As noted previously, prior to the ACS, Massachusetts began the SIM Initiative implementing PCPRI as the primary program to advance the payment reform strategy in the state. PCPRI was designed to transform primary care payment to an alternative payment strategy while advancing behavioral health integration in the primary care setting. PCPRI was designed in collaboration with stakeholders and built on the state's successful multi-payer PCMH Initiative.

The PCPRI model paid providers through risk-adjusted capitation payments for primary care services and care coordination, with approximately one-third of providers opting to including behavioral health services in the capitation. Providers were eligible for shared savings payments based on their panels' TCOC and were paid incentives for reporting and performance on quality measures. PCPRI contracts included practice transformation milestones, and the capitation payments provided flexible funding for providers to implement changes such as care coordination, expanding care teams, and expanded hours. Technical assistance was also provided to assist providers in achieving the milestones.

State officials expected PCPRI to have a broad impact through voluntary participation of the six MassHealth MCOs, primary care providers (PCPs) in their networks, and providers in the PCC Plan administered by MassHealth. All non-institutionalized Medicaid beneficiaries under age 65 were enrolled in either an MCO or the PCC Plan unless they had other coverage.

Box 1: PCPRI promoted integration of behavioral health in primary care sites

Several levers were used to promote integration—contract milestones, practice transformation technical assistance, and the payment model:

- Milestones included on-site behavioral health providers, routine screening of patients for behavioral health conditions, and scheduling of behavioral health appointments within 14 days.
- The practice transformation vendor helped providers achieve behavioral health milestones, including coaching by a behavioral health clinician with practice experience in a primary care setting.
- Capitation payments provided flexible financing to expand care teams, and providers could opt to have behavioral health services included in their capitation payments.

PCPRI was launched in March 2014 but participation fell far short of the program's goals. Twenty-eight provider organizations participated, with a total of 62 sites. At its peak, approximately 90,000 Medicaid beneficiaries were covered, accounting for only 6 percent of the Medicaid population in May 2016. The major factor in low provider participation was that none of the MassHealth MCOs participated. Plans cited several concurrent issues that diverted their attention from PCPRI, including procurement for MassHealth MCO contracts, problems with the state's health insurance marketplace (known as the Massachusetts Health Connector), and issues with very high-priced pharmaceuticals. Plans also expressed concerns about the payment model's complexity and the lack of claims history for many potential enrollees. As an additional challenge, state officials pointed to the departure of key EOHHS leaders during 2013, ahead of the 2014 gubernatorial election.

For providers, the absence of MCO participation and PCPRI's prescriptive design were key factors in decisions about participation. Providers needed to implement large-scale changes to achieve PCPRI milestones, but capitation payments and shared savings only applied to the PCC-covered Medicaid patients in their panels. Some providers also said they preferred an ACO approach because accountability is shared with hospitals.

PCPRI operated from March 2014 through December 2016 with two provider organizations opting to add additional practice sites in the second year of the program. For the third year, the program did not permit additional organizations or sites to be added. Although provider participation and the number of covered lives remained lower than expected throughout its operating period, PCPRI had a positive impact, according to state officials, who noted that PCPRI participation helped prepare providers to participate in the ACOs developed under the new ACS strategy and intended to accelerate alternative payment adoption. These ACOs also

increased integration of behavioral health into primary care settings and enabled providers to expand their care teams.

Resetting the MassHealth payment and delivery strategy. In March 2015, EOHHS announced plans to reset its MassHealth payment and delivery reform strategy and to develop and implement statewide an ACO model—the new ACS—that would achieve the goals set by Chapter 224. EOHHS had already begun development of a MassHealth ACO model with support from its SIM award, including convening a technical advisory group and requesting stakeholder input through a Request for Information in the fall of 2014, activities that generated considerable stakeholder interest. A new governor was elected in November 2014, and new EOHHS and MassHealth directors were appointed in early 2015. State officials said the new leadership was supportive of the reset.

Accountable Care Strategy. After its March 2015 announcement of the new direction, the state moved quickly to engage stakeholders and begin building support for the ACS. During spring 2015, Massachusetts held public forums across the state to share its plans and receive input. Later, the state formed eight large stakeholder groups that met over a 6-month period and provided input into components of the ACS model that included strategic design, payment model design, quality, attribution, LTSS, behavioral health, health homes, and ACO certification.

Based on stakeholder input, MassHealth developed three MassHealth ACO models, all not initially accountable for LTSS and certain high-cost pharmaceuticals but otherwise tailored to the MassHealth providers' varying capacities and the structure of MassHealth managed care:

1. Accountable Care Partnership Plans (Model A, covering 13 of the 17 ACOs) are integrated partnerships between an MCO and ACO that receive prospective capitation payments and assume full insurance risk;
2. Primary Care ACOs (Model B, covering 3 of the 17 ACOs) are advanced provider-led ACOs contracting directly with MassHealth rather than partnering with MCOs; and
3. MCO-Administered ACOs (Model C, covering the remaining ACO) are provider-led ACOs, which receive administrative support from an MCO and are accountable for the care of patients who are aligned through attribution rather than plan enrollment.

The Accountable Care Partnership Plan model uses prospective capitation payments with performance risk, and Primary Care and MCO-Administered ACOs use retrospective shared savings with upside and downside risk for TCOC; MCO-Administered ACOs assume less risk.

Table C-1. Medicaid ACO models in Massachusetts, 2018

Payment model	Payment type	Payments	Risk	Payment targets	Quality measure domains	Implementation
Partnership Plan (Model A ACO)	Prospective integrated ACO-MCO capitated payments	For all Enrollees	Upside and downside insurance risk	Financial and quality	Clinical Quality, Member Experience	March 1, 2018
Primary Care ACO (Model B)	Retrospective shared savings and risk	For all Enrollees	Upside and downside performance risk	Financial and quality	Clinical Quality, Member Experience	March 1, 2018
MCO-Administered (Model C)	Retrospective shared savings and risk (lower levels of gain/risk than Model B)	For all attributed members	Upside and downside performance risk	Financial and quality	Clinical Quality, Member Experience	March 1, 2018

ACO = accountable care organization; MCO = managed care organization.

ACOs are encouraged to develop high value, clinically integrated provider partnerships, with Accountable Care Partnership Plans allowed to establish preferred networks.[69]

In response to behavioral health and LTSS stakeholder concerns, as well the perspective that additional supports are needed to help members manage complex behavioral health and LTSS needs, the state added new CPs to coordinate care for high-risk individuals with significant behavioral health needs and individuals who use LTSS. The CP model leverages the existing capacity of behavioral health and LTSS providers to coordinate care across delivery systems.

State officials said the design, planning, and implementation of the Medicaid ACOs incorporated lessons learned from PCPRI, including a less prescriptive model, engagement of hospitals in the model, and use of contract levers to ensure Medicaid MCO participation. Key contract levers included a revised managed care plan selection process that incentivizes contracting with ACOs, PCP-based attribution and PCP exclusivity, and TCOC models that offered more risk/reward than the PCPRI contracts, allowing for opportunities to earn greater amounts of savings. The three ACO models addressed some providers' preference to (1) assume more risk than the PCPR model allowed, and (2) share responsibility between hospitals and PCPs. The state also upgraded its capacity to provide timely and complete claims data to support management of patient panels.

[69] Prior to ACO implementation, MassHealth members either enrolled in an MCO (approximately 60 percent) with a more restricted network or in the state's PCC plan (approximately 40 percent) with a much more extensive network. With the launch of the ACS, MassHealth members were assigned to an ACO following their choice of provider; most ACOs are Accountable Care Partnership Plans, which are allowed to establish preferred networks.

In addition to providing input on ACO design, stakeholders helped identify and develop payment model features that enabled MassHealth ACO models to be aligned with other payers' alternative payment method models. A key alignment area was accountability for TCOC, which was increasingly used by Massachusetts payers and providers. Another area of alignment development included quality measures.

Box 2: Behavioral health integration in ACS

- The CP model leverages the capacity of behavioral health providers to coordinate care for individuals with serious mental illness (SMI) across the spectrum (i.e. physical, behavioral, LTSS, and social service needs).
- MassHealth contracts with all Behavioral Health CPs and ACOs have requirements to contract and work with the Behavioral Health CPs within their service areas.
- ACOs identify individuals in need of CP services and make referrals. MassHealth will also share list of members with ACOs that are eligible for CP supports.
- Of the 1.8 million MassHealth members, 35,000 are anticipated to have access to new Behavioral Health CP supports.
- The state is also restructuring the Department of Mental Health (DMH) program serving those with SMI who live in the community, and they are eligible for Behavioral Health CP support as well.

Pilot ACO. Prior to launching its three ACO models, Massachusetts conducted the Pilot ACO, based on the Primary Care ACO, with retrospective shared savings based on TCOC for PCC plan members attributed to the providers participating in the pilot. The Pilot ACO—although it did not include CPs, MCOs, or other ACO models—provided an opportunity for MassHealth providers to test certain aspects of the model and continue use of accountable care during the transition from PCPRI to the ACS. Six ACOs participated in the pilot and 160,000 Medicaid beneficiaries were covered, a much higher figure than the 90,000 covered by PCPRI at its peak.

The Pilot ACO surfaced differences in how MassHealth identified providers versus how provider systems did, which is critical in attributing members to an ACO. The Pilot ACO also helped MassHealth work with ACOs to improve the data the agency sends to providers to share claims and other information necessary to coordinate and track members' care (see ***Section C.2*** for more detail). Providers participating in the Pilot ACO found this information useful in tracking patients with high numbers of emergency department (ED) visits and inpatient admissions. They also provided feedback to the state in terms of the reports' format and level of data shared, with the goal of helping improve the utility of the information to better manage members' care. Receptive to feedback, the state made changes to the reports throughout the Pilot ACO. However, providers remained frustrated that certain data, like substance use treatment information, were not identified to specific members because of privacy requirements.

Massachusetts concluded the Pilot ACO in February 2018. The Full ACO launch began in January 2018, with "shadow enrollment" that enabled ACOs to see the beneficiaries attributed to them. Beneficiaries' ACO enrollments were effective March 1, 2018.

Full ACO. While still conducting the Pilot ACO in 2017, Massachusetts took steps to implement the Full ACO by re-procuring MCOs, procuring ACOs and CPs, and negotiating the DSRIP protocol with the Center for Medicaid and CHIP Services (CMCS). New MCO contracts require MCOs to contract with at least one MCO-Administered ACO operating in overlapping service areas during the 5-year ACS demonstration period. The managed care enrollment process also provided a lever to ensure MCO participation in the ACS. Historically, PCPs were able to provide primary care services to members through contracts with multiple MCOs; however, in the new landscape, PCPs are exclusive to one ACO, MCO, or the PCC Plan; selection of a PCP by a member determines plan selection. Therefore, MCOs risk losing members if beneficiaries select PCPs affiliated with ACOs that are not partnering with the MCO (Accountable Care Partnership Plans, or Model A) or not part of its provider network (under MCO-Administered ACOs, or Model C), which means that MCOs have an additional incentive to contract with PCPs, unlike with PCPRI.

The ACO procurement process was successful in attracting bidders: 21 provider organizations submitted proposals in response to the RFP; 18 were selected, and 17 of them signed participation contracts in August 2017. Thirteen of the ACOs signing contracts were Accountable Care Partnership Plans, between MCOs and ACOs. Three of the state's largest ACOs signed contracts, all participants in the Pilot ACO program, to operate as Primary Care ACOs; they will manage certain administrative functions in collaboration with MassHealth and assume risk. Finally, one provider organization contracted as an MCO-Administered ACO, which relies on one MCO for administrative support but can participate as a provider in other MCOs' networks.

Although Accountable Care Partnership Plans receive capitated payments, ACOs under the other two models are retrospectively accountable for TCOC based on benchmarks. State officials said that by the seventh year (2 years after the ACS demonstration period) they want all ACOs to achieve an absolute benchmark rather than a blended regional/historical benchmark.

MassHealth ACOs are required by contract to obtain ACO certification through the HPC, which state agencies worked with stakeholders to develop. HPC and MassHealth collaborated on certification requirements to ensure ACOs' capacity to serve the needs of MassHealth beneficiaries (Commonwealth of Massachusetts, 2016), including meeting the care delivery needs of the population. The certification demanded four prerequisites and included 15 criteria that require supportive documentation to ensure that ACOs have multiple capacities—financial, health IT, integration of medical services, and more.

Box 3: ACO certification standards for year 1

Prerequisites

1. ACO has obtained, if applicable, a risk-bearing provider organization certificate or waiver from the Department of Insurance.
2. ACO has filed all required Material Changes Notices with the HPC.
3. ACO is in compliance with all federal and state antitrust laws and regulations.
4. ACO is in compliance with the HPC's Office of Patient Protection guidance regarding an appeals process to review and address patient complaints and provide notice to patients.

Sample Criteria

- Patient-centered, accountable governance structure
- Cross-centered care: coordination with behavioral health, hospital, specialists, and LTSS
- Supports a community-based program
- Performs quality, financial analytics and shares them with providers
- Commits to advanced health IT integration and adoption

Additional care delivery requirements in the ACO contracts include screening members to identify care needs, coordinating care, managing discharges and transitions, and operating a clinician advice and support line for members. ACOs must also comprehensively assess and develop person-centered care plans for members with complex care needs and must partner with CPs to address those needs for certain identified members.

Beneficiaries eligible for Medicaid managed care have a choice of four types of plans, including 13 Partnership ACOs across the state, three Primary Care ACOs, the PCC Plan, and two MCOs for those who do not want to participate in an ACO. The Primary Care ACOs, the PCC Plan, and one of the MCOs offer statewide coverage, with the second MCO offering coverage across the state except the southern region. The state performed prospective assignment of members into ACOs effective January 1, 2018, based on their previous relationship with a PCP, using the same Provider ID by Service Location (PID/SL) system used for the Pilot ACO and the PCC Plan. MassHealth sent out written material explaining members' assignments to an ACO and initially received few inquiries. Beneficiaries said they found the letters confusing and of those that were interviewed in focus groups, most ignored them.

Community Partners. As planned, the Behavioral Health CPs will have primary responsibility for coordinating care for adults with SMI or substance use disorder and are intended to supplement, and not duplicate, the efforts of any other case managers or coordinators, such as DMH case managers. For LTSS, the ACOs will have primary responsibility for care coordination for at least the first year. There will be a second procurement for enhanced LTSS CPs, which will function like the Behavioral Health CPs and have primary responsibility for care coordination. Community Service Agencies (CSAs) will continue to provide State Plan care coordination for children with serious emotional disturbances and will receive DSRIP funding for infrastructure. In addition to coordinating Medicaid health care,

behavioral health, and LTSS, the plan is for CPs and CSAs to help beneficiaries access flexible services for health-related social needs (see further below) funded through allotments of DSRIP funds to the ACOs.

MassHealth contracted with 27 CPs (18 Behavioral Health CPs and 9 LTSS CPs) in December 2017, with program launch scheduled for July 1, 2018. CPs will receive care coordination payments and funding to support infrastructure such as connection to Mass HIway and care coordination IT systems, both financed through DSRIP. Approximately 60,000 individuals are expected to be referred by the ACOs and the state to CPs to ensure that their complex care needs are appropriately coordinated within community support systems. The state has had previous relationships with the CP entities, which have provided a variety of services to high-need individuals through contracts with DMH, Department of Public Health, or Developmental Disability Services. CPs are required to contract with ACOs and MCOs, and MassHealth provided guidance to establish guardrails for these partnerships. CP representatives expressed frustration with the lack of standardization in establishing partnerships with the ACOs during a particularly busy time. The state indicated, just after the official launch of the Full ACO, that it may need an additional month to launch the CP program (see ***Section C.2*** for more detail).

Flexible services. The plan is for ACOs to receive DSRIP funding for flexible services to assist eligible members with certain health-related social needs. The state submitted a revised flexible services protocol to CMCS in December 2017, which reduced the target population and services list to include housing and nutrition supports, based on feedback from CMS. The state is in active negotiations with CMS about the protocol, but there remain many unknowns for the state and the ACO providers. The tentative plan is to focus on capacity building in 2018 and start delivering these flexible services in mid-2019, but this depends on CMS approval.

Mass HIway. In 2015, the state shifted its health IT focus from a range of health IT efforts (see description of "other health IT initiatives" below) to increasing the use and functionality of the Mass HIway. Although most hospitals were connected to the Mass HIway, only 9 percent of all provider organizations were connected, and most providers who were connected did not use it for care transitions (Massachusetts EOHHS, 2016, p. 9). An interagency work group identified barriers hindering provider connection and use of the Mass HIway and developed an e-Health plan with support from the SIM Initiative.

The state launched several initiatives in 2015 to (1) reduce barriers to connecting and sharing patient information, and (2) increase the value proposition for using the Mass HIway. To address the complexity of connecting to the Mass HIway, a team developed simplified and standardized connection methods. A work group addressed another barrier by developing recommendations to clarify the state's policy for obtaining patient consent before sharing their health information electronically. The state also began planning an Event Notification Service (ENS) to improve care transitions by facilitating transmission of admission, discharge, and

transfer (ADT) notices through the Mass HIway. A fourth initiative was added to help provider organizations that share health information implement new processes and workflows for using that information to inform patient care.

Massachusetts used its regulatory authority to increase provider use of the Mass HIway by promulgating regulations in February 2017 that clarify the policy on patient consent and provide timeframes for provider connection and use. The regulations align the requirements for patient consent for HIway Direct Messaging with the requirements to transfer information over the phone or fax machine. Services that store health information, such as the ENS, will require patient opt-in, which can be obtained through written notice. Patients may also opt out if they do not agree to participate in the ENS. A timetable was established for acute care hospitals, community health centers (CHCs), and large and medium ambulatory care centers to connect to the Mass HIway, and connection dates for other types of providers may be added in the future.

The state used purchasing and funding levers to ensure that MassHealth ACOs, CPs, and MassHealth MCO providers connect to and use the Mass HIway. Mass HIway connection requirements were incorporated into the RFPs and contracts for the MCOs, ACOs, and CPs. ACOs, CPs, and CSAs will receive DSRIP funding for infrastructure, which can be used for establishing connections to the Mass HIway. CPs and CSAs may also upgrade their internal care management systems to support their expanding roles in coordinating health care services with behavioral health and LTSS.

e-Referral. One SIM-supported initiative, which has continued since the first year of the SIM Initiative, is e-Referral. This initiative is a bidirectional electronic referral system designed to facilitate referrals by primary care clinicians to community resources such as smoking cessation, diabetes prevention, and fall prevention programs operated by community-based organizations. E-Referral was bolstered as a component of the Prevention and Wellness Trust Fund, which was created and funded by surcharges on health plans. SIM funding supported expansion of e-Referral to additional clinical sites and community resources, regardless of participation in either PCPRI or the ACS.

PCPs' offices and community sites initially expressed frustration with launching the technology, but by January 2018, feedback was overall favorable. Once established, the technology allowed for easy referrals from the PCP to an appropriate community-based organization (CBO). That CBO was able to provide some follow-up, and provider offices were able to review data to check whether a patient in fact connected with the community-based organization. The state reported that providers made 4,852 referrals during the e-Referral pilot and received 8,212 feedback reports from community organizations through April 14, 2018 (e-mail communication from the state, July 24, 2018).

Other health IT initiatives. Other SIM-supported health IT and data initiatives were completed or terminated during 2015, when the state began to concentrate its investments on the Mass HIway, as described above. Three early initiatives centered on care for people with LTSS needs were completed by spring 2015: (1) Community Links, a provider portal to allow PCPs and hospital discharge planners to view patients' in-home care records, and Community Connect, a similar portal to allow beneficiaries and authorized caregivers to view the same data; (2) Section Q reporter, to expedite transmission of referrals from nursing facilities to community aging services; and (3) health IT changes to streamline the transmission of functional eligibility requests, determinations, and redeterminations for adult foster care and group adult foster care.

SIM funds also supported expansion of the Massachusetts Department of Public Health's public health electronic surveillance network, known as MDPHnet, which enabled public health officials to quickly and efficiently query the EHR systems of participating primary care clinics serving more than 1.2 million Massachusetts residents. Two other health IT initiatives were discontinued before completion—the all-payer claims database provider portal and an initiative to help behavioral health and LTSS providers connect to the HIE.

MCPAP and MCPAP for Moms. In March 2014, SIM funding was used to enhance support for MCPAP, a program that began in 2005 and provides pediatric behavioral health consultation services to pediatric PCPs across the state. MCPAP's regional teams provide child psychiatry consultation services via telephone to help pediatricians better identify and treat children and adolescents with behavioral health problems. As of the end of 2016, 63 percent of pediatricians in the state were using MCPAP services. Building on MCPAP's success, in April 2015 the state launched a similar program focused on perinatal mental health conditions through MCPAP for Moms, which delivers psychiatric support to perinatal providers and other clinicians treating pregnant women and new moms with perinatal mental health needs. To secure sustainability for MCPAP and MCPAP for Moms, in June 2017 the state legislature appropriated a surcharge on commercial health plans.

C.1.3 How Massachusetts' SIM Initiative changed state health policy: successes, challenges, and lessons learned

Upon realizing that PCPRI would not be as successful as originally envisioned, MassHealth, with support from the Innovation Center, shifted resources toward investing in the ACS model, a crucial component of which was an ACO model. The Pilot ACO, consisting of six Model B ACOs, was launched in December 2016. The Full ACO launched in March 2018 as the SIM Initiative was ending. The state and stakeholders strongly supported the ACS reform, although it is far too early to gauge its long-term success. As the state considered the best way to transform health care systems in the state, it built on the SIM Initiative's successes, challenges, and lessons learned during the SIM test period.

Successes

Participation in the SIM Initiative helped Massachusetts plan for its application for DSRIP funding to effect a seamless transition from supporting delivery system reform (now the ACS) with SIM funding to supporting it with DSRIP program funding. The state's Medicaid Section 1115 waiver amendment, which authorized the Pilot ACO, was approved effective November 4, 2016, through June 30, 2017. CMS also approved an extension of the Medicaid Section 1115 waiver, effective July 1, 2017, through June 30, 2022. The waiver extension authorizes $1.8 billion of DSRIP funding over 5 years (the ACS demonstration period) to support the ACOs and CPs. DSRIP overlapped with SIM funding for approximately 10 months.

PCPRI's use of contracting requirements was successful in promoting the integration of behavioral and physical health. PCPRI required structural changes at participating provider delivery sites. Examples of these requirements included staffing at least one master's- or doctoral-level behavioral health provider on site for 40 hours per week, having the capability to schedule an appointment with a behavioral health provider within 14 days from the time of the request, and routinely screening patients for behavioral health conditions. Providers were enthusiastic about co-locating behavioral health providers within the primary care setting.

Massachusetts leveraged managed care plan enrollment and DSRIP funding to encourage providers and MCOs to participate in the ACS's Medicaid ACO model. A total of 17 ACOs contracted with MassHealth to provide integrated, quality care with a focus on controlling costs. State leadership reported during the final site visit that they were pleased with how many ACOs partnered to participate in this new reform. Most (13) of the ACOs opted for the Accountable Care Partnership Plan, which is the prospective capitated model with both up- and down-side risk. The predominant reason provider groups and MCOs gave for entering into ACO partnerships to participate in this Medicaid reform was the potential for DSRIP funding based on the number of MassHealth members attributed to the ACO.

The state has achieved initial buy-in across stakeholders for the ACO risk-sharing model. Participation in ACO partnerships is itself important, but the level of buy-in both provider groups and MCOs expressed in 2018 for the overall concept of integrated care and sharing risk indicates a deeper level of engagement. Buy-in within these new ACO partnerships will be critically important in reaching the delivery and payment reform goals of ACS, which include reducing costs of care and improving quality and member experience.

Massachusetts used state legislation, regulations, and procurement requirements to begin to lay the groundwork to facilitate providers' increased collaboration in the future. One example is the area of health IT: In transitioning to the ACS, the state focused its health IT efforts on expanding provider use of the Mass HIway to support coordination of care among providers (particularly between acute care hospitals, ambulatory medical practices, and CHCs). These

efforts have included streamlining the connection process—promulgating new state rules that align opt-in requirements for sharing of information over HIway Direct Messaging with the requirements for sharing information over the phone or fax machine. In a second example, MassHealth established Medicaid contractual requirements for ACOs and CPs to collaborate with each other.

Challenges

MassHealth experienced challenges in implementing PCPRI that ultimately resulted in the state sunsetting the initiative and refocusing resources on ACS:

- ***One of PCPRI's major shortcomings was the unwillingness of MassHealth MCOs in the state to participate.*** MCO participation in PCPRI was voluntary, and no MCOs chose to participate, leaving only 6 percent of Medicaid beneficiaries covered by the PCPRI risk-sharing arrangements as of May 2016. If MCOs had participated, many more providers would almost certainly have joined PCPRI, given the larger number of their patient panel that would have been under the PCPRI incentive structure.
- ***Providers found the data-reporting infrastructure insufficient to support management of their patient panels***. Providers said the data were delayed, they did not understand the attribution process, and they believed the data produced presented an inaccurate reflection of their patient panels.
- ***Providers expressed uncertainty about the PCPRI shared savings results.*** After the program started, the state revised its TCOC targets because of significant shifts in member rating categories and certain program changes from the base year to the performance year. As the initiative ended, providers were still unsure if they had achieved savings or losses. One provider mentioned that it was still holding funds in reserve for the possibility of loss. The state is awaiting CMS approval of the expenditure authority to make the shared savings payments.

Identification of MassHealth members appropriately attributed to each Medicaid ACO proved challenging. MassHealth identifies participating providers using an agency-generated PID/SL to ensure compatibility with an agency data system (Commonwealth of Massachusetts, 2009). Pilot ACOs had to work with MassHealth for months to harmonize provider identifiers to ensure that members were attributed to the correct PCPs, because only a limited number of individuals at the Pilot ACOs understood what PID/SLs were.

For some provider groups participating in a Medicaid ACO, ACS is their first experience operating in an at-risk arrangement. Some providers are currently engaged in at-risk arrangements in commercial or Medicare. But for other providers, moving to a capitated budget for patients from the FFS payments with which they are familiar represents a substantial shift. Although the state certified all ACS-participating providers as actuarially sound—through a process that included an actuarial review and guidance on creating a reinsurance mechanism—losing money as a result of high-cost patients could still prove a serious issue for providers. Some providers may be protected from the full consequences of any loss if they have partnership

contracts that provide for their MCO to take a disproportionate share of any shared losses and gains.

Data sharing is critical to ACO success, but technology and privacy laws can be barriers to timely access. MassHealth and the ACOs participating in the Pilot ACO have both devoted resources toward data sharing development, and both reported during the final site visit that they had made important progress in timely access to claims data. However, some protected data, particularly pertaining to behavioral health, are still not shared with the ACO, including the individual-level costs associated with substance abuse treatment for a specific MassHealth member. This gap in data is partially mitigated for the Model A ACOs that have an MCO partner that can share these data on individual MassHealth members. Timeliness is also an issue. Even though MassHealth shares information regularly with ACOs, there can be lags in getting full information on a member's claims. Finally, although ACOs are responsible for ensuring that their technology infrastructure is capable of connecting to the Mass HIway system to receive information like ED admissions and discharges, this functionality in the Mass HIway is still not fully operational.

Lessons learned

The iterative approach to delivery and payment reforms that has characterized Massachusetts' progress toward reform under the SIM Initiative allowed for stakeholder engagement and incorporating lessons along the way. Although the state may not have intended to take intermittent steps toward reforms when the SIM Initiative launched and PCPRI was implemented, the path of trial and error may have served the state well. Lessons learned from PCPRI's failure to achieve broad provider participation, and the limited reforms that resulted, informed the Pilot ACO and the establishment of financial incentives for Full ACO participation. The Pilot ACO enabled the state to work closely with participating provider groups to exchange meaningful data, which will be critically important to the overall success of the Full ACO. Also, the phased approach to designing and launching the Full ACO model allowed the state time to engage providers and health plans in its development. As a result, these stakeholders were able to contribute toward the design, which likely helped to secure their buy-in to the overall concept.

Massachusetts state leadership found tremendous value in the flexibility of SIM funding, which allowed them to bring in technical assistance and pilot the ACO model. Although not part of its original SIM application, the ability to change course enabled the state to accelerate the process of bringing the Full ACO to market. According to one high-level state official, this change to the Medicaid program is the largest since the 1990s. The flexibility of the SIM funding allowed for true innovation and timely sunsetting of a model that was not achieving its goals.

The Pilot ACO allowed Massachusetts to address many operational challenges early, serving as an opportunity to create trust among providers and identify issues the ACOs were likely to face. The Pilot ACO turned out to be a good chance for the state to test a new type of relationship between MassHealth as a payer and providers serving its beneficiaries and to have a more involved management process focused on achievement of performance goals. The Pilot ACO allowed for modifications to the program and its administration and created an open communication channel between the ACOs and MassHealth.

e-Referral's success, particularly the opportunity to extend it to outside community-based organizations, depended not just on the technology used but also on adequate funding for the community wellness programs. For example, one PCP said that, when it launched e-Referral, it initially made all of its referrals to the local YMCA. However, it subsequently learned that its Medicaid patients could only afford to use the YMCA programs that were free. This is because such patients were only eligible for subsidized funding for community services provided under the Prevention and Wellness Trust Fund grant—likely putting YMCA services for which fees were charged out of the financial reach of Medicaid beneficiaries. Another provider said that, because of the YMCA fee problem, the provider had instead focused on referring patients to a local area agency on aging, which provides various state-funded services free to older adults. So, although e-Referral was technically successful, the ultimate sustainability and overall success of the program will depend on availability of funding to subsidize the services for patients without the means to finance any out-of-pocket costs.

C.1.4 Anticipated long-term changes following the SIM Initiative

Prior to the SIM Initiative, Massachusetts had begun prioritizing redesign of the health care system in combination with payment reform that aligned with outcomes while promoting population health efforts. The SIM Initiative allowed the state to seize momentum initiated in the state by EOHHS leadership and the legislature by providing (1) additional funding to invest in coordinated activities to support the state's reform goals, and (2) the freedom to focus on these efforts. Importantly in Massachusetts, the SIM Initiative also enabled the state to test a major reform initiative, realize its value and limitations, and leverage lessons learned to design and launch a new broader initiative—the ACS.

State leadership memorialized their commitment to the ACO model in the Medicaid Section 1115 waiver and in securing DSRIP funding to ensure additional federal support for the initial 5 years of the model. Massachusetts' Medicaid Section 1115 waiver was amended effective July 1, 2017, to authorize the ACO models and $1.8 billion in DSRIP funding for a 5-year period (July 2017–June 2022), along with other changes (see ***Table C-2***). The state intended to use DSRIP to finance key components of the ACS—including more than $1 billion in ACO funding to support implementation of the three models and $546 million in CP funding to support implementation of the Behavioral Health CPs and LTSS CPs and infrastructure funding

Table C-2. DSRIP funding streams by ACS demonstration year (in millions of dollars)

Funding stream	DY1	DY2	DY3	DY4	DY5	Total	Percentage of total
ACOs	$329.2	$289.9	$229.4	$152.0	$65.1	$1,065.0	59%
CPs	57.0	95.9	132.2	133.6	128.0	546.6	39%
Statewide investments	24.2	24.6	23.8	24.8	17.4	114.8	6%
State operations and implementation	14.6	14.6	14.6	14.6	14.6	73.0	4%
Total	$425.0	$425.0	$400.0	$325.0	$225.0	$1,800.0	100%

ACO = accountable care organization; ACS = Accountable Care Strategy; CP = Community Partner; DY = demonstration year.
Source: EOHHS, 2017a, p. 7.

for CSAs. ACOs and CPs will use their DSRIP funds to develop infrastructure and build workforce capacity. DSRIP funds will also be used to provide care coordination payments for CPs. The state planned to allocate a portion of its ACO funding for flexible services. Technical assistance to ACOs and CPs will be provided from a separate funding Statewide Investments stream, which also funds other initiatives. A fourth DSRIP funding stream, State Operations and Implementation, will fund state staff overseeing implementation and operations of the ACOs, CPs, and statewide investments (EOHHS, 2017a).

The Mass HIway is sustained by user fees and state and federal funding, according to state officials, while MCPAP has stable funding from state general revenue appropriated to DMH. Sustaining and scaling up e-Referral will require ACOs to invest their resources, such as DSRIP infrastructure funding. The state used data from the pilot to develop a business case, which will be used to market e-Referral to ACOs. A clinical site participating in the pilot said it intended to continue using e-Referral, and a community-based services provider said it was seeking sustainable funding for health and wellness programming.

C.1.5 Summary of SIM Initiative implementation

At the end of the Massachusetts SIM Initiative, the state's most substantial achievements included the following:

- **Test of a model, PCPRI, that gave PCPs important preparatory experiences** to participate in the later ACO model, notably in coordinating with behavioral health care providers and in analyzing data feedback reports for performance improvement.
- **Design and pilot of the ACS with extensive stakeholder input and collaboration**, over a long period of time, yielding support from Medicaid MCOs, health care systems, and community-based behavioral health and LTSS providers.

- **Implementation of the ACS**, which enables providers to integrate care and use community providers to (1) provide intensive care coordination and interventions for those who need it, but also (2) connect patients to population health services within the community.

Because Massachusetts changed payment models in the middle of its SIM Initiative period, the federal evaluation undertook an additional analysis of its model implementation, based on qualitative data collection, in January 2018. ***Section C.2*** presents the results of this implementation analysis that have not previously been published, but upon which much of the information about the Massachusetts SIM Initiative presented in ***Section C.1*** was based.

C.2 Implementation of the SIM Initiative in Massachusetts After 4 Years of the Test Period

As of March 2018—nearly 4 years after the SIM test period began in Massachusetts—the state completed its shift in the Medicaid program away from a payment model with accountability focused on primary care clinicians to a model with accountability focused more broadly on the continuum of providers. The new model, the ACS, has two major components: (1) an ACO component, which has three alternative ACO models (A, B, and C, see ***Section C.1.1*** for detail); and (2) CPs, existing community organizations that will collaborate with ACOs to coordinate care for patients with high LTSS and behavioral health needs. MassHealth began the new strategy by launching a 15-month Pilot ACO, with six Model B ACOs and no CP component. The state followed the Pilot ACO with implementation of the Full ACO on March 1, 2018. The CP component of the ACS is set to launch on July 1, 2018.

Key Results From Massachusetts' SIM Initiative Accountable Care Strategy, April 2017–January 2018

- The state conducted a Pilot ACO to test the model of provider-led ACOs contracting directly with MassHealth (Massachusetts Medicaid) with retrospective payment and the state's data systems needed to support the model while expanding the number of Medicaid beneficiaries covered by alternative payments.
- MassHealth elected and contracted Medicaid ACOs and MCOs to participate in the Full ACO, using purchasing levers to ensure participation in key components of the Full ACO model.
- MassHealth implemented three models in the Full ACO—ACO-MCO Partnership Plans (Model A, 13 ACOs), Primary Care ACOs (Model B, 3 ACOs), and MCO-Administered ACOs (Model C, 1 ACO).
- MassHealth transformed Medicaid managed care by replacing most traditional MCO choices with Partnership Plans and Primary Care ACOs and enrolling most Medicaid beneficiaries into plans based on their PCP attribution.
- MassHealth procured community-based entities to serve as CPs and provide care coordination supports for members with certain behavioral health and LTSS needs.

This section provides a detailed analysis of the activities in the final year of the SIM test period in Massachusetts:

1. Pilot ACO operations: December 2016–February 2018
2. Full ACO planning and experience:
    a. ACO model implementation: Launch date, March 1, 2018
    b. CP implementation: Launch date, July 1, 2018
3. Infrastructure development to reduce the barriers to health information exchange

This analysis is based on four sources of qualitative data, described in more detail in ***Sub-appendix C-1***:

- Twenty-seven key informant stakeholder interviews, conducted in Boston and Worcester, Massachusetts, during the week of January 22–25, 2018 (***Table C-3***). Interviewees gave their perspective on the various components of the SIM Initiative and the Full ACO, focusing especially on the Pilot ACO, the Full ACO, and e-Referral.
- Seven focus groups with providers and consumers involved in the Pilot ACO were also conducted January 22–25, 2018. Their purpose was to understand consumers' and providers' current experience of, and reflections on, care delivery during the Pilot ACO and changes they observed over time. To capture this information, the moderators used a guide that addressed consumer and provider perspectives on quality of care, care coordination, delivery reform, and provider reaction to opportunities for participation in new delivery systems, payment models, or other infrastructure supports.
    – The providers selected for focus groups were PCPs in Pilot ACOs in Boston and Worcester; a total of 32 PCPs participated in four focus groups.
    – The consumers selected for focus groups were Medicaid beneficiaries attributed to Pilot ACOs in Boston and Worcester; a total of 20 beneficiaries participated in three focus groups.
- Document review, including state-developed reports and local news articles.
- Telephone conversations with state officials/partners to gather more in-depth information on select topics and to review other evaluation-related information.

The discussion that follows builds on the descriptions of the ACS and other SIM-supported initiatives in ***Section C.1***. Because the Pilot ACO and preparations for the Full ACO launch took place concurrently, the discussions of some ACO-related topics are intertwined.

Table C-3. Key informant interviews conducted in Massachusetts, January 2018

Key informant	Number of interviews
State officials	7
Managed care organizations	2
ACO providers	11
Community Partners	4
E-Referral stakeholders	3
Total	27

ACO = accountable care organization.

C.2.1 Pilot ACO experience

KEY INSIGHTS

- Six provider organizations participated in the pilot, which used a retrospective payment model similar to the provider-led Model B ACO model in the Full ACO.
- State officials and ACOs said the pilot provided an opportunity to test systems, then identify and address challenges prior to the Full ACO launch.
- Preliminary data from MassHealth appear to show that most of the ACOs in the pilot were within +/- 2 percent of their benchmarks for shared savings/losses.
- PCPs from practices affiliated with Pilot ACOs described changes implemented at their practices during the SIM Initiative, such as behavioral health integration, care team use, and panel management.
- Most Medicaid beneficiaries described generally positive experiences and well-organized integrated care at PCPs affiliated with the Pilot ACOs.

This section discusses the successes and challenges of the Pilot ACO from the perspectives of the state and ACO provider organizations, PCPs, and Medicaid beneficiaries. Six organizations participated in the Pilot ACO, which used a retrospective payment model similar to the Primary Care ACO; additional details of the payment models for all three types of Medicaid ACOs are provided in ***Table C-1***. The pilot began in December 2016 and concluded at the end of February 2018. Most of the six Pilot ACOs had previously participated in PCPRI, and five of them continued as Model A or Model B ACOs in the Full ACO launch.

Preliminary data from the pilot appear to show that most of the ACOs in the pilot were within the +/- 2 percent corridor for shared savings/losses. Pilot success is exemplified anecdotally in a homeless patient who frequently went to the hospital complaining of chest pain to get a meal. The relevant ACO started tracking him, identified the root of the problem (hunger), and met his need for a meal while achieving substantial health care cost savings by keeping him out of the hospital.

The Pilot ACO allowed MassHealth to learn about the implications of implementing contracts with ACOs and identified some successful elements that are in the Full ACO. The state found the Pilot ACO to be a good opportunity to engage in an involved contract management relationship focused on achieving certain performance goals (see ***Section C.1.2*** for a more complete description of PCPRI). In addition, some elements from the Pilot ACO were retained in the Full ACO. An important one of these was the "referral circle." This is a system whereby Model B Primary Care ACOs, in addition to having access by referral to the full MassHealth provider network of specialists, may identify for its attributed MassHealth members a list of providers of various types (the referral circle) with which the ACO has a special relationship. Referrals are not required for services provided to ACO-attributed members by providers within the relevant referral circle. ACOs may or may not choose to establish such circles.

The pilot gave the ACOs a chance to build their analytic capacity and the state the chance to determine what data elements are valuable in the data reports. For example, the ACOs found it helpful to have the members' beginning and end dates of attribution in the reports (span dates). Several providers explained how their practices leveraged a team-based approach and established regular meetings to discuss specific high utilizers, which was found to be a very positive change. Staff—including a high-risk nurse care manager, mental health social workers, community resource specialists, behavioral health, pharmacy, the executive director, and psychiatrists—would regularly participate in the meetings to discuss the care approach for these specific high-utilizing patients. The ACOs in the Pilot ACO that continued into the Full ACO found the pilot experience helpful in preparing them to be successful in the Full ACO.

ACOs in the Pilot ACO found identifying their providers and reconciling their EHRs with attributed member lists to be a frustrating challenge. For provider identification, most ACOs use national provider identifiers (NPIs) and tax identification numbers (TINs). Although MassHealth uses NPIs and TINs for various purposes in provider enrollment, for most ACO operations MassHealth identifies each provider site using a PID/SL. PID/SLs typically correspond to sites rather than individual doctors. MassHealth worked with each ACO to identify the PID/SLs that represented its primary care providers. For member attribution, MassHealth considered any member whose designated primary care clinician of record in the MassHealth system was at one of the PID/SLs associated with an ACO to be attributed to that ACO. The PID/SL system is unique to MassHealth and its systems, however, and does not directly translate to ACOs' internal systems. As a result, ACOs (who might internally track relationships between individual doctors, identified by NPIs, and their members) had to reconcile member assignment information from MassHealth, which matched members to sites identified by PID/SLs. The ACO then needed to apply its provider-to-PID/SL relationship to identify the member-to-provider relationship, which may be different than the ACO's existing member-to-provider relationship, which is likely based on what is in the ACO's EHR. This reconciliation process can be challenging, given that members may choose different PCPs than what is reflected in the EHR.

One Pilot ACO provider network noted that reconciling its ACOs' PCP identifying information with MassHealth's PID/SL system took at least 6 months.

Many providers who saw or used the member rosters expressed frustration about the accuracy of the lists they were given. MassHealth provided member rosters to ACOs directly, and ACOs were responsible for subsequently providing information to their practices and doctors; ACOs varied in their ability to do this effectively. One provider explained that the roster he got from his ACO came in a format that was not user friendly, requiring time spent trying to reconcile the list that would otherwise have been used to provide patient care. Another provider mentioned that it had been challenging to get its panel list accurate, even after using its population health managers to reach out to people who may no longer consider that provider to be their PCP. Another provider expressed similar frustration, particularly about the process for reconciling differences if a patient is attributed to one PCP but identifies someone else as his or her PCP.

Through experience with the full program launch, MassHealth has learned that many providers, in attempting to understand the set of members with whom they have a primary care relationship, reference their EHRs, which typically resulted in an inflated and inaccurate count. Although in some cases there were isolated linkage issues or data gaps on the MassHealth side, the majority of the work MassHealth has done with providers and ACOs over the past year to analyze reported discrepancies has resulted in MassHealth demonstrating that the ACO is considering certain members to be part of their patient panel when in fact they are officially designated to a different provider as their PCP.

Identifying this issue in the Pilot ACO provided a chance to work out some of the confusion related to PID/SLs before the launch of the Full ACO. Specifically, between February 2017 and March 2018, MassHealth held several rounds of formal iteration of ACOs' PID/SL lists. MassHealth performed analytics on the submitted lists and identified potential errors or omissions; for example, if a PID/SL shared a tax ID number with a submitted PID/SL but was left off the list, MassHealth suggested its inclusion. In parallel, MassHealth held office hours and education sessions on PID/SLs. After the launch of the program, MassHealth instituted and expanded a range of supports related to provider operations, including creating a standing internal workgroup, internal and external data reports on ACO provider affiliations, and a structured maintenance process to allow for ACOs to collaborate with MassHealth in keeping PID/SL information up to date as provider affiliations evolve. As of 2018, ACOs receive regular monthly reports of their latest PID/SL and associated configurations.

PCPs judged that the Pilot ACO drove ACO leadership to implement programs that really did transform patient care. Providers thought the model "shook the trees" to get those who control budgets to put resources where providers have been saying they should put resources for a long time. Providers also appreciated the ability to have ACO-funded care

coordinators make direct contact with patients, noting how much more effective it is than communication that comes through forms and letters without any personal knowledge of the patients. Several providers mentioned developing value-based care teams and approaches. And several said they had added population health managers to their practices, which have been working well. Health managers identify patients who need lab work, colonoscopies, mammograms, and other screenings. In terms of ED utilization, providers described a number of transformation activities. One provider's ACO hired an ED care manager to engage high ED utilizers and try to get them to see their PCP. Another practice already had staff focused on care coordination with hospitals.

Providers were concerned that they would be held accountable for quality measures that were outside their control. For example, a provider does not get measured on whether he or she has an informed discussion regarding breast cancer screening, but only on whether the screening takes place, which depends, from the provider's perspective, on the patient not the provider. For depression management, if a patient does not fill his or her prescription, the provider is penalized for that, rather than the pharmacist or, again, the patient. And the provider is penalized when a patient goes to the ED with nothing but a sore throat. As one provider explained it, MassHealth members "do not have any skin in the game."

Providers agreed that behavioral health integration was a priority for them, but noted that there are especially challenges with psychiatrist shortages. Some in both Boston and Worcester described a high level of integration, with therapists and psychiatrists on site to see patients and consult with PCPs. Some mentioned warm handoffs from PCPs to therapists, interdisciplinary case conferences, specialized population health managers, and behavioral health screenings for all patients. But others described access issues that included waits of several months for appointments with psychiatrists, and in some cases, similar wait times to see therapists. One PCP said warm handoffs to a therapist were only available for patients in crisis. Another PCP talked about referring patients to "nonexistent psychiatrists" (i.e., there were insufficient numbers of psychiatrists to receive referrals).

Some beneficiaries indicated that their PCPs do screen them for behavioral health issues. But others described a lower level of integration and confirmed challenges with timely access to behavioral health.

Most beneficiaries described well-organized systems of integrated care. Although typically saying they had not noticed a change in the care they were receiving, several beneficiaries did say their PCPs knew about, and followed up with them after, a hospitalization or trip to the ED. Both Boston focus groups unanimously said their primary care physicians knew when they had been hospitalized; about half of the Worcester group said so. Beneficiaries generally appreciated their primary care physicians following up on hospitalizations because it

made them feel that their doctors were really paying attention to them and making sure they were getting the care they needed.

Referrals to specialists received generally, although not universally, positive reviews. Although most beneficiaries felt the system worked well and they were able to get specialist care when needed, some felt that getting the necessary approvals through MassHealth placed undue burden on the beneficiaries themselves. The difference appeared to stem from whether the beneficiary's PCP took care of the referrals or left the beneficiary to arrange it with the PCP's approval. For example, one beneficiary complained that she had to write to MassHealth to get approval for a referral, which took a month, while another beneficiary's doctor did the referral paperwork and the beneficiary saw no delay.

Finally, most beneficiaries did not have a single case manager, or something similar. Those who did tended to have more complex needs, such as cancer, or had advocated for themselves strongly enough to obtain a disproportionate level of attention from their providers.

Beneficiaries were very satisfied with their PCPs. Common reasons for rating doctors highly were that the doctors cared for their patients as people, respected their time and were prompt, and pushed their patients to be healthy. Beneficiaries mostly said their doctors worked to keep them healthy by discussing exercise, physical therapy, smoking cessation, preventive care (for example for cancer), and sometimes other classes or programs. Beneficiaries also noted that their PCPs would remind them often of appointments.

C.2.2 Full ACO planning and experience

KEY INSIGHTS

- ACO leadership was generally very positive about the level of engagement in the year preceding the Full ACO launch.
- The readiness review and contracting for the Full ACO was administratively burdensome, and provider groups had mixed reviews on its utility.
- Lack of standardization for the ACO-CP partnerships led to an overly complicated contracting process.
- Leadership among ACOs and CPs is concerned that the infrastructure to share information between the two organizations will be inadequate.
- The state's methods for attributing MassHealth members to ACOs resulted in fewer than expected lives being attributed, negatively impacting ACO budget planning.
- Three-quarters (13 of 17) of the ACOs contracting with the state chose to participate in Model A, the ACO-MCO partnership model.

This section discusses the successes and challenges of the Full ACO (that is, the three ACO models plus the CP component), although some insights come in the context of information from the Pilot ACO experience. The discussion covers the perspective of state officials, ACO provider organizations, MCOs, and other relevant stakeholders.

As of early 2018, 17 organizations were preparing to participate in the Full ACO, which launched on March 1, 2018. Additional details on the Full ACO are provided in ***Section C.1***. The CP component of the Full ACO is scheduled to launch on July 1, 2018, after submission of this report. Thus, the views expressed around the Full ACO are focused on its design and the very early implementation of the three ACO models. The following sections focus, respectively, on Full ACO implementation experience to date, ACO structure, and intended care delivery changes.

Implementation

Stakeholder engagement

ACOs were generally very positive about the level of engagement in the year preceding the Full ACO launch. Leadership at several ACOs had positive feedback about stakeholder engagement. One ACO noted that the stakeholder process had been robust, with public forums and work groups; that stakeholders were free to speak their minds; and that MassHealth officials really listened. Another ACO said that the state had also engaged with providers during rate-setting discussions, explained their methodology, and made some modifications in response to providers' concerns. One ACO put it this way: "The state works with us in a way that shows they are not just giving us lip service. I don't get everything I want on the provider side, but the engagement and willingness to discuss has been terrific."

Both state officials and stakeholders focused their comments on the process of selecting quality measures for ACOs and CPs. State officials said that input from stakeholders was very helpful in development of quality measure slated for the Full ACO and CP programs, although the process had delayed finalization of the measures. As an example of stakeholders' influence, in addition to the commitment that MassHealth made through its 1115 waiver to improve integration of physical health, behavioral health, LTSS, and health-related social services, state officials cited the role of advocates in pushing for measures relevant for the LTSS and SMI populations to supplement established Healthcare Effectiveness Data and Information Set measures. As a result, Massachusetts planned to include LTSS and behavioral health beneficiary experience surveys and to develop a measure of community tenure that measures providers' performance in keeping individuals living in the community rather than in institutions. Concurrent with quality measure selection for ACOs and CPs, a Performance Measurement Alignment Task Force (see ***ACS Quality Measurement Alignment***, below) was also seeking alignment across MassHealth programs and between MassHealth and commercial payers.

All Medicaid beneficiaries in the focus groups received notification of the transition to the ACO program. Although these notifications went generally unheeded, beneficiaries almost universally received the core message—that if the beneficiaries did nothing, they could keep their assigned doctor. One beneficiary was reassured to have gotten the mailer: "They [were] talking about eliminating health care, Obamacare. And my concerns [were] alleviated when I got that package in the mail. Told me that I had nothing to worry about it." Other beneficiaries were frustrated by the many notifications and changes in the MassHealth program: "After I read it, I burned it…I was like, 'here they go again.'"

Many beneficiaries were affected by the actual transition to the Full ACO, resulting in many questions to the state from beneficiaries, providers, and payers. Members' enrollments in the ACOs became effective March 1, 2018, which also marked the beginning of the ACO performance period for TCOC accountability. State agency officials reported so many calls to MassHealth the first week in March that the agency increased call center times during the week and on Saturdays. Calls were primarily by beneficiaries and related to pharmaceutical prescriptions not covered under the new system, but there were calls from plans and providers as well. As a way to ensure continuity of care during the initial transition, MassHealth included a requirement in its ACO contracts that plans honor prior authorizations for at least 30 days, and behavioral health authorizations for at least 90 days. After discussions with stakeholders and the plans, the state and the plans collectively agreed to extend the Continuity of Care period to 90 days for all authorizations, not just behavioral health authorizations. Additionally, members were originally given a 90-day plan period to change their PCP and plan choice. This period was extended by 30 days to 120 days to allow for enough time for members to select their plan following the extension of the Continuity of Care period. After the 120-day selection period, beneficiaries are locked into a plan until the next open enrollment period, although members can change PCPs within that plan.

Readiness review

Readiness reviews included state official review of ACO policy and procedures, administrative functions, clinical model/program plans, plans for behavioral health services and pharmacy, readiness assessments, access reports, marketing materials, and contractual relationships. This process was intended to ensure the ability of the ACOs to be ready to enroll members by the ACO launch date and to be successful under the Full ACO. It was a complex and multifaceted process that served to highlight potential areas of noncompliance prior to implementation, but more importantly highlight areas of performance to prioritize in the critical first year of implementation.

The readiness review and contracting for the Full ACO was administratively burdensome and provider groups had mixed reviews on its utility. Both MCOs and provider networks reported that the process required thousands of pages of materials, and although thorough, may have been more than was necessary. One provider network representative said the

process helped initiate governance discussions. Another explicitly noted, "It didn't help address any of [the provider's] questions"; however, this was not the explicit goal of the process.

Community Partners

The state's vision of the CP program is to integrate physical health, behavioral health, and LTSS with CPs working to coordinate care for ACO and MCO members with certain behavioral health and LTSS needs. There are two types of CPs. Behavioral Health CPs provide comprehensive care coordination for members, coordinating physical, behavioral, and social service needs, and LTSS CPs function as a subject matter expert for ACOs, coordinating LTSS needs of members. The state will assign members with existing relationships with a CP entity to that CP, to ensure the continuity of their care. The state will identify members who, based on claims and service history, may benefit from CP supports and for the first two quarters of the program, MassHealth will assign members to Behavioral Health CPs and LTSS CPs on behalf of the ACOs, maintaining existing relationships for members with behavioral health needs where possible. Beginning in 2019, ACOs will be able to choose to which CP a member is assigned.

By second quarter 2018, all CP-ACO contracts (around 280) were signed (e-mail communication from the state, July 24, 2018). Each ACO must contract with all Behavioral Health CPs with overlapping service areas to help maintain existing MassHealth member relationships in the first year of the program. In addition, every ACO needs to contract with at least two LTSS CPs in the overlapping areas. The state procured 18 Behavioral Health CPs and 9 LTSS CPs in different areas across the state to participate in the ACS, which will provide full statewide coverage.

According to some in ACO leadership positions, ACOs are currently focused more on Behavioral Health than LTSS CPs because the TCOC benchmark includes behavioral health services immediately, whereas LTSS services will be phased into the TCOC benchmark after the second year of the program. The LTSS CPs will serve individuals with complex LTSS needs such as persons with intellectual or developmental disabilities (including autism, brain injuries or cognitive impairments, physical disabilities, older adults, and children and youth with LTSS needs). The LTSS CP is responsible for being an advisor to the ACO for a person's LTSS needs. The ACO develops the comprehensive assessment and care plan, while the LTSS CP develops the LTSS component of the care plan and coordinates LTSS and social services.

The Behavioral Health CPs will serve a population with high behavioral health needs, including individuals with severe mental illness or substance use disorders. The Behavioral Health CPs are responsible for outreach and engagement, conducting a comprehensive assessment using a standardized tool, developing the care team and care plan, providing integrated care management, and being the lead for the member through all these processes.

ACO executives are nervous about the need to integrate such a wide-ranging and complex work plan for these patients. ACO executives acknowledged that the CPs will be vital components of the ACO model but that, to be efficient, ACOs and CPs need to ensure that they are not duplicating services to those members determined to be high risk and eligible for enhanced services.

Creating unique processes demonstrating an approach to coordinating with each ACO has taken significant CP resources, when many felt they should be focusing on more important implementation tasks. The contract deadline to partner with an ACO was April 30, 2018; by the end of June 2018, the CPs needed to have finished the documentation demonstrating the ability to meaningfully integrate with ACOs, not just hold contracts with them. MassHealth planned to conduct site visits to verify that the CPs can implement the ACO-specific workflows they documented for each of their ACO partners. ACOs are required to contract with all Behavioral Health CPs, and at least two LTSS CPs, with overlapping service areas. One LTSS CP has contracted with 16 ACOs and MCOs, and two BH CPs have 14 agreements each. The state's intent in requiring these agreements was to ensure that members could be offered a choice of CP by their ACO or MCO and for ACOs or MCOs to be able to maintain existing relationships for members already receiving behavioral health services from organizations that were also contracted to provide Behavioral Health CP supports.

Lack of ACO-CP partnership standardization has led to an overly complicated contracting process. CPs universally described the contracting process as unnecessarily onerous, because MassHealth did not provide standard contracting templates. Several CPs suggested the administrative burden of entering into up to 16 contracts could have been dramatically reduced if MassHealth had created a standard contract that could be used for all ACO-CP partnerships. A behavioral health provider association in Massachusetts drafted a model for the ACO-CP partnership contract for Behavioral Health CPs to present to ACOs as a template. The template was discussed with MassHealth and was used as a basis for some contracts, reducing some of the contracting complexity. Standardized work flows and care plans would help as well, but MassHealth did not offer standardized workflows because each ACO and CP had different starting points in areas such as technology adoption, information exchange, governance structure, and clinical models; for example, some CPs are just starting to develop EHRs, while others have had them for years. The state's initial view was to balance prescriptiveness with flexibility by defining the set of documented processes required to be developed between ACO and CP partners, while allowing the partners to collaborate on workflows within certain parameters, such as standardized file formats and reporting timeframes. As best practices emerge, the state intends to work with ACOs and CPs to standardize workflows further.

Some concerns about the CP model revolve around the fast roll out of the program. Several ACOs expressed concern that the CP component is being "neglected" to launch the Full

ACO, and one said it would have been better to delay the CP component for a year, while the Full ACO was implemented, although such a delay would have been challenging, given the time-limited nature of DSRIP funding, which is supporting the CP program. Another ACO believed the CP model is the right model, but said it may make sense to have a smaller set of CPs, notwithstanding the recognized need to avoid disrupting existing relationships.

Many ACOs and CPs are concerned about information flows between the two organizations. Providers expressed excitement about connectivity with CPs but voiced concerns about workflow between ACOs and CPs—in part because of the lack of connectivity between the organizations and evolving expectations about who is responsible for the different components of a beneficiary's care. The ACOs are concerned that the majority of CPs are community-based organizations that do not have electronic health systems they can integrate with those of their ACO clinical partners. Data sharing is further complicated by privacy regulations surrounding substance use data. The state is encouraging use of the Mass HIway for data exchange; however, none of the CPs are yet operational, thus there are no use cases to date. CPs are concerned that they will have a large number of ACOs to communicate with and that they may be required to exchange data in many ways. A major concern was that there is no standardized method of ACO-CP communication. For the Behavioral Health CP population, the state prescribed the use of the InterRAI Community Health Assessment tool. Some LTSS CPs, concerned that the ACOs do not understand the LTSS population, suggested that an assessment tool (e.g., InterRAI) should be specified for use. None has so far been identified, although the state is working toward standardizing assessments for members with complex LTSS needs in anticipation of LTSS services moving under managed care.

To improve the information flow between clinical partners, some ACOs are moving all their clinical partners to the same EHR vendor. For ACOs not doing this, hospitals that are not connected electronically to an ACO's other clinical partners rely on services such as Patient Ping—an ENS operated by a private vendor—to provide information on the ACO's patient panel, including hospitalization. MassHealth is currently working on developing statewide ENS capacity (see further below), but no such state-sponsored service is available yet.

Beneficiary attribution

The state's complex methods for attributing MassHealth members to ACOs have resulted in fewer than expected lives being attributed, adversely impacting ACOs' budget planning. When the ACOs received patient rosters for the members the state had attributed to them as of the launch of the Medicaid ACO on March, 1, 2018, the new (lower) estimates for some ACOs led to concern that their budget planning based on the originally anticipated number of covered lives had been too optimistic. The state recognized this challenge and allowed the ACOs to use the DSRIP funding based on the earlier estimates. However, the total number of anticipated covered lives was approximately 10 percent lower than originally anticipated.

Part of the reason for this discrepancy was that each ACO's DSRIP budget was based on the distribution of ACO lives from an earlier period (2017) and was not finalized until early 2018. Between those two points in time (1) there was an overall decrease in managed care eligible population; (2) member counts from the earlier period were based on the state's understanding of which providers were part of the ACO, but these were higher than actual across the board; and (3) a portion of the DSRIP member counts were excluded because of service area exclusions (e.g., a member's PCP is in an ACO that does not cover the member's service area).

To avoid any adverse impact on ACO budgeting, the original, early CY2017 DSRIP estimates were used by MassHealth to develop the DSRIP funding amounts for ACOs for the full first year of the program. New member counts, using actual ACO enrollment, will be used starting with CY2019 funds, which should provide ACOs with enough time for their enrollments to stabilize from the combined effects of member choice and auto-assignment. MassHealth has been closely monitoring ACO enrollment levels and using auto-assignment levers to accelerate their stabilization and has been educating ACOs and providing enrollment data to them, including daily enrollment transaction files and (more recently) regular market share reports, throughout this process.

Data analytics

MassHealth will provide quarterly reports to the ACOs with information on their highest ED users, members with the most inpatient admissions, members with the highest costs, and which members are in the numerators and denominators of the quality measures. In addition, MassHealth is providing monthly raw claims extracts, which ACOs are combining with clinical data to inform their population health management strategies in a more timely fashion. MassHealth will also provide claims and standardized reports to the CPs. Finally, the state will monitor LTSS spend in the early years to assess the extent of any cost shifting during the 2 years before the ACOs are at risk for LTSS spending. ACO suggestions of additional data that might be useful include (1) breaking the reports up by PID/SL, because practice transformation takes place at the practice or site level; and (2) breaking pediatric patients into finer age breaks than 0–18 to help improve management of the pediatric patient panel. Provider organizations in the Pilot ACO said the reports they received were helpful in identifying high utilizers, but that the typical 6-month lag in MassHealth data was not timely enough for efficient panel management. Ideally, providers would like real-time data.

Overall, the Pilot and Full ACO participants, MassHealth, and the MCO partners all gave high priority to achieving effective data analytics. The ACOs and CPs receive DSRIP funding to support the infrastructure investments they need to get their data analytics in place. Many stakeholders mentioned the importance of these funds in hiring analytics staff and developing data dashboards to identify frequent health care utilizers, given the 6-month delay in state-provided data. As noted, most of the ACOs are Accountable Care Partnership Plans, which include an MCO partner with the clinical partner. The clinical partners in these ACOs are relying

on substantial data analytics support from their MCO partners. This is especially important in spending related to managing mental health and substance use, because the MCOs can identify individual members' service use. However, those ACOs with no MCO partner (Primary Care ACOs) are concerned about their ability to manage those members with significant mental health and substance use issues, given that the state reports only include aggregate data in these areas because of the confidentiality restrictions in 42 CFR Part 2.

Quality measure alignment

The EOHHS Quality Measurement Alignment Task Force supported multi-payer alignment on ACO measures and informed measure alignment of MassHealth programs. State officials said the task force provided a valuable opportunity to engage with all commercial payers and ACO leadership, disability advocates, and academics. An ACO said that stakeholders had an opportunity to provide feedback on quality measures and were in agreement on most measures. In addition to influencing the ACO and CP measures (see ***ACS Stakeholder Engagement***, above), according to state officials, the task force discussions informed internal discussions at MassHealth about alignment quality measures for all their programs—One Care, Senior Care Options, other MCOs, the PCC Plan, and the hospital program, in addition to the ACOs and CPs.

Overall, the ACO partners were optimistic about the set of quality measures in the Full ACO. The final set of 22 measures (down from the state's original plan for 39) was not finalized until a few weeks before the launch of the ACO because it required CMS approval, however, which concerned several ACOs. There was also concern about the lack of pediatric quality measures and a bit of skepticism about using measures that other payers did not require. Because the ACOs in the Pilot ACO only had to submit quality data for two hybrid measures those ACOs felt they had not been able to build significantly on the pilot experience before they entered the Full ACO.

ACO structure in the full ACO

Three-quarters of the ACOs (13 of the 17) contracting with the state chose to participate in the ACO-MCO partnership model. A core component of the new direction of the state's health system reform, as noted, is creation of ACOs that follow one of three models (A, B, and C) designed by the state (see ***Table C-1***). In Accountable Care Partnership Plans (Model A), both providers and MCOs are responsible for bearing risk, making partner selection all the more important and leading to tighter networks for members. One reason for the Model A design was that MassHealth wanted to encourage the less-experienced ACOs to partner with an MCO to mitigate their lack of experience managing risk. In addition, as described in ***Section C.1.1***, MCOs can get some assurance as to the financial viability of their ACO providers, because the Massachusetts Division of Insurance had to certify the ACO providers as being actuarially sound enough to participate in a Full ACO partnership.

Three of the largest ACOs, which were part of the Pilot ACO program, chose to remain Primary Care ACOs (Model B) under Full ACO implementation. One reason given was to retain their autonomy, which was not possible in a model in which they shared risk with an MCO. It was also logical for Pilot ACOs to continue under Model B, because that was the only ACO variant tested in the pilot. One of the Pilot ACOs opted not to continue in the Full ACO, citing hesitation about the CPs' ability to bear their own portion of the risk at the state's rates. Other ACOs, however, gave their CPs the option of negotiating for differential levels of risk with the ACO, thus moderating their risk or enhancing their savings potential. ACOs and MCOs, however, cannot obligate CPs to bear downside risk for the first two contract years.

During MassHealth's ACO procurement period (September 29, 2016–January 12, 2017), MCOs met with a number of provider networks to share their value propositions, with differences in how each Accountable Care Partnership Plan was formed. One MCO chose its partnership based on a decades-long relationship with the chosen provider network that included shared risk arrangements in the commercial and Medicare markets. Another provider network opted to partner with a particular MCO because that partnership made the best financial sense for the providers, given the other plan options available to them. Yet another partnership described itself as based more on an organizational fit than a financially driven fit for the provider network. ACO leaders confirmed that there was a mix of newly formed partnerships and others that built on existing relationships, a few of which included previous risk-bearing arrangements. Whether there was a preexisting relationship between the providers and the MCO may not be a factor in ultimate ACO success, but both provider networks and MCOs indicated that existing familiarity with one another helped in launching their Accountable Care Partnership Plans.

ACO leadership cited the strong financial incentive to join the Full ACO as a key factor in their decision making process. Many of the ACO executive leaders across all three ACO models cited the strong incentive provided by the generous DSRIP infrastructure funding that would be available only to ACOs. Others mentioned the large Medicaid book of business they would lose if they chose not to participate. MCO representatives said the Medicaid managed care attribution model gave them a strong incentive to partner with ACOs to avoid losing members.

Establishing their ACO partnerships with MCOs included creating a governance structure, entering into contracts, and making financial agreements with each other. In Accountable Care Partnership Plans, the ACO will receive the MassHealth prospective capitated payment based on their attributed membership, requiring creation of a payment structure between the MCOs and the provider network. Two MCOs reported developing payment structures that work best for their partner providers, which in most cases is FFS. Because providers already have the systems in place that support FFS payments, changing to a capitated budget model would have been administratively burdensome as they prepared to launch the Full ACO. There will still need to be reconciliation if member costs exceed the capitated rate,

however, which means provider networks need to establish some level of reinsurance or reserve funds to cover potential losses.

Changes in care delivery under the Full ACO

The Full ACO goal is to reduce the cost of care, and improve quality and member experience, by driving delivery changes that lead to better care for patients. Although changes to the delivery system in the Full ACO are all still in their infancy, ACO leadership discussed their plans to drive change under the Full ACO. State officials, MCOs, ACO provider networks, and CPs anticipated changes over the course of the Full ACO implementation, including those already apparent in the early stages, and all expressed commitment to the Full ACO vision of integrated, coordinated health services that engage providers with payers in financial risk to achieve efficiencies while providing quality care.

Many of the ACO clinical sites were very optimistic that the ACO program would further extend their capacity to transform care delivery for their attributed patients. Although ACOs described different specific strategies, they were all focused on outreach, care management, and focusing on high-risk patients. Many of the ACOs come into the Full ACO with risk-sharing experience through contracts with commercial payers or Medicare. CPs felt the Full ACO will make more of an impact on service delivery at the community level than previous efforts such as PCPRI and also will enable them to begin acquiring the tools necessary for effective care management (which includes building a relationship with the ACO partner that facilitates better management across the care continuum).

There was wide consensus on using multidisciplinary teams to focus on the highest cost patients. Many of the ACOs are performing outreach to their patient panels, including patients they may not have seen in a long time. ACOs are also hiring executive directors, care managers, specialists, data analytics staff, nurses, recovery coaches, quality improvement coordinators, licensed mental health counselors, and more to help them achieve effective care coordination. At the same time, however, there is general concern that this ramp up in hiring may lead to layoffs after the DSRIP funding phases out, especially in the smaller ACOs that do not have large capital buffers.

The Pilot ACOs mentioned the value of that experience in improving their ability to conduct effective outreach. Other ACOs said they are focusing on better communications with their providers when one of their patients is hospitalized by using embedded staff at local hospitals or electronic event notification systems which, they said, have led to better transitions of care and processes for assisting patients with discharge and post-discharge follow-up. ACOs also said they are considering how to support patients with their social needs (e.g., housing, nutrition) by implementing social needs screenings.

Health plans expect to see provider behavior change because of the new financial incentive structure. DSRIP funds for infrastructure are already helping provide system infrastructure to enable provider behavior change. For example, these funds are supporting care coordination and data analytics staff, who provide support services to clinicians to make them more effective and efficient. Another area of provider behavioral change under the ACS includes addressing substance use disorders. Several ACOs mentioned that a large percentage of their CP-aligned patients had substance use disorders and noted that it will be a major shift for the ACOs to begin caring for them. Several ACOs expect the greatest long-term impact on cost to be in mental health and substance use disorders, although they expect to see short-term increases in cost before the long-term savings kick in. A final area of provider change is expected to be in creating formal partners and networks across the continuum of care. For example, one ACO's strategy has been to solicit responses to an RFP to consolidate the number of home health agencies to which the ACO referred its patients in an effort to have a high-quality/low-cost group of providers with whom they regularly partner.

C.2.3 Infrastructure to support care integration in the ACS and beyond

KEY INSIGHTS	
	• The state is using multiple levers to increase connections to the Mass HIway, the state's HIE. • MassHealth is also working to increase the functionality of the Mass HIway with a statewide ENS. • The e-Referral system exceeded its goals in terms of the number of sites enrolled and the number of EHR systems connected. • Massachusetts achieved high enrollment in MCPAP for Moms and plans to turn its attention to meeting the needs of enrolled providers.

Over the course of the SIM Initiative, MassHealth developed several longstanding infrastructure supports that will continue under the Full ACO to support greater coordination between providers, provide better care for patients, increase connections between community resources and clinical sites, and increase access to behavioral health services.

The state is using multiple levers to increase connections to the Mass HIway and several additional levers to increase its use, including a staggered timeframe for providers to use the Mass HIway after they connect. Chapter 224 of the Acts of 2012 required all health care providers to implement interoperable EHR systems connected to the Mass HIway, and the Mass HIway regulations promulgated in February 2017 established a timetable for different categories of providers to connect. During the 2018 site visit, state officials said that approximately 12,000 provider organizations were connected to the Mass HIway, either directly (approximately 1,300) or through Health Information Service Providers. In the last 3 months of 2017, the Mass HIway had 10 million transactions per month, compared to 7 million per month a year earlier (EOHHS, 2018). However, because many providers use the Mass HIway in a limited

way, the state plans to continue efforts to increase traffic. One ACO said that although it was connected to the Mass HIway, that was not integral to its communications infrastructure, and some providers said their sites still receive some ADT notices by fax.

MassHealth is also working to increase the functionality of the Mass HIway by implementing an ENS to transmit ADT notices from hospitals to other providers. MassHealth plans a hybrid ENS approach to avoid competing with existing ENS vendors that provide ADT notices, according to state officials. In Phase 1, the state's vendor will implement an ADT repository with a centralized opt-out mechanism to protect patients' right to confidentiality and comply with state law. The state anticipates that the repository vendor will share data with authorized ADT vendors, which will continue to distribute notifications to their subscribers. In Phase 2, if private vendors have not provided sufficient access to ADT notifications for all providers, the state will offer a basic ENS service to fill in the gaps. The state plans to avoid competing with private vendors by focusing on the unserved or offering a more basic service. State officials said they anticipate a soft launch of the statewide ENS arrangement in early 2019.

Several ACOs who discussed the ENS issue indicated that they already receive notifications through shared EHR systems, private ADT vendors, or both, but that they receive fewer notifications when patients go outside the providers' own systems. One ACO said it uses two private ENS vendors and its health system's EHR system to keep up with its patients but receives less information from hospitals outside their systems. Another ACO said that timely notices will be an important factor in its success, so a statewide solution to ENS will be helpful. Some providers said they ask patients who need a hospital visit to go to hospitals connected to the providers' practices to enable more effective monitoring of their patients' ED use.

State officials said that during the first 2 years the e-Referral system exceeded its goals in number of sites enrolled and of EHR systems connected. During state fiscal year 2017, 14 clinical sites were participating in e-Referral, making approximately 3,000 referrals to 23 community-based organizations. Several factors were cited for the major increase. State officials and stakeholders said it had taken months to establish initial connections. State officials said they streamlined the connection process, and the system was now compatible with a number of EHR systems. But stakeholders noted that, even after their EHR is connected to the e-Referral node on the Mass HIway, some clinicians are slow to adopt the new process because it takes time to discuss such referrals with patients and obtain their consent.

After successfully meeting or exceeding the goals in the first 2 years of the pilot, DPH changed its strategy in the third year to demonstrate the concept of systems change through the use of e-Referral. DPH concentrated on increasing utilization of e-Referral at the seven highest performing sites. These seven sites were already sending a high volume of referrals so DPH's

goal was to see if increased technical assistance could lead it to double the number of referrals that it sent in the year.

DMH officials said their top success in the past year was achieving high enrollment in MCPAP for Moms and that they now planned to turn their attention to meeting the needs of enrolled providers, especially the needs of OB/GYNs. MCPAP and MCPAP for Moms received SIM Initiative support to help providers address behavioral health issues in primary care settings. As enrollment increased, the percentage of enrolled providers using behavioral health services increased from 34 percent in Q1 2017 to 40 percent in Q3 2017 among obstetric providers, and also declined from 47 to 40 percent among pediatric PCPs. DMH officials said they need to determine whether the decrease in utilization was appropriate or whether patients' needs are being met through other means. Through outreach, DMH had learned that some of the larger practices in the state added or increased the number of behavioral health professionals working in primary care settings, so DMH plans data analysis to see whether higher levels of behavioral health integration corresponded with decreased MCPAP behavioral health utilization.

State officials said that one challenge for MCPAP for Moms is that many OB/GYNs see themselves as specialists and therefore feel no responsibility to address their patients' behavioral health needs. The underlying challenge is determining where a program like MCPAP fits into the evolving health care environment, which is increasing behavioral health integration in primary care settings and includes ACOs that can provide behavioral health resources to PCPs in their networks. Several PCPs said their sites use MCPAP for consults, but one PCP complained that when she calls back about a patient she typically gets a different behavioral health professional the second time and that this lack of continuity can result in inconsistent information.

C.2.4 Future developments in the full ACO

KEY INSIGHTS	
	• Full ACO sustainability depends on achieving cost savings. • CPs expressed concern about their continued existence after DSRIP funding expires. • The state's flexible services protocol to allow for interventions targeting social determinants of health is still under review.

Once the time-limited DSRIP funding ends, continued funding for DSRIP-supported investments will need to be addressed through cost savings. According to several MCOs, the state's previous payment rate allowed for a slightly higher rate for providers in MCOs (105 percent of the FFS fee). The state has now created a blended fee schedule across the FFS and MCO books of business that is slightly higher than the original FFS rates and slightly

lower than the original MCO rates. Providers viewed this as a rate cut, however, because so much of their business was weighted toward managed care. As the time-limited DSRIP dollars decline over the Full ACO's 5-year implementation period, providers will need to continue supporting investments through cost savings. In addition, MassHealth members may experience a shift in providers because of the lever of network provider selection available to the Accountable Care Partnership Plan ACOs. Over the next 5 years, ACOs will need to balance their budget against scheduled decreases in DSRIP funding for their attributed members during the DSRIP program, and providers will need to find ways to reduce their cost structure, earn shared savings based on lowering average expenditures for their attributed MassHealth members, or both.

CPs expressed concern about their continued existence as CPs and as community-based providers after DSRIP funding expires. At the end of the 5-year full ACO period, the goal is for CPs to prove their value so that the ACOs will voluntarily fund the CPs' programs. However, one of the CPs thought it an overstatement to say that all CPs will be funded by ACOs. Another concern is that the ACOs will "build versus buy" behavioral health services. Initially, some ACOs created their own behavioral health services; the fear is that these large ACOs will build their own outpatient behavioral health clinics rather than use the community-based providers, which have been serving the community for decades. The same Behavioral Health CP explained that, although their existence was a big part of why MassHealth leveraged the community-based system to develop the CP component of the ACO, the question remains as to whether the ACOs will continue to see value in community-based services rather than building their own in-house services.

The state's flexible services protocol[70] to allow for interventions targeting social determinants of health is still under review. A last area of potential challenge will be implementing a flexible services protocol. The state submitted a revised flexible services protocol to CMS in December 2017, which reduced the target population and list of services to housing and nutrition supports, based on CMS feedback. This leaves many unknowns for both the state and the ACO providers. The state's current plan is to focus on capacity building in 2018 and start delivering services under the flexible services protocol in mid-2019, but this is tentative pending CMS approval.

Because Massachusetts changed payment models in the middle of its SIM Initiative period, data for a quantitative, claims-based impact analyses of the Pilot ACO or full ACS are not available. For the impact analysis of PCPRI, please see the SIM Evaluation Year 4 Annual Report. Trends in population health and statewide Medicaid beneficiary utilization, expenditures,

[70] An option under Medicaid waivers (EOHHS, 2017a).

care coordination, and quality of care are available in ***Sub-appendix C-1.*** The state's own evaluation of the ACS will continue outside of the SIM Initiative.

C.3 Discussion

The SIM Initiative in Massachusetts began in April 2013, and because of a no-cost extension, it ended in April 2018. During the course of the SIM Initiative, Massachusetts experimented with several models to advance alternative payment methods in its Medicaid program. The SIM Initiative was instrumental to accelerate the pace with which the state was able to design and implement multiple models over the 5-year period of performance. By April 2018, the state launched a large-scale ACO initiative covered 832,000 Medicaid beneficiaries, aligned Medicaid MCO and provider interests, incorporated community-based resources for behavioral health and long-term services and supports, and in the future will provide funding for flexible services to meet social determinants of health.

The state designed its Medicaid ACO program after testing a different model, the Primary Care Payment Reform Initiative (PCPRI), which had low participation from providers and no participation from Medicaid MCOs—a situation that Massachusetts addressed by designing the ACO program to mitigate this risk. Although patient-level outcomes of the PCPRI, relative to an in-state comparison group, were not in the desired direction (i.e., no change in utilization or quality and increased total per person expenditures, as measured by claims data) (RTI International, 2018), providers reported some success in gaining experience with understanding performance feedback reports and incorporating co-location of behavioral health providers within primary care settings.

Massachusetts also made progress in providing additional access to pediatric behavioral health consultations through a network of child psychiatrists available for tele-consult under a program called the Massachusetts Child Psychiatry Access Project (MCPAP). In addition to pediatric consultations, the state expanded the service to postpartum mothers. There was also a large effort to create a system of referrals between community resources and primary care centers, called e-Referral. It is unclear if this effort will continue or be used by the ACOs, however.

Finally, Massachusetts put a major effort into overhauling its HIE, Mass HIway, to increase its utilization and functionality. These efforts are still underway, and the state hopes to have an Event Notification Service available through the Mass HIway in the near future.

Concurrent with these changes in Medicaid policies, other trends were observed related to the health and health care of this population. First, the proportion of Massachusetts low-income adults who reported current smoking decreased from 25.4 percent in 2013 to 18.8 percent in 2016, a statistically significant decline (using Behavioral Risk Factor Surveillance System survey data; see ***Sub-appendix C-1*** for details). At the same time, there was a 3 percentage point

decrease in the proportion of individuals who did *not* try to quit smoking. These smoking-related measures were the only statewide population health measures we examined that showed any statistically significant change during the period of the SIM Initiative—there were no changes in days of reported poor physical or mental health, for example, nor changes in self-reported diagnosis of diabetes, obesity, or access to a personal doctor, routine checkup, or dental visit in the last year.

Additionally, relative to comparison group states, in the first year of the SIM Initiative the statewide Medicaid population had improved quality of care[71] but mixed outcomes in terms of utilization: changes in the undesired direction were fewer physician visits, a decline in follow-up after hospital admissions (acute and mental illness-related), more inpatient admissions, and a worse rate of hospitalizations for ambulatory care sensitive conditions. More positively, Massachusetts Medicaid beneficiaries had a relative decline in ED visits and readmissions, but not enough to offset total expenditures: total per beneficiary per month expenditures were higher for the Medicaid child and adult populations (separately), Medicare-Medicaid population, and Medicaid-only population relative to comparison group states (see ***Sub-appendix C-1*** for details). Although these trends are unrelated to the Medicaid payment model in place during this time, PCPRI, which reached a small percentage of Medicaid beneficiaries, they demonstrate room for improvement in care coordination and cost containment in Massachusetts' statewide health care transformation efforts.

Overall, Massachusetts made huge strides in moving the Medicaid program toward alternative payment methods focused on paying for value rather than volume. Innovative programs such as MCPAP increased access to much-needed services that are in small supply. Finally, the state made progress toward creating a usable HIE to which many providers expressed strong interest. Massachusetts will learn much over the next 5 years as the ACO model matures; however, the groundwork for that progress was laid during the SIM Initiative.

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[71] Quality of care measures that improved relative to comparison group states, in the first year of the SIM Initiative, included: Percentage of women age 41–69 years who had a mammogram to screen for breast cancer during the measurement year; percentage of children age 3 to 6 years with any well-child visits; initiation in alcohol and other drug dependence treatment; engagement of alcohol and other drug-related treatment; percentage of patients age 5–64 years with persistent asthma who were appropriately prescribed medication during the year; and percentage of patients age 18 years and older diagnosed with a new episode of major depression and treated with antidepressant medication who remained on medication treatment at least 84 days.

Quality of care measures that showed no difference from comparison group states included: Percentage of children with 0 well-child visits by 15 months of age; percentage of children with 6 or more well-child visits by 15 months of age; and percentage of patients age 18 years and older diagnosed with a new episode of major depression and treated with antidepressant medication who remained on medication treatment at least 180 days.

In Massachusetts relative to a comparison group, in the first year of the SIM Initiative, the percentage of patients seen for a visit between October 1 and March 31 who received an influenza immunization during the visit declined (worsened).

Because Massachusetts changed payment models in the middle of its SIM Initiative period, data for a quantitative, claims-based impact analyses of the Pilot ACO or full ACS are not available. For the impact analysis of PCPRI, please see the SIM Evaluation Year 4 Annual Report (RTI International, 2018). Trends in population health and statewide Medicaid beneficiary utilization, expenditures, care coordination, and quality of care are available in ***Sub-appendix C-1***. The state's own evaluation of the ACS will continue outside of the SIM Initiative.

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Sub-appendix C-1. Supplementary Results

This sub-appendix contains additional data relevant to Massachusetts during the SIM Initiative. ***Section C-1.1*** presents population-level health status data drawn from a statewide survey to offer some context of changes in the overall population health during the period of the SIM Initiative. ***Section C-1.2*** presents results from an analysis comparing the Massachusetts statewide Medicaid-covered population to statewide Medicaid-covered populations in a group of comparison states not participating in the SIM Initiative. These analyses test whether the SIM Initiative activities in Massachusetts offered enough leverage to change the trajectory of utilization and expenditure outcomes throughout different types of populations statewide. This leverage would occur via two primary mechanisms: first, providers likely make changes in care delivery for all patients, not just those participating in a payment model; second, the state built some infrastructure under the SIM Initiative that could assist a range of providers statewide in improving care.

C-1.1 Massachusetts Population-level Health Status Measures, 2013–2016

The Behavioral Risk Factor Surveillance Survey (BRFSS) is a state-based survey conducted annually by state health departments, guided by the Centers for Disease Control and Prevention (CDC). The survey is used to collect data from U.S. residents 18 and older regarding health insurance coverage, health risk behaviors, health status, and preventive health practices.

Table C-1-1 summarizes BRFSS data for the time period corresponding to the SIM Initiative, 2013 and 2016, for low income, non-aged adults. The only statistically significant differences between 2013 and 2016 demonstrate mixed findings with regard to tobacco cessation:

- The proportion of Massachusetts low-income adults who reported current smoking decreased from 25.4 percent in 2013 to 18.8 percent in 2016.
- Respondents also reported a 3-percentage point decrease in the proportion of individuals who did not try to quit smoking.

This comparison of changes between 2013 and 2016 controls for the following individual and family characteristics: sex, age, race and ethnicity, educational attainment, marital status, family and household size, employment status, family income, and home ownership). We did not control for health insurance status in these analyses. Because eligibility criteria for Medicaid expanded for low-income adults and the Health Insurance Marketplaces started during this time, it is possible that the improvements may be a result of these or other reforms implemented during this time period.

Table C-1-1. Regression-adjusted changes in population health for low-income adults 18 to 64 in Massachusetts, 2013–2016

Measure	2013	2016	2016–2013 difference
Self-reported health status is fair or poor	18.1%	17.2%	−0.9
Any days physical health was not good in last 30 days	41.9%	40.4%	−1.5
Number of days physical health was not good in last 30 days	4.1	4.3	0.2
Any days mental health was not good in last 30 days	47.9%	48.0%	0.0
Number of days mental health was not good in last 30 days	5.8	5.4	−0.4
Ever diagnosed with diabetes	6.5%	5.8%	−0.7
Is obese	22.7%	22.0%	−0.7
Current smoker	25.4%	18.8%	−6.6**
Current smoker who has not tried to quit in last year	9.7%	6.7%	−3.0**
Does not have health insurance	13.0%	10.7%	−2.3
Does not have a personal doctor	21.9%	20.2%	−1.7
Did not have a routine checkup in the past year	26.4%	28.6%	2.2
Did not have a dental visit in the past year[a]	30.6%	32.5%	1.9

Source: 2013–2016 BRFSS.

Note: Low income is defined as income at or below 138% of the federal poverty level. The sample size is 3,046 for 2013, 1,505 for 2016, and 8,984 for the 2013–2016 period.

[a] Information on dental visits is not available for 2013; the 2014 measure is used instead.

*/** Significantly different from zero at the 0.10/.05 level, two-tailed test.

C-1.2 Massachusetts Statewide Claims-based Measures

The data summarized here provide some context to trends in the health care utilization and expenditures of Massachusetts's Medicaid relative to similar populations in other states during the time of the SIM Initiative. Under the SIM Initiative, Massachusetts implemented two payment and delivery models: the Primary Care Payment Reform Initiative (PCPRI), which ended in 2016, and a Medicaid accountable care organization (ACO) model. PCPRI reached 6 percent of the state's Medicaid population and started in 2014.

We present findings on changes in outcomes for the statewide Medicaid population using Massachusetts Medicaid data obtained from the state and comparison group data obtained from the Medicaid Analytic eXtract (MAX) files. The Medicare and commercial populations were not a focus of Massachusetts's SIM Initiative activities, so we do not present statewide results for these populations in Massachusetts. Because the claims data used in these analyses include all Medicaid beneficiaries in the state and only include 1 year after the start of the SIM Initiative in Massachusetts, these trends are likely not influenced by the PCPRI or pilot ACO models in Massachusetts. However, these trends illustrate the context in which health care providers

participating in delivery system and payment models are working and what changes were occurring in health care use and expenditures in the state during the SIM Initiative.

We summarize the findings from difference-in-differences analyses that compared outcomes for Massachusetts relative to the comparison group from 3 years prior (January 2011 to December 2013) to 1 year after (January 2014 to December 2014) the SIM Initiative started for the Medicaid population. We used claims data to derive the following annual outcomes:

- **Care coordination**
  - Percentage of beneficiaries with any physician visits
  - Percentage of mental illness–related acute inpatient hospital admissions with a mental health follow-up visit within 7 days and 30 days
  - Percentage of acute admissions with a follow-up visit within 14 days
- **Utilization**
  - Inpatient admissions per 1,000 persons
  - Emergency department (ED) visits per 1,000 persons
  - 30-day readmissions per 1,000 discharges
- **Total per member per month (PMPM) expenditures**
- **Quality of care**
  - Rate of hospitalizations for ambulatory care sensitive conditions
  - Flu immunization rates
  - Breast cancer screening rates
  - Well-child visit rates
    - Number by 15 months of age and any for children age 3 to 6 years
  - Initiation and engagement of alcohol and other drug-related treatment
  - Asthma medication management
  - Depression medication management

Because of inherent differences in utilization patterns, we examined rates of inpatient admissions, ED visits, and 30-day readmissions along with total expenditures separately for children and adults. We also examined inpatient admission and ED visit rates (all cause and behavioral health related) and expenditures (total and behavioral health related) separately for persons with behavioral health conditions because this high-risk group may use more health care than the overall population. Detailed methods on these analyses are presented in ***Appendix G***.

C-1.2.1 Trends for the Medicaid population after 1 year of the SIM Initiative

Because MAX files were not available for Massachusetts, we used Massachusetts Medicaid data provided by the state. These data contain enrollment and claims data for all Massachusetts Medicaid beneficiaries. We used MAX files made available through the CCW enclave for Massachusetts's comparison group (Connecticut and Michigan). The MAX data contain all the enrollment and claims information for every Medicaid beneficiary in the state. Because beneficiaries dually enrolled in Medicare and Medicaid do not have complete utilization or expenditure data in the Medicaid claims, we report care coordination, utilization, and quality outcomes for beneficiaries enrolled in Medicaid only. We report the total expenditures for those dually enrolled in Medicare and Medicaid and those only enrolled in Medicaid separately.

In general, the findings for care coordination, utilization, expenditure, and quality of care outcomes for the Medicaid beneficiaries in Massachusetts were mixed in the first year of the SIM Initiative. After 1 year of the SIM Initiative, key statistically significant changes for Massachusetts Medicaid beneficiaries relative to the comparison group include the following:

- **Overall physician visit rates declined** across all age groups, with declines among children, adults, and all beneficiaries. However, primary care visits among children generally improved, with an increased percentage of children age 3 to 6 years of age with any well-child visits in the year increased.
- **Care coordination**, as measured by rates of follow-up within 30 days after a hospitalization for mental illness, **declined**. These was no statistically significant difference in the corresponding 7-day follow-up rate.
- **Utilization results were mixed. Inpatient hospital admission rates increased** for the overall population and for adults. However, **for children, the inpatient admission rate decreased**. There was a decrease in the rate of 30-day readmissions and an increase in overall rate of hospitalizations for ambulatory care–sensitive conditions.
- **ED visit rates decreased** overall and for both children and adults.
- **Quality of care findings were generally positive**. Rates of breast cancer screening, asthma medication management, antidepressant medication management, and initiation and engagement of alcohol and other drug treatment improved. However, the rate of flu immunizations declined.
- **Expenditures increased across all ages and beneficiary types.** Specifically, there were increased total expenditures for adult, child, and all Medicaid beneficiaries and for dual Medicare-Medicaid beneficiaries.
- Among beneficiaries with behavioral health conditions, we found similar findings to the overall population. **Inpatient hospital admission rates and behavioral health–related inpatient admission rates increased,** while **all-cause ED visits declined**. However, unlike in the full population, **30-day readmissions increased**. **Total expenditures and total behavioral health–related expenditures both increased.**

Appendix D: Minnesota SIM Initiative Progress and Findings

Minnesota SIM Initiative

Award
$45 million

Period of performance
October 1, 2013 to December 31, 2017

Pre-SIM Landscape

Minnesota eHealth Initiative

Funding issued for eHealth in 2006; EHRs widely adopted by 2013.

2008 Health Reform Law

Established 1) the HCH model, 2) the predecessor to the IHP model, and 3) the State Health Improvement Plan that laid initial ACH groundwork.

Health Care Homes

The State established HCHs in 2008 and implemented a certification process in 2010.

Reimbursement of Emerging Professions

Authorized Medicaid reimbursement for community health workers in 2007 and licensing of dental therapists in 2009.

Other Investments in Reform

Expanded Medicaid benefits for adults, launched Medicare ACO models, and had other CMMI awards in place.

Strategies

Symbols represent strategies that build on efforts that pre-date SIM.

Bolster health IT and data analytics
The State issued grants to increase exchange of health information and effective use of data analytics, and addressed provider privacy and security concerns.

Pursue payment reform
Minnesota facilitated successful participation in value-based purchasing models by a broad range of providers, with a focus on expanded participation in IHPs.

Pursue delivery system reform
Minnesota funded workforce development, engaged priority settings in ACHs, and expanded HCH participation. Reforms were inclusive of small and rural providers.

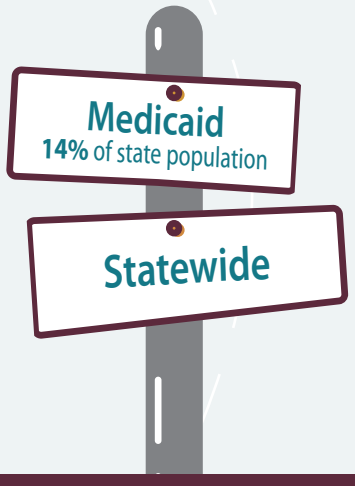
Reach

as of December 2017

More than half (58%) of Minnesota's total Medicaid population was served by the state's IHP model.

Integrated Health Partnership

58%



Health Care Home

70%

ACH = Accountable Community for Health; ACO = accountable care organization; CMMI = Center for Medicare & Medicaid Innovation; EHR = electronic health record; HCH = health care home; IHP = Integrated Health Partnership

Impact on Medicaid Population

✔ = Relative improvement to CG
✘ = No improvement relative to CG
● = No statistically significant change

Goals

Integrated Health Partnership

Better Care Coordination

- ✔ Specialty provider visits
- ✔ 14-day follow up after inpatient admission
- ✘ Primary care provider visit

  Though not the expected finding, given other positive findings, the decreased PCP visit rate may reflect effective coordination outside the traditional office setting.

Increased Quality of Care

- ✔ Hba1c testing

  Improvements in HbA1c testing rates were expected, given the model focus, confirming that focused incentives can yield improvements.
- ● Percentage of patients age 5–64 years with persistent asthma who were appropriately prescribed medication during the year
- ✘ Percentage of patients age 18 years and older diagnosed with a new episode of major depression and treated with antidepressant medication who remained on medication treatment at least 180 days

Appropriate Utilization of Services

- ✔ ED visits
- ✔ 30-day readmissions
- ✘ Inpatient admissions

  Though not expected, given other positive findings, increased rates of admission may reflect appropriate use of needed inpatient services.

Lower Total Spending*

- ✔ Professional PBPM spending
- ● Facility PBPM spending
- ● Total medical PBPM spending

* We used Medicaid claims data from CMS MAX and Alpha-MAX research files to estimate IHP impact on care coordination, quality, and utilization while we used Medicaid data from the Minnesota All Payer Claims Database to estimate impact on spending.

Limitations

Minnesota used SIM funds to support a broad range of innovations, which may reduce the measurable effects of IHPs because of contamination of the comparison groups. Accordingly, the estimated effects represented here are conservative estimates. Even so, they represent a more realistic view of the impact the IHP model given that multiple health reforms are happening simultaneously in the state.

Lessons Learned

- ☑ Successful collaboration between the two state agencies that led the SIM Initiative was key to making progress.
- ☑ Defining accountable care through the Continuum of Accountability Matrix was critical to expanding accountable care models.
- ☑ Clearly outlining roles and responsibilities was key to successfully integrating emerging professions.
- ☑ A successful balance between spreading funding across many providers and "stacking" grants to a single provider can help spur progress in providers' transformation.

CG = comparison group; ED = emergency department; IHP= Integrated Health Partnership; PBPM = per beneficiary per month; PCP = primary care provider

D.1 Minnesota's SIM Initiative, 2013–2017

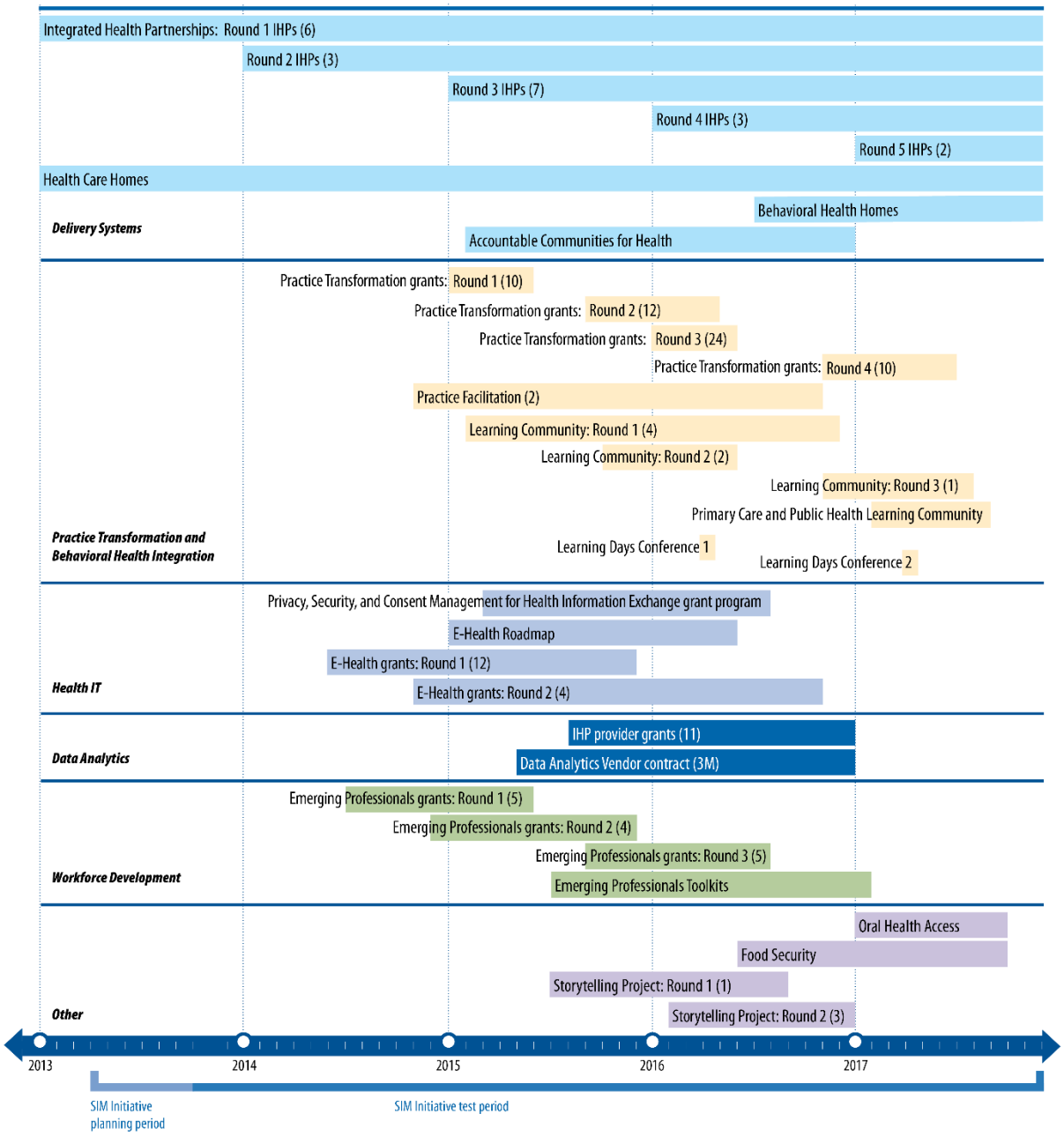
Minnesota's SIM Initiative ran from October 1, 2013, to December 31, 2017.[72] At the start, Minnesota's SIM Initiative leaders intended to use the award to accelerate progress toward the goal to "improve health in communities, provide better care, and lower health care costs by expanding patient-centered, team-based care, behavioral health, long-term care, and community prevention services" (Minnesota Accountable Health Model, 2017). To this end, the state used much of its SIM award to directly support and expand participation in models to achieve accountability for cost and quality of care—models that largely existed prior to the SIM award. Much of this work was explicitly intended to (1) accelerate development of the state's major delivery and payment reform initiative, Integrated Health Partnerships (IHPs), a Medicaid Accountable Care Organization (ACO) model; and (2) encourage clinical and service delivery integration between primary care and what Minnesota calls the "priority settings": behavioral health, social services, local public health, and long-term care.

This section describes the evolution of Minnesota's SIM Initiative, beginning with a timeline depicting major health delivery and payment transformation activities and policies as they pertain to the SIM Initiative (see ***Figure D-1***). An overview of the health environment in Minnesota in the years just prior to implementation of the SIM Initiative begins the discussion. The section goes on to describe major activities Minnesota undertook as part of its health system transformation under the SIM Initiative, followed by a review of the successes, challenges, and lessons learned during the test period. The section ends with a look forward to issues of sustainability and further progress after the test period ends.[73]

[72] The SIM Initiative award began with a 6-month planning period, April to September 2013. Minnesota received a no-cost extension to its original 3-year test period, from October 2016 to December 2017.

[73] Note that this chapter does not provide details on each of the state's investments, but rather reflects generally on Minnesota's progression through the SIM period of performance in key areas. Refer to Annual Report 4 for a more detailed analysis of each of the Minnesota's SIM activities.

Figure D-1. Highlights from Minnesota's health care system transformation before, during, and after the SIM Initiative



Note: (n) = number of contracts/grants made

Policies prior to 2013: Jan 2006—e-Health Initiative; Jan 2007—Begin direct reimbursement of community health workers, Interoperable Electronic Health Record Mandate; Jul 2008–2008 Health Care Reform Law; Jan 2009—Dental Therapists authorized licensing; Jan 2010–2010 Legislation—Health Care Delivery Systems demonstration, Health Care Homes, and Community Care Teams; Jul 2010—Health Care Home certification process; Jan 2012—Multi-Payer Advanced Primary Care Practice demonstration, e-Health Connectivity Grant Program.

D.1.1. Setting the stage for the SIM Initiative in Minnesota (2004–2013)

The Minnesota SIM Initiative built on a longstanding history of health reform and cross-agency collaboration in Minnesota that has led to innovative policy changes. In addition to being an early leader in health information technology (health IT), Minnesota has an established history of managed care, including alternative payment models, as the primary entity driving health care payment. Minnesota is generally known as a progressive state, and most stakeholders referred to the state's spirit of collaboration as an important driver of these policy changes.

The Minnesota eHealth Initiative. The impetus for the eHealth initiative, which was established as early as 2004 as a private-public collaborative under the Minnesota Department of Health (MDH), was "to accelerate the adoption of use and [health] IT in order to improve health care quality, increase patient safety, reduce health care costs and improve public health." The state issued four waves of funding for eHealth before the SIM Initiative, starting in 2006. As of 2013, most providers and hospitals had adopted an electronic health record (EHR) system.

Minnesota's 2008 Health Reform Law. Much of the direction for Minnesota's pre-SIM health system reform efforts came from the state's 2008 Health Care Reform Law, which led to 2010 legislation implementing the Health Care Delivery System Demonstration Project tasked with testing "alternative and innovative health care delivery systems that provide services for an agreed upon total cost of care of risk/gain sharing payment arrangement." The Health Care Delivery System Demonstration defined the model that would later become the state's IHPs. The law also established health care homes (HCHs) (see more below).[74] Another creation of the 2008 law was the Statewide Health Improvement Partnership (SHIP)—focusing specifically on obesity and tobacco use efforts—which laid the groundwork for the Community Care Team pilot, which evolved into Accountable Communities for Health (ACHs) under the SIM Initiative. ACHs are partnerships between an ACO, or an ACO-like entity, and a priority setting that addresses the needs of a defined population in the community.

Health Care Homes. Established under the 2008 Health Reform Law, the state implemented a certification process for HCHs in July 2010. Certified primary care clinics provided patient- and family-centered coordinated care and in exchange received a tiered flat amount per patient, depending on health status, from participating payers, including Medicare between 2012 and 2014 under the CMS Multi-Payer Advanced Primary Care Practice Demonstration.

Reimbursement of emerging professions. In 2007, the state legislature authorized policy to support the direct reimbursement of community health workers (CHWs), with CMS approving an amendment authorizing Medicaid payments for CHWs in 2008 (American Public

[74] Minnesota Department of Health and Minnesota Department of Human Services: 2008 Health Care Reform Summary. St. Paul, Minn. June 2008. http://www.health.state.mn.us/divs/opa/08reformsummary.pdf

Health Association, 2009; Office of the Revisor of Statutes, 2017). In 2009, the state authorized licensing of dental therapists.

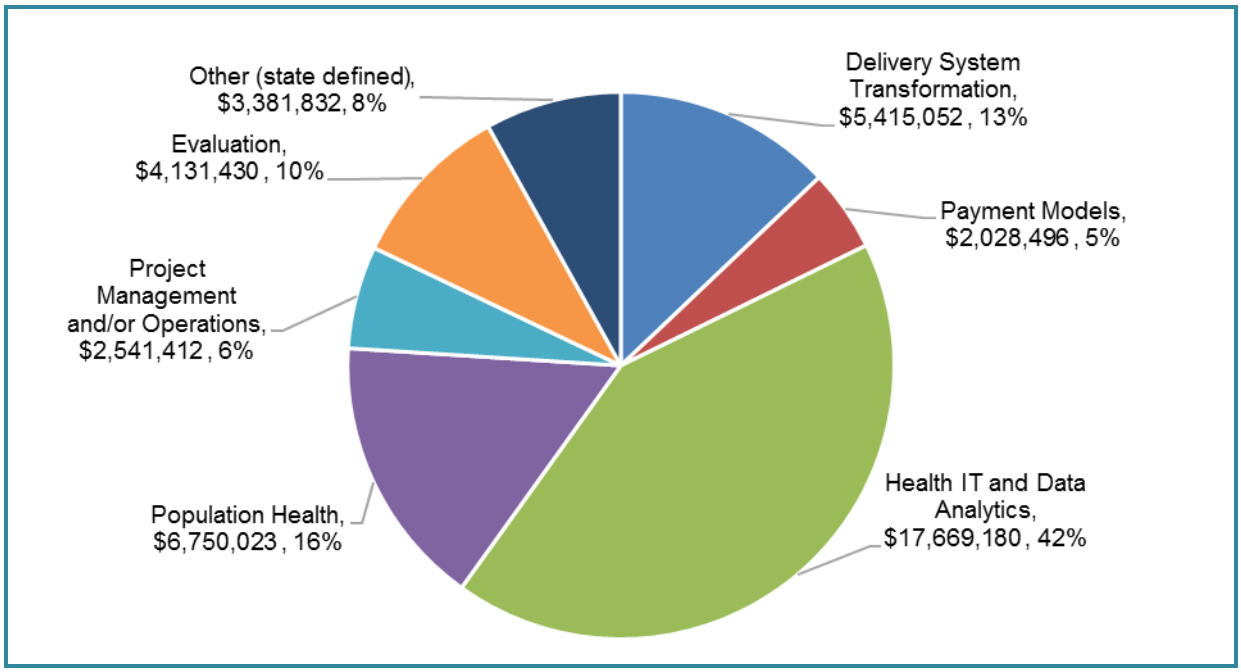
Other federal and state investments. The state was home to Innovation Center-funded awards, including eight Health Care Innovation awards and four Bundled Payment Care Improvement sites, and participated in the Financial Alignment Initiative for Medicare-Medicaid beneficiaries (Greene, 2017). In 2013, Minnesota also had three Pioneer Model ACOs and two Shared Savings Program ACOs, both Medicare ACO models that began in 2012 (Gavin et al., 2016). Although not typical of many states, Minnesota began providing coverage for childless adults with incomes below 75 percent of the federal poverty level in 1976.[75] Hennepin Health began as a delivery system demonstration in January 2012 to serve this population in Hennepin County. The 2-year pilot project adopted an ACO-like model to improve care coordination (Sandberg et al., 2014). Under the Patient Protection and Affordable Care Act, Minnesota expanded Medicaid to individuals with incomes below 138 percent of the federal poverty line (FPL) starting January 1, 2014. Additionally, Minnesotans with incomes between 138 and 200 percent of the FPL are eligible for MinnesotaCare, a health care program that pays for medical services for adults and children in Minnesota who don't have affordable health insurance.

D.1.2. Major activities fully or partially supported with SIM funds

Minnesota received a Round 1 SIM Initiative Model Test award of approximately $45 million, which was primarily used to expand and accelerate existing health care reform efforts. Approximately 50 percent of this funding was spent, through grants, to directly support and expand participation in models intended to achieve accountability for cost and quality of care, or improve care delivery (see ***Figure D-2***). The state specifically focused on expanding participation in IHPs, HCHs, ACHs, and Behavioral Health Homes (BHHs). Because prior efforts to change health care delivery and payment focused on traditional providers such as physicians and hospitals, with most of the uptake in the commercial sector, the state focused SIM Initiative resources on accelerating change in the priority settings and in Medicaid. The state's investments in other supporting infrastructure focused on low-resource providers, such as smaller providers, rural providers, providers ineligible for the Medicare or Medicaid EHR Incentive Programs, and providers serving specific populations.

[75] http://www.house.leg.state.mn.us/hrd/pubs/gamcib.pdf

Figure D-2. Minnesota SIM Initiative spending 2013–2017



A joint effort between the Department of Human Services (DHS) and MDH, Minnesota used the SIM award to support a range of activities to facilitate providers' ability to meaningfully participate in an "accountable health model." The SIM Initiative activities represented three main domains: payment reform, health IT, and delivery reform.[76]

In 2014, concurrent with the SIM Initiative, DHS also secured a Testing Experience and Functional Tools (TEFT) in Community-Based Long-Term Services and Supports (CB-LTSS) grant from CMS. This 4-year grant aims to "test a cross-disability experience of care survey and a set of functional assessment items, demonstrate personal health records, and create an electronic LTSS service plan standard" (Medicaid.gov, 2016). This grant dovetails with the stated SIM Initiative goals of integrating priority settings into health care reform. DHS officials noted specifically that coordination with the federal TEFT grant work improved their capability to share information with providers.

During the SIM award period, state officials remained consistent over time in identifying the drivers they would use to meet the Initiative's goals to expand value-based payment models and integrate priority settings into the health care system: eHealth, data analytics, coordinated care, community partnerships, and payment and measurement. The state made progress in

[76] Minnesota also invested in developing resources for the provider community at large, such as the eHealth roadmap, emerging professions toolkits, a health information privacy and security toolkit, and a series of Learning Communities and Storytelling Projects—all of these activities are described in detail in Annual Report 4.

advancing each of these drivers during the test period. Brief descriptions of major activities fully or partially funded by the SIM Initiative follow, beginning with delivery system and payment models and the specific infrastructure supporting model participants and followed by activities that reached providers statewide.

Payment reform. Minnesota providers and payers were already participating in value-based purchasing models before the SIM Initiative, as noted in the previous section, including substantial Medicaid ACO expansion. Minnesota saw the SIM Initiative as an opportunity for payers to come together and align around the ACO model. To better understand ACO penetration, the state used SIM funds to conduct an ACO baseline survey in April 2015. Results showed "50% of clinics, hospitals, and physicians either belong to an ACO or belong to a larger organization that participates in an ACO," with ACO contracts with commercial insurers being most prevalent. A third of providers in these arrangements were at risk for more than 10 percent of their revenue at the time of the survey (Minnesota Accountable Health Model, n.d.). These survey results confirmed the state's understanding that Medicaid had the most room to advance an ACO model and that providers needed to become more comfortable bearing risk.

Integrated Health Partnerships, a Medicaid ACO model. The delivery systems participating in the Health Care Delivery System Demonstration Project described above were renamed as IHPs in 2013. Beginning in 2014, the state put out a request for applications and selected delivery systems to become IHPs annually, with Hennepin Healthcare becoming an IHPs in 2014. IHPs are Minnesota's Medicaid ACOs for beneficiaries under age 65, and the state used expanding participation in that model as a key metric of the SIM Initiative's success. Most Minnesotans eligible for a Minnesota Health Care Program (Medical Assistance Program and MinnesotaCare, collectively) are enrolled with a Medicaid managed care organization (MCO), and MCOs are required to participate in the IHP model; they continue to reimburse IHP participating providers for services rendered to their enrollees and contribute a proportional amount to any shared savings the IHP realizes. As a result, the state maintains the widespread and successful MCO program through a complex retrospective attribution and shared savings payment system with IHPs. Integration of Minnesota managed care and IHPs has allowed the state to retain financial stability through full capitated payments to Medicaid MCOs while simultaneously implementing shared savings for IHPs.

Box 1: Minnesota Medicaid MCOs

- Number of Medicaid MCOs: 8[1]
- Medicaid beneficiaries enrolled in a Medicaid MCO in 2013: 70.2 percent[2]

[1] Minnesota Department of Human Services (2018)

[2] Kaiser Family Foundation (2014)

Cognizant of existing Medicare ACO programs, the state adopted similar strategies for IHP implementation. For example, both IHPs and the Medicare Shared Savings Program use 12-month retrospective attribution based on plurality of primary care services, and IHPs use a similar structure as Medicare Pioneer ACOs to phase in two-sided risk, with the potential for

savings and losses. IHPs aligned their quality measures with the Statewide Quality Reporting and Measurement System (SQRMS), although true measure alignment was elusive, as discussed in the Challenges section of this report ***(Section D.1.3)***.

Health care homes.[77] HCHs, an explicitly multi-payer arrangement, were a central underpinning to the state's goal of increasing the number of patients in patient-centered, team-based, and coordinated care. HCHs are charged with providing care coordination to patients and are paid for care coordination using a tiered flat amount per patient, with the rate also varying by health status. Minnesota's participation in the Multi-Payer Advanced Primary Care Practice demonstration from 2012 to 2014 facilitated Medicare's financial support to HCHs for the Medicare beneficiaries they served.

Box 2: Behavioral Health Home Services

Implemented in July 2016, the goals of behavioral health home services are that an individual:

- Has access to and utilizes routine and preventive health care services
- Has consistent treatment of mental health and other co-occurring health conditions
- Gains knowledge of health conditions, effective treatments, and practices of self-management of health conditions
- Learns and considers healthy lifestyle routines
- Has access to and uses social and community supports to assist the individual meet his or her health wellness goals

Source: Minnesota Department of Human Services (2018)

Box 3: Rural Health Efforts

According to state officials, 43 percent of SIM participating organizations are located in rural areas.

Eight IHPs include rural health clinics.

Minnesota reached its rural areas by:

- Requiring 10 of the 25 care teams receiving assistance from a practice facilitation grantee be in rural or underserved communities
- Funding development of a Learning Community and a Learning Days Planning by the National Rural Health Resource center
- Awarding four practice transformation grants to rural providers (one in round 1 and three in round 4)

To expand participation in both HCHs and IHPs, the state developed its SIM activities specifically so smaller or more rural providers could take advantage of them. Through SIM practice transformation grants, 56 practices received support in such areas as performance-based payment, quality improvement, and health IT. The first round of grants was open to providers seeking a broad range of activities. The second round was targeted to providers seeking HCH certification. Development of Behavioral Health Home services, a legislative priority concurrent

[77] Although they predated the SIM Initiative, HCHs were later codified by statutes: Minnesota Health Care Homes (Minnesota Statute §256B.0751, available at https://www.revisor.mn.gov/statutes/?id=256B.0751).

with the SIM Initiative, was the target for the third set of grants. Implemented in July 2016, the fourth set of grants targeted providers seeking to further develop integrated care networks.

Health IT and data analytics. The SIM Initiative continued Minnesota's forward-looking investments in health IT, primarily by increasing EHR adoption and supporting IHPs with data analytic capability.

***EHR Adoption and HIE*.** Although Minnesota had financially supported health IT over the prior decade, variation among care settings in EHR adoption remained. As part of a 2008 legislative mandate, hospitals and health care providers were required to have an interoperable EHR system by January 1, 2015. Using SIM funds, the state planned to award eHealth grants that would increase EHR use among providers not eligible for the Medicare or Medicaid EHR Incentive Programs; facilitate health information exchange (HIE) that included the priority settings; standardize definition of common data elements across payers and providers; and address providers' privacy and security concerns. The first SIM eHealth grant round represented the fifth wave of eHealth funding issued by the state since 2006 (Minnesota e-Health Initiative, 2015).

Approximately $5.6 million in SIM funds was awarded to eHealth grantees, for which the state required inclusion of an ACO or ACO-like entity and at least one priority setting—partnerships referred to collectively as eHealth collaboratives. Initially the state wanted to require eHealth collaboratives' connection to a Health Information Organization (HIO). But around 6 months after the state awarded its first eHealth grants, the state's single HIO folded, as reported by a state official, facing sustainability challenges resulting from not having enough providers connected prior to the SIM Initiative. The result of losing this HIO was a delay that has affected the state's ability to push providers toward connecting directly toward HIOs, instead allowing connection to a Health Data Intermediary. Some early grantees had to rework their plans for data exchange after their grant had been awarded. It was only in later grant rounds that the state was able to require connection to an HIO, with four active HIOs at the close of the test period. The state reported that 88 percent of targeted organizations are HIE-enabled as of the end of the test period.

Through the SIM Initiative period of performance, individual providers expressed increasing comfort with EHRs, generally finding them to be a useful source of information by the end of the test period. However, many continued to cite the lack of EHR interoperability and inability to access patient data statewide as frustrations. Consumers also expressed increasing comfort with EHRs, but both providers and consumers noted that EHRs can detract from the doctor-patient relationship.

Data analytics. Understanding financial and quality data is critical to success in an accountable care model. Accordingly, Minnesota's plans for the SIM Initiative included data

alignment across payers and direct data analytics support to IHPs. With regard to alignment, a data analytics subgroup of a state-convened Multi-Payer Alignment Task Force recommended that payers standardize their approaches to data analytics in very basic areas such as patient demographics, health status, and cost. The state implemented this recommendation by providing IHPs with a single data set that included all their IHP beneficiaries, regardless of their enrollment with a Medicaid MCO. Additionally, $4.2 million in grants was provided directly to IHPs to help them develop targeted analytic capacity, and the state also hired a contractor to facilitate improvement in data analytics across IHPs. IHP leadership universally praised both the data and the support the state provided. Individual providers liked having data on their patients but remained concerned about the accuracy and timeliness of the data. Although the subgroup identified key data elements needed to improve the social determinants of health, they did not develop a standardized framework for collection of that data, which continued to impede provider efforts to track quality throughout the test period. To keep this effort moving at all, late in its SIM period of performance, the state issued a food security grant that tasked the grantee with piloting an IHP intervention on ways to capture and subsequently address food security challenges among their beneficiaries.

Other health IT investments. Two additional SIM investments in health IT, considerably smaller but successful, were the eHealth Roadmap and a Privacy Toolkit. The eHealth Roadmap was facilitated by the state and led by a steering committee representing the priority settings. It provides use cases and recommendations for the "adoption and use of eHealth" in the priority settings (Minnesota Department of Health, 2016). The Privacy Toolkit, designed by a law firm the state commissioned for this task, assists providers in navigating health information privacy laws. This toolkit provides templates for policies, procedures, and agreements that a practice can customize to ensure that it meets state and federal privacy and security requirements (Minnesota Department of Health, 2017).

Delivery system reform. As a community stakeholder noted in Spring 2014, "if SIM can help create a culture that changes the notion of what a care team is that would be a huge step…but it involves changing mindsets and culture." In addition to the more conventional ways of transforming health system delivery in the form of integrated care models, Minnesota's delivery system reform efforts under the SIM Initiative were explicitly built to include the priority settings, to facilitate the needed conceptual shift away from health care traditionally defined. In addition to the specified priority settings (behavioral health, social services, local public health, and long-term care), the SIM Initiative targeted grant funds to a broader range of providers in "emerging professions" (including community paramedics, community health workers, and dental therapists), to test integration of these professions with conventional health care delivery, and to establish their business case. The emerging professions grant program distributed around $400,000 to a total of 14 organizations for 12 months each, over a 3-year period (July 2014 to July 2016). The state documented the experience of these grantees in

toolkits to facilitate replication by other organizations. Many SIM activities incorporated both priority and other nonmedical settings, but the most prominent is the ACH model.

Accountable Communities for Health. ACHs, as noted, are partnerships between an ACO-like entity and a priority setting, which address the needs of a defined population in the community. The state awarded a total of almost $6 million of SIM funds in competitive ACH grants to 15 organizations, most of which have elected to continue funding their SIM-funded positions after the grant funds expired.[78] The state provided Learning Communities grants targeted to ACHs and provided technical support and peer-to-peer-learning opportunities to facilitate development of the model. Of the 15 funded, 8 ACHs appear to have secured continued operations, based on demonstrated savings or established organizational relationships,[79] and all 15 report success stories for their models. The remaining seven ACH awardees do not appear to have clear sustainability plans.[80] Toward the end of the SIM Initiative Test period, the state also funded an Oral Health access grant. Differing from an ACH in that it was awarded to a partnership between an HCH and a dental provider, this grantee is testing ACH-type service integration in the dental provider context.

Other SIM strategies to incorporate priority settings. Most SIM activities were designed to explicitly incorporate the priority settings. Some of the practice transformation and practice facilitation grants were targeted to providers wishing to provide Behavioral Health Home services, for example. The eHealth Roadmap's target audiences were required to be priority settings whose providers were active participants in developing the eHealth Roadmap.[81] Although the IHP model always encouraged inclusion of priority settings, the state's updates for the next round of IHP contracts in 2018 provide further incentive to do so, by allowing IHPs to opt out of two-sided risk in exchange for including non-embedded providers, such as social service providers, in a way that includes revenue sharing.

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[78] Details on the target populations and interventions pursued by each ACH can be found on the Minnesota Accountable Health Model website: http://www.dhs.state.mn.us/main/idcplg?IdcService=GET_DYNAMIC_CONVERSION&RevisionSelectionMethod=LatestReleased&dDocName=sim_achgp

[79] These eight are Unity Family Health; UCare FUHN; Mayo CCT; Hennepin County—Brooklyn Park; Altair ACH; Greater Ferguson Falls; New Ulm Medical Center; and Southern Prairie Community, based on site-specific summaries available at http://www.dhs.state.mn.us/main/idcplg?IdcService=GET_DYNAMIC_CONVERSION&RevisionSelectionMethod=LatestReleased&dDocName=sim_achgp

[80] These seven are CentraCare; Ely CCT; Hennepin County Correctional Clients; North County Community; Northwest Metro; Together for Health; and Total Care Collaborative based on site-specific summaries available at http://www.dhs.state.mn.us/main/idcplg?IdcService=GET_DYNAMIC_CONVERSION&RevisionSelectionMethod=LatestReleased&dDocName=sim_achgp

[81] In addition, the SIM Initiative funded two Learning Community grants that provided support for integration of behavioral health and community providers. Further, two Storytelling project grants provided illustrative examples of integrating local public health, social services, and cross-sector engagement.

D.1.3. How Minnesota's SIM Initiative changed state health policy and programs: Successes, challenges, and lessons learned

The Minnesota SIM Initiative's efforts to help foster health system change in the state, as described above, had successes in many areas, building in large part on the state's relatively advanced pre-SIM health care environment. In addition to successes, there were inevitable challenges and important lessons learned. This section reviews the Minnesota SIM Initiative's successes, challenges, and lessons learned during the test period.

Model Participation Goals and Achievement

The state surpassed its goals with respect to provider participation in SIM-related models.

Model	Goal	Achievement
IHP	18	21
HCH	415	420
ACH	15	15
BHH	25	27

ACH = Accountable Communities for Health; BHH = behavioral health home; HCH = health care home; IHP = Integrated Health Partnership.

Successes

The state exceeded its goals for participating in SIM-related delivery and payment models by focusing its efforts on existing models and new populations. The state leveraged its experience in health care reform and incorporated feedback from providers and payers about how to best apply SIM funds to transform health care delivery and payment models in Minnesota. In 2012, MDH and DHS convened around 150 stakeholders across the state and, based on stakeholder feedback, focused the state's SIM efforts on building existing HCHs and ACOs, community engagement, behavioral health, and care for complex patients. With this focus on using the SIM Initiative to support and expand participation in existing programs, the state met or surpassed its goals with respect to participation in targeted models that aimed at achieving accountability for cost and quality of care; see ***Addendum Table D.1*** for additional information about reach of Minnesota's SIM-related models. SIM funding was instrumental in preparing many practices for participation in IHPs or health homes.

Providing flexibility in model design spurred innovation and engaged a variety of providers. The SIM Initiative deliberately designed ACHs to be locally developed. As a provider noted in 2014, "ACHs can't be too prescriptive. The state needs to give room for innovation." Although not all ACHs succeeded, some did. Of note is the opioid medication diversion model developed by Unity Family ACH, which reduced prescriptions and pharmacy costs and improved quality of life for its patients.[82] The model was so successful the legislature awarded more than $1 million to pilot sites to replicate it. The state provided similar flexibility in the IHP model to providers that serve unique populations. In some cases, for example, the state allowed a particular IHP a modified set of quality measures more applicable to its population. The model

[82] The state's fact sheet on the Unity Family ACH is available at http://www.dhs.state.mn.us/main/idcplg?IdcService=GET_FILE&RevisionSelectionMethod=LatestReleased&Rendition=Primary&allowInterrupt=1&noSaveAs=1&dDocName=dhs-286878

also changed over time in response to provider feedback, including adjustments to the attribution methodology to make sure IHPs continued to have their well-managed beneficiaries attributed over time.

Providers need more than money; they appreciate ongoing partnership and support in the form of data and learning opportunities. Minnesota state officials were closely involved in reviewing SIM-funded grant applications and overseeing those grants once awarded. Awardees had to be clear about what exactly they intended to do with the funds and how that could move them forward (as measured in the Continuum of Accountability Matrix, which the state used to help define "accountable care"). Providers consistently noted their view of the state as a partner that wanted to help them succeed, even when the administrative work related to the grant felt onerous to the grantee. The most notable examples of state support include data provision to the IHPs, which supplied consistent information on Medicaid beneficiaries across Medicaid payers (managed care and fee-for-service); IHP provider grants to ensure that IHPs could use those data to effectively manage costs and utilization; and Learning Community grants providing technical support and peer-to-peer-learning opportunities to ACHs and grants supporting integration of behavioral health and community providers. The state spent more than $500,000 of SIM funds on Learning Community and Storytelling activities, which providers described as helping them continue to build new relationships. Developers of the eHealth Roadmap, Privacy and Security Toolkit, and Emerging Professions Toolkits also found success in telling providers how to use the tools they had.

Minnesota's Medicaid beneficiaries consistently reported that providers advised them on health improvement and preventive care strategies, and that they experienced some level of coordinated care between primary and specialty care providers. In 2015, for example, beneficiaries noted that their primary care practices gave them referrals to YMCA fitness programs, transportation, nutrition classes, and substance abuse meetings. With the exception of beneficiaries in Duluth early in the SIM Initiative, who complained of providers not having enough time to spend with them, most beneficiaries in 2014 and 2015 reported that they had a good relationship with their primary care provider, were satisfied with coordination between primary care and specialists, and that they received physician advice to help them manage their health. Although generally positive about the coordination services they observed, not all beneficiaries embraced how primary care practices were staffed to accomplish this coordination. In 2014, beneficiaries expressed positive views of expanded staff at primary care practices, for example social workers and administrative staff, but by 2017 beneficiaries expressed negative views of physician assistants and nurse practitioners used to extend the primary care team, citing preference for seeing a physician.

IHPs have shown promising cost savings and will continue to expand. IHPs were well received by providers, in large part because of the state-provided data and support. Critically, IHPs also exhibited an overall savings across their population while maintaining or improving

quality of care as calculated by the state. First and second round IHPs, with agreements starting in 2013 and 2014 respectively, demonstrated $61.5 million savings compared to their 2014 targets, with payments to IHPs ranging from $790,000 to $4.5 million (Minnesota Accountable Health Model, 2016). A new round of Requests for Proposals (RFPs) was released in 2017 for what is referred as IHP 2.0 to begin in 2018, which adds requirements to further health IT, integrate priority settings, and increase risk-sharing. See the SIM Evaluation Round 1 Year Four Annual Report for a full account of these changes. Additionally, the state released a request for comment on Next Generation IHPs, which is a model that intends to "better align the incentives between this IHP model and traditional managed care organizations" (Minnesota Department of Human Services, 2017).

Challenges

Managing the federal SIM Initiative awards as a large grant-based project proved administratively challenging. As one state official noted, "it's a process to get money and forms filled out once we've identified any of our grantees", and another said it was unfortunate that the state "made funding decisions based on being able to take on even more burden as it relates to the relationship with them [CMS]." The state also could not hire staff as quickly as its planning required. In addition, the state faced a 3-month delay in having its operational plan approved by CMS. Administering such a large number of grants over a relatively short period continued to strain state resources, even when the staffing and planning were complete. The state was awarded a no-cost extension of 12 months to allow additional time for certain grantees to spend down their funds, and to implement a few smaller grants toward the end of the SIM Initiative. In turn, providers expressed frustration at the administrative burden on them with respect to the grants they received from the state, such as reporting on their progress and detailed accounting of where the funds were being spent.

State plans for stakeholder engagement proved too optimistic. Minnesota's SIM Initiative leadership limited consumer engagement by design, focusing deliberately on community engagement and creating a new community engagement position at MDH. Moreover, although grantees, IHPs, and representatives from the priority settings engaged deeply in providing feedback to the state, the ability to tap into individual provider experience was limited. Finally, after initial optimism, for example, the Multi-Payer Alignment Task Force did not yield the expected alignment across payers' approaches to contracting with providers around "accountable care" or incorporating priority settings or social determinants of health. After early successes with the Continuum of Accountability Matrix and the data analytics subgroup, Task Force members representing private payers (including private insurers, Medicaid MCOs, and self-insured large employers) were reluctant to share information they considered proprietary, attending meetings to hear the discussions but not contributing. Some payers expected the state to leverage payers' own experiences implementing contracts that hold providers accountable for patients' total cost of care and felt rebuffed by the state as it was developing the IHP model.

Stakeholders at both 2014 and 2017 interviews noted that, although the state listened to stakeholders, state officials "already have their vision of where this is going." To one interviewee, the state represented a payer in these discussions rather than taking the role of a convener.

Providers felt burdened by quality reporting throughout the test period through lack of measure alignment. The state already had a SQRMS in place at the start of the SIM Initiative, as noted, but multiple providers still blamed lack of measure alignment among payer plans (for example, the measures required by the Medicare Shared Savings Program ACOs are not always the same as those required by the IHP model) as impeding any incentive to manage for quality. A member of the Multi-payer Alignment Task Force expressed the widely felt disappointment that quality measurement alignment among payers remained a neglected issue. As recently as spring 2017, a provider noted, "It's less and less time engaged with the patient, and more and more time making sure you're checking all the right boxes and doing all the right things."

The decision to focus primarily on IHPs as the main payment reform limited progress in extending care integration to long-term care. IHP grantees focused largely on behavioral health and local public health, with little to no movement on integrating long-term care and social services having small advances. One probable reason is that IHPs do not serve beneficiaries eligible for both Medicare and Medicaid, which are the most likely users of long-term care, which incentivized IHP grantees to focus on a priority setting more relevant to their patient base.

Over time, Medicaid beneficiaries expressed less regular use of the ED for care, they remained concerned about access to specialists, especially psychiatrists. In focus groups of adult Medicaid beneficiaries in 2014, in both Duluth and Minneapolis, beneficiaries reported regular use of ED for care. This theme recurred in 2015 and again in 2017, although by 2017, reports of ED use were more limited to those who said they went because they could get better access to behavioral health care at the ED. Beneficiaries reported concerns about access to psychiatrists in 2015 and 2017, but also by 2017, some beneficiaries reported experience with co-located behavioral health providers at their usual source of care. Lack of access to dental care was noted consistently in 2014, 2015, and 2017.

Lessons learned

Successful collaboration between the two state agencies that led the SIM Initiative, MDH and DHS, was key to the SIM Initiative's achievements. Early on, as one state official put it, the SIM Initiative needed to "reflect a joint vision," but decision making "can be slow and laborious" and the two "organizations have different cultures." At the time of our final interview with stakeholders, both state officials and members of the Multi-Payer Alignment Task Force noted that pursuing a project the size and scope of the SIM Initiative, of necessity, broke down the silos between DHS and MDH, substantially strengthening their connection to one another.

State officials expect this collaboration to persist: "Even if it's not called SIM, we'll be able to take it with us as we move forward." State officials also noted having a roadmap from the Governor, and commitment from the state's executive leadership as "critical in the success of Minnesota's SIM project."

Defining accountable care was critical to expanding accountable care models. Early on, the Multi-Payer Alignment and Community Advisory Task Forces developed the Continuum of Accountability Matrix to define the term "accountable care," responding to the many stakeholders who cited a "lack of vision [for the SIM Initiative]."[83,84] Receipt of grant dollars from the state, funded by the SIM award, was explicitly predicated on completion of the Matrix. The Matrix's clear definitional components helped make the overarching goal of these funds clear to potential grantees at the grant-writing stage and helped the state allocate funding to organizations at different stages along the accountable care continuum. Task Force members considered this definitional clarity its greatest accomplishment.

Clearly defining roles and responsibilities is key to successfully integrating emerging professions. Both dental therapists and community paramedics had clearly defined roles and responsibilities. In contrast, the onus of defining the role of CHWs fell on the clinic trying to use them. A state official noted that many practices simply did not understand how to use CHWs effectively, treating them simply as another care coordinator. Although concerns about "turf" were an issue in integration of both CHWs and dental therapists, the clear definition of the services dental therapists could provide assuaged those concerns over time.

A successful balance between "stack" and "spread" can help spur progress in providers' transformation.[85] Grants were well spread throughout the provider community, accommodating effectively to the additional needs of small and rural providers. But the state combined this, wherever possible, with "stack" grants, to address the need for continuing steps in more complex transformations and create momentum within an organization—for example, a provider may need to improve the functionality of its EHR to enable it to meaningfully collaborate with a community partner.

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[83] Additional information on the Multi-Payer Alignment Task Force is available at http://www.dhs.state.mn.us/main/idcplg?IdcService=GET_DYNAMIC_CONVERSION&RevisionSelectionMethod=LatestReleased&dDocName=sim_task_forces_multi_payer#

[84] The Continuum of Accountability Matrix is available at http://www.dhs.state.mn.us/main/idcplg?IdcService=GET_DYNAMIC_CONVERSION&RevisionSelectionMethod=LatestReleased&dDocName=SIM_Docs_Reps_Pres

[85] The state evaluation team developed a case study that looks at the impacts of "stacking" in more detail: http://www.dhs.state.mn.us/main/groups/sim/documents/pub/dhs-292037.pdf http://www.dhs.state.mn.us/main/idcplg?IdcService=GET_DYNAMIC_CONVERSION&RevisionSelectionMethod=LatestReleased&dDocName=SIM_MAP

D.1.4 Anticipated long-term changes following the SIM Initiative

As the SIM Initiative ends in Minnesota, the overwhelming consensus is that the SIM Initiative has changed the way providers think about health. In 2014 interviews, a state official described the SIM Initiative as a "once in a century opportunity for public health and medicine to come together." In 2017, interviewees universally spoke of developing relationships they previously did not know how to develop and pursuing relationships with "intentionality." The state ensured that most SIM-funded grants specifically required collaboration with a priority setting. This proved effective in forcing providers to develop leadership and structure in building the necessary relationships. As many stakeholders reflected, the grants forced people to "co-manage, come together, and talk about [what they are doing]"; "they were able to establish relationships with community partners, or individuals, that they didn't have before, and they were able to start to understand each other in different ways." Stakeholders also described improved relationships across the provider community, with some provider focus group participants noting better relationships with other providers and more coordination. An IHP participant described partnerships as "a really key strength…at one point we were fierce competitors for our patients, now we are fierce collaborators." The SIM Initiative's managing partners, MDH and DHS, credit the SIM experience with facilitating a deeper relationship between the two agencies, which they expect to persist as Minnesota continues to work on health care reform.

> *"I would have never guessed at the beginning of SIM that it would be something we say we did, but the narrative has changed in Minnesota about "What is health?" There has been a big shift in the awareness of social determinants, the kinds of relationships that need to be in place; it's not fully due to SIM—those conversations were happening in many other places—but SIM provided a venue and some funding opportunities to accelerate those conversations, and to put them into practice…"*—State Official, April 2017

Many of the SIM-funded grant programs were not intended to extend beyond the SIM test period. Instead, they were significant one-time investments that sought to achieve specific changes but were not intended as long-term programs. For Minnesota, this group includes investments in health IT/HIE, data analysis, and practice transformation. Minnesota achieved significant strides in readying health care practices to operate in a more data-driven, analytic environment. To date no IHPs have left the program, and more will be signing up for IHP 2.0. This suggests that these one-time investments were significant enough to sustain participation in these models and that this participation is inclusive of small and rural providers. In short, the success of these one-time investments ensured the continuation of IHPs, HCHs, and behavioral health home services. However, this intense support, both financial and otherwise, contributed to the administrative burden discussed in the challenges section.

Other investments in this category of one-time investments include the eHealth Roadmap and the two toolkits, one for emerging professions and one for privacy and security. Although

five of the six CHW grantees will sustain those positions after the SIM Initiative period of performance, partially because of state support from the Office of Rural and Primary Care, state officials expressed concerns about continued financing strategies for emerging professions if commercial payer interest does not increase.

In contrast, other SIM investments were intended to test different delivery systems that may not all be appropriate as long-term arrangements. Specifically, ACHs are examples of SIM-supported initiatives that were given seed money to demonstrate their effectiveness but ultimately needed to sink or swim on their own merits. As noted in our prior discussion on ACHs, 8 of the 15 funded ACHs appear to have secured continued operations based on demonstrated savings or established organizational relationships. This is not a negative; rather, the SIM Initiative allowed the state to experiment with promising models, not all of which will be successful, but which still offer the potential for significant future policy promise. Unity Family ACH, described earlier, is a good example of this. In some cases, ACHs that aligned with their local SHIP entity can leverage that alignment to continue their population health activities.

Table D-1 provides an overview of which SIM activities will be sustained, and how.

D.1.5 Summary of SIM Initiative implementation

At the end of the Minnesota SIM Initiative, the state had achieved:

- A more effective and meaningful relationship between MDH and DHS.
- A sustainable Medicaid ACO model with broad participation from a variety of providers (IHPs).
- An increased understanding, by both provider systems and payers, of the value of integrating priority settings and social determinants of health, with some success stories to model moving forward (ACHs, eHealth grants, food security grant, and emerging professions).
- Significant progress in the readiness of a broad range of providers, including small and rural providers, able and willing to manage performance-based payment or financial risk. This progress was achieved through SIM investments in Health IT, practice transformation support, and data analytics. These investments supported providers' ability to use data in achieving improved workflows, clinical coordination, and patient management.

Table D-1. Summary of SIM Initiative activities in Minnesota, Spring 2017

Activity type	Activity	Payers	Provider types	Sustained post SIM	Sustainability mechanism
Payment system	Integrated Health Partnerships	Medicaid [a]	Primary care Specialty care Prevention Priority settings [b]	Yes	Legislation [c]
Delivery / payment system	Health Care Homes	Multi-payer	Primary care Prevention	Yes	Legislation [d]
	Behavioral Health Homes	Medicaid	Primary care Behavioral health Priority settings	Yes	Legislation
Delivery system	Accountable Communities for Health	N/A	Prevention ACO/ACO-like models Priority settings	Yes—8 of 15	Provider or other grant investment
	Learning Community	N/A	Primary care Specialty care Prevention Priority settings	No	
Practice transformation and behavioral health integration	Practice Transformation and Practice Facilitation	N/A	Primary care Specialty care Prevention Priority settings	No	
Health IT [e]	Privacy, Security, and Consent Management for Health Information Exchange grant program	N/A	Primary care Specialty care Prevention Integrated health systems Priority settings	Yes	Public document
	e-Health Roadmap	N/A	Priority settings	Yes	Public document
	E-Health grant program	N/A	Primary care Specialty care Prevention Integrated health systems Priority settings ACO/ACO-like models	No	
Data analytics	IHP provider grant program	Medicaid	IHPs	No	Although formal grants have ended, IHPs will continue to receive data analytics support from the state
	Data Analytics Vendor contract (3M)	Medicaid	IHPs	No	

(continued)

Table D-1. Summary of SIM Initiative activities in Minnesota, Spring 2017 (continued)

Activity type	Activity	Payers	Provider types	Sustained post SIM	Sustainability mechanism
Workforce development	Emerging Professionals [f]		Dental prevention Public health	Yes—in some cases	Provider investment or other grants Office of Rural Health and Primary Care funding
Other	Storytelling Engagement Project	N/A	NA	No	
	Food Security Grant	Medicaid	IHPs	Unclear	Other grant investment and contracts with health systems
	Oral Health Access	N/A	Health Care Homes	Yes	Provider investment

ACO = accountable care organization; IHP = Integrated Health Partnership; IT = information technology; N/A = not applicable.

[a] Minnesota's DHS includes a provision in all Medicaid managed care organization (MCO) contracts requiring MCOs to participate in the IHP program. Additionally, DHS contracts directly with each IHP.

[b] Priority settings refers to behavioral health, local public health, social services, and long-term and post-acute care.

[c] Legislation passed in 2010 mandated that the Minnesota Department of Human Services (DHS) develop and implement a demonstration "testing alternative and innovative health care delivery systems, including accountable care organizations" (Minnesota 2010 Legislative session, 256B.0755).

[d] Minnesota Health Care Homes (Minnesota Statute §256B.0751, available at this link: https://www.revisor.mn.gov/statutes/?id=256B.0751).

[e] Minnesota Interoperable Electronic Health Record Mandate (Minnesota Statute §62J.495 (Electronic Health Record Technology)) supports these activities, available at this link: https://www.revisor.mn.gov/statutes/?id=62J.495. For more information: http://www.health.state.mn.us/e-health/hitimp/ and http://www.health.state.mn.us/e-health/lawsmn.html.

[f] Minnesota Statute 256B.0625, Subdivision 49 (Community Health Workers); Minnesota Statute 256B.0625, Subdivision 60 (Community Paramedics); Minnesota Statutes Section 150A.105, Subdivisions 2 and 3 (dental therapists).

Addendum Table D.1. Providers and populations reached by Minnesota's SIM Initiative–related delivery system and payment models

		Participating providers		Population reached	
Minnesota	Participating payers	As of Mar 2017	As of Dec 2017*	As of Mar 2017*	As of Dec 2017*
IHP	Medicaid	10,971	11,542	59%	58%
HCH	Participating Payers	3,472	3,597	69%	70%
BHH services	Medicaid	--	--	0.1%	0.2%

BHH = behavioral health home; HCH = health care home; IHP = Integrated Health Partnership.

*The state's period of performance ended December 2017.

Note: Sources for these provider and population data as of March 2017 are detailed in the Year Four Annual Report (RTI International, 2018). Counts of providers and populations reached as of December 2017 are state reported numbers (CMS, 2017). Denominators used to compute percentage of population reached are Kaiser Family Foundation population estimates based on the Census Bureau's March 2017 Current Population Survey (Kaiser Family Foundation, 2018).

Minnesota's Integrated Health Partnership (IHP) model, having been conceptualized and planned before the SIM Initiative, became one of the most successful and well-entrenched health system reform models in the state during the SIM Initiative. This makes the state's IHP model an excellent focus for rigorous quantitative analyses of the Minnesota SIM Initiative's early impact on key utilization and quality of care outcomes. Outcomes for beneficiaries attributed to an IHP are measured against the comparable populations that were attributed to non-IHP participating providers.

Sections D.2 and ***D.3***, respectively, present the estimated impacts of IHPs in Medicaid and commercial populations. Data were available for the first 3 to 4 years of IHP implementation (2013–2015 for spending outcomes and 2013–2016 for care coordination and quality outcomes).

D.2 Model-Specific Impact Findings: *Minnesota's Integrated Health Partnership for Medicaid Beneficiaries*

IHPs are accountable care organizations that serve non-aged Medicaid beneficiaries. The first six IHPs launched on January 1, 2013. More IHPs were established between 2014 and 2017, expanding the population of patients receiving care from IHP-affiliated providers. By the first quarter of 2017, there were approximately 460,548 Medicaid beneficiaries—representing approximately 58 percent of all Minnesota Medicaid beneficiaries—attributed to 21 IHPs.[86]

[86] The denominator for this figure is an estimate of all Medicaid beneficiaries in Minnesota for 2016 from the Current Population Survey (CPS), not just those eligible for IHP attribution. The denominator may underestimate the total number of Medicaid beneficiaries in Minnesota because the CPS tends to underestimate Medicaid enrollment in general.

KEY INSIGHTS

- Although **physician visits decreased** relative to the comparison group, that change was coupled with **improvements in 14-day follow-up after admission**, a **decrease** in **30-day readmissions**, and a **decrease** in **outpatient emergency department (ED) visits**.
- We found an **increase in inpatient admissions** relative to the comparison group.
  - Largely attributable to the adult population, this increase may reflect newly eligible beneficiaries with unmet health needs being admitted.
  - The corresponding decrease in readmissions suggests these beneficiaries are receiving the care they need after discharge.
- We found no significant changes in **total medical expenditures**, although we did observe greater decreases in **professional expenditures** in the IHP group relative to the comparison group.
- Quality of care measures addressing an area of direct IHP focus—**rates of HbA1c testing** among people with diabetes and **appropriate use of asthma medication**—showed significant and **positive findings**, suggesting that participation in an IHP is influencing provider behavior.
- For Medicaid beneficiaries with behavioral health conditions, there were smaller increases in **total expenditures** and **behavioral health expenditures** for the IHP group than the comparison group; however, there were less positive findings on quality of care and care coordination measures, illustrating the challenges in coordination of care for this population voiced by providers, consumers, and state officials.

Participating IHPs that achieve total cost of care targets are eligible for shared savings in addition to standard reimbursement. Minnesota makes these shared savings available on a lagged basis: IHPs do not receive the full amount of shared savings until 12 months after the end of the performance year. The amount of shared savings an IHP receives depends not only on spending benchmarks but also on IHP performance on patient experience and quality of care measures for conditions such as diabetes and asthma. Our analysis explicitly includes diabetes and asthma quality of care measures for this reason. Some IHPs are exposed to two-sided risk after their first year of operation; they can receive shared savings but also face financial penalties when they do not meet total cost of care and quality targets. Other IHPs—called "virtual IHPs" during the study period—receive shared savings but do not assume downside risk. Minnesota designed the virtual IHP track to incentivize independent, smaller provider practices or practices that serve specific populations to participate in payment reforms. Eight virtual IHPs were established during the study period (Spaan, 2016).

Minnesota bases total cost of care targets for each IHP on the Medicaid population attributed to that IHP. Minnesota uses Medicaid beneficiaries' past enrollment information and evaluation and management claims to determine whether those beneficiaries can be attributed to an IHP. From January 2013 through January 2016, Minnesota attributed beneficiaries to IHPs by examining beneficiary claims from the previous 12 months. Beginning in January 2016, the state

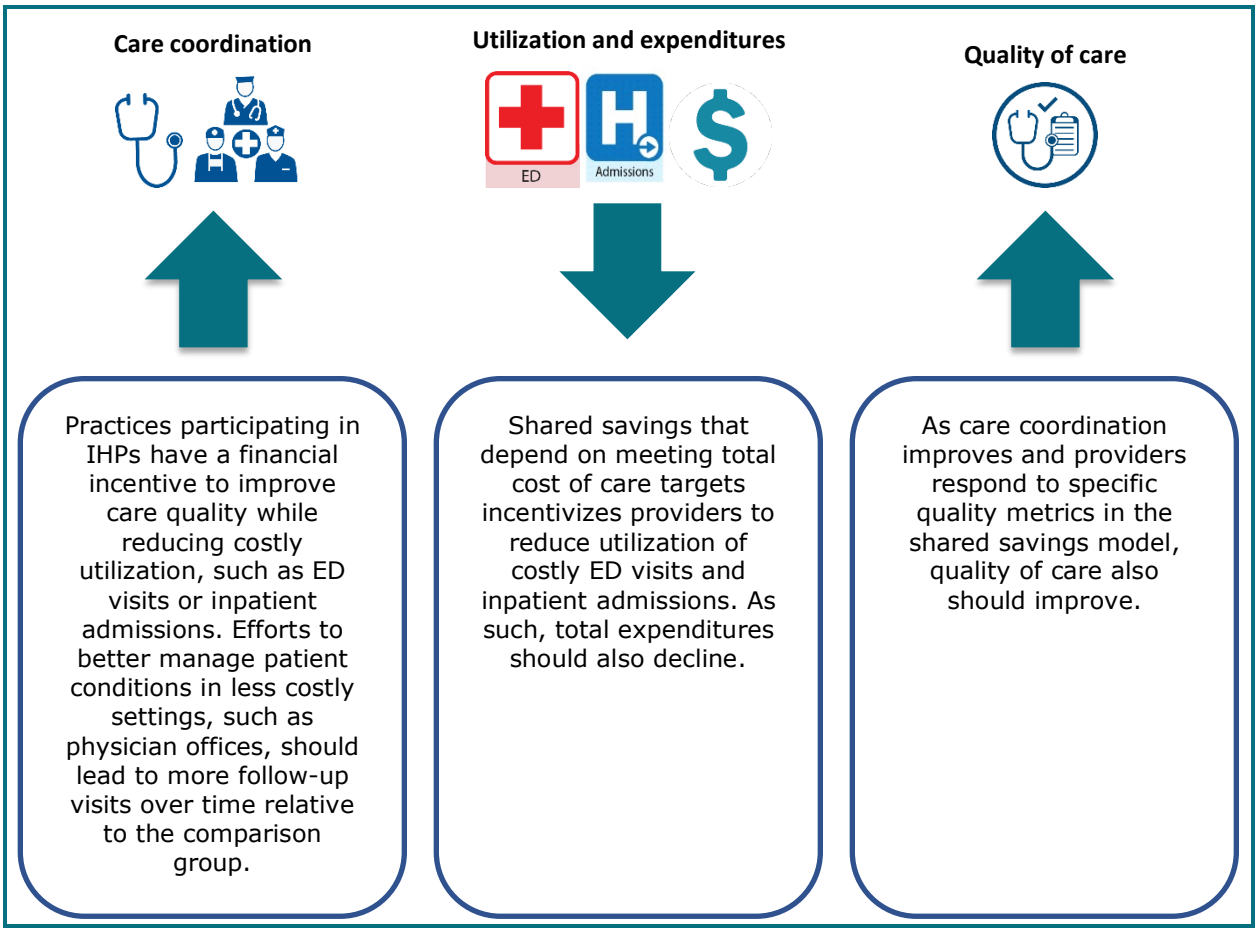
extended the "lookback" period to 24 months in certain cases, with the goals of attributing infrequent users of health care to IHPs and increasing the stability of the attributed population.

During the study period, Minnesota supported IHPs with SIM-funded grants to increase cooperation between IHPs and community-based providers and to improve IHPs' data-analytics capacity. Minnesota also provided IHPs with data on their attributed populations across Medicaid payers (fee-for-service and managed care), which was universally praised by the recipients. Minnesota also used SIM funds to develop another grant program that supported practice transformation activities among engaged Minnesota providers, including but not limited to IHP-affiliated providers. As the initiative progressed, providers reported increased use of and comfort with electronic health records and seeing more near real-time discharge notifications. Providers in both our focus groups and our interviews noted improvements in communication and relationship building between providers and feeling they had greater access to resources needed to coordinate care.

In the Year Four Annual Report (RTI International, 2018), we examined changes in care coordination, utilization, and quality for Medicaid beneficiaries attributed to IHPs compared to Medicaid beneficiaries attributed to non-IHP providers. IHP-attributed beneficiaries had higher rates of breast cancer screening (quality) and higher rates of follow-up after hospital discharge (care coordination) than did comparison beneficiaries. We did not find statistically significant changes in utilization outcomes in IHP-attributed beneficiaries relative to the comparison group. This previous analysis included only data through the end of 2014 and measured impacts only after SIM funding started in 2014, which may be too early to see impacts.[87] The current study reflects 3 to 4 years of IHP experience (2013–2015 for spending outcomes, 2013–2016 for other outcomes). Because IHPs only face one-sided risk in their first year of operation, earlier cohorts of IHPs may have stronger incentives to manage utilization and expenditures for attributed beneficiaries in additional years included in this report. In addition, over this longer period, IHPs have had more opportunity to implement practice transformation initiatives, coordinate care for attributed patients, improve their health information technology (health IT) and data-analytic capabilities, and create closer partnerships with providers in other settings. If IHPs successfully reduce utilization of costly ED and inpatient services for attributed beneficiaries, patient-level spending should decrease as well (see ***Figure D-3***). Despite the expectation that IHPs will reduce spending and utilization, increase health care quality, and improve care coordination, the sheer number of contemporaneous health care delivery reforms in Minnesota makes it more challenging to detect the effects of IHPs on health care. For example, some Medicaid payers

[87] In addition, the analyses from the fourth annual report included 2013 as a "pilot" year in the pre-period. This analysis includes 2013 as part of the post-IHP implementation period. The year 2013 was included in the pre-period in the fourth annual report because we aligned the pre- and post-periods with the start of SIM funding. In this analysis we align the pre- and post-periods with the start of the IHP model.

Figure D-3. Expected direction of outcome measures



ED = emergency department; IHP = Integrated Health Partnership.

have additional shared savings initiatives separate from IHPs. In this period of high health care reform activity, it is also possible that non-IHP providers are subject to incentives similar to (or even the same as) IHPs.

To assess the effects of Minnesota's IHPs on care for Medicaid beneficiaries we addressed the following research question:

- How did trends in key outcomes for care coordination, utilization, expenditures, and quality of care change in the IHP-attributed Medicaid after implementation relative to the comparison group?

To address the research question we used a difference-in-differences (D-in-D) quasi-experimental design, incorporating a comparison group to control for underlying changes in the health care environment in Minnesota. We used two sources for this analysis: Medicaid eligibility and encounter data received from the Minnesota Department of Human Services (DHS) and Medicaid data from Minnesota All Payer Claims Database (MN APCD). The MN

APCD was used for expenditure data because DHS data do not include reliable information on payments. DHS data include 3 years prior to IHP implementation (2010–2012) and 4 years post-IHP launch (2013–2016). MN APCD data include 3 years of pre-IHP data (2010–2012) and 3 years after IHP implementation (2013–2015). The analytic timeframes differ across these data sources because complete 2016 MN APCD data were not available.

The intervention group includes Minnesota Medicaid beneficiaries who were attributed to IHP providers in at least 1 year between 2013 and 2016. The comparison group includes Minnesota Medicaid beneficiaries who were attributed to non-IHP providers. Implementing the IHP attribution process in the comparison group reduces potential bias by ensuring that both IHP and comparison populations had similar patterns of eligibility and at least one evaluation and management visit in an attribution year. To avoid contamination we excluded beneficiaries from the comparison group if they were ever attributed to an IHP in any year after IHP implementation. Medicaid beneficiaries who could not be attributed to any provider were excluded from our analyses altogether.

Because of the rapid expansion of the IHP model in Minnesota we were concerned that there would be few Medicaid beneficiaries who had never been attributed to an IHP between 2013 and 2016 and therefore eligible for inclusion in our comparison group. Specifically, if these beneficiaries are substantively different from beneficiaries who were eventually attributed to an IHP, then it is possible that results could be biased because of unexplained differences between the intervention and comparison groups. However, results of our propensity score analysis suggest that, even prior to applying propensity score weights, there were relatively small differences in many sociodemographic and health characteristics across the intervention and comparison groups. After applying propensity score weights, differences were almost negligible. This suggests that any potential bias is likely minimal.

Following comparison group selection we constructed annual person-level propensity score weights to balance the IHP group and comparison group on individual and county characteristics. The IHP group and weighted comparison group were similar at baseline on key demographic characteristics (***Table D-2***). We estimate effects of the IHP model not only for the overall IHP and comparison populations but also separately for adults, children, and individuals with mental or behavioral health issues. A summary of the analytic methods is included below, and the methods are detailed in ***Sub-appendix D-2***.

Although the IHP did not target any subset of the Medicaid population with particular characteristics, certain subpopulations may be impacted by the model differently because they have different inherent utilization patterns. To assess the impact of the IHP on subpopulations we ran the models for key outcomes separately for the overall, child, and adult populations and for persons diagnosed with behavioral health conditions. We include the results for the overall population and behavioral health subpopulation in this chapter; the results for the adult and child

subpopulations are summarized in this chapter and the full results are included in ***Sub-appendix D-1***.

Methods Snapshot for Impact Analysis
• **Study design:** D-in-D quasi-experimental design using an unbalanced longitudinal panel. • **Population**: The intervention group comprised Medicaid beneficiaries attributed to providers participating in IHPs. The comparison group comprised similar Minnesota Medicaid beneficiaries attributed to providers who did not participate in IHPs. • **Data:** Medicaid claims data provided by the Minnesota DHS and Medicaid data from the Minnesota All Payer Claims Database (MN APCD). DHS data include 3 years before (2010–2012) and 4 years after (2013–2016) the start of the IHP program. MN APCD data include 3 years before (2010–2012) and 3 years after (2013–2015) the IHP program's launch. • **Sample:** The analytic sample included non-aged Medicaid beneficiaries who met the enrollment criteria to be eligible for IHP attribution[88] and excluded Medicare-Medicaid enrollees, beneficiaries who had not received any health care home or primary care services during the post-IHP implementation period. • **Measures:** The analysis assesses the effects of IHPs on care coordination (annual percent): Primary and specialty care visits, and 14-day follow-up; quality of care (annual percent): HbA1c testing, prescribing of asthma medication, and adherence to antidepressant medication; utilization (annual rate): inpatient admissions, readmissions, outpatient ED visits, readmissions, and expenditures (annual per member per month in dollars). • **Statistical analysis:** Logistic regression (binary) and ordinary least squares (expenditures) models were used. Analytic weights were created by multiplying the propensity score times the fraction of time a person was enrolled in Medicaid. Standard errors were clustered at the beneficiary level to account for correlation in outcomes across time. All models included controls for demographic, health status, and socioeconomic county-level variables.

[88] Refer to the Model Summary for additional information on the IHP attribution algorithm: http://www.dhs.state.mn.us/main/idcplg?IdcService=GET_FILE&RevisionSelectionMethod=LatestReleased&Rendition=Primary&allowInterrupt=1&noSaveAs=1&dDocName=dhs16_177106

Table D-2. Weighted means and standardized differences prior to IHP implementation, IHP and comparison groups identified in DHS Medicaid claims data, 2012

Characteristic	IHP group	Comparison group	Standardized difference[a]	p-value
Weighted N	294,923	294,946		
Individual-level sociodemographic characteristics				
Infants (%)	4.2	4.1	0.4	0.14
Age 1–18 years (%)	51.2	51.0	0.6	0.03
Age 19–64 years (%)	44.6	44.95	0.7	0.01
Age 65 years or older (%)	0.01	0.01	0.2	0.46
CDPS Risk Score	1.3	1.3	0.9	<0.001
Female (%)	56.2	56.2	0.0	1.00
Disabled (%)	8.3	8.2	0.2	0.55
Non-white (%)	49.7	49.7	0.2	0.55
Continuously enrolled in 2012 (%)	91.9	91.8	0.1	0.72
Enrolled for at least 9 months in 2011 (%)	69.9	69.8	0.1	0.82
Any ED visits in 2011 (%)	31.8	31.8	0.01	0.96
Any inpatient admissions in 2011 (%)	10.3	10.3	0.02	0.94
County-level characteristics				
Median age	37.4	37.6	4.7	<0.001
Percent below the poverty line	12.4	12.2	4.8	<0.001
Hospital beds per 1,000 residents	3.5	3.1	14.9	<0.001
Percent without health insurance	9.7	9.8	8.0	<0.001
RUCA Code	77.4	72.1	12.2	<0.001

CDPS = Chronic Illness and Disability Payment System (CDPS score is a risk-adjustment score calculated from ICD9 and ICD10 diagnosis codes included on hospital and outpatient claims, with larger CDPS scores corresponding to a larger number of comorbidities or a more severe set of comorbidities); DHS = Department of Human Services; ED = emergency department; IHP = Integrated Health Partnership; RUCA = Rural-Urban Commuting Area.

[a] Absolute standardized differences (SDs) are expressed as percentages. <10% SD is ideal for inferring balance between groups. To balance the population characteristics for the claims-based analyses we estimated propensity scores for all individuals from the comparison group for each year of the analysis. After propensity score weighting, the standardized differences between the weighted comparison group means and intervention group means were all well under the standard 10% threshold for individual-level variables; however, a few county-level variables exceed the threshold. Nonetheless, the differences in the county-level means is still quite small. County-level variables are shown here to provide context. Because there was little variation in county-level characteristics, balancing on these variables is difficult. Therefore, to optimize the balance and avoid extreme weights, county-level covariates were excluded from the propensity score model.

D.2.1 Did care coordination change among Medicaid IHP beneficiaries?

KEY INSIGHTS

- Overall, rates of both **visits to a primary care provider and visits to specialty providers decreased more for IHP beneficiaries** relative to the comparison group.
  - These unexpected findings may reflect IHPs offering non-office based alternatives for care management, which may be striking a balance between providing needed care without overutilization.
- The rate of **any follow-up visits within 14 days of inpatient discharge increased more for IHP beneficiaries** relative to the comparison group.
  - This positive result corroborates reports from providers that the prevalence of near real-time discharge notifications increased during this period.
  - Additionally, the findings may reflect an increase in effective care management activities in IHPs.

In ***Table D-3*** we present the results of the D-in-D regression analyses for the following care coordination outcomes: percentage of beneficiaries with a visit to a primary care provider, percentage of beneficiaries with a visit to a specialty provider, and percentage of acute inpatient hospital admissions with a follow-up visit within 14 days. We report annual regression-adjusted D-in-D estimates individually for the first 4 years after the implementation of IHP along with an overall D-in-D estimate for all 4 years combined.

- During the 4 years of the IHP model, the likelihood of a visit to a primary care provider declined for both IHP beneficiaries and the comparison group, but the likelihood of a visit declined more in the IHP group. Overall, the percentage of beneficiaries with a **visit to a primary care provider** declined by 7.8 more percentage points for IHP beneficiaries relative to the comparison group ($p < 0.001$).
- Likewise, the likelihood of a visit to a specialty provider declined more for the IHP group than the comparison group for each year, and the overall percentage of beneficiaries with a **visit to a specialty provider declined** by 9.4 more percentage points for IHP beneficiaries relative to the comparison group ($p < 0.001$).
  - This trend was observed in both the child and adult subpopulations. Interpretation of these findings is challenging. On one hand, reductions in primary care and specialist visits may indicate that IHP-affiliated providers were successful in preventing unnecessary use of outpatient care. On the other hand, we expected to see some increases in visits to primary care and specialty visits if providers were substituting avoidable ED and inpatient hospital utilization with outpatient care.

Table D-3. Difference in the pre-post annual change in care coordination for Medicaid beneficiaries in Minnesota IHPs relative to the comparison group, first 4 years of IHP implementation (January 2013 through December 2016)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	N
Percentage of beneficiaries with a visit to a primary care provider								3,985,920
Year One	92.5	87.2	82.6	75.6	−1.8 (−2.3, −1.2)	−1.9	<0.001	
Year Two	92.5	87.2	80.3	75.8	−4.1 (−4.4, −3.7)	−4.4	<0.001	
Year Three	92.5	87.2	61.3	76.3	−17.7 (−17.9, −17.6)	−19.2	<0.001	
Year Four	92.5	87.2	61.8	57.2	−3.4 (−3.5, −3.3)	−3.7	<0.001	
Overall	92.5	87.2	67.2	71.1	−7.8 (−8.0, −7.7)	−8.5	<0.001	
Percentage of beneficiaries with a visit to a specialty provider								3,985,920
Year One	38.1	33.7	25.6	30.3	−8.5 (−8.7, −8.3)	−22.4	<0.001	
Year Two	38.1	33.7	26.0	29.7	−7.8 (−8.0, −7.6)	−20.5	<0.001	
Year Three	38.1	33.7	24.4	31.2	−11.7 (−11.9, −11.5)	−30.7	<0.001	
Year Four	38.1	33.7	24.9	28.4	−8.5 (−8.7, −8.3)	−22.3	<0.001	
Overall	38.1	33.7	25.0	29.9	−9.4 (−9.5, −9.3)	−24.6	<0.001	
Percentage of acute inpatient hospital admissions with a follow-up visit within 14 days								579,959
Year One	51.4	50.5	52.4	52.1	−0.6 (−1.5, 0.2)	−1.2	0.23	
Year Two	51.4	50.5	55.4	53.1	1.4 (0.7, 2.2)	2.7	0.002	
Year Three	51.4	50.5	55.6	54.1	0.5 (−0.1, 1.2) †	1.0	0.19	
Year Four	51.4	50.5	55.4	53.4	1.1 (0.4, 1.8)	2.2	0.01	
Overall	51.4	50.5	55.1	53.2	0.8 (0.4, 1.1)	1.5	0.001	

CG = comparison group; D-in-D = difference-in-differences; IHP = Integrated Health Partnership.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in the likelihood of a care coordination event in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in the likelihood of a care coordination event in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention group's baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the difference in likelihood of a care coordination event. The estimates are multiplied by 100 to obtain percentage probabilities. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix D-2* for additional detail.

†The Year Three 80% confidence interval for the percentage of acute inpatient hospital admissions with a follow-up visit within 14 days is (0.01, 1.1). Standard statistical practice is to use confidence intervals of 90% or higher; 80% confidence intervals are provided here for comparison purposes only. Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only.

Data source: RTI analysis of Minnesota Medicaid claims, 2010–2016.

  - The baseline rate of visits to primary care providers was higher in the IHP group, both overall and among children and adults separately, than in the comparison group. Although the reason for this high baseline is unknown, the decreases may reflect the number of primary care visits coming closer to the average over time for IHP-attributed beneficiaries.
  - Appropriate alternatives to traditional office visits offered by IHPs may also have played a role in this finding. Further, in 2016, the state acknowledged IHPs' decreasing use of primary services with an attribution methodology adjustment. It implemented a 2-year look back period applicable to beneficiaries who were attributed in a prior year but not the current year. Beneficiaries who may be highly engaged in services in their year with IHPs may not require a similar level of services in subsequent years when the relationship is established. Note that attribution to an IHP can be either through receipt of primary services or through evidence of a health care home payment.
  - Despite the declines, Medicaid beneficiaries consistently reported that providers advised them on health improvement and preventive care strategies, and that they experienced some level of coordinated care between primary and specialty care providers. However, beneficiaries did express some concerns over access to specialists, particularly behavioral health providers.
- Overall, the follow-up rate for the IHP during the baseline period was 51 percent. During the demonstration period, that rate increased to 54 percent. In contrast, the overall comparison group rates increased less throughout these periods. The overall percentage of inpatient discharges with any **follow-up visit within 14 days of inpatient discharge** increased by 0.8 more percentage points for IHP beneficiaries relative to the comparison group ($p = 0.001$).
  - This trend was driven by the 14-day follow-up rates for adults; the estimated impact among children was negative and statistically significant. The baseline rates of 14-day follow-up for children was higher than that of adults, suggesting that there was more room for improvement in the adult populations. Further, coexisting performance-based initiatives that focus on adults, such as the Medicare Shared Savings Program, may cause providers to focus particularly on the adult population.
  - This finding is in line with the expectations of the IHP program and could also be tied to improved care management and increasing real-time discharge notifications in IHPs.

D.2.2 Did utilization change among Medicaid IHP beneficiaries?

KEY INSIGHTS

- Overall, the rate of **acute inpatient admissions showed greater increases for IHP beneficiaries** than the comparison group.
  - This outcome is inconsistent with the goals of IHPs, and is driven by the adult subpopulation. This population likely faced more challenges, such as unstable eligibility year to year.
  - We did find **decreases** in the rate of **acute inpatient admissions for children who were attributed to IHPs** (relative to children in the comparison group), showing improvements for this target Medicaid population.
- Findings were expected and positive findings for two other IHP utilization measures. Relative to the comparison group, **outpatient ED visits decreased** more and rates of **readmission within 30 days of discharge increased less**.
  - Although expected, these results show an important achievement and may reflect increased care management by IHP providers.

In ***Table D-4*** we present the results of the D-in-D regression analyses for inpatient admissions, outpatient ED visits, and 30-day readmissions. We report regression-adjusted D-in-D estimates individually for the first 4 years after the implementation of IHP along with an overall D-in-D estimate for all years combined.

- In each of the 4 years of IHP implementation, inpatient admissions per 1,000 beneficiaries increased more for IHP beneficiaries relative to the comparison group. As a result, the overall rate of **all-cause acute inpatient hospitalizations** increased by 7.4 more admissions per 1,000 beneficiaries for IHP beneficiaries relative to the comparison group ($p < 0.001$).
  - This increase in **the rate of all-cause acute inpatient hospitalizations was only observed in adults** who were attributed to IHPs (see ***Table D-1-2*** in ***Sub-appendix D-1***).
  - In contrast, the rate of **all-cause acute inpatient hospitalizations** statistically significantly **declined for children** who were attributed to IHPs relative to children in the comparison group. This may reflect the participation of two IHPs specifically focused on pediatric populations (Children's Hospital and Clinics of Minnesota and Gillette Children's Specialty Healthcare) and more stable eligibility among the pediatric population.
  - In each year of IHP implementation the number of ED visits per 1,000 beneficiaries declined for both IHP beneficiaries and the comparison group, but the rate declined statistically significantly more for IHP beneficiaries. Consequently, the overall annual rate of **outpatient ED visits** declined by approximately 30 more visits per 1,000 beneficiaries among IHP beneficiaries relative to the comparison group. These highly positive findings were **consistent across both child and adult subpopulations**. Additionally, Medicaid beneficiaries expressed less regular use of the ED for care, further supporting this finding.

Table D-4. Difference in the pre-post annual change in utilization for Medicaid beneficiaries in Minnesota IHPs relative to the comparison group, first 4 years of IHP implementation (January 2013 through December 2016)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
All-cause acute inpatient hospitalizations (per 1,000 covered persons)								3,985,920
Year One	100.1	99.2	120.1	111.4	7.3 (5.4, 9.1)	7.3	<0.001	
Year Two	100.1	99.2	110.4	97.2	12.4 (10.8, 13.9)	12.4	<0.001	
Year Three	100.1	99.2	112.3	104.4	6.3 (5.0, 7.6)	6.3	<0.001	
Year Four	100.1	99.2	113.2	105.4	6.0 (4.7, 7.2)	5.9	<0.001	
Overall	100.1	99.2	113.1	104.3	7.4 (6.6, 8.1)	7.4	<0.001	
Outpatient ED visits (per 1,000 covered persons)								3,985,920
Year One	425.8	372.4	355.9	320.0	−14.2 (−17.1, −11.4)	−3.3	<0.001	
Year Two	425.8	372.4	340.1	309.1	−18.5 (−20.9, −16.1)	−4.3	<0.001	
Year Three	425.8	372.4	321.2	304.6	−33.2 (−35.3, −31.1)	−7.8	<0.001	
Year Four	425.8	372.4	303.2	289.3	−36.0 (−38.1, −34.0)	−8.5	<0.001	
Overall	425.8	372.4	320.9	305.0	−29.7 (−30.9, −28.5)	−7.0	<0.001	
30-day readmissions (per 1,000 discharges)								369,362
Year One	123.5	124.3	111.8	119.3	−7.0 (−15.4, 1.4) †	−5.7	0.17	
Year Two	123.5	124.3	122.6	125.0	−1.6 (−9.6, 6.3)	−1.3	0.74	
Year Three	123.5	124.3	125.2	131.0	−5.0 (−13.1, 3.2)	−4.0	0.32	
Year Four	123.5	124.3	134.9	142.7	−6.8 (−15.1, 1.5) †	−5.5	0.18	
Overall	123.5	124.3	126.1	128.7	−5.1 (−9.4, −0.8)	−4.1	0.05	

CG = comparison group; D-in-D = difference-in-differences; ED = emergency department; IHP = Integrated Health Partnership.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in payments or in the rate in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in payments or in the rate in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention group's baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The probability estimates are multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries/discharges. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix D-2* for additional detail.

†The 80% confidence interval for the percentage of acute inpatient hospital admissions with a readmission within 30 days of discharge is (−13.5, −0.5) in Year One and (−13.3, −0.4) in Year Four. Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only.

The following sample sizes represent weighted period-quarters included in the regression model for the entire study period: inpatient admissions and ED visits not leading to hospitalizations (N = 3,985,920); 30-day readmissions (N = 369,362).

Data source: RTI analysis of Minnesota DHS Medicaid claims, 2010–2016.

- The **overall rate of 30-day readmissions** increased less for IHP beneficiaries relative to the comparison group, but there was no statistically significant difference in the change in the 30-day readmission rate for any of the 4 years of IHP implementation. The overall rate likely reached statistical significance because of the increased sample size from combining the yearly estimates.
- The findings were consistent with the goals of IHP, which were to improve care coordination and reduce unnecessary utilizations.
  - Increases observed in inpatient hospitalizations were coupled with decreases in outpatient ED visits and decreases in readmissions, which, for the adult population, may represent appropriate utilization of services. For the pediatric population we found the expected decreases, illustrating progress.
  - Further supporting this hypothesis, because the adult population has stricter eligibility requirements, and may forego medical care prior to receiving Medicaid, they may be more likely to have untreated illness upon becoming eligible for Medicaid and IHP attribution.

D.2.3 Did expenditures change among Medicaid IHP beneficiaries?

KEY INSIGHTS

- Overall, total medical PBPM expenditures decreased more for IHP beneficiaries than for the comparison group, but these changes were not statistically significant. However, there was **a decline in total spending for the IHP group relative to the comparison group in the third year of IHP implementation**. This finding in the third year suggests that IHPs may be able to slow expenditure growth over the longer term.
- Facility PBPM expenditures increased less in the IHP group than in the comparison group during the first 3 years of the IHP implementation, but this change was not statistically significant.
- **Professional PBPM spending declined more in the IHP group than in the comparison group.** This finding is consistent with decreases in primary care provider visit use and specialty care provider visit use for the IHP group in the Medicaid claims-based analysis.

As noted in ***Sub-appendix D-2***, reliable data on Medicaid expenditures are not available in Minnesota Medicaid claims data from Minnesota DHS, so we used Medicaid data from the MN APCD to examine the effects of IHPs on Medicaid expenditures. ***Sub-appendix D-2*** also notes that, because of data availability, the MN APCD analysis includes one less post-period year than the Medicaid claims-based analysis does. The MN APCD analysis also differs from the Medicaid claims-based analysis because we could not match a list of IHP-attributed beneficiaries received from DHS to Medicaid data in the MN APCD. As a result, we replicated the IHP attribution process in the MN APCD data. This attribution process is described in more detail in ***Sub-appendix D-2***. ***Table D-5*** provides summary statistics for the Medicaid IHP and comparison groups in the MN APCD in the last baseline year.

Table D-5. Weighted means and standardized differences prior to IHP implementation, Medicaid IHP and comparison groups identified in the Minnesota All Payer Claims Database, 2012

Characteristic	IHP group	Comparison group	Standardized difference[a]	p-value
N	239,245	239,288		
Individual level sociodemographic characteristics				
Age (in years)	21.0	21.0	0.1	0.86
Age 0–1 (%)	3.9	3.9	0.03	0.93
Age, 1–18 (%)	50.6	49.9	1.4	0.00
Age, 19–64 (%)	45.5	46.1	1.4	0.00
HCC risk score	2.1	2.1	0.2	0.44
Female (%)	56.3	56.3	0.0	1.00
Continuously enrolled in 2012 (%)	53.7	53.7	0.1	0.82
Enrolled for at least 9 months in 2011 (%)	64.9	64.8	0.1	0.81
Any ED visit in 2011 (%)	29.5	29.5	0.01	0.96
Any inpatient admissions in 2011 (%)	8.8	8.8	0.01	0.96
Total expenditures (PBPM) in 2011 ($)	412.00	487.90	1.4	0.00
County-level characteristics				
Median age	37.5	37.5	1.0	0.00
Percent below the poverty line	12.7	12.1	16.9	0.00
Hospital beds per 1,000 residents	3.5	3.1	17.0	0.00
Percent without health insurance	9.7	9.6	3.5	0.00
Rural/Urban Continuum Code (%)	77.1	72.6	10.4	0.00

ED = emergency department; HCC = Hierarchical Condition Category (HCC risk score is a risk-adjustment score calculated from ICD9 and ICD10 diagnosis codes included on hospital and outpatient claims; larger HCC scores correspond with a larger number of comorbidities or a more severe set of comorbidities). IHP = Integrated Health Partnership.

[a] Absolute standardized differences (SDs) are expressed as percentages. < 10% SD is ideal for inferring balance between groups. To balance the population characteristics for the claims-based analyses we estimated propensity scores for all individuals from the comparison group for each year of the analysis. After propensity score weighting, the standardized differences between the weighted comparison group means and intervention group means were all well under the standard 10% threshold for individual-level variables; however, a few county-level variables exceed the threshold. Nonetheless, the differences in the county-level means is still quite small. County-level variables are shown here to provide context. Because there was little variation in county-level characteristics, balancing on these variables is difficult. Therefore, to optimize the balance and avoid extreme weights, county-level covariates were excluded from the propensity score model.

In ***Table D-6***, we present the results of the D-in-D regression analyses for total medical, facility, and professional PBPM expenditures. We report regression adjusted D-in-D estimates individually for the first 3 years after the implementation of IHPs, along with an overall D-in-D estimate for all years combined. In ***Figure D-4***, we present the annual D-in-D estimates for the first 3 years of the IHP model, respectively.

- There was no statistically significant difference in the change in **total medical expenditures** in the IHP group versus in the comparison group during the first 3 years of IHP implementation overall. However, in the third year of IHP implementation, total medical expenditures in the IHP group declined by $24 more (5 percent) than in the comparison group ($p = 0.02$).
  - Total medical expenditures in the IHP group also decreased more than in the comparison group for both adults and children, although—as for overall expenditures—these results were not statistically significant. As in the overall population, there were statistically significant decreases in total spending for IHP Medicaid adults and children in the third year of IHP implementation.
  - The difference in total medical expenditures between the IHP and comparison groups trended downward during the first 3 years of IHP implementation (***Figure D-4***).
    - The statistically significant decreases in total medical spending in the third year of IHP implementation suggests that the IHP model may reduce spending growth over the longer term, even if it does not achieve savings immediately.
- In the first 3 years of IHP implementation, **facility expenditures** increased less in the IHP group than in the comparison group. However, this change was not statistically significant. In addition, there were no statistically significant changes in annual facility spending in the IHP group relative to facility spending in the comparison group.
  - Facility expenditures did not increase despite statistically significant increases in rates of all-cause inpatient hospitalizations—a key driver of facility expenditures—in the IHP group.
- **Professional expenditures** declined by $7 more (2 percent) in the IHP group relative to the comparison group in the first 3 years of IHP implementation ($p = 0.06$). In addition, professional spending declined by $10 more (3 percent) in the IHP group relative to the comparison group in the third year of IHP implementation ($p < 0.001$).
  - This result is consistent with the Medicaid claims-based analysis finding that the likelihood of a visit to a primary care provider and a specialty care provider decreased statistically significantly more in the IHP group than in the comparison group.

Table D-6. Difference in the pre-post annual change in total medical expenditures PBPM for Medicaid beneficiaries in Minnesota IHPs relative to the comparison group, first 3 years of IHP implementation (January 2013 through December 2015)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value
Total medical expenditures (PBPM) ($)							
Year One	500.96	470.99	560.85	518.62	12.26 (−6.65, 31.18)	2.4	0.29
Year Two	500.96	470.99	468.20	438.48	−0.26 (−21.74, 21.23)	−0.1	0.98
Year Three	500.96	470.99	445.35	439.66	−24.29 (−41.02, −7.55)	−4.8	0.02
Overall	500.96	470.99	474.41	453.85	−9.40 (−20.75, 1.95) ₮	−1.9	0.17
Facility expenditures (PBPM) ($)							
Year One	158.07	153.86	174.85	166.75	3.89 (−8.24, 16.03)	2.5	0.60
Year Two	158.07	153.86	176.36	162.13	10.02 (−1.62, 21.66) ₮	6.3	0.16
Year Three	158.07	153.86	188.33	197.96	−13.84 (−28.82, 1.14) ₮	−8.8	0.13
Overall	158.07	153.86	181.79	180.08	−2.49 (−10.95, 5.97)	−1.6	0.63
Professional expenditures (PBPM) ($)							
Year One	342.89	317.13	386.00	351.87	8.37 (−0.35, 17.09) ₮	2.4	0.11
Year Two	342.89	317.13	291.84	276.35	−10.28 (−25.39, 4.84)	−3.0	0.26
Year Three	342.89	317.13	257.02	241.70	−10.45 (−15.83, −5.06)	−3.0	0.001
Overall	342.89	317.13	292.62	273.76	−6.92 (−12.86, −0.97)	−2.0	0.06

CG = comparison group; D-in-D = difference-in-differences; IHP = Integrated Health Partnership; PBPM = per beneficiary per month.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in payment in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in payment in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention groups baseline period adjusted mean.

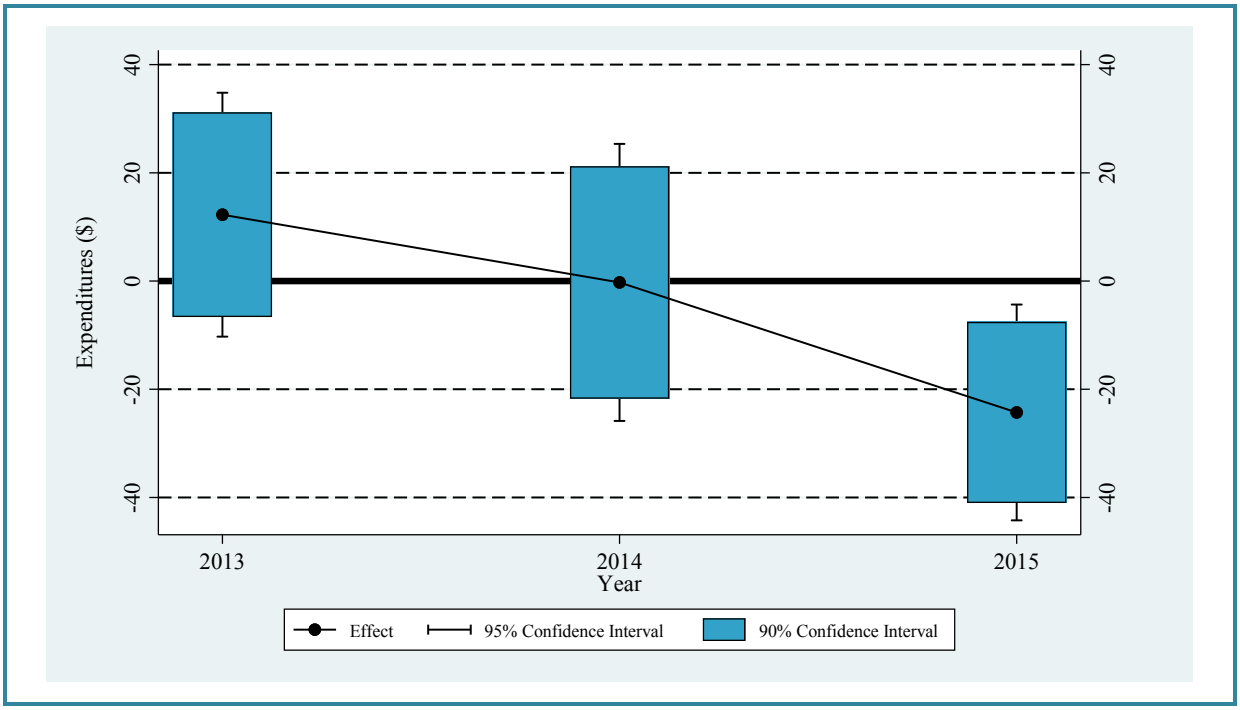
Methods: An ordinary least squares model was used to obtain estimates for differences in expenditures. The year-specific regression-adjusted D-in-D may not match the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights across these figures. See *Sub-appendix D-2* for additional detail.

₮ The overall 80% percent confidence interval for total medical expenditures is (−18.25, −0.56). The Year Two 80% confidence interval for facility expenditures is (0.95, 19.09). The Year Three 80% confidence interval for facility expenditures is (−25.51, −2.16). The Year One 80% confidence interval for professional expenditures is (1.57, 15.16). Standard statistical practice is to use confidence intervals of 90% or higher; 80% confidence intervals are provided here for comparison purposes only.

The following sample size represents weighted beneficiary-years included in the regression model for total medical expenditures, facility expenditures, and professional expenditures for the entire study period: N = 2,076,353.

Data source: RTI analysis of Medicaid data from the Minnesota All Payer Claims Database, 2010–2015.

Figure D-4. Annual difference in the pre-post change in total medical PBPM expenditures for Medicaid beneficiaries in Minnesota IHP and comparison groups, first 3 years of IHP implementation (January 2013 through December 2015)



IHP = Integrated Health Partnership; PBPM = per beneficiary per month.

Bars indicate 90 percent confidence intervals (CIs), and lines that extend beyond the bars indicate 95% CIs. CIs that do not cross the origin on the x-axis indicate statistically significant effect estimates; CIs that cross the origin denote statistically insignificant effects.

Data source: RTI analysis of Medicaid data from the Minnesota All Payer Claims Database, 2013–2015.

D.2.4 Did quality of care change among Medicaid IHP beneficiaries?

KEY INSIGHTS

- We observed a key positive quality improvement in the **increase in the likelihood of IHP beneficiaries getting an HbA1c test** (relative to the comparison group).
  - This finding suggests that SIM investments in health IT and data analytics—which enabled IHP providers to better use data to identify and manage their at-risk diabetes populations—translated into higher quality of care.
- **Other quality of care metrics showed no improvement** for the evaluation period.
  - We found insignificant findings associated with the appropriate use of asthma medications overall, although there were significant improvements in Year Four relative to the comparison group.
  - Results with respect to consistent antidepressant medication adherence were disappointing, suggesting that more time is needed for patient behavior—a core element needed for lasting clinical compliance and improved outcomes—to align with provider recommendations.

In ***Table D-7*** we present the results of the D-in-D regression analyses for the quality of care measures using Medicaid claims data from Minnesota DHS. We report regression-adjusted D-in-D annual estimates individually for the first 4 years after the implementation of IHP along with an overall D-in-D estimate for all years combined.

- During the baseline period, approximately 93 percent of patients age 18–75 years with diabetes in both the IHP and comparison groups had HbA1c testing. In the 4 years of IHP implementation, the percentage of patients in the IHP group who had HbA1c testing generally increased while the rate remained the same or declined in the comparison group. Consequently, the overall percentage **of HbA1c testing** increased by 3 percentage points for IHP beneficiaries relative to the comparison group ($p < 0.001$).
  - Process of care measures are easier to implement and do not rely as much on patient compliance or changed patient behavior. So, it is not unexpected that IHP providers were able to achieve improvements. It is notable, however, that IHPs were able to achieve significant improvements given the high baseline.
- The percentage of patients age 18 years and older diagnosed with a new episode of major depression and treated with antidepressant medication who remained on medication treatment at least 180 days increased less (and was statistically significant) for IHP beneficiaries relative to the comparison group during the third year of IHP implementation and for the 4 years overall. Overall, the percentage of patients with **antidepressant medication management** increased by 1.4 fewer percentage points for IHP beneficiaries relative to the comparison group ($p = 0.002$).

Table D-7. Difference in the pre-post annual change in quality of care for Medicaid beneficiaries in Minnesota IHPs relative to the comparison group, first 4 years of IHP implementation (January 2013 through December 2016)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	N
Percentage of patients age 18–75 years with diabetes (type 1 and type 2) who had hemoglobin A1c (HbA1c) testing (%)								113,674
Year One	93.1	92.8	95.0	92.8	1.9 (1.1, 2.7)	2.0	<0.001	
Year Two	93.1	92.8	94.0	92.2	1.4 (0.7, 2.2)	1.5	0.002	
Year Three	93.1	92.8	93.3	90.2	2.4 (1.7, 3.1)	2.6	<0.001	
Year Four	93.1	92.8	93.8	88.1	4.5 (3.7, 5.3)	4.8	<0.001	
Overall	93.1	92.8	93.8	90.7	3.0 (2.5, 3.4)	3.2	<0.001	
Percentage of patients age 18 years and older diagnosed with a new episode of major depression and treated with antidepressant medication who remained on medication treatment at least 84 days (%)								96,944
Year One	48.1	49.7	50.9	51.1	1.4 (−0.6, 3.3)	2.8	0.26	
Year Two	48.1	49.7	51.0	51.1	1.4 (−0.3, 3.1) †	3.0	0.16	
Year Three	48.1	49.7	51.7	54.8	−1.6 (−3.0, −0.2)	−3.3	0.06	
Year Four	48.1	49.7	51.2	53.0	−0.2 (−1.6, 1.2)	−0.5	0.79	
Overall	48.1	49.7	51.3	52.7	−0.3 (−1.1, 0.6)	−0.5	0.60	
Percentage of patients age 18 years and older diagnosed with a new episode of major depression and treated with antidepressant medication who remained on medication treatment at least 180 days (%)								96,944
Year One	34.1	35.1	35.7	37.5	−0.8 (−2.6, 1.1)	−2.2	0.50	
Year Two	34.1	35.1	36.5	36.8	0.6 (−1.0, 2.3)	1.9	0.51	
Year Three	34.1	35.1	36.2	40.2	−2.9 (−4.3, −1.6)	−8.7	<0.001	
Year Four	34.1	35.1	35.8	38.0	−1.2 (−2.6, 0.1) †	−3.5	0.14	
Overall	34.1	35.1	36.0	38.3	−1.4 (−2.2, −0.7)	−4.2	0.002	

(continued)

Table D-7. Difference in the pre-post annual change in quality of care for Medicaid beneficiaries in Minnesota IHPs relative to the comparison group, first 4 years of IHP implementation (January 2013 through December 2016) (continued)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	N
Percentage of patients age 5–64 years with persistent asthma who were appropriately prescribed medication during the year (%)								57,132
Year One	72.6	70.3	67.0	65.8	−1.2 (−3.2, 0.9)	−1.6	0.35	
Year Two	72.6	70.3	65.1	64.5	−1.7 (−3.5, 0.1) †	−2.4	0.12	
Year Three	72.6	70.3	67.7	66.2	−0.8 (−2.5, 0.9)	−1.1	0.43	
Year Four	72.6	70.3	82.2	77.8	2.1 (0.3, 3.9)	2.9	0.06	
Overall	72.6	70.3	69.7	66.9	−0.6 (−1.5, 0.4)	−0.8	0.31	

CG = comparison group; D-in-D = difference-in-differences; IHP = Integrated Health Partnership.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in the likelihood of a quality of care event in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in the likelihood of a quality of care event in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention group's baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the difference in likelihood of a quality of care event. The estimates are multiplied by 100 to obtain percentage probabilities. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix D-2* for additional detail.

† The Year Two 80% confidence interval for the percentage of patients age 18 years and older diagnosed with a new episode of major depression and treated with antidepressant medication who remained on medication treatment at least 84 days is (0.1, 2.8). The Year Four 80% confidence interval for the percentage of patients age 18 years and older diagnosed with a new episode of major depression and treated with antidepressant medication who remained on medication treatment at least 180 days is (−2.3, −0.2). The Year Two 80% confidence interval for the percentage of patients age 5–64 years with persistent asthma who were appropriately prescribed medication during the year is (−3.1, −0.3). Standard statistical practice is to use confidence intervals of 90% or higher; 80% confidence intervals are provided here for comparison purposes only.

The following sample sizes represent weighted period-years included in the regression model for the entire study period: Percentage of patients age 18–75 years with diabetes (type 1 and type 2) who had HbA1c testing (N = 113,674).

Data source: RTI analysis of Minnesota DHS Medicaid claims, 2010–2016.

  - This finding is somewhat disappointing given the IHP emphasis on integration of behavioral health with other clinical care.
  - Continued access to sufficient behavior health clinical care, cited by physicians and patients in our focus groups, may also be a factor; even with additional focus and services, access issues may still remain a challenge in Minnesota.

- In the first 3 years of IHP implementation **the appropriate use of asthma medication** declined more for IHP beneficiaries and the comparison group, but the difference in the change was not statistically significant. In the fourth year, the percentage of patients age 5–64 years with persistent asthma who were appropriately prescribed medication during the year increased by 2 more percentage points for IHP beneficiaries relative to the comparison group ($p < 0.10$). The rate of appropriate use of asthma medication increased substantially in both groups in the fourth year; the rate increased from 73 to 82 percent for IHP beneficiaries.
  - This measure reflects a focus of the IHP model, and these results suggest that this focus is yielded improvements over time.

D.2.5 Did utilization change among Medicaid IHP beneficiaries with behavioral health conditions?

KEY INSIGHTS

- Our findings for IHP beneficiaries with behavioral health conditions generally followed those for the total IHP-attributed population: **outpatient ED, primary care, and specialty care visits all decreased. The overall inpatient admission rate decreased, but less so for IHP beneficiaries** relative to the comparison group.
- One exception to these parallel findings is a decrease in the **rate of any follow-up visit within 14 days of inpatient discharge for IHP beneficiaries with behavioral health conditions** relative to beneficiaries with behavioral health conditions in the comparison group. This metric increased for the total IHP population.
  - This finding is both unexpected and negative, and affirms concerns voiced by providers, consumers, and state officials on the challenges in coordinating care for this population, and ensuring access to their services.
  - These explanations are consistent with our finding that **IHP patients were less likely than their comparison group to adhere to their prescription drug regimen beyond 180 days**.

We present the results of the D-in-D regression analyses for visits to a primary care provider, visits to a specialty provider, follow-up visits within 14 days of an inpatient hospital admission, the rate of all-cause acute inpatient hospitalizations, the rate of outpatient ED visits, and the rate of 30-day readmissions in ***Table D-8***. Because beneficiaries with behavioral health conditions are at a higher risk to use more services, we expect that the impact of the care management services offered under the IHPs may have a greater impact on this subpopulation relative to the full population. Further, a focus of the SIM Initiative more broadly in Minnesota

Table D-8. Difference in the pre-post annual change in utilization for Medicaid beneficiaries with behavioral health conditions in Minnesota IHPs relative to the comparison group, first 4 years of IHP implementation (January 2013 through December 2016)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	N
Percentage of beneficiaries with any visit to a primary care provider (%)								876,307
Year One	93.2	88.6	84.2	77.7	−1.5 (−2.3, −0.6)	−1.6	0.004	
Year Two	93.2	88.6	81.9	79.1	−4.6 (−5.3, −4.0)	−5.0	<0.001	
Year Three	93.2	88.6	69.4	79.5	−13.0 (−13.5, −12.6)	−14.0	<0.001	
Year Four	93.2	88.6	70.4	63.9	−1.9 (−2.1, −1.6)	−2.0	<0.001	
Overall	93.2	88.6	74.1	75.5	−5.7 (−5.9, −5.5)	−6.1	<0.001	
Percentage of beneficiaries with any visit to a specialty care provider (%)								876,307
Year One	49.1	45.2	41.6	46.7	−9.0 (−9.6, −8.5)	−18.4	<0.001	
Year Two	49.1	45.2	41.2	45.4	−8.3 (−8.9, −7.8)	−16.9	<0.001	
Year Three	49.1	45.2	38.3	46.4	−12.5 (−13.0, −12.0)	−25.5	<0.001	
Year Four	49.1	45.2	38.0	42.3	−8.6 (−9.2, −8.1)	−17.6	<0.001	
Overall	49.1	45.2	39.2	45.3	−9.8 (−10.1, −9.5)	−19.9	<0.001	
Percentage of acute inpatient hospital admissions with a follow-up visit within 14 days (%)								173,293
Year One	47.1	44.3	44.1	44.8	−3.4 (−5.0, −1.8)	−7.3	<0.001	
Year Two	47.1	44.3	45.7	45.5	−2.6 (−4.1, −1.1)	−5.5	0.004	
Year Three	47.1	44.3	45.6	45.5	−2.7 (−4.2, −1.3)	−5.7	0.002	
Year Four	47.1	44.3	45.1	44.0	−1.7 (−3.2, −0.2)	−3.6	0.06	
Overall	47.1	44.3	45.2	45.0	−2.4 (−3.2, −1.7)	−5.2	<0.001	
All-cause acute inpatient hospitalizations (per 1,000 covered persons)								876,307
Year One	141.0	134.3	145.9	138.8	0.04 (−4.4, 4.5)	0.03	0.99	
Year Two	141.0	134.3	145.9	133.4	5.9 (1.7, 10.1)	4.2	0.02	
Year Three	141.0	134.3	141.2	129.0	5.8 (2.1, 9.5)	4.1	0.01	
Year Four	141.0	134.3	134.2	125.7	2.0 (−1.6, 5.7)	1.4	0.36	
Overall	141.0	134.3	140.1	132.0	3.6 (1.6, 5.7)	2.6	0.003	
Outpatient ED visits (per 1,000 covered persons)								876,307
Year One	499.9	444.3	438.7	399.9	−16.0 (−22.3, −9.7)	−3.2	<0.001	
Year Two	499.9	444.3	433.8	392.9	−13.8 (−19.5, −8.1)	−2.8	<0.001	
Year Three	499.9	444.3	417.9	385.8	−22.7 (−27.9, −17.5)	−4.5	<0.001	
Year Four	499.9	444.3	395.2	370.2	−29.7 (−34.9, −24.5)	−5.9	<0.001	
Overall	499.9	444.3	415.0	387.9	−22.8 (−25.6, −19.9)	−4.6	<0.001	

(continued)

Table D-8. Difference in the pre-post annual change in utilization for Medicaid beneficiaries with behavioral health conditions in Minnesota IHPs relative to the comparison group, first 4 years of IHP implementation (January 2013 through December 2016) (continued)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	N
30-day readmissions (per 1,000 discharges)								149,830
Year One	167.5	171.2	159.5	177.1	−14.4 (−30.3, 1.5) †	−8.6	0.14	
Year Two	167.5	171.2	178.3	178.6	3.4 (−10.9, 17.8)	2.0	0.69	
Year Three	167.5	171.2	187.3	186.6	4.6 (−14.3, 23.5)	2.7	0.69	
Year Four	167.5	171.2	191.2	192.9	2.2 (−14.4, 18.8)	1.3	0.83	
Overall	167.5	171.2	182.7	182.7	1.0 (−8.0, 10.1)	0.6	0.85	

CG = comparison group; D-in-D = difference-in-differences; ED = emergency department; IHP = Integrated Health Partnership.

Note: The probability estimates are multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries/discharges.

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in use in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in use for the intervention group relative to the comparison group.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The estimates are multiplied by 100 to obtain percentage probabilities and by 1,000 to obtain rates per 1,000 covered persons or discharges. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix D-2* for additional detail.

†The Year One 80% confidence interval for the rate of 30-day readmissions (per 1,000 discharges) is (−26.8, −2.0). Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only.

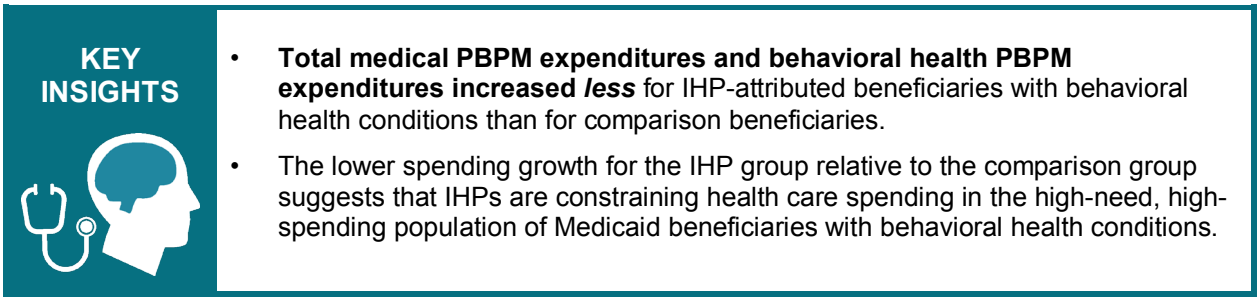
Data Source: RTI analysis of Minnesota DHS Medicaid data, 2010–2016.

was to test models that integrated behavioral health, social services, long-term care, or local public health, such as ACHs. Although participation in these models was not required of an IHP, many did participate. We report the D-in-D estimate for each year of IHP implementation and an overall estimate for all years combined.

- The percentage of **beneficiaries with behavioral health conditions** who **visited a primary care practitione**r declined by 5.7 more percentage points for IHP beneficiaries relative to the comparison group ($p < 0.001$). Likewise, the percentage of IHP beneficiaries with a **visit to a specialty care provider** declined by 9.8 percentage points relative to the comparison group. This finding was unexpected but similar to the finding for the total IHP population.

- The percentage of **discharges with a follow-up visit within 14 days** declined for IHP **beneficiaries with behavioral health conditions** while increasing in the comparison group. As a result we found statistically significant relative decreases in the rate of any follow-up visits within 14 days of inpatient discharges for IHP-attributed beneficiaries with behavioral health conditions relative to their comparison group counterparts (2.4 percent relative decline, $p < 0.001$). These findings are in contrast to the relative increase in the follow-up visit rate that we found in the overall IHP population.
- Overall all-cause acute inpatient admissions declined for both IHP-attributed and comparison group beneficiaries with behavioral health conditions; however, inpatient admissions declined *less* for IHP beneficiaries. Relative to beneficiaries with behavioral health conditions in the comparison group, **the inpatient admission rate** declined by 3.6 fewer admissions per 1,000 beneficiaries for IHP beneficiaries. These findings differ slightly from our findings in the overall population where we found greater increases in the inpatient admission rate for IHP beneficiaries relative to the comparison group.
- The **rate of outpatient ED visits** decreased more for IHP-attributed beneficiaries with behavioral health conditions relative to beneficiaries with behavioral health conditions in the comparison group for each of the 4 years of the IHP model and overall (overall decline was 22.8 visits per 1,000 beneficiaries, $p < 0.001$). This was a positive finding we also noted in the total IHP population.
- These findings suggest that, apart from 14-day follow-up post-discharge, utilization of beneficiaries with behavioral health conditions is largely consistent with the overall IHP Medicaid population. Contrary to expectations, the magnitude of the impact of the IHP model was not substantially greater in this high-risk population; however, the inpatient admission rate did show more promising trends for beneficiaries with behavioral health conditions relative to the full population.
- The decrease in 14-day follow-up is consistent with the decrease in the percentage of patients diagnosed with a new episode of major depression and treated with antidepressant medication who remained on medication treatment at least 84 days. Taken together these findings reinforce the idea that engaging this population in the health care system is challenging.

D.2.6 Did expenditures change among Medicaid IHP beneficiaries with behavioral health conditions?



We present the results of the D-in-D regression analyses for total medical expenditures and behavioral health related expenditures for Medicaid beneficiaries with behavioral health conditions in ***Table D-9***. As noted in ***Section D.2.5***, because beneficiaries with behavioral health conditions are at a higher risk to use more services we expect that the impact of the care management services offered under the IHPs may have a greater impact on this subpopulation relative to the full population. We report the D-in-D estimate for each year since the implementation of the model along with an overall estimate for all years combined.

- **Adjusted means for total medical expenditures** for IHP and comparison group **beneficiaries with behavioral health conditions** ranged between $1,074.21 per beneficiary per month and $1,307.98 per beneficiary per month. These expenditure estimates are more than twice that of the total medical expenditure adjusted means for the overall IHP and comparison groups, highlighting the significant health care needs of individuals with behavioral health conditions.
- Total medical expenditures increased by $127.73 less in the IHP group than in the comparison group over the first 3 years of IHP implementation ($p = 0.09$). A large statistically significant decrease in total medical spending PBPM in the third year of IHP implementation drives this overall result.
  - As expected, the magnitude of the change in total medical expenditures (12 percent) for beneficiaries with behavioral health conditions was larger than the magnitude for the overall population. Unlike for the overall population, we found a statistically significant difference in the overall change in total medical expenditures for the subpopulation with behavioral health conditions.
  - This change in total medical expenditures is consistent with the statistically significant decreases in inpatient admissions, ED visits, specialty visits, and primary visits for the IHP-attributed behavioral health subpopulation reported in the Medicaid claims-bases analysis.
  - This is an expected and positive finding because it suggests that IHPs could reduce spending growth in this high-need population.

Table D-9. Difference in the pre-post annual change in total medical expenditures PBPM for Medicaid beneficiaries with behavioral health conditions in Minnesota IHPs and the comparison group, first 3 years of IHP implementation (January 2013 through December 2015)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value
Total medical PBPM expenditures ($)							
Year One	1,074.21	1,068.12	1,254.12	1,323.23	−75.21 (−297.12, 146.70)	−7.0	0.58
Year Two	1,074.21	1,068.12	1,159.19	1,320.74	−167.64 (−491.07, 155.79)	−15.6	0.39
Year Three	1,074.21	1,068.12	1,173.61	1,291.19	−123.67 (−216.16, −31.19)	−11.5	0.03
Overall	1,074.21	1,068.12	1,186.34	1,307.98	−127.73 (−252.71, −2.76)	−11.9	0.09
Behavioral health PBPM expenditures ($)							
Year One	572.42	573.99	726.38	698.94	29.01 (11.40, 46.62)	5.1	0.01
Year Two	572.42	573.99	599.63	596.74	4.46 (−11.87, 20.80)	0.8	0.65
Year Three	572.42	573.99	568.71	656.25	−85.97 (−140.50, −31.44)	−15.0	0.01
Overall	572.42	573.99	613.31	645.80	−30.89 (−56.31, −5.47)	−5.4	0.05

CG = comparison group; D-in-D = difference-in-differences; IHP = Integrated Health Partnership; PBPM = per beneficiary per month.

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in use in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in use for the intervention group relative to the comparison group.

Methods: An ordinary least squares model was used to obtain estimates for differences in expenditures. The year-specific regression-adjusted D-in-D may not match the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights across these figures. See *Sub-appendix D-2* for additional detail.

The following sample size represents the total number of weighted beneficiary-years included in the regression model for total medical expenditures and behavioral health expenditures for the entire study period: N=491,553.

Data Source: RTI analysis of Medicaid data from the Minnesota All Payer Claims Database, 2010–2015.

- **Behavioral health expenditures for IHP-attributed beneficiaries with behavioral health conditions** also increased by $30.89 less in the IHP group than in the comparison group over the first 3 years of IHP implementation (p = 0.05). There also were statistically significant declines in behavioral health spending in the IHP group relative to the comparison group in the first and second years—but not in the third year—of IHP implementation.
  - This is also a positive finding because it supports the hypothesis that IHPs can constrain health care spending.

D.2.7 Discussion and limitations

The SIM Initiative in Minnesota was a statewide effort to transform health care from a medical delivery–based system to one that focuses on accountable care that cross-cuts all determinants of health. The state leveraged many other state-level initiatives that were co-occurring within the state of Minnesota, traditionally a highly active state in the area of health care reform. The IHP model provided financial incentives (shared savings/shared losses) that were intended to induce providers to improve the quality of care beneficiaries receive and thereby reduce cost and utilization. SIM funding supported investments to enhance the ability of providers to use data and coordinate care in a way that facilitated success in the model. Resulting from these initiatives, we expected that IHP-attributed beneficiaries would exhibit improved care coordination, lower utilization, and improved quality of care outcomes.

Broadly, many of the findings were consistent with the expected outcomes and demonstrate some evidence of positive impact in Minnesota. Some care coordination outcomes improved for IHP-attributed beneficiaries relative to the comparison group. Specifically, the rate of specialist visits decreased, the rate of any follow-up within 14 days of discharge increased, and in the fourth year of IHP implementation the percentage of patients with persistent asthma who were appropriately prescribed asthma medication increased, all relative to the comparison group.

But our findings were sometimes unexpected. One unexpected care coordination finding was that the rate of primary care visits also decreased relative to the comparison group. Although it is often expected that an increase in primary care visits can lead to better care management and therefore reduce downstream utilization, it is also possible that care management could occur outside of the primary care setting. In fact, our utilization outcomes broadly suggest that effective and efficient care management may have happened outside of the primary care setting, with statistically significant reductions in the rates of ED visits that did not lead to an admission and 30-day readmissions observed among IHP-attributed beneficiaries relative to the comparison group. The findings also suggest that process of care measures were well implemented by IHP providers. Despite relatively high rates of HbA1c testing in both the IHP and comparison groups during the baseline (i.e., > 90 percent), IHP providers achieved a statistically significant improvement in the percentage of patients with diabetes who had HbA1c tests relative to the comparison group.

Two findings stand out as particularly inconsistent with the goals of the IHP model. First, we found that there was an increase in the rate of inpatient admissions among IHP-attributed beneficiaries relative to the comparison group. The increases observed in inpatient hospitalizations were coupled with decreases in outpatient ED visits and decreases in 30-day readmissions, suggesting that although utilization increased, it may have been appropriate utilization of services. Further supporting this hypothesis, the increase in hospitalizations was in

the adult population, which is more likely to have untreated illness upon becoming eligible for Medicaid and IHP attribution. Among children who were attributed to IHPs we found a decrease in the rate of inpatient admissions relative to children in the comparison group, as expected.

Second, we found that there was a decrease in the percentage of beneficiaries who were newly diagnosed with depression and who appropriately used medications relative to the comparison group. As noted in ***Section D.1***, providers faced barriers with respect to sharing data on this population, making coordinating care for this population particularly challenging. Although stakeholders reported improvements in the integration of behavioral health into traditional health care settings, this finding may reflect the longer time horizon needed for this kind of implementation to take root and to change consumer behavior.

The challenges in changing consumer behavior are supported by the results of the appropriate use of asthma medications as well. Despite being a specific focus of the IHP model's quality measures, it was not until the fourth year of the model that any significant improvements were found, further supporting the general conclusion that it is difficult to change consumer behavior. These challenges are especially acute among Medicaid beneficiaries who often are inconsistently enrolled and face social, financial, and logistical barriers to adherence.

Using MN APCD data, we examined expenditure outcomes for IHP beneficiaries. Although there were no statistically significant differences in total medical expenditures overall relative to the comparison group, the statistically significant reductions in expenditures in Year 3 indicate that savings could materialize over the longer term. There was a lower rate of increase in professional spending but no change in facility spending in the IHP group. In the subpopulation of Medicaid beneficiaries with behavioral health conditions, we found lower rates of increase in total spending and behavioral health spending in the IHP group relative to the comparison group. These latter two findings indicate that IHPs have the potential to reduce spending growth in this high-need, high-utilization population. Furthermore, the null findings for spending for the overall population should be considered in the context of other promising care coordination, utilization, and quality of care findings.

Lastly, as a sensitivity analysis we explored whether early entrants into the IHP program produced different outcomes relative to later entrants into the IHP program. Specifically, we split the data into four cohorts of IHP-attributed beneficiaries based on the year during which each IHP-attributed beneficiary was first attributed. We used the first year of attribution on the comparison group side as well to formulate a cohort-specific comparison group. With one exception, results were broadly similar to the findings reported above (results are available in ***Sub-appendix D-1***). Among beneficiaries attributed to the 2013 cohort of IHPs we observed an increase in the rate of inpatient admissions relative to the comparison group who were first attributed in 2013, which is consistent with the findings presented above. In contrast, among beneficiaries attributed to the 2014, 2015, or 2016 cohort of IHPs we observed a statistically

significant decrease in the rate of inpatient admissions relative to the comparison group who were first attributed in 2014, 2015, or 2016, respectively. This shows us that the 2013 cohort, which is the largest cohort, is driving our overall results with respect to inpatient admissions. However, it is unclear why the impacts among the 2013 cohort on inpatient admissions were different from the three later cohorts. There were no eligibility or other changes during the post-period that could have resulted in a fundamentally different population, nor were there any substantive changes in the IHP model that could explain the differences in impacts.

Some results of our analyses of the impact of IHPs on the Medicaid population differ from results reported in Minnesota's state self-evaluation, conducted by State Health Access and Data Assistance Center (SHADAC), which used a different evaluation design, MN APCD data for utilization and expenditure outcomes, and clinic-level registry data for quality of care outcomes (SHADAC, 2017). SHADAC's evaluation used a pre-post design with no comparison group, 1 year of pre-period data (2012), and 2 years of post-period data (2013–2014).[89] Using this design, SHADAC reported that inpatient admission rates decreased from the pre-period to the post-period, whereas we found that inpatient admissions increased more in the IHP group than in the comparison group. Consistent with our findings, the self-evaluation found decreases in ED visits. SHADAC found reductions in total expenditures for adults and reductions in inpatient spending for both children and adults. Like SHADAC, we found downward trends in total spending, but these changes relative to a comparison group were not statistically significant for either children or adults. In contrast to SHADAC, we found increases in total facility spending in the IHP group, although these changes were not statistically significant relative to a comparison group. In addition to the different evaluation design, the differences in these findings on expenditure outcomes may be the result of different methods for calculating expenditures; we used expenditure amounts directly from claims, while SHADAC applied standardized prices to services to calculate expenditures.

SHADAC found no significant changes in quality of care using clinic-level outcomes from clinic-level registry data, whereas we found mixed results using individual-level quality outcomes from claims data: improvements on one outcome, worse results on another outcome, and no statistically significant changes on two outcomes.

A subsequent analysis by SHADAC used a comparison group but focused only on the six IHPs that launched in 2013 and included only 1 year of pre-period data and 2 years of post-period data. This analysis found statistically significant increases in primary care visits and decreases in specialty care visit use and ED visit use. These results are consistent with Year 1

[89] Additional differences in evaluation design to note: SHADAC examined changes in outcomes between the pre- and post-periods separately for Round 1 IHPs, which launched in 2013, and Round 2 IHPs, which launched in 2014, whereas our main analysis does not separate the IHP group into separate cohorts. We present results separately for separate IHP cohorts in a supplemental analysis in ***Section D-1.1***. Another notable difference between our analysis and SHADAC's analysis is that SHADAC attributed individuals to IHPs during the pre-period, while we did not.

and Year 2 findings in our analysis of individuals attributed to the first cohort of IHPs (see ***Table D-1-5***). SHADAC's comparison group analysis also found no changes to quality or total expenditures; we did not produce comparable cohort-specific analyses for these outcomes.

When looking at results, it is important to remember that IHP providers do not represent the universe of providers who were incentivized to reform how they deliver care as part of the SIM Initiative, nor was the SIM Initiative the only initiative incentivizing providers in the state. The broad-ranging nature of the innovations tested in Minnesota may reduce the measurable effects of IHPs because of contamination of the comparison groups. Accordingly, the estimated effects represented here are conservative and may be biased toward the null. In light of this limitation, the many positive findings associated with IHPs are all the more impressive. On the other hand, other non-IHP SIM-related activities such as the effort to expand participation in Health Care Homes likely affected outcomes for some of the IHP-attributed beneficiaries, and this could have led to better outcomes by virtue of the potential synergy created through being both a Health Care Home and participating in an IHP. Unfortunately, we could not precisely identify which beneficiaries in the IHP group (and comparison group) were likely exposed to one or more additional payment or delivery system reform models. Accordingly, we cannot disentangle whether some findings were, in part, attributed to other non-IHP activities to which IHP-attributed beneficiaries may be been exposed. Furthermore, IHPs themselves predate SIM by 10 months, having started in January 2013. Our results reflect not only what the state accomplished as a result of their participation in the SIM Initiative, but also efforts the state had begun prior to the SIM Initiative.

D.3 Model-Specific Impact Findings: *Spillover Effects of Minnesota's Integrated Health Partnerships on the Commercially Insured Population*

Because most IHPs also treat commercially insured and other publicly insured individuals, it is possible that provider participation in an IHP would produce a "spillover effect" for the commercial population. In other words, the practice changes produced by IHP affiliation could affect how providers care not only for Medicaid beneficiaries but also for commercially insured patients, who represent 59 percent of Minnesota's population.[90] This analysis focused on ascertaining whether there were any spillover effects of the IHP model on commercially insured members who also received care from IHP-participating providers with respect to medical expenditures, health care utilization, and care coordination.

[90] Minnesota Department of Health, Health Economics Program. Chartbook Section 2: Trends and variation in health insurance coverage. http://www.health.state.mn.us/divs/hpsc/hep/chartbook/section2.pdf

D.3.1 Did care coordination change among IHP-attributed commercial plan members?

KEY INSIGHTS

- Overall, IHP-attributed commercial plan members were more likely than the comparison group to have **visits with a primary care provider** but less likely to have **visits with a specialty care provider**.
  - These results may represent a substitution of specialty care for primary care, and differs from the Medicaid population, where IHP-attributed Medicaid beneficiaries were less likely to receive both primary care and specialty care services than the comparison group.
- IHP-attributed commercial plan members were more likely to have **follow-up visits within 14 days of inpatient discharge** than comparison group.
  - This corresponds with the findings from Medicaid beneficiaries, and consistent with providers reporting increased use of discharge notifications during the study period.

In ***Table D-10*** we present the results of the D-in-D regression analyses for the following care coordination outcomes: percentage of commercial plan members with a visit to a primary care provider, percentage of commercial plan members with a visit to a specialty provider, and percentage of acute inpatient hospital admissions with a follow-up visit within 14 days. We report annual regression-adjusted D-in-D estimates individually for the first 3 years after the implementation of IHP along with an overall D-in-D estimate for all 3 years combined.

- During the first 3 years of the IHP model, **the percentage of commercial plan members with a visit to a primary care provider** increased by 1.8 percentage points more for IHP-attributed individuals than for the comparison group ($p < 0.001$). In addition, IHP-attributed commercial plan members were more likely to have a primary care visit relative to the comparison group in each individual year of IHP implementation ($p < 0.001$ for each year).
- The **percentage of commercial plan members with a visit to a specialty provider** increased less for the IHP group than the comparison group in each year of IHP implementation. As a result, IHP-attributed commercial plan members were 3.3 percentage points less likely to have a specialty visit than were comparison group members ($p < 0.001$).
  - The trends regarding physician visits were observed in both the child and adult subpopulations. The relative increase in the percentage of beneficiaries with a primary care visit and the co-occurring relative decrease in the percentage of beneficiaries with a specialty care visit suggests that there may have been a substitution of specialty care for primary care for the commercial population.

Table D-10. Difference in the pre-post annual change in care coordination for Minnesota IHP-attributed commercial plan members relative to the comparison group, first 3 years of IHP implementation (January 2013 through December 2015)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	N
Percentage of commercial plan members with a visit to a primary care provider (%)								5,788,367
Year One	72.9	70.4	95.8	92.9	1.6 (1.5, 1.6)	2.1	<0.001	
Year Two	72.9	70.4	95.8	93.0	1.6 (1.5, 1.6)	2.2	<0.001	
Year Three	72.9	70.4	96.6	93.1	2.2 (2.1, 2.2)	3.0	<0.001	
Overall	72.9	70.4	96.2	93.0	1.8 (1.8, 1.9)	2.5	<0.001	
Percentage of commercial plan members with a visit to a specialty care provider (%)								5,788,367
Year One	29.0	29.5	34.7	38.3	−3.1 (−3.3, −2.9)	−10.7	<0.001	
Year Two	29.0	29.5	35.3	39.4	−3.6 (−3.7, −3.4)	−12.3	<0.001	
Year Three	29.0	29.5	37.5	41.2	−3.2 (−3.3, −3.0)	−10.9	<0.001	
Overall	29.0	29.5	36.2	40.0	−3.3 (−3.4, −3.2)	−11.3	<0.001	
Percentage of acute inpatient hospital admissions with a follow-up visit within 14 days (%)								287,270
Year One	42.0	41.4	49.5	49.2	−0.4 (−1.2, 0.4)	−1.0	0.37	
Year Two	42.0	41.4	53.4	51.7	1.0 (0.3, 1.7)	2.4	0.02	
Year Three	42.0	41.4	55.0	52.6	1.7 (1.0, 2.3)	3.9	<0.001	
Overall	42.0	41.4	52.4	51.5	0.7 (0.2, 1.1)	1.6	0.01	

CG = comparison group; D-in-D = difference-in-differences; IHP = Integrated Health Plan.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in the likelihood of a care coordination event in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in the likelihood of a care coordination event in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention groups baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the difference in likelihood of a care coordination event. The estimates are multiplied by 100 to obtain percentage probabilities. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix D-2* for additional detail.

The following sample size represents weighted person-years included in the regression model for the entire study period for visits to a primary care provider and for visits to a specialty care provider: N = 5,788,367. The following sample size represents weighted admissions included in the regression model for the entire study period for admissions with a follow-up visit with 14 days: N = 287,270.

Data source: RTI analysis of commercial data from the Minnesota All Payer Claims Database, 2010–2015.

- These findings contrast with the relative declines in the likelihood of both a primary care visit and a specialty care visit for IHP-attributed Medicaid beneficiaries. As noted in ***Section D.2***, the state adjusted its attribution algorithm to allow beneficiaries to remain attributed to an IHP they had an established relationship even in the absence of a primary care visit. See ***Sub-appendix D-2, Section D-2.1*** for more details. It is unclear whether commercial payers were incentivizing or disincentivizing primary visits in any way.

- Overall, the 14-day follow-up rate for the IHP-attributed commercial plan members during the baseline period was 42 percent. After 3 years of IHP implementation, that rate increased to 52 percent. In contrast, follow-up visit rates in the overall comparison group increased less from the baseline through the IHP implementation period. The overall **percentage of inpatient discharges with any follow-up visit within 14 days of discharge** increased by 0.7 more percentage points for IHP-attributed commercial plan members than for comparison group members ($p = 0.01$).
  - The positive findings for 14-day follow-up visit rates for the overall commercial population were driven by changes in follow-up visit rates for adults. There was no overall difference in 14-day follow-up visit rates for commercially insured IHP-attributed children relative to a comparison group. As noted in ***Section D.2***, the differing results for children and adults could be because of provider focus on initiatives, such as the Medicare Shared Saving Program, that include a provider performance component but that target adult patients.
  - This finding of an increased follow-up visit rate corresponds to both findings from the IHP Medicaid population and the expectations of most payment reform models. As noted in ***Section D.2***, potential explanations for this finding include the increased use of discharge notifications among IHP-affiliated providers and improved care management practices for patients discharged from hospitals.
  - The relative decrease in specialty provider visit use, increase in primary care provider visit use, and increase in follow-up visits within 14 days suggests that Medicaid participation in these models is facilitating improvements in care coordination in the commercial population.
  - Although trends in primary care visits were inconsistent between the commercial and Medicaid populations, it is not clear what is driving that difference, and the reason may be structural differences between the payers. Note that for the commercial population, trends in primary care visits are in the expected direction, while the relative decline in the Medicaid population is an unexpected result.

D.3.2 Did utilization change among IHP-attributed commercial plan members?

KEY INSIGHTS

- The commercial IHP group had a higher rate of acute inpatient admissions than the comparison group.
  - As in the Medicaid analysis, the relative increase in the rate of admissions for the IHP group is driven by trends in the adult subpopulation.
- There was a smaller increase in the rate of outpatient ED visits in the IHP group than in the comparison group, a finding that suggests that IHPs may help constrain the rate of ED visits in the commercial population.
- The rate of 30-day readmissions did not change for the commercial IHP group relative to the comparison group; however, in the third year of the IHP model, there was a smaller increase in the IHP group relative to the comparison group.
  - This result contrasts with findings for the Medicaid population, which showed reductions in readmissions but suggests that IHPs potentially could affect readmissions for the commercial population over the longer term.

In ***Table D-11*** we present the results of the D-in-D regression analyses for inpatient admissions, outpatient ED visits, and 30-day readmissions. We report regression-adjusted D-in-D estimates individually for the first 3 years after IHP implementation along with an overall D-in-D estimate for all years combined.

- **The overall rate of all-cause acute inpatient hospitalizations** increased by 0.9 more admissions per 1,000 covered lives in the IHP group than in the comparison group ($p < 0.001$). The relative increase in inpatient hospitalizations in the IHP group was largest in magnitude in the first year of IHP implementation and decreased over time. In the third year of IHP implementation, there is no difference in the hospitalization rate between the IHP and comparison groups.

– As in the Medicaid claims-based analysis, the increase in the rate of all-cause acute inpatient hospitalizations was observed in commercially insured adults attributed to IHPs (see ***Table D-1-14*** in ***Sub-appendix D-1***) but not for commercially insured children attributed to IHPs (***Table D-1-13***). There was no difference in the overall rate of all-cause acute inpatient hospitalizations for IHP-attributed commercially insured children relative to the comparison group.

– For the Medicaid claims-based analysis, we hypothesized that the newly eligible beneficiaries with more unmet health needs may be driving this result, but this explanation does not apply to the commercial population, who tend to both have more stable coverage and fewer and less severe chronic health conditions.

- In each year of IHP implementation the number of ED visits per 1,000 covered lives increased for both the commercial IHP group and the comparison group, but the rate increased less for the IHP group. Consequently, **the IHP group had approximately 2.9 fewer ED visits per 1,000 covered lives than the comparison group** ($p < 0.001$). These findings were consistent across both child and adult subpopulations.

Table D-11. Difference in the pre-post annual change in utilization for IHP-attributed commercial plan members and the comparison group, first 3 years of IHP implementation (January 2013 through December 2015)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
All-cause acute inpatient hospitalizations (per 1,000 covered persons)								5,788,367
Year One	49.5	48.8	51.9	48.9	2.1 (1.3, 3.0)	4.3	<0.001	
Year Two	49.5	48.8	52.6	50.4	1.3 (0.6, 2.1)	2.7	0.002	
Year Three	49.5	48.8	49.6	48.8	0.01 (−0.6, 0.6)	0.0	0.98	
Overall	49.5	48.8	51.1	49.3	0.9 (0.5, 1.3)	1.8	<0.001	
Outpatient ED visits (per 1,000 covered persons)								5,788,367
Year One	120.5	114.5	125.5	124.4	−5.3 (−6.5, −4.1)	−4.4	<0.001	
Year Two	120.5	114.5	127.9	122.3	−0.8 (−1.9, 0.3)	−0.7	0.25	
Year Three	120.5	114.5	126.0	122.8	−3.2 (−4.2, −2.2)	−2.6	<0.001	
Overall	120.5	114.5	126.5	123.0	−2.9 (−3.5, −2.2)	−2.4	<0.001	
30-day readmissions (per 1,000 discharges)								229,157
Year 1	60.6	60.2	111.3	104.6	4.9 (−2.4, 12.1)	8.0	0.27	
Year 2	60.6	60.2	107.3	112.2	−3.9 (−9.7, 1.9)	−6.4	0.27	
Year Three	60.6	60.2	108.0	120.2	−9.0 (−14.6, −3.3)	−14.8	0.01	
Overall	60.6	60.2	109.1	113.5	−1.9 (−5.7, 1.9)	−3.2	0.40	

CG = comparison group; D-in-D = difference-in-differences; ED = emergency department; IHP = Integrated Health Plan.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in payments or in the rate in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in payments or in the rate in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention groups baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The probability estimates are multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries/discharges. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix D-2* for additional detail.

The following sample size represents weighted person-years included in the regression model for the entire study period for inpatient hospitalizations and outpatient ED visits for visits: N = 5,788,367. The following sample size represents weighted admissions included in the regression model for the entire study period for 30-day readmissions: N = 229,157.

Data source: RTI analysis of commercial data from the Minnesota All Payer Claims Database, 2010–2015.

- These results also are consistent with findings from the Medicaid analysis, although the estimated effects for the commercial population are smaller in magnitude. The common findings across Medicaid and commercial population again suggest the possibility of a spillover effect for the commercial IHP group.

- **Although the readmission rate increased less in the commercial IHP group than in the comparison group, there was no statistically significant change in the rate of 30-day readmissions in the IHP-attributed commercially insured population** relative to the comparison group. However, in the third year of IHP implementation, the IHP group had 9.0 fewer readmissions per 1,000 discharges relative to the comparison group ($p = 0.01$).[91]
  - This finding contrasts with results from the Medicaid claims-based analysis, in which the smaller increase in the readmission rate for the IHP group relative to the comparison group was statistically significant ($p = 0.05$).
  - This result for the third year of IHP implementation could suggest that as IHPs continue to participate in the market, there may be impacts to the commercial population with respect to readmissions over the longer term.

D.3.3 Did expenditures change among IHP-attributed commercial plan members?

KEY INSIGHTS

- In the first 3 years of the IHP model, total medical expenditures PMPM increased more in the group of IHP-attributed commercial plan members than the comparison group.
  - Although unexpected, this finding is not surprising because we also do not find overall reductions in total medical expenditures for IHP-attributed Medicaid beneficiaries—the IHP target population.
- The increase in total medical spending in the commercial IHP group was driven by children—PMPM expenditures for the IHP-attributed adult subpopulation increased less than for the comparison group.

In ***Table D-12***, we present the results of the D-in-D regression analyses for total commercial PMPM expenditures.[92] We also provide results for total commercial expenditures for children in ***Table D-1-15*** and adults in ***Table D-1-16*** in ***Sub-appendix D-1***. We report annual regression adjusted D-in-D estimates individually for the first 3 years after implementation of the IHPs, along with an overall D-in-D estimate for both years combined. In ***Figure D-5*** we present the individual estimates for the first 3 years of IHP implementation.

[91] Children under age 18 are not eligible for the 30-day readmissions measure. As a result, 30-day readmissions are not presented for children given the relatively small sample number of children (children who are exactly 18 years old) eligible for the measure.

[92] As noted in ***Sub-appendix D-2***, total spending is equivalent to total medical expenditures and does not include pharmaceutical expenditures.

Table D-12. Difference in the pre-post annual change in total medical expenditures PMPM for IHP-attributed commercial plan members relative to the comparison group, first 3 years of IHP implementation (January 2013 through December 2015)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
Total medical expenditures (PMPM) ($)								5,788,367
Year One	256.20	247.16	295.64	283.12	3.48 (−1.34, 8.30)	1.4	0.24	
Year Two	256.20	247.16	292.42	267.77	15.60 (10.39, 20.82)	6.1	<0.001	
Year Thee	256.20	247.16	282.83	269.46	4.34 (−0.01, 8.68) †	1.7	0.10	
Overall	256.20	247.16	288.71	271.90	7.77 (4.96, 10.59)	3.0	<0.001	

CG = comparison group; D-in-D = difference-in-differences; IHP = Integrated Health Partnership; PMPM = per member per month.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in expenditures in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in expenditures in the intervention group relative to the comparison group. The regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. The relative difference is the D-in-D estimate as a percentage of the intervention groups baseline period adjusted mean.

Methods: An ordinary least square model was used to obtain estimates for differences in expenditures. The year-specific regression-adjusted D-in-D may not match the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights across these figures. See *Sub-appendix D-2* for additional detail.

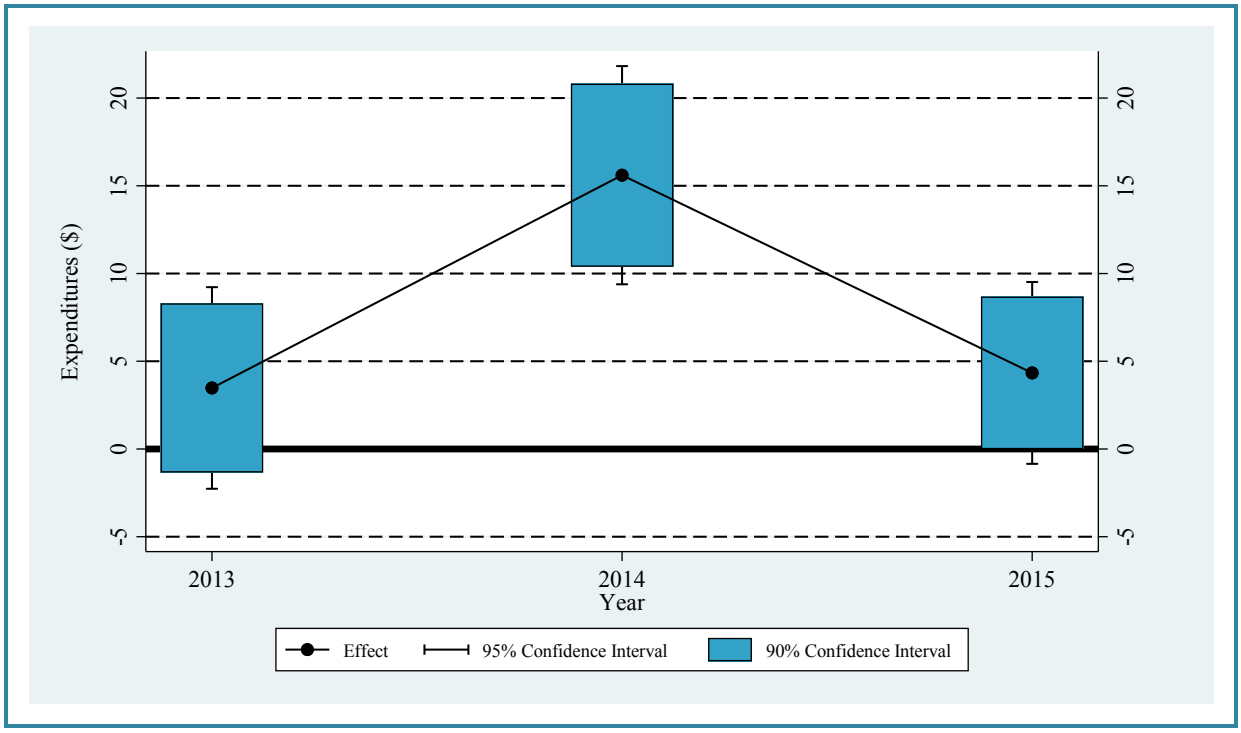
†The 80% confidence interval for total medical expenditures is (0.95, 7.72) in Year Three. Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only.

The following sample size represents weighted person-years included in the regression model for total medical expenditures for the entire study period: N = 5,788,367.

Data source: RTI analysis of commercial data from the Minnesota All Payer Claims Database, 2010–2015.

- Overall, **total medical expenditures increased $7.77 more for IHP-attributed commercial plan members** relative to the comparison group ($p < 0.001$) during the first 3 years of IHP model implementation. ***Figure D-5*** shows that there is a statistically significant increase in expenditures in the IHP group in Year Two of IHP implementation that drives the overall expenditure finding. ***Figure D-5*** also shows that there is no apparent trend in D-in-D estimates over time.

Figure D-5. Annual difference in the pre-post change in total PMPM expenditures for IHP-attributed commercial plan members and the comparison group, first 3 years of IHP implementation



IHP = Integrated Health Partnership; PMPM = per member per month.

Bars indicate 90% confidence intervals (CIs), and lines that extend beyond the bars indicate 95% CIs. CIs that do not cross the origin on the x-axis indicate statistically significant effect estimates; CIs that cross the origin denote statistically insignificant effects.

- Trends in estimated total medical expenditures for children are consistent, although larger in magnitude, with trends for the overall population. Total medical expenditures increased more for IHP-attributed children with commercial coverage than for comparison group children for each of the three implementation years and overall ($19.03 PMPM, $p < 0.001$).
- On the other hand, IHPs were associated with reduced expenditure growth for commercially insured adults. Total expenditures increased $5.92 less for IHP-attributed, commercially insured adults than for the comparison population over the 3 years of IHP implementation ($p = 0.01$) (see ***Tables D-1-15*** and ***Tables D-1-16 Sub-appendix D-1***).
- It is not clear why expenditures increased more for IHP-attributed, commercially insured children than for comparison group children but increased less for IHP adults than for comparison group adults. One possible explanation is that the IHP-affiliated providers perceive fewer opportunities to constrain health care spending within a pediatric population than within an adult population because average expenditures for children are lower than expenditures for adults in both the Medicaid and commercial populations.

– For both the Medicaid and commercial analyses, IHPs appeared to have bigger effects on adult expenditures than on children's expenditures, suggesting that delivery system reform efforts are focused more on the adult population and that those efforts are showing results for both the commercially insured and Medicaid adult populations. These results may reflect a bias toward the adult population with respect to implementation of delivery system reforms at the provider level. Because the Minnesota market includes Medicare ACOs, the quality metrics and financial incentives of ACOs are generally more aligned in that population.

D.3.4 Did care coordination, expenditures and utilization change among IHP-attributed commercial plan members with behavioral health conditions?

KEY INSIGHTS

- Findings for IHP-attributed commercial plan members with behavioral health conditions followed those for the total IHP-attributed population for some outcomes: **visits to primary care providers, visits to specialty care providers, and inpatient admissions.**
- As in the overall population, there was **no change in readmission rates.** Unlike in the overall population, there was **no change in follow-up visits within 14 days after an inpatient admission.**
- Increases in total spending PMPM are similar in direction to the findings for the overall population but are not statistically significant.
- Unexpectedly, **the ED visit rate declined more in the comparison group than among IHP-attributed commercial plan members with behavioral health conditions.**

We present the results of the D-in-D regression analyses for visits to a primary care provider, visits to a specialty provider, follow-up visits within 14 days of an inpatient hospital admission, the rate of all-cause acute inpatient hospitalizations, the rate of outpatient ED visits, and the rate of 30-day readmissions in ***Table D-13***. Because individuals with behavioral health conditions are more likely to use health care services, care management services from IHP providers could have a greater effect on health care expenditures and utilization for this subpopulation relative to the overall IHP-attributed commercial population. As noted in ***Section D-5***, the SIM Initiative more broadly had a focus on behavioral health integration, and although participation in these models was not required of an IHP, many did participate. We report the D-in-D estimate for each year since IHP model implementation along with an overall estimate for all years combined.

Table D-13. Difference in the pre-post annual change in care coordination, utilization and expenditures for IHP-attributed commercial plan members and the comparison group with behavioral health conditions, first 3 years of IHP implementation (January 2013 through December 2015)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
Percentage of commercial plan members with a visit to a primary care provider (%)								**510,147**
Year One	81.6	81.6	94.6	92.9	1.4 (1.2, 1.6)	1.7	<0.001	
Year Two	81.6	81.6	94.5	93.2	1.2 (1.0, 1.4)	1.5	<0.001	
Year Three	81.6	81.6	95.9	93.6	2.1 (1.9, 2.2)	2.6	<0.001	
Overall	81.6	81.6	95.2	93.3	1.7 (1.5, 1.8)	2.0	<0.001	
Percentage of commercial plan members with a visit to a specialty care provider (%)								510,147
Year One	40.4	41.6	49.0	52.1	−1.9 (−2.5, −1.3)	−4.6	<0.001	
Year Two	40.4	41.6	51.3	53.5	−1.0 (−1.6, −0.5)	−2.6	0.002	
Year Three	40.4	41.6	54.6	55.4	0.5 (−0.04, 1.0)†	1.1	0.13	
Overall	40.4	41.6	52.3	54.0	−0.6 (−0.9, −0.2)	−1.4	0.004	
Percentage of acute inpatient hospital admissions with a follow-up visit within 14 days (%)								42,688
Year One	41.5	41.0	48.0	49.3	−1.8 (−4.0, 0.4) †	−4.3	0.18	
Year Two	41.5	41.0	52.1	52.1	−0.5 (−2.7, 1.8)	−1.1	0.73	
Year Three	41.5	41.0	55.2	51.5	3.2 (1.0, 5.3)	7.7	0.02	
Overall	41.5	41.0	51.4	51.1	0.1 (−1.2, 1.4)	0.3	0.86	
All-cause acute inpatient hospitalizations per 1,000 covered persons								510,147
Year One	7.5	7.3	6.8	6.5	0.05 (−0.3, 0.4)	0.7	0.80	
Year Two	7.5	7.3	7.3	6.6	0.5 (0.1, 0.8)	6.0	0.02	
Year Three	7.5	7.3	7.4	6.5	0.7 (0.4, 1.0)	8.7	<0.001	
Overall	7.5	7.3	7.2	6.6	0.5 (0.3, 0.6)	6.0	<0.001	
Outpatient ED visits (per 1,000 covered persons)								510,147
Year One	198.2	195.3	194.7	191.2	0.6 (−4.2, 5.4)	0.3	0.84	
Year Two	198.2	195.3	194.4	184.3	7.7 (3.0, 12.4)	3.9	0.01	
Year Three	198.2	195.3	190.1	176.6	11.1 (6.9, 15.3)	5.6	<0.001	
Overall	198.2	195.3	192.5	182.5	7.6 (4.9, 10.2)	3.8	<0.001	
30-day readmissions (per 1,000 discharges)								34,944
Year One	993.7	1,000.8	1,238.7	1,313.6	−60.0 (−215.8, 95.9)	−6.0	0.53	
Year Two	993.7	1,000.8	1,351.2	1,482.8	−91.7 (−250.7, 67.2)	−9.2	0.34	
Year Three	993.7	1,000.8	1,450.6	1,569.1	−78.7 (−250.7, 93.4)	−7.9	0.45	
Overall	993.7	1,000.8	1,331.2	1,462.6	−73.9 (−169.1, 21.3)	−7.4	0.20	
Total medical expenditures (PMPM) ($)								510,147
Year One	546.66	529.75	543.43	521.56	4.96 (−19.14, 29.07)	0.91	0.73	
Year Two	546.66	529.75	584.44	571.97	−4.44 (−59.56, 50.68)	−0.81	0.89	
Year Three	546.66	529.75	612.63	578.66	17.06 (−37.21, 71.32)	3.12	0.61	
Overall	546.66	529.75	587.56	563.09	7.55 (−22.96, 38.06)	1.38	0.68	

(continued)

Table D-13. Difference in the pre-post annual change in care coordination, utilization and expenditures for IHP-attributed commercial plan members and the comparison group with behavioral health conditions, first 3 years of IHP implementation (January 2013 through December 2015) (continued)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
Behavioral health-related expenditures (PMPM) ($)								510,147
Year One	127.17	138.81	156.89	162.24	6.29 (−2.37, 14.94)	4.94	0.23	
Year Two	127.17	138.81	178.92	168.01	22.55 (14.08, 31.02)	17.73	0.00	
Year Three	127.17	138.81	197.17	180.24	28.57 (18.23, 38.91)	22.46	0.00	
Overall	127.17	138.81	182.01	172.20	21.44 (15.69, 27.19)	16.86	0.00	

CG = comparison group; D-in-D = difference-in-differences; ED = emergency department; IHP = Integrated Health Partnership; PMPM = per member per month.

Note: The probability estimates are multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries/discharges.

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in use in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in use for the intervention group relative to the comparison group.

Methods: A logistic regression model was used to obtain estimates of the difference in likelihood of a care coordination event. The estimates are multiplied by 100 to obtain percentage probabilities. A logistic regression model was used to obtain estimates of the differences in probability of any utilization. An ordinary least squares model was used to obtain estimates for differences in expenditures. For binary outcomes, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. For expenditure outcomes, the year-specific regression-adjusted D-in-D may not match the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights across these figures. See *Sub-appendix D-2* for additional detail.

The following sample size represents weighted person-years included in the regression model for the entire study period for visits to primary care providers, visits to specialty care providers, inpatient admissions, outpatient ED visits, inpatient hospitalizations, outpatient ED visits, total medical expenditures, and behavioral health-related expenditures: N = 510,147. The following sample size represents weighted admissions included in the regression model for the entire study period for follow-up visits within 14 days: N = 34,944. The following sample size represents weighted admissions included in the regression model for the entire study period for 30-day readmissions: N = 42,688.

†The Year Three 80% confidence interval for the percentage of commercial plan members with a visit to a specialty care provider is (0.1, 0.9). The Year One 80% confidence interval for percentage of acute inpatient hospital admissions with a follow-up visit within 14 days is (−3.5, −0.1). Standard statistical practice is to use confidence intervals of 90% or higher; 80% confidence intervals are provided here for comparison purposes only.

Data Source: RTI analysis of commercial data from the Minnesota All Payer Claims Database, 2010–2015.

- Commercially insured members with behavioral health conditions in the IHP group were 1.7 percentage points more likely to **visit a primary care provider** than comparison group members were ($p < 0.001$). On the other hand, IHP-attributed commercial plan members with behavioral health conditions were less likely to **visit a specialty care provider**—by 0.6 percentage points—than comparison group members were ($p = 0.004$).
- In addition, the **percentage of inpatient admissions with a follow-up visit within 14 days** increased more for the commercial IHP group with behavioral health conditions than for the comparison group. However, this finding was not statistically significant.
- The **rate of all-cause acute inpatient admissions** declined for both IHP-attributed commercial plan members with behavioral health conditions and for the comparison group from the baseline period to the IHP implementation period. However, inpatient admissions declined by 0.5 fewer admissions per 1,000 covered individuals for IHP-attributed commercial plan members with behavioral health conditions than for the comparison group ($p < 0.001$).
- The **rate of outpatient ED visits** also declined over time in both the IHP and comparison groups, but there was a smaller decrease—by 7.6 ED visits per 1,000 commercial plan members—in the outpatient ED visits rate for the IHP group than for the comparison group ($p < 0.001$).
    - The absolute decreases in the ED visit rate in the subpopulation with behavioral health conditions suggests that some effort is being made to connect this population with needed services. This is consistent with the statewide efforts of the SIM Initiative to better engage and connect behavioral health providers with primary care and ACO models.
- There was a smaller increase in the **readmission rate** for IHP-attributed commercial plan members with behavioral health conditions than for the comparison group. However, this change was not statistically significant.
- **Total medical expenditures** increased more for IHP-attributed commercial plan members with behavioral health conditions than for the comparison group, but this finding was not statistically significant.
- **Behavioral health spending PMPM** increased $21.44 more for IHP-attributed commercial plan members with behavioral health conditions than for the comparison group ($p < 0.001$). Because individuals with behavioral health conditions are a high-need group, it may be that care management connects them with needed health care services, resulting in increased—rather than reduced—spending.
- Many of the findings for the behavioral health subpopulation are consistent with general population. Other findings are consistent in direction—although not in statistical significance—suggesting there are not notable outcome disparities between the overall population and the subpopulation with behavioral health conditions. The exceptions are rates of ED visits and expenditure measures. As noted earlier, the change in expenditures likely reflects an increase in needed care, while ED visits are

in the expected direction, but the IHP group is outperformed by the comparison group. Except for the findings for primary care visits and specialty care visits, the magnitude of the effect of the IHP model was not greater in the behavioral health subpopulation. This is not surprising given that members of the behavioral health subpopulation with the most serious and persistent behavioral health condition are less likely to be commercially insured.

D.3.5 Discussion and limitations

As noted in ***Sub-appendix D-2*, *Section D-2.7***, Minnesota's SIM Initiative leveraged other ongoing state-level initiatives in Minnesota. SIM funding supported investments to enhance the ability of providers to use data and coordinate care in a way that facilitated success in any ACO-like model, although the expected consequence was increased participation in the IHP program. As noted earlier, Minnesota had many commercial ACOs in addition to IHPs, and many providers see both commercial and Medicaid patients. The SIM resources given to help providers succeed in these types of accountable care models should be applicable to delivery system transformation regardless of the payer. Further, having Medicaid participate in an already popular payment reform can provide the "critical mass" needed to effect behavior change at the provider level. Therefore, it is reasonable to expect IHPs to affect outcomes for the commercial population, even though Medicaid beneficiaries are the target population for IHPs. However, we caveat that these results should not be viewed as solely attributable to SIM efforts within the state or to the introduction of Minnesota's IHPs for the Medicaid population, since the IHP-attributed commercially insured population may have been the focus of other quality improvement or payment model incentives initiated by commercial health plans in Minnesota and adopted by IHP-participating providers.

In some cases, findings in the commercially insured population were consistent with those of the Medicaid population. For the Medicaid and commercial populations, the IHP-attributed group experienced changes in the expected direction in specialty care visits and follow-up visits within 14 days after an inpatient admission relative to the comparison group. An unexpected finding was that there were statistically significant increases in inpatient admissions in both the overall Medicaid and commercial populations and for Medicaid-covered and commercially insured adults.

On the other hand, findings for primary care visit use, total medical spending, and readmissions differed between the Medicaid and commercially insured populations. For primary care visit use and total medical spending, there were differences in the directions and statistical significance of findings across the Medicaid and commercial population. Trends in readmissions were similar for the Medicaid and commercial populations, but the statistical significance of the findings differed for these populations.

There was a statistically significant decrease in primary care visit use in the Medicaid IHP group relative to the comparison group, but there was an increase in visit use for the commercial IHP group relative to the comparison group. Because we expected IHPs to increase primary care visit use, we consider this a positive finding for the commercially insured population, particularly when coupled with a decrease in specialty visits. The relative increase in primary care visit use and relative decrease in specialty visit use suggests that the commercial IHP group is substituting primary care for specialty care.

There was a statistically significant increase in total medical expenditures in the IHP group in the commercially insured population relative the comparison group, while the Medicaid population experienced no statistically significant difference in spending relative to the comparison group. Furthermore, total medical expenditures decreased for both the IHP and comparison groups in Medicaid but increased for commercially insured IHP and comparison groups. It is worth noting that the Medicaid population had more positive and significant outcomes than the commercially insured group. The increases in commercial expenditures were driven by children. As mentioned earlier, this may reflect a focus on the adult population, perhaps in part because there are more adults in ACO-like models in Minnesota because of the presence of Medicare ACOs throughout the state.

Readmission rates increased less in the IHP group than in the comparison group for both Medicaid and commercial populations. This change was statistically significant in the Medicaid population but not in the commercial population. However, in the third year of IHP implementation, the readmission rate increased markedly less in the commercial IHP group than in the comparison population, suggesting that provider participation in an IHP may improve outcomes over the longer term.

In general, findings for the population with behavioral health conditions mirrored the findings from the general population in both the Medicaid and commercial analyses—with the exceptions of results for 14-day follow-up visits after hospital discharge. There was a statistically significant increase in 14-day follow-up visits relative to the comparison group in the commercially insured population but no statistically significant change for this same measure for the behavioral health subpopulation. The overall Medicaid IHP population also experienced relative increases in 14-day follow-up visits relative to the comparison group, but the Medicaid IHP behavioral subpopulation experienced relative decreases for this outcome. In the commercial population—but not in the Medicaid population—findings for ED visits differed between the behavioral health subpopulation and the overall population. In the overall commercial population, IHPs were associated with *smaller increases* in ED visit use; in the commercially insured behavioral health subpopulation, IHPs were associated with *smaller decreases* in ED visit use.

Our results for commercial plan members differ from results from Minnesota's state self-evaluation, conducted by State Health Access and Data Assistance Center (SHADAC), which used a different evaluation design.[93] SHADAC's evaluation used a pre-post design with no comparison group, 1 year of pre-period data (2012), and 2 years of post-period data (2013–2014). SHADAC also examined impacts by IHP cohort, which we did not.[94] In general, SHADAC found no changes in primary care visit use, specialty care visit use, ED visit use, and inpatient admissions for commercially insured individuals attributed to IHPs launched in 2014. SHADAC found some evidence of declines from the pre-period to the post-period in primary care visit use, specialty visit use, ED visit use, and inpatient admissions for individuals attributed to IHPs launched in 2013. In contrast, looking across IHP-attributed commercial plan members combined across all cohorts 2013 through 2016, we find increasing trends from the pre-period to the post-period for these outcomes, although we also find increasing trends for these outcomes in our comparison group.

SHADAC found no change in total expenditures for commercially insured individuals attributed to IHPs that launched in 2013 but increased expenditures for both children and adults attributed to IHPs launched in 2014. In contrast, we found that expenditures for both the IHP and comparison populations decreased for children and increased for adults over time, although expenditures declined *less* for IHP children than for comparison group children and increased *less* for IHP adults than for comparison group adults. One potential reason for this difference in findings for total expenditures is that we calculated expenditures using payment amounts directly from claims, while SHADAC applied standardized prices to services to calculate expenditures.

Taken together, findings of IHPs' spillover on commercial populations suggest that implementing a Medicaid ACO model—and therefore aligning Medicaid incentives with incentives in preexisting Medicare and commercial ACO programs—may benefit commercially insured populations. However, it is important to remember that the broad-ranging nature of the innovations tested in Minnesota may reduce the measurable effects of IHPs because the comparison group could have exposure to some of the same health reforms as the IHP group. Accordingly, the estimated effects represented here are conservative and may be biased toward the null. Again, we cannot not precisely identify which members of the IHP and comparison groups were exposed to other payment or delivery system reform models and cannot determine whether some findings were, in part, attributed to other non-IHP initiatives to which IHP group members could have been exposed.

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93 http://www.dhs.state.mn.us/main/idcplg?IdcService=GET_FILE&RevisionSelectionMethod=LatestReleased&Rendition=Primary&allowInterrupt=1&noSaveAs=1&dDocName=dhs-297302

94 Another difference between our analysis and SHADAC's is that SHADAC attributed individuals to IHPs in the pre-period, while we did not.

D.4 Discussion

The SIM Initiative in Minnesota began in October 2013, and because of a no-cost extension, ended in December 2017. Minnesota built on existing health reform efforts, and so had a consistent vision throughout the SIM test period: Minnesota wanted to increase the numbers of providers that could meaningfully participate in value-based or coordinated care models. Specifically, the state wanted to accelerate growth in IHPs and HCHs, and test out models that integrated behavioral health, social services, long-term care, or local public health (known as "priority settings") using ACHs. At the end of the SIM test period, more than 11,000 providers were participating in an IHP, reaching almost 60 percent of Minnesota Medicaid beneficiaries, and approximately 3,700 providers were in HCHs, reaching close to 70 percent of Minnesotans. Fifteen ACHs received SIM-funded grants to become established, and by 2017, eight of them had identified plans for continuing after the SIM-funded grant ended.

Minnesota used the SIM Initiative to expand and refine health care delivery and payment models already in place. Prior to the SIM Initiative, the state had developed the Health Care Delivery System Demonstration as part of a 2008 Health Reform Law, and those became IHPs starting January 1, 2013. The same law created Coordinated Care Teams, which were the foundation for the ACH model. HCHs also existed prior to the SIM Initiative and represent the only multi-payer reform initiative in the state. Other reforms supported as part of the SIM Initiative failed to garner meaningful multi-payer participation. Under the SIM Initiative, the state established a Multi-Payer Alignment Task Force; however, after early successes with creating the Continuum of Accountability Matrix and the data analytics subgroup, Task Force members were reluctant to share information they considered proprietary.

Minnesota used much of its SIM funding to issue grants directly to providers looking to increase their capacity to participate in these models, and here too the state leveraged existing initiatives. Minnesota had an eHealth Initiative dating back to 2006, and an EHR mandate, meaning most providers already had EHRs at the start of the SIM Initiative. The state used SIM resources to fund development of eHealth collaboratives, which were partnerships between an ACO, or ACO-like entity, and a priority setting. The collaboratives themselves were mostly successful, but broader gains in health information exchange made less progress than anticipated. The state also developed nontraditional health care roles, termed "emerging professions," around an existing framework. The state had already reimbursed for CHW services and had licensing criteria for dental therapists. The state administered SIM-funded grants to develop resources that supported integration of these professions, and community paramedics, into practices.

The state issued grants to a broad range of providers, to involve small and rural providers across the state. The state balanced "stacking" multiple grants to a single provider, and "spreading" grants across multiple providers, which helped ensure that they facilitated practice transformation in a comprehensive manner while also giving providers across the state an

opportunity to participate. Of importance was the technical assistance and data analytics support the state provided. HCHs and BHHs had access to practice transformation grants, and practice facilitation that provided structured venues for providers to learn from the experience of one another. The state, with the help of a contractor, provided comprehensive beneficiary data to participating IHPs and provided resources, including grant funding, to help providers use those data to help improve care. Because the IHP model includes managed care-enrolled and fee-for-service Medicaid beneficiaries, having a new source of comprehensive data for all Medicaid beneficiaries allowed providers to see and use data for the entirety of their Medicaid population.

When looking at the impact IHPs had on the Medicaid population, the support provided by the state seems to have made a difference. Although physician visits for IHP-attributed Medicaid beneficiaries decreased relative to an in-state comparison group of non–IHP-attributed beneficiaries, this decrease accompanied improvements in 14-day follow-up after admission, a decrease in readmissions, and a decrease in ED visits not resulting in an inpatient admission, again, relative to the comparison group. Unexpectedly, we also found an increase in inpatient admissions relative the comparison group, largely attributable to the adult population. This may reflect newly eligible beneficiaries with unmet health needs being admitted; however, the positive finding for readmissions suggests that once in the system, these beneficiaries are receiving the preventive care they need. All of these findings were statistically significant (see ***Section D.2*** and ***Sub-appendix D-1*** for details). Additionally, we identified smaller relative increases in professional spending in the IHP population relative to the comparison group, although no statistically significant changes in total medical expenditures for the IHP group (also reported in ***Section D.2***).

With respect to quality of care, measures used in this evaluation that addressed areas of direct IHP focus—rates of HbA1c testing among people with diabetes and appropriate use of asthma medication—also showed positive findings. IHPs exhibited statistically significant increased rates of HbA1c testing relative to the comparison group, despite a baseline rate greater than 90 percent. With respect to asthma medication, the overall rate of appropriate use of asthma medication was insignificant, but in the fourth year the IHP group had statistically significant increases relative to the comparison group (also reported in ***Section D.2***). These findings illustrate how participation in an IHP is influencing provider behavior, with some process of care measures such as testing HbA1c levels showing gains in the shorter term, and others, such as appropriately prescribing asthma medications, taking more time to show positive results. However, providers continued to cite quality reporting as burdensome and a lack of measure alignment.

The subset of Medicaid beneficiaries with behavioral health conditions exhibited less positive findings for utilization and quality of care, affirming concerns voiced by providers, consumers, and state officials on the challenges in coordinating care for this population. The rate of consistent adherence to antidepressant medication increased for the IHP group, although the

increase was greater in the comparison group. This measure was not a specific focus of IHPs, although improving delivery and coordination of behavioral health care was a focus of the larger SIM Initiative in the state. In addition to unexpected findings with respect to medication adherence, this population showed greater decreases in rates of 14-day-follow-up after admission than the comparison group, counter to the positive results was saw in the overall population. Although we did see decreases in admissions for this population, unlike for the overall population, these decreases were smaller than in the comparison group. On the other hand, there were smaller increases in total medical expenditures and behavioral health expenditures in the IHP behavioral subpopulation relative to the comparison behavioral health subpopulation. These expenditure findings are consistent with the IHP model's goal of lowering spending growth. All results for the subpopulation of beneficiaries with behavioral health conditions were statistically significant.

The IHP model also was associated with changes in care coordination, utilization, and spending for the commercially insured population, even though the IHP model was targeted toward the Minnesota Medicaid population. Because Medicare and commercial ACOs already are operational in Minnesota, the IHP program may have aligned provider incentives in Medicaid with existing provider incentives in Medicare and commercial insurance. This alignment may have strengthened existing incentives for commercial ACOs and, as a result, may have produced effects within the commercial population that are similar to those for IHP-attributed Medicaid population.

The IHP-attributed commercial population had better outcomes than their non-IHP attributed counterparts across all care coordination measures and ED utilization. Excepting use of primary care visits, these findings are consistent with our Medicaid analysis, suggesting that the practice patterns stemming from, or amplified by, IHPs are also benefitting the commercial population. This extends to certain subpopulation as well, with the adult IHP attributed commercial population outperforming the comparison group on total expenditures—the child population saw increases in spending. The differences in expenditures trends between commercially insured children and commercially insured adults may be the result of a greater focus on adults in IHPs and other ACO initiatives.

The behavioral health subpopulation of IHP attributed commercial beneficiaries showed results similar to the overall population on many metrics, however the rate of 14-day follow-up after admission and total medical spending did not vary significantly from the comparison group, and the comparison group outperformed the IHP group with respect to ED utilization. Except for the adverse effect on ED visits, results for the behavioral health subpopulation are not markedly worse than in the overall population—unlike in the Medicaid analysis. This may be because of differences in severity of illness between commercially insured individuals with behavioral health issues and Medicaid beneficiaries with behavioral health issues.

Concurrent with the implementation of IHP and HCH models, trends in statewide population health for Minnesota's low-income adults demonstrate the potential for increased access to care: between 2013 and 2016, there was an 8.6 percentage point *decrease* in self-reported *lack of* health insurance, attributable to increased access to Medicaid and other ACA-supported coverage. Few other changes on these statewide measures occurred within this time period, but two were statistically significant: positively, a 6.2 percentage point *decrease* in the proportion of low-income adults who reported as current smokers, and negatively, a 5.6 percentage point *increase* in the proportion reporting they are obese (see ***Table D-1-9*** in ***Sub-appendix D-1*** for description of these data and the full measure set).

During the SIM Initiative, the Minnesota population statewide demonstrated relatively better outcomes in terms of utilization, expenditures, and quality of care, as compared to the statewide populations in comparison group states (see ***Sub-appendix D-1, Section D-1.5*** for a description of full results from these analyses). The generally positive findings—as measured for Medicaid, Medicare, and commercially insured populations—may reflect the strong history in delivery system transformation in the state. Specifically, both the Medicaid and commercially insured population had better rates of physician visits, and across all types of insurance, the rate of ED visits not leading to a hospitalization was relatively lower than in comparison group states. The rate of inpatient admissions declined relative to the comparison group in the commercially insured and Medicare population, although it increased in the Medicaid population. Still, most quality of care measures showed relative improvement in the Minnesota Medicaid (and Medicare) populations relative to those same populations in comparison group states. Because Minnesota did not have an explicit focus on populations other than Medicaid, these findings do not reflect the impact of SIM resources specifically but do suggest that the state's environment during this time was consistent with the goals of the SIM Initiative.

Overall, Minnesota made significant progress in moving providers toward alternative payment models focused on paying for value rather than volume, especially in the Medicaid program. The collaborative spirit that the SIM Initiative fostered both between state agencies and between providers was consistently noted as one of its lasting legacies. Many of the ACHs will continue after the SIM Initiative ends, finding alternative sources of funding and serving as success stories to model. The IHP model continues to expand and accelerate, with a new cohort joining in 2018 that has agreed to improve integration with nontraditional providers of care or assume increasing levels of financial risk. The SIM Initiative helped Minnesota magnify the impact and reach of existing state efforts and allowed it to give providers the critical resources they needed to successfully shift to new models of delivery and payment.

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Sub-appendix D-1. Supplementary Results

This sub-appendix contains additional data relevant to Minnesota during the SIM Initiative. ***Sections D-1.1*** and ***D-1.2*** describe results from additional analyses to test the impact of the Integrated Health Partnerships model, for Medicaid and commercially insured populations, respectively. ***Section D-1.3*** presents population-level health status data drawn from a statewide survey, to offer some context of changes in the overall population health during the period of the SIM Initiative.

Section D-1.4 presents results from analyses of Medicaid-insured, commercially insured, and Medicare-insured populations, comparing the Minnesota statewide population to statewide populations in a group comparison states not participating in the SIM Initiative. These analyses test whether the SIM Initiative activities in Minnesota offered enough leverage to change the trajectory of utilization and expenditure outcomes throughout different types of populations statewide. This leverage would occur via two primary mechanisms: first, providers likely make changes in care delivery for all patients, not just those participating in a payment model; second, the state built some infrastructure under the SIM Initiative that could assist a range of providers statewide in improving care.

D-1.1 Supplementary Results for the Minnesota Medicaid IHP Impact Analysis

In ***Table D-1-1*** and ***Table D-1-2*** we present the results of the difference-in-differences (D-in-D) regression analyses for the care coordination outcomes for children and adults, respectively. ***Table D-1-3*** and ***Table D-1-4*** present inpatient admissions and emergency department (ED) visits not leading to a hospitalization (outpatient ED visit) for children and adults, respectively. We present 30-day readmissions per 1,000 discharges for adults only because the measure is for persons age 18 years and older. We report annual regression-adjusted D-in-D estimates individually for the 4 years after the implementation of the Integrated Health Partnership (IHP), along with an overall D-in-D estimate for both years combined. These results are summarized in ***Appendix D, Section D.2***.

Table D-1-1. Difference in the pre-post annual change in care coordination for child Medicaid beneficiaries in Minnesota IHPs relative to the comparison group, first 4 years of IHP implementation (January 2013 through December 2016)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	N
Percentage of beneficiaries with any visit to a primary care provider (%)								2,166,498
Year One	92.4	87.1	77.0	74.1	−7.0 (−7.7, −6.2)	−7.5	<0.001	
Year Two	92.4	87.1	75.9	75.2	−7.6 (−8.1, −7.1)	−8.2	<0.001	
Year Three	92.4	87.1	55.8	76.0	−21.2 (−21.4, −20.9)	−22.9	<0.001	
Year Four	92.4	87.1	56.5	53.6	−4.3 (−4.5, −4.1)	−4.7	<0.001	
Overall	92.4	87.1	62.3	69.6	−10.3 (−10.4, −10.1)	−11.1	<0.001	
Percentage of beneficiaries with any visit to a specialty care provider (%)								2,166,498
Year One	27.4	23.7	15.3	19.9	−7.4 (−7.7, −7.2)	−27.1	<0.001	
Year Two	27.4	23.7	17.1	19.7	−5.8 (−6.0, −5.5)	−21.1	<0.001	
Year Three	27.4	23.7	15.3	21.0	−9.6 (−9.9, −9.4)	−35.1	<0.001	
Year Four	27.4	23.7	16.1	18.8	−6.8 (−7.0, −6.5)	−24.6	<0.001	
Overall	27.4	23.7	16.0	19.8	−7.5 (−7.7, −7.4)	−27.4	<0.001	
Percentage of acute inpatient hospital admissions with a follow-up visit within 14 days (%)								228,811
Year One	69.1	68.4	66.8	69.4	−3.3 (−4.5, −2.1)	−4.8	<0.001	
Year Two	69.1	68.4	71.0	70.8	−0.5 (−1.7, 0.6)	−0.8	0.42	
Year Three	69.1	68.4	70.7	71.7	−1.6 (−2.7, −0.6)	−2.4	0.01	
Year Four	69.1	68.4	70.9	71.8	−1.5 (−2.5, −0.4)	−2.1	0.02	
Overall	69.1	68.4	70.2	70.9	−1.6 (−2.1, −1.0)	−2.3	<0.001	

CG = comparison group; D-in-D = difference-in-differences; IHP = Integrated Health Partnership.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in the likelihood of a care coordination event in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in the likelihood of a care coordination event in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention group's baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the difference in likelihood of a care coordination event. The estimates are multiplied by 100 to obtain percentage probabilities. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix D-2* for additional detail.

Data source: RTI analysis of Minnesota DHS Medicaid claims, 2010–2016.

Table D-1-2. Difference in the pre-post annual change in care coordination for adult Medicaid beneficiaries in Minnesota IHPs relative to the comparison group, first 4 years of IHP implementation (January 2013 through December 2016)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	N
Percentage of beneficiaries with any visit to a primary care provider (%)								1,818,757
Year One	92.5	87.4	87.1	77.4	2.5 (1.8, 3.2)	2.7	<0.001	
Year Two	92.5	87.4	84.2	76.9	−0.8 (−1.3, −0.4)	−0.9	0.002	
Year Three	92.5	87.4	68.0	77.2	−13.7 (−13.9, −13.5)	−14.8	<0.001	
Year Four	92.5	87.4	68.4	62.0	−2.3 (−2.5, −2.2)	−2.5	<0.001	
Overall	92.5	87.4	72.7	73.2	−5.4 (−5.5, −5.2)	−5.8	<0.001	
Percentage of beneficiaries with any visit to a specialty care provider (%)								1,818,757
Year One	50.4	45.6	38.6	42.9	−9.0 (−9.4, −8.6)	−17.8	<0.001	
Year Two	50.4	45.6	36.8	41.9	−9.7 (−10.0, −9.4)	−19.2	<0.001	
Year Three	50.4	45.6	35.2	43.6	−13.5 (−13.7, −13.2)	−26.7	<0.001	
Year Four	50.4	45.6	35.5	40.1	−9.9 (−10.2, −9.6)	−19.7	<0.001	
Overall	50.4	45.6	35.9	42.1	−11.0 (−11.1, −10.8)	−21.7	<0.001	
Percentage of acute inpatient hospital admissions with a follow-up visit within 14 days (%)								350,144
Year One	42.2	40.4	41.2	39.6	−0.1 (−1.2, 0.9)	−0.3	0.84	
Year Two	42.2	40.4	43.8	40.8	1.3 (0.3, 2.2)	3.0	0.03	
Year Three	42.2	40.4	43.6	41.4	0.5 (−0.3, 1.3)	1.2	0.31	
Year Four	42.2	40.4	43.2	40.2	1.2 (0.4, 2.1)	2.9	0.02	
Overall	42.2	40.4	43.2	40.5	0.8 (0.4, 1.3)	2.0	0.003	

CG = comparison group; D-in-D = difference-in-differences; IHP = Integrated Health Partnership.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in the likelihood of a care coordination event in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in the likelihood of a care coordination event in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention group's baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the difference in likelihood of a care coordination event. The estimates are multiplied by 100 to obtain percentage probabilities. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix D-2* for additional detail.

Data source: RTI analysis of Minnesota DHS Medicaid claims, 2010–2016.

Table D-1-3. Difference in the pre-post annual change in utilization for child Medicaid beneficiaries in Minnesota IHPs relative to the comparison group, first 4 years of IHP implementation (January 2013 through December 2016)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
Inpatient admissions (per 1,000 beneficiaries or discharges)								2,166,498
Year One	63.0	62.1	73.7	68.2	4.4 (2.6, 6.1)	6.9	<0.001	
Year Two	63.0	62.1	73.2	67.9	4.3 (2.8, 5.9)	6.9	<0.001	
Year Three	63.0	62.1	69.9	71.7	−2.6 (−4.0, −1.3)	−4.2	0.001	
Year Four	63.0	62.1	69.0	71.8	−3.3 (−4.6, −2.1)	−5.3	<0.001	
Overall	63.0	62.1	70.6	70.0	−0.8 (−1.5, −0.1)	−1.3	0.07	
Outpatient ED visits (per 1,000 beneficiaries or discharges)								2,166,498
Year One	403.9	354.7	322.7	282.6	−4.3 (−7.9, −0.6)	−1.1	0.05	
Year Two	403.9	354.7	312.7	281.2	−12.9 (−16.0, −9.8)	−3.2	<0.001	
Year Three	403.9	354.7	284.8	273.0	−32.8 (−35.7, −30.0)	−8.1	<0.001	
Year Four	403.9	354.7	265.8	260.2	−40.0 (−42.9, −37.1)	−9.9	<0.001	
Overall	403.9	354.7	286.9	273.9	−28.7 (−30.3, −27.1)	−7.1	<0.001	

CG = comparison group; D-in-D = difference-in-differences; ED = emergency department; IHP = Integrated Health Partnership.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in payments or in the rate in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in payments or in the rate in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention group's baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The probability estimates are multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries/discharges. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix D-2* for additional detail.

The following sample sizes represent weighted period-quarters included in the regression model for the entire study period: inpatient admissions and ED visits not leading to hospitalizations (N = 2,166,498); 30-day readmissions (N = 3,598).

Data source: RTI analysis of Minnesota DHS Medicaid claims, 2010–2016.

Table D-1-4. Difference in the pre-post annual change in utilization for adult Medicaid beneficiaries in Minnesota IHPs relative to the comparison group, first 4 years of IHP implementation (January 2013 through December 2016)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
Inpatient admissions (per 1,000 beneficiaries or discharges)								1,818,757
Year One	147.0	145.5	160.4	146.5	12.6 (9.2, 15.9)	8.6	<0.001	
Year Two	147.0	145.5	150.7	131.0	18.2 (15.7, 20.8)	12.4	<0.001	
Year Three	147.0	145.5	149.7	134.5	12.9 (10.8, 15.0)	8.8	<0.001	
Year Four	147.0	145.5	152.2	140.4	9.5 (7.4, 11.6)	6.5	<0.001	
Overall	147.0	145.5	151.8	137.5	12.4 (11.2, 13.6)	8.4	<0.001	
Outpatient ED visits (per 1,000 beneficiaries or discharges)								1,818,757
Year One	452.9	398.0	394.1	358.0	−17.1 (−21.5, −12.7)	−3.8	<0.001	
Year Two	452.9	398.0	373.1	341.6	−20.5 (−23.9, −17.1)	−4.5	<0.001	
Year Three	452.9	398.0	362.7	340.3	−29.8 (−32.7, −26.9)	−6.6	<0.001	
Year Four	452.9	398.0	348.9	326.9	−30.1 (−33.0, −27.2)	−6.7	<0.001	
Overall	452.9	398.0	361.7	340.6	−27.2 (−28.9, −25.5)	−6.0	<0.001	
30-day readmissions (per 1,000 beneficiaries or discharges)								370,345
Year One	125.3	127.1	114.8	122.3	−5.9 (−14.5, 2.7)	−4.7	0.26	
Year Two	125.3	127.1	126.4	128.5	−0.2 (−8.4, 8.0)	−0.2	0.97	
Year Three	125.3	127.1	128.8	133.8	−3.0 (−11.4, 5.4)	−2.4	0.56	
Year Four	125.3	127.1	139.1	146.6	−5.3 (−13.7, 3.1)	−4.2	0.30	
Overall	125.3	127.1	129.9	132.0	−3.5 (−7.9, 1.0)	−2.8	0.20	

CG = comparison group; D-in-D = difference-in-differences; ED = emergency department; IHP = Integrated Health Partnership.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in payments or in the rate in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in payments or in the rate in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention group's baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The probability estimates are multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries/discharges. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix D-2* for additional detail.

The following sample sizes represent weighted period-quarters included in the regression model for the entire study period: inpatient admissions and ED visits not leading to hospitalizations (N = 1,818,757); 30-day readmissions (N = 370,345).

Data source: RTI analysis of Minnesota DHS Medicaid claims, 2010–2016.

In ***Table D-1-5*** through ***Table D-1-8*** we present the results of the D-in-D regression analyses stratified by attribution cohort. The 2013 attribution cohort included beneficiaries who were first attributed to an IHP or the comparison group in 2013. The 2014, 2015, and 2016 cohorts were similarly defined. We present results for the number of visits to a primary care provider, the number of visits to a specialty provider, the rate of all-cause acute inpatient admissions, the rate of ED visits that did not result in an inpatient hospital admission, and the rate of 30-day readmissions. These results are a sensitivity analysis to determine whether early entrants into the IHP model performed better than later entrants. These results are referenced and summarized in ***Appendix D, Section D.2.7***.

Table D-1-5. Difference in the pre-post annual change in utilization for Medicaid beneficiaries in the first cohort of Minnesota IHPs relative to the comparison group, first 4 years of implementation (January 2013 through December 2016)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	N
Percentage of beneficiaries with any visit to a primary care provider (%)								1,705,269
Year One	85.6	85.0	97.3	95.9	1.3 (1.2, 1.4)	1.5	<0.001	
Year Two	85.6	85.0	97.7	95.7	1.6 (1.5, 1.8)	1.9	<0.001	
Year Three	85.6	85.0	88.9	95.6	−6.8 (−7.1, −6.6)	−8.0	<0.001	
Year Four	85.6	85.0	88.6	85.6	2.5 (2.2, 2.8)	2.9	<0.001	
Overall	85.6	85.0	93.9	93.7	−0.2 (−0.3, −0.1)	−0.2	0.001	
Percentage of beneficiaries with any visit to a specialty care provider (%)								1,705,269
Year One	30.4	32.4	33.0	38.0	−2.7 (−3.0, −2.4)	−8.9	<0.001	
Year Two	30.4	32.4	32.3	38.6	−4.1 (−4.5, −3.7)	−13.4	<0.001	
Year Three	30.4	32.4	29.9	38.9	−6.9 (−7.3, −6.5)	−22.8	<0.001	
Year Four	30.4	32.4	30.2	35.2	−3.0 (−3.4, −2.6)	−9.8	<0.001	
Overall	30.4	32.4	31.6	37.8	−4.0 (−4.2, −3.8)	−13.1	<0.001	
Rate (per 1,000 covered persons) of all-cause acute inpatient hospitalizations (%)								1,705,269
Year One	103.1	103.2	132.1	122.2	9.5 (7.4, 11.7)	9.2	<0.001	
Year Two	103.1	103.2	106.2	105.7	0.6 (−1.7, 2.8)	0.5	0.69	
Year Three	103.1	103.2	100.4	101.4	−0.7 (−2.9, 1.5)	−0.7	0.60	
Year Four	103.1	103.2	98.1	91.6	5.3 (2.9, 7.6)	5.1	<0.001	
Overall	103.1	103.2	112.9	106.7	4.5 (3.3, 5.6)	4.4	<0.001	

(continued)

Table D-1-5. Difference in the pre-post annual change in utilization for Medicaid beneficiaries in the first cohort of Minnesota IHPs relative to the comparison group, first 4 years of implementation (January 2013 through December 2016) (continued)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	N
Rate of ED visits that did not result in an inpatient hospital admission (per 1,000 covered persons)								1,705,269
Year One	410.7	364.7	416.4	367.5	2.7 (−0.6, 5.9) †	0.7	0.18	
Year Two	410.7	364.7	417.9	378.9	−7.8 (−11.9, −3.6)	−1.9	0.002	
Year Three	410.7	364.7	391.6	376.3	−31.3 (−35.5, −27.0)	−7.6	<0.001	
Year Four	410.7	364.7	366.8	345.9	−24.2 (−28.7, −19.8)	−5.9	<0.001	
Overall	410.7	364.7	401.7	368.1	−12.2 (−14.2, −10.3)	−3.0	<0.001	
Rate of 30-day readmissions (per 1,000 discharges)								168,358
Year One	115.9	116.9	145.3	146.4	<0.01 (−9.9, 9.9)	<0.01	1.00	
Year Two	115.9	116.9	154.9	160.6	−4.2 (−18.5, 10.1)	−3.6	0.63	
Year Three	115.9	116.9	163.7	160.2	4.1 (−14.1, 22.3)	3.6	0.71	
Year Four	115.9	116.9	174.5	165.4	9.2 (−9.1, 27.6)	8.0	0.41	
Overall	115.9	116.9	155.1	156.5	1.2 (−5.8, 8.2)	1.1	0.77	

CG = comparison group; D-in-D = difference-in-differences; ED = emergency department; IHP = Integrated Health Partnership.

Note: The probability estimates are multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries/discharges.

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in use in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in use for the intervention group relative to the comparison group.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix D-2* for additional detail.

†The Year One 80% confidence interval for the rate of ED visits that did not result in an inpatient hospital admission (per 1,000 covered persons) is (0.1, 5.2). Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only.

Data Source: RTI analysis of Minnesota DHS Medicaid data, 2010–2016.

Table D-1-6. Difference in the pre-post annual change in utilization for Medicaid beneficiaries in the second cohort of Minnesota IHPs relative to the comparison group, first 3 years of implementation (January 2013 through December 2015)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	N
Percentage of beneficiaries with any visit to a primary care provider (%)								830,749
Year One	83.4	68.1	95.9	94.7	−1.7 (−1.8, −1.6)	−2.1	<0.001	
Year Two	83.4	68.1	79.0	94.8	−18.2 (−18.5, −18.0)	−21.9	<0.001	
Year Three	83.4	68.1	85.5	82.1	−5.9 (−6.2, −5.6)	−7.1	<0.001	
Overall	83.4	68.1	88.0	86.0	−8.1 (−8.2, −8.0)	−9.7	<0.001	
Percentage of beneficiaries with any visit to a specialty care provider (%)								830,749
Year One	31.1	19.8	30.6	32.9	−16.6 (−17.0, −16.2)	−53.4	<0.001	
Year Two	31.1	19.8	27.1	36.6	−24.3 (−24.8, −23.8)	−78.2	<0.001	
Year Three	31.1	19.8	29.0	31.8	−17.1 (−17.6, −16.5)	−54.8	<0.001	
Overall	31.1	19.8	29.1	31.9	−19.2 (−19.5, −19.0)	−61.8	<0.001	
Rate of all-cause acute inpatient hospitalizations (per 1,000 covered persons)								830,749
Year One	85.5	83.1	114.4	106.7	6.4 (3.7, 9.1)	7.5	<0.001	
Year Two	85.5	83.1	93.2	110.8	−16.5 (−19.0, −14.0)	−19.3	<0.001	
Year Three	85.5	83.1	93.1	117.0	−21.6 (−24.5, −18.7)	−25.3	<0.001	
Overall	85.5	83.1	102.5	109.4	−7.7 (−9.2, −6.1)	−8.9	<0.001	
Rate of ED visits that did not result in an inpatient hospital admission (per 1,000 covered persons)								830,749
Year One	367.1	287.7	360.6	312.7	−34.7 (−38.7, −30.6)	−9.4	<0.001	
Year Two	367.1	287.7	326.2	332.1	−91.2 (−95.8, −86.6)	−24.8	<0.001	
Year Three	367.1	287.7	327.2	299.8	−54.3 (−59.3, −49.2)	−14.8	<0.001	
Overall	367.1	287.7	341.6	308.6	−57.8 (−60.4, −55.1)	−15.7	<0.001	

(continued)

Table D-1-6. Difference in the pre-post annual change in utilization for Medicaid beneficiaries in the second cohort of Minnesota IHPs relative to the comparison group, first 3 years of implementation (January 2013 through December 2015) (continued)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	N
Rate of 30-day readmissions (per 1,000 discharges)								74,755
Year One	98.6	79.7	135.8	151.5	−45.8 (−62.5, −29.1)	−46.4	<0.001	
Year Two	98.6	79.7	148.3	176.5	−62.3 (−84.7, −40.0)	−63.2	<0.001	
Year Three	98.6	79.7	154.5	176.5	−58.6 (−85.3, −31.9)	−59.4	<0.001	
Overall	98.6	79.7	142.6	157.3	−52.8 (−64.8, −40.8)	−53.5	<0.001	

CG = comparison group; D-in-D = difference-in-differences; ED = emergency department; IHP = Integrated Health Partnership.

Note: The probability estimates are multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries/discharges.

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in use in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in use for the intervention group relative to the comparison group.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix D-2* for additional detail.

Data Source: RTI analysis of Minnesota DHS Medicaid data, 2010–2016.

Table D-1-7. Difference in the pre-post annual change in utilization for Medicaid beneficiaries in the third cohort of Minnesota IHPs relative to the comparison group, first 2 years of implementation (January 2013 through December 2014)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	N
Percentage of beneficiaries with any visit to a primary care provider (%)								775,647
Year One	81.9	54.8	91.3	94.4	−7.1 (−7.2, −7.0)	−8.7	<0.001	
Year Two	81.9	54.8	80.2	75.3	−11.4 (−11.6, −11.2)	−13.9	<0.001	
Overall	81.9	54.8	87.0	77.2	−8.8 (−8.9, −8.7)	−10.7	<0.001	
Percentage of beneficiaries with any visit to a specialty care provider (%)								775,647
Year One	27.0	15.0	29.5	36.3	−24.6 (−25.1, −24.1)	−91.2	<0.001	
Year Two	27.0	15.0	27.6	32.1	−22.0 (−22.5, −21.4)	−81.3	<0.001	
Overall	27.0	15.0	28.8	30.5	−23.6 (−23.9, −23.2)	−87.3	<0.001	
Rate of all-cause acute inpatient hospitalizations (per 1,000 covered persons)								775,647
Year One	88.1	86.5	123.2	132.5	−9.8 (−12.8, −6.8)	−11.1	<0.001	
Year Two	88.1	86.5	103.9	110.7	−5.6 (−8.2, −2.9)	−6.3	0.001	
Overall	88.1	86.5	115.7	117.6	−8.1 (−10.2, −6.0)	−9.2	<0.001	
Rate of ED visits that did not result in an inpatient hospital admission (per 1,000 covered persons)								775,647
Year One	356.2	252.1	350.4	322.5	−87.6 (−92.3, −82.9)	−24.6	<0.001	
Year Two	356.2	252.1	330.1	307.9	−91.9 (−97.1, −86.6)	−25.8	<0.001	
Overall	356.2	252.1	342.5	297.8	−89.3 (−92.8, −85.8)	−25.1	<0.001	
Rate of 30-day readmissions (per 1,000 discharges)								72,843
Year One	98.2	92.2	135.0	176.6	−46.3 (−65.9, −26.6)	−47.1	<0.001	
Year Two	98.2	92.2	146.8	198.7	−57.3 (−81.2, −33.3)	−58.3	<0.001	
Overall	98.2	92.2	138.4	169.0	−49.4 (−65.0, −33.9)	−50.4	<0.001	

CG = comparison group; D-in-D = difference-in-differences; ED = emergency department; IHP = Integrated Health Partnership.

Note: The probability estimates are multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries/discharges.

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in use in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in use for the intervention group relative to the comparison group.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix D-2* for additional detail.

Data Source: RTI analysis of Minnesota DHS Medicaid data, 2010–2016.

Table D-1-8. Difference in the pre-post annual change in utilization for Medicaid beneficiaries in the fourth cohort of Minnesota IHPs relative to the comparison group, first year of implementation (January 2013 through December 2013)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	N
Percentage of beneficiaries with any visit to a primary care provider (%)								674,254
Overall	82.1	48.4	92.0	75.0	−6.9 (−7.0, −6.8)	−8.4	<0.001	
Percentage of beneficiaries with any visit to a specialty care provider (%)								674,254
Overall	28.3	12.3	29.9	28.8	−32.4 (−33.0, −31.9)	−114.7	<0.001	
Rate of all-cause acute inpatient hospitalizations (per 1,000 covered persons)								674,254
Overall	89.0	89.7	130.3	133.0	−14.9 (−18.4, −11.5)	−16.8	<0.001	
Rate of ED visits that did not result in an inpatient hospital admission (per 1,000 covered persons)								674,254
Overall	335.7	242.4	319.7	289.4	−117.8 (−123.1, −112.5)	−35.1	<0.001	
Rate of 30-day readmissions (per 1,000 discharges)								53,405
Overall	86.0	86.6	148.6	153.8	−24.9 (−43.1, −6.7)	−29.0		

CG = comparison group; D-in-D = difference-in-differences; ED = emergency department; IHP = Integrated Health Partnership.

Note: The probability estimates are multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries/discharges.

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in use in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in use for the intervention group relative to the comparison group.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix D-2* for additional detail.

Data Source: RTI analysis of Minnesota DHS Medicaid data, 2010–2016.

D-1.2 Supplementary Results for Expenditures for the Minnesota Medicaid IHP Impact Analysis

In ***Table D-1-9*** and ***Table D-1-10*** we present the results of the difference-in-differences (D-in-D) regression analyses for total medical PBPM expenditures for children and adults, respectively. We report annual regression-adjusted D-in-D estimates individually for the 3 years after the implementation of the Integrated Health Partnership (IHP), along with an overall D-in-D estimate for all 3 years combined. These results are summarized in ***Appendix D, Section D.2***.

Table D-1-9. Difference in the pre-post annual change in total PBPM expenditures for child Medicaid beneficiaries enrolled in an IHP relative to the comparison group, first 3 years of IHP implementation (January 2013 through December 2015)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	N
Total expenditures (PBPM) ($)								1,127,128
Year One	354.75	318.77	368.02	300.26	31.78 (16.26, 47.31)	9.0	0.001	
Year Two	354.75	318.77	283.73	247.28	0.47 (−10.76, 11.71)	0.1	0.94	
Year Three	354.75	318.77	281.19	283.28	−38.07 (−66.09, −10.04)	−10.7	0.03	
Overall	354.75	318.77	299.79	274.29	−10.47 (−24.04, 3.09)	−3.0	0.20	

CG = comparison group; D-in-D = difference-in-differences; IHP = Integrated Health Partnership; PBPM = per beneficiary per month.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in payment in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in payment in the intervention group relative to the comparison group. The regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. The relative difference is the D-in-D estimate as a percentage of the intervention groups baseline period adjusted mean.

Methods: An ordinary least square model was used to obtain estimates for differences in expenditures. The following sample size represent weighted beneficiary-years included in the regression model for the entire study period: total expenditures (N = 1,127,128).

Data source: RTI analysis of Medicaid data from the Minnesota All Payer Claims Database, 2010–2015.

Table D-1-10. Difference in the pre-post annual change in total medical PBPM expenditures for adult Medicaid beneficiaries enrolled in an IHP relative to the comparison group, first 3 years of IHP implementation (January 2013 through December 2015)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-Period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	N
Total medical expenditures (PBPM) ($)								
Year One	655.98	635.58	791.67	775.51	−4.24 (−59.35, 50.87)	−0.6	0.90	949,356
Year Two	655.98	635.58	708.83	751.25	−62.82 (−198.97, 73.33)	−9.6	0.45	
Year Three	655.98	635.58	658.37	679.00	−41.03 (−70.40, −11.66)	−6.3	0.02	
Overall	655.98	635.58	696.89	718.68	−42.19 (−90.41, 6.02)[Ŧ]	−6.4	0.15	

CG = comparison group; D-in-D = difference-in-differences; IHP = Integrated Health Partnership; PBPM = per beneficiary per month.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in payment in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in payment in the intervention group relative to the comparison group. The regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. The relative difference is the D-in-D estimate as a percentage of the intervention groups baseline period adjusted mean.

Methods: An ordinary least square model was used to obtain estimates for differences in expenditures.

[Ŧ] The overall 80% percent confidence interval for total medical PBPM expenditures is (−79.77, −4.62). Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only.

The following sample size represents weighted beneficiary-years included in the regression model for total medical expenditures for the entire study period: N = 949,356.

Data source: RTI analysis of Medicaid data from the Minnesota All Payer Claims Database, 2010–2015.

D-1.3 Supplementary Results for the Analysis of the Spillover Effects of Minnesota's IHPs on the Commercially Insured Population

In ***Table D-1-11*** and ***Table D-1-12*** we present the results of the difference-in-differences (D-in-D) regression analyses for the care coordination outcomes for children and adults, respectively. ***Table D-1-13*** and ***Table D-1-14*** present inpatient admissions, emergency department (ED) visits not leading to a hospitalization (outpatient ED visit), and 30-day readmissions per 1,000 beneficiaries for children and adults.[95] ***Table D-1-15*** and ***Table D-1-16*** present total expenditures PMPM for children and adults. We report annual regression-adjusted D-in-D estimates individually for the 3 years after the implementation of the Integrated Health Partnership (IHP), along with an overall D-in-D estimate for both years combined. These results are summarized in ***Appendix D, Section D.3***.

Table D-1-11. Difference in the pre-post annual change in care coordination for IHP-attributed child commercial plan members and the comparison group, first 3 years of IHP implementation (January 2013 through December 2015)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
Percentage of commercial plan members with a visit to a primary care provider (%)								1,845,577
Year One	77.1	75.2	96.2	95.8	0.1 (−0.02, 0.2)†	0.1	0.18	
Year Two	77.1	75.2	96.9	96.1	0.4 (0.3, 0.5)	0.5	<0.001	
Year Three	77.1	75.2	97.4	96.5	0.6 (0.5, 0.7)	0.8	<0.001	
Overall	77.1	75.2	96.9	96.2	0.4 (0.3, 0.4)	0.5	<0.001	
Percentage of commercial plan members with a visit to a specialty care provider (%)								1,845,577
Year One	20.6	21.6	21.7	25.5	−2.0 (−2.2, −1.7)	−9.5	<0.001	
Year Two	20.6	21.6	21.5	24.2	−1.7 (−1.9, −1.4)	−8.2	<0.001	
Year Three	20.6	21.6	20.9	24.2	−2.4 (−2.6, −2.1)	−11.4	<0.001	
Overall	20.6	21.6	21.3	24.5	−2.0 (−2.2, −1.9)	−9.8	<0.001	
Percentage of acute inpatient hospital admissions with a follow-up visit within 14 days (%)								63,834
Year One	66.4	66.7	69.4	71.0	−1.3 (−2.8, 0.1)	−2.0	0.13	
Year Two	66.4	66.7	73.2	73.2	0.3 (−1.1, 1.7)	0.4	0.73	
Year Three	66.4	66.7	72.9	74.3	−1.1 (−2.5, 0.2)	−1.7	0.18	
Overall	66.4	66.7	71.6	73.0	−0.8 (−1.6, 0.0)	−1.2	0.11	

(continued)

[95] Thirty-day readmissions are not calculated for children given the small sample number of children eligible for the measure.

Table D-1-11. Difference in the pre-post annual change in care coordination for IHP-attributed child commercial plan members and the comparison group, first 3 years of IHP implementation (January 2013 through December 2015) (continued)

CG = comparison group; D-in-D = difference-in-differences; IHP = Integrated Health Partnerships.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in payments or in the rate in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in payments or in the rate in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention groups baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the difference in likelihood of a care coordination event. The estimates are multiplied by 100 to obtain percentage probabilities. The regression-adjusted D-in-D estimates represent the average treatment effect *on the treated*, whereas the regression-adjusted means represent the average treatment effect. As a result, the regression-adjusted D-in-D and the D-in-D calculated from the adjusted means will differ.

The following sample size represents weighted person-years included in the regression model for the entire study period for visits to a primary care provider and for visits to a specialty care provider: N = 1,845,577. The following sample size represents weighted admissions included in the regression model for the entire study period for admissions with a follow-up visit with 14 days: N = 63,834.

† The Year One 80% confidence interval for visits to a primary care provider is (0.0, 1.6). Standard statistical practice is to use confidence intervals of 90% or higher; 80% confidence intervals are provided here for comparison purposes only.

Data source: RTI analysis of commercial data in the Minnesota All Payer Claims Database, 2010–2015.

Table D-1-12. Difference in the pre-post annual change in care coordination for IHP-attributed adult commercial plan members and the comparison group, first 3 years of IHP implementation (January 2013 through December 2015)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
Percentage of commercial plan members with a visit to a primary care provider (%)								3,943,306
Year One	70.8	69.4	95.5	91.5	2.3 (2.2, 2.3)	3.2	<0.001	
Year Two	70.8	69.4	95.3	91.6	2.2 (2.1, 2.2)	3.1	<0.001	
Year Three	70.8	69.4	96.2	91.7	2.8 (2.7, 2.8)	3.9	<0.001	
Overall	70.8	69.4	95.8	91.6	2.5 (2.45, 2.50)	3.5	<0.001	
Percentage of commercial plan members with a visit to a specialty care provider (%)								3,943,306
Year One	33.0	32.3	40.7	44.6	−3.7 (−3.9, −3.5)	−11.2	<0.001	
Year Two	33.0	32.3	42.1	46.9	−4.6 (−4.8, −4.4)	−13.9	<0.001	
Year Three	33.0	32.3	45.6	49.5	−3.7 (−3.8, −3.5)	−11.1	<0.001	
Overall	33.0	32.3	43.5	47.7	−4.0 (−4.1, −3.9)	−12.0	<0.001	

(continued)

Table D-1-12. Difference in the pre-post annual change in care coordination for IHP-attributed adult commercial plan members and the comparison group, first 3 years of IHP implementation (January 2013 through December 2015) (continued)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
Percentage of acute inpatient hospital admissions with a follow-up visit within 14 days (%)								222,013
Year One	33.6	33.1	44.1	43.4	0.2 (−0.7, 1.1)	0.6	0.71	
Year Two	33.6	33.1	48.2	46.1	1.6 (0.7, 2.4)	4.6	0.003	
Year Three	33.6	33.1	50.9	47.9	2.5 (1.7, 3.3)	7.4	<0.001	
Overall	33.6	33.1	47.6	46.3	1.4 (0.9, 1.9)	4.1	<0.001	

CG = comparison group; D-in-D = difference-in-differences; IHP = Integrated Health Partnerships.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in payments or in the rate in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in payments or in the rate in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention groups baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the difference in likelihood of a care coordination event. The estimates are multiplied by 100 to obtain percentage probabilities. The regression-adjusted D-in-D estimates represent the average treatment effect *on the treated*, whereas the regression-adjusted means represent the average treatment effect. As a result, the regression-adjusted D-in-D and the D-in-D calculated from the adjusted means will differ.

The following sample size represents weighted person-years included in the regression model for the entire study period for visits to a primary care provider and for visits to a specialty care provider: N = 3,943,306. The following sample size represents weighted admissions included in the regression model for the entire study period for admissions with a follow-up visit with 14 days: N = 222,013.

Data source: RTI analysis of commercial data in the Minnesota All Payer Claims Database, 2010–2015.

Table D-1-13. Difference in the pre-post annual change in utilization for IHP-attributed child commercial plan members and the comparison group, first 3 years of IHP implementation (January 2013 through December 2015)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
All-cause acute inpatient hospitalizations (per 1,000 covered persons)								1,845,577
Year One	37.4	34.9	43.3	29.0	1.2 (0.1, 2.4)	3.3	0.07	
Year Two	37.4	34.9	33.5	30.3	0.9 (−0.1, 1.9)†	2.5	0.12	
Year Three	37.4	34.9	29.2	27.9	−0.9 (−1.8, 0.0)	−2.4	0.09	
Overall	37.4	34.9	34.1	29.0	0.2 (−0.3, 0.8)	0.6	0.48	
Outpatient ED visits (per 1,000 covered persons)								1,845,577
Year One	138.0	129.3	134.9	125.3	−7.3 (−9.4, −5.2)	−5.3	<0.001	
Year Two	138.0	129.3	128.0	122.1	−2.5 (−4.5, −0.5)	−1.8	0.04	
Year Three	138.0	129.3	125.3	122.7	−6.0 (−7.8, −4.1)	−4.3	<0.001	
Overall	138.0	129.3	128.5	123.1	−5.1 (−6.3, −4.0)	−3.7	<0.001	

CG = comparison group; D-in-D = difference-in-differences; ED = emergency department; IHP = Integrated Health Partnerships.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in payments or in the rate in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in payments or in the rate in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention groups baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The probability estimates are multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries/discharges. For binary outcomes estimated using nonlinear models, the regression-adjusted D-in-D estimates represent the average treatment effect *on the treated*, whereas the regression-adjusted means represent the average treatment effect. As a result, the regression-adjusted D-in-D and the D-in-D calculated from the adjusted means will differ. Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only.

The following sample size represents weighted person-years included in the regression model for inpatient admissions and emergency department visits not leading to hospitalizations for the entire study period: N = 1,845,577.

† The Year Two 80% confidence interval for inpatient hospitalizations is (0.2, 1.7). Standard statistical practice is to use confidence intervals of 90% or higher; 80% confidence intervals are provided here for comparison purposes only.

Data source: RTI analysis of commercial data in the Minnesota All Payer Claims Database, 2010–2015.

Table D-1-14. Difference in the pre-post annual change in utilization for IHP-attributed adult commercial plan member and the comparison group, first 3 years of IHP implementation (January 2013 through December 2015)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
All-cause acute inpatient hospitalizations (per 1,000 covered persons)								3,943,306
Year One	51.6	40.6	59.4	54.7	3.7 (2.6, 4.9)	7.2	<0.001	
Year Two	51.6	40.6	60.2	57.6	1.4 (0.5, 2.4)	2.8	0.01	
Year Three	51.6	40.6	60.9	59.4	0.4 (−0.4, 1.2)	0.7	0.45	
Overall	51.6	40.6	60.4	57.9	1.4 (0.8, 1.9)	2.7	<0.001	
Outpatient ED visits (per 1,000 covered persons)								3,943,306
Year One	112.4	86.7	126.3	123.5	−3.6 (−5.1, −2.1)	−3.2	<0.001	
Year Two	112.4	86.7	129.4	122.8	0.2 (−1.1, 1.6)	0.2	0.78	
Year Three	112.4	86.7	127.4	123.2	−2.3 (−3.5, −1.1)	−2.0	0.002	
Overall	112.4	86.7	127.8	123.1	−1.8 (−2.5, −1.0)	−1.6	<0.001	
30-day readmissions (per 1,000 discharges)								225,686
Year One	61.7	61.6	112.0	105.8	4.9 (−2.4, 12.2)	7.9	0.27	
Year Two	61.7	61.6	106.0	109.1	−2.3 (−8.2, 3.6)	−3.7	0.52	
Year Three	61.7	61.6	107.6	119.0	−8.0 (−14.3, −1.8)	−13.0	0.04	
Overall	61.7	61.6	108.9	112.3	−1.2 (−5.1, 2.7)	−1.9	0.62	

CG = comparison group; D-in-D = difference-in-differences; ED = emergency department; Integrated Health Partnership.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in payments or in the rate in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in payments or in the rate in the intervention group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the intervention groups baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The probability estimates are multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries/discharges. For binary outcomes estimated using nonlinear models, the regression-adjusted D-in-D estimates represent the average treatment effect *on the treated*, whereas the regression-adjusted means represent the average treatment effect. As a result, the regression-adjusted D-in-D and the D-in-D calculated from the adjusted means will differ. Standard statistical practice is to use confidence intervals of 90% or higher.

The following sample size represents weighted person-years for inpatient admissions and ED visits for the entire study period: N = 3,943,306. The following sample size represents weighted admissions for 30-day readmissions for the entire study period: N = 225,686.

Data source: RTI analysis of commercial data in the Minnesota All Payer Claims Database, 2010–2015.

Table D-1-15. Difference in the pre-post annual change in total medical expenditures PMPM for IHP-attributed child commercial plan members relative to the comparison group, first 3 years of IHP implementation (January 2013 through December 2015)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
Total medical expenditures (PMPM) ($)								1,845,577
Year One	218.54	210.80	190.10	172.03	10.32 (1.66, 18.99)	4.72	0.05	
Year Two	218.54	210.80	166.60	132.35	26.51 (18.19, 34.84)	12.13	<0.001	
Year Three	218.54	210.80	132.66	106.76	18.16 (9.54, 26.78)	8.31	0.001	
Overall	218.54	210.80	158.22	131.45	19.03 (13.99, 24.06)	8.71	<0.001	

CG = comparison group; D-in-D = difference-in-differences; IHP = Integrated Health Partnership; PMPM = per member per month.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in payment in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in payment in the intervention group relative to the comparison group. The regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. The relative difference is the D-in-D estimate as a percentage of the intervention groups baseline period adjusted mean.

Methods: An ordinary least squares model was used to obtain estimates for differences in expenditures. Standard statistical practice is to use confidence intervals of 90% or higher.

The following sample size represents weighted person-years included in the regression model for total medical expenditures the entire study period: total medical payments: N = 1,845,577.

Data source: RTI analysis of commercial data in the Minnesota All Payer Claims Database, 2010–2015.

Table D-1-16. Difference in the pre-post annual change in total medical expenditures PMPM for IHP-attributed adult commercial plan members relative to the comparison group, first 3 years of IHP implementation (January 2013 through December 2015)

Outcome and time period	Pre-period adjusted mean, IHP	Pre-period adjusted mean, CG	Test-period adjusted mean, IHP	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval) (80% confidence interval)	Relative difference (%)	p-value	Total weighted N
Total medical expenditures (PMPM) ($)								3,943,306
Year One	278.36	271.41	349.66	343.27	−0.56 (−6.18, 5.06)	−0.20	0.87	
Year Two	278.36	271.41	359.86	349.06	3.85 (−2.41, 10.11)	1.38	0.31	
Year Three	278.36	271.41	356.96	364.60	−14.60 (−21.16, −8.04)	−5.25	<0.001	
Overall	278.36	271.41	356.37	355.34	−5.92 (−9.81, −2.03)	−2.13	0.01	

CG = comparison group; D-in-D = difference-in-differences; IHP=Integrated Health Partnership; PMPM = per member per month.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in payment in the intervention group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in payment in the intervention group relative to the comparison group. The regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. The relative difference is the D-in-D estimate as a percentage of the intervention groups baseline period adjusted mean.

Methods: An ordinary least squares model was used to obtain estimates for differences in expenditures. Standard statistical practice is to use confidence intervals of 90% or higher. The following sample size represents weighted person-years included in the regression model for total medical expenditures the entire study period: N = 3,943,306.

Data source: RTI analysis of commercial data in the Minnesota All Payer Claims Database, 2010–2015.

D-1.4 Minnesota Population-level Health Status Measures, 2013–2016

The Behavioral Risk Factor Surveillance System (BRFSS) is a state-based survey conducted annually by state health departments, guided by the Centers for Disease Control and Prevention (CDC). The survey is used to collect data from U.S. residents 18 and older regarding health insurance coverage, health risk behaviors, health status, and preventive health practices. The data summarized here provide some context to trends in the health of Minnesota's population during the time of the SIM Initiative, but which were unlikely to have been affected by Minnesota's SIM Initiative activities. Because these survey data draw from all low-income adults age 18–64 in the state, these trends illustrate the context in which health care providers participating in Minnesota Medicaid's delivery system and payment models are working. More detail on the methods used is available in ***Appendix G***.

Table D-1-17 summarizes BRFSS data for the time period corresponding to the SIM Initiative (2013 and 2016) and for low-income, non-aged adults. We chose to look specifically at low-income, non-aged adults because the Minnesota SIM Initiative made changes to payment models in Medicaid, which serves this population. In general, there are only small (and generally statistically insignificant) changes in health-related measures of interest. Statistically significant differences between 2013 and 2016 included the following:

- An 8.6 percentage point decrease in self-reported lack of health insurance for the low-income adult population in Minnesota, attributable to increased access to Medicaid and other ACA supported coverage.
- A 6.2 percentage point decrease in the proportion of respondents who reported as current smokers.
- A 5.6 percentage point increase in the proportion of respondents reporting they are obese. Increased self-reports of this measure may reflect better access to care and therefore identification of appropriate clinical diagnosis, without sufficient time in this period to address this condition.
- A 4.6 percentage point decrease in the proportion of respondents who did not have a routine checkup in the past year.

This comparison of changes between 2013 and 2016 controls for the following individual and family characteristics: sex, age, race and ethnicity, educational attainment, marital status, family and household size, employment status, family income, and home ownership). We did not control for health insurance status in these analyses. Because eligibility criteria for Medicaid expanded for low-income adults and the Health Insurance Marketplaces started during this time, it is possible that the improvements in having a routine checkup may be a result of these or other reforms implemented during this time period.

Table D-1-17. Regression-adjusted changes in population health for low-income adults 18 to 64 in Minnesota, 2013–2016

Measure	2013	2016	2016–2013 difference
Self-reported health status is fair or poor	15.9%	16.7%	0.8
Any days physical health was not good in last 30 days	37.9%	37.6%	−0.3
Number of days physical health was not good in last 30 days	3.6	3.9	0.3
Any days mental health was not good in last 30 days	43.0%	46.1%	3.0
Number of days mental health was not good in last 30 days	4.8	5.3	0.5
Ever diagnosed with diabetes	5.2%	5.6%	0.5
Is obese	21.5%	27.1%	5.6**
Current smoker	29.5%	23.3%	−6.2**
Current smoker who has not tried to quit in last year	9.6%	9.2%	−0.4
Does not have health insurance	22.4%	13.8%	−8.6**
Does not have a personal doctor	41.2%	40.2%	−1.0
Did not have a routine checkup in the past year	39.9%	35.1%	−4.8*
Did not have a dental visit in the past year[a]	36.4%	34.5%	−1.9

Source: 2013–2016 BRFSS.

Note: Low-income is defined as income at or below 138% of the federal poverty level. The sample size is 2,248 for 2013, 2,680 for 2016, and 9,984 for the 2013–2016 period. */** Significantly different from zero at the 0.10/.05 level, two-tailed test.

[a] Information on dental visits is not available for 2013; the 2014 measure is used instead.

D-1.5 Minnesota Statewide Claims-based Measures

The data summarized here provide some context to trends in the health care utilization and expenditures of Minnesota's Medicaid, Medicare, and commercially insured populations relative to similar populations in other states during the time of the SIM Initiative. Under the SIM Initiative, Minnesota supported two existing payment and delivery models: Health Care Homes (HCHs) and Integrated Health Partnerships (IHPs). By the end of the SIM Initiative, the HCH model reached 69 percent of the total population, and the IHP model reached 59 percent of the Medicaid population. We present findings on changes in outcomes for the statewide Medicaid population using Medicaid Analytic eXtract (MAX) files, for the commercially insured population using data from MarketScan Research Databases (©2016 from Truven Health Analytics LLC, an IBM Company) and for the Medicare population using Medicare fee-for-service (FFS) claims.

We summarize the findings from difference-in-differences analyses that compared outcomes for Minnesota relative to the comparison group from before and after the SIM Initiative started in October 2013. We analyzed Medicaid claims data over 3 years (October 2011 to September 2014) and commercial and Medicare claims data over 5 years (October 2011 to

September 2016). Although the analyses use the SIM Initiative implementation start date to divide the analysis period, these findings are not intended as estimates of SIM-related impacts. The claims data used in these analyses are not restricted to those touched by the HCH or IHP models—the data include all Medicaid and Medicare beneficiaries in the state and the entire commercially insured population that is included in the MarketScan database. As such, the populations studied are at most only incidentally affected by the initiative. In sum, the trends reported here highlight some of the context in which health care providers participating in delivery system and payment models are working and what changes were occurring in health care use and expenditures in the state during the SIM Initiative, whether or not they were directly related to the initiative.

Specifically, we used claims data to derive the following annual outcomes:

- **Care coordination**
  - Percentage of beneficiaries with any physician visits
    - Broken out by primary care and specialty providers for the commercially insured population
  - Percentage of mental illness–related acute inpatient hospital admissions with a mental health follow-up visit within 7 days and 30 days
  - Percentage of acute admissions with a follow-up visit within 14 days
- **Utilization**
  - Inpatient admissions per 1,000 persons
  - Emergency department (ED) visits per 1,000 persons
  - 30-day readmissions per 1,000 discharges
- **Total per member per month (PMPM) expenditures**
- **Quality of care**
  - Rate of hospitalizations for ambulatory care sensitive conditions (avoidable admissions)
  - Flu immunization rates
  - Breast cancer screening rates
  - Well-child visit rates
    - Number by 15 months of age and any for children age 3 to 6 years
  - Initiation and engagement of alcohol and other drug-related treatment
  - Asthma medication management
  - Depression medication management
  - Tobacco screening rates (for Medicare only)

Because of inherent differences in utilization patterns, we examined rates of physician visits, inpatient admissions, ED visits, and 30-day readmissions along with total expenditures separately for children and adults for the Medicaid and commercially insured populations. We also examined inpatient admission and ED visit rates (all cause and behavioral health related) and expenditures (total and behavioral health related) separately for Medicaid beneficiaries and commercial plan members with behavioral health conditions because this high-risk group may use more health care than the overall population. For each analysis, we use a statistical significance level of $p < 0.10$. Detailed methods on these analyses are presented in ***Appendix G***.

D-1.5.1 Trends for the Minnesota Medicaid population, 2011–2014

We used Medicaid data from the CMS MAX and Alpha-MAX research files made available through the CCW enclave for Minnesota and its comparison states (Iowa and Washington). The MAX data contains all the enrollment and claims information for every Medicaid beneficiary in the state. Because beneficiaries dually enrolled in Medicare and Medicaid do not have complete utilization or expenditure data in the Medicaid claims, we report care coordination, utilization, and quality outcomes for beneficiaries enrolled in Medicaid only. We report the total expenditures for those dually enrolled in Medicare and Medicaid and those only enrolled in Medicaid separately.

In general, the findings for care coordination, utilization, expenditure, and quality of care outcomes for the Medicaid beneficiaries in Minnesota were mixed from 2011 to 2014, with consistently positive results among quality of care measures. Between 2011 and 2014, key statistically significant changes for Minnesota Medicaid beneficiaries relative to the comparison group include the following:

- **Primary care use for children improved**. The percentage of children with any visit to a physician increased, along with the percentage of children who had six or more well-child visits by 15 months of age. The percentage of children who did not have any well-child visits by 15 months of age decreased.
- **The overall likelihood of a physician visit increased, driven by an increase in the likelihood of a physician visit for children, but the likelihood of a physician visit among adults decreased.**
- **Inpatient hospital admission rates increased** for the overall population and for children and adults separately. The rate of hospitalizations for ambulatory care sensitive conditions (avoidable admissions) also increased for the overall population.
- **ED visit rates declined** overall and for children and adults.
- **Quality of care findings were positive**. Rates of breast cancer screening, flu immunizations, asthma medication management, antidepressant medication management, and initiation and engagement of alcohol and other drug treatment improved.

- **Expenditure results were mixed.** Total expenditures declined for Medicaid-only beneficiaries overall and adult Medicaid beneficiaries, but increased for child Medicaid beneficiaries and beneficiaries dually enrolled in Medicare and Medicaid.
- Among beneficiaries with behavioral health conditions, as was true among the overall population, **ED visits (all cause and behavioral health related) declined.** However, **all-cause inpatient hospital admission rates decreased** among this subpopulation. **Total expenditures** and **behavioral health–related expenditures also declined**.

D-1.5.2 Trends for the Minnesota commercially insured population, 2011–2016

We used data from MarketScan Research Databases (©2016 from Truven Health Analytics LLC, an IBM Company), to calculate outcomes for the commercially insured population in Minnesota and its comparison group (Colorado, Iowa, and Washington). Individuals represented in the database are those age 1 to 64 years who are covered under plan types with a wide variety of delivery and payment types—including FFS, fully and partially capitated plans, and various plan models (such as preferred provider organizations). Although MarketScan is among the largest available data sources for commercial data, the data is a convenience sample of the commercially insured in each state that overrepresents large employers. As such, employer-sponsored insurance is not necessarily accurately represented for each state. Moreover, the sample varies from state to state and year to year depending on which payers choose to participate. In Minnesota, the sample size of commercial plan members in the MarketScan data declines steadily from 2011 to 2016. In 2011, 16 percent of Minnesota's commercial population is included in the sample whereas in 2016, only 9 percent of the commercial population is included.[96]The overall estimated changes in care coordination, utilization, and quality of care outcomes for the commercially insured population in Minnesota were mixed, with positive performance in key expenditure and hospital utilization measures, but negative results among children's primary care utilization. From 2011 to 2016, key statistically significant changes for Minnesota commercial plan members relative to the comparison group include the following:

- **Primary care use for children worsened,** as evidenced by decreases in the percentage of children with any visits to a primary care provider, the percentage of children with 6 or more well-child visits by 15 months of age, and the percentage of children age 3 to 6 with any well-child visits. The percentage of children with no well-child visits by 15 months of age correspondingly increased.

[96] The percentage of the state's commercially insured population included in MarketScan data was calculated by taking the total sample size included in MarketScan in the state in the given year over the number of nonelderly (age 0-64) residents in the state covered by employer sponsored insurance as reported in Kaiser State Health facts (https://www.kff.org)

- **Inpatient and outpatient hospital utilization improved**, as evidenced by a relative decline in rates of all cause inpatient admissions and ED visits for children, adults, and the overall commercially insured population.
- **Quality of care**, as measured by breast cancer screening rates, asthma medication management, antidepressant medication management, and initiation and engagement of alcohol and other drug treatment, **was largely unchanged, although the rate of flu immunization increased**.
- The relative improvements in utilization appear to have translated to reduced total expenditures, as **total expenditures decreased among children, adults, and the overall commercially insured population.**
- **Among persons with behavioral health conditions, expenditures (total expenditures and total behavioral health-related expenditures) also declined significantly overall.** However, this subpopulation did not see corresponding statistically significant decreases in inpatient and outpatient hospital utilization. Primary care provider visits did significantly decrease.

D-1.5.3 Trends for the Minnesota Medicare population, 2011–2016

We used Medicare claims and enrollment data from the CCW. These data include complete enrollment and claims data for Medicare fee-for-service beneficiaries for Minnesota and its comparison group (Colorado, Iowa, and Washington).

The overall estimated changes in care coordination, utilization, and quality of care outcomes for the Medicare beneficiaries in Minnesota were generally not in line with the goals of the SIM Initiative, although total expenditures did decline. From 2011 to 2016, key statistically significant changes for Minnesota Medicare beneficiaries relative to the comparison group include the following:

- **Rates of primary care provider visits and specialty care provider visits both decreased**. This represents a desired change for primary care visits and an undesired change for specialty care visits.
- **Care coordination was mixed.** The percentage of mental illness-related admissions with a mental health follow-up within 7 days increased, while percentage of admissions with a follow-up visit within 14 days declined.
- **Inpatient and outpatient hospital utilization decreased**. Inpatient admissions and outpatient ED visits decreased for the overall population and for beneficiaries who were and were not dually enrolled in Medicare and Medicaid. Likewise, the overall **rate of admissions for ambulatory care sensitive conditions decreased**.
- **Quality of care results were mixed**. Flu immunization and tobacco screening rates improved while breast cancer screening rates declined.
- Despite relative decreases in avoidable and more expensive types of utilization, **there was no significant change in total expenditures**.

Appendix E: Oregon SIM Initiative Progress and Findings

Oregon SIM Initiative

Award
$45 million

Period of performance
October 1, 2013 – May 31, 2017

Pre-SIM Landscape

Coordinated Care Model
Implemented for Medicaid in 2012, with the launch of 16 statewide CCOs.

Patient-Centered Primary Care Home Program
Oregon's version of a medical home program launched in Medicaid in 2011.

Other Investments in Reform
Developed quality measurement, health IT infrastructure, and technical assistance to providers.

Favorable Stakeholder Environment
Health care reforms were widely supported by the former governor's office, state legislature, health care officials, and other key stakeholders.

Oregon Health Authority
Established to consolidate regulatory authority over Medicaid and the health plans of state employees and public educators.

Strategies

Symbols represent strategies that build on efforts that pre-date SIM.

Support CCM implementation and spread
Oregon launched the Transformation Center to faciliate learning and spread of best practices, provide technical assistance to CCOs, and engage key stakeholders.

Expand PCPCH program
Oregon invested SIM funds to further develop its PCPCH model and assist primary care providers in becoming recognized PCPCHs.

Develop health care infrastructure
SIM funds advanced many existing efforts (e.g., health IT, health equity) and funded new projects (e.g., population health, workforce development).

Use state authorities to promote change
Oregon used its purchasing power to spread CCM beyond Medicaid, enacted legislation, and secured state and federal funding to advance its health care reforms.

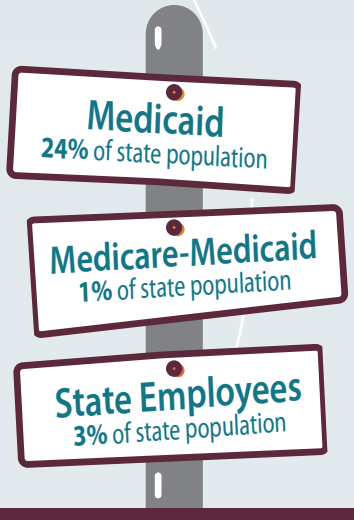
Reach

as of March 2017

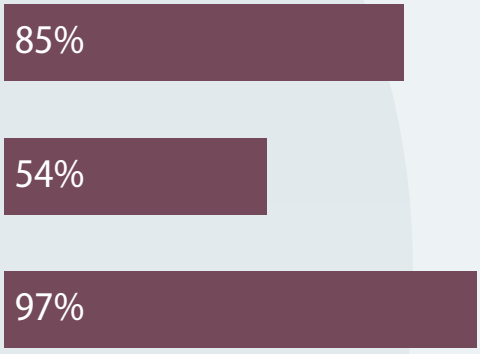
Patient-Centered Primary Care Homes

75%

A majority of Oregon's total Medicaid population was served by the state's PCPCH and CCM models (75% and 85%, respectively).



Coordinated Care Model



CCM = Coordinated Care Model; CCO = Coordinated Care Organization; PCPCH = Patient-Centered Primary Care Home; PPO = preferred provider organization

Impact on Select Populations

✓ = Relative improvement to CG
✗ = No improvement relative to CG
● = No statistically significant change

Goals	PCPCH Medicaid population	CCM State employees
Better Care Coordination	✓ Specialty provider visits ● Primary care provider visits An increase in specialty visits may indicate improved care coordination that connects patients to appropriate resources.	✓ Primary care provider visits ✓ Specialty provider visits
Increased Quality of Care	✓ Colorectal cancer screening ● Adolescent well-care visits ● HbA1c testing ● SBIRT for substance abuse	✓ Patient perception of overall quality* ✓ SBIRT for substance abuse ● Cervical cancer screening
Appropriate Utilization of Services	● ED visits ● Inpatient admissions	● ED visits ● Inpatient admissions ● 30-day readmissions
Lower Total Spending	● Total PBPM spending	✗ Total PMPM spending Increases in primary and specialty care are expected to decrease hospital care and ultimately lower total spending in the long term.

* This finding is based on analysis of consumer survey data.

Limitations

The way that patients were identified for the PCPCH analysis may have resulted in conservative estimates.

Only some CCOs were making incentive payments to PCPCH clinics during the study period, potentially limiting the impact of the model on actual practice patterns among clinicians.

Relatively few state employees opted for new, more coordinated plans in the first two years; the impact of CCM may improve if those plans gain subscribers.

Changes in the CCM comparison group's plan options during the study period to include lower cost options may imply that the findings for state employees are conservative.

Lessons Learned

- ☑ Broad support for health system change and use of existing infrastructure and resources helped to expand the reach of SIM-supported models.
- ☑ Technical assistance to health systems and providers that were hands-on and tailored were perceived as higher-value.
- ☑ Oregon advanced health system change using purchasing and legislative levers, but regulatory approaches may be needed to futher expand CCM.

CCM = Coordinated Care Model; CCO = Coordinated Care Organization; CG = comparison group; ED = emergency department; PBPM = per beneficiary per month; PCPCH = Patient-Centered Primary Care Home; PMPM = per member per month; SBIRT = screening, brief intervention, and referral to treatment

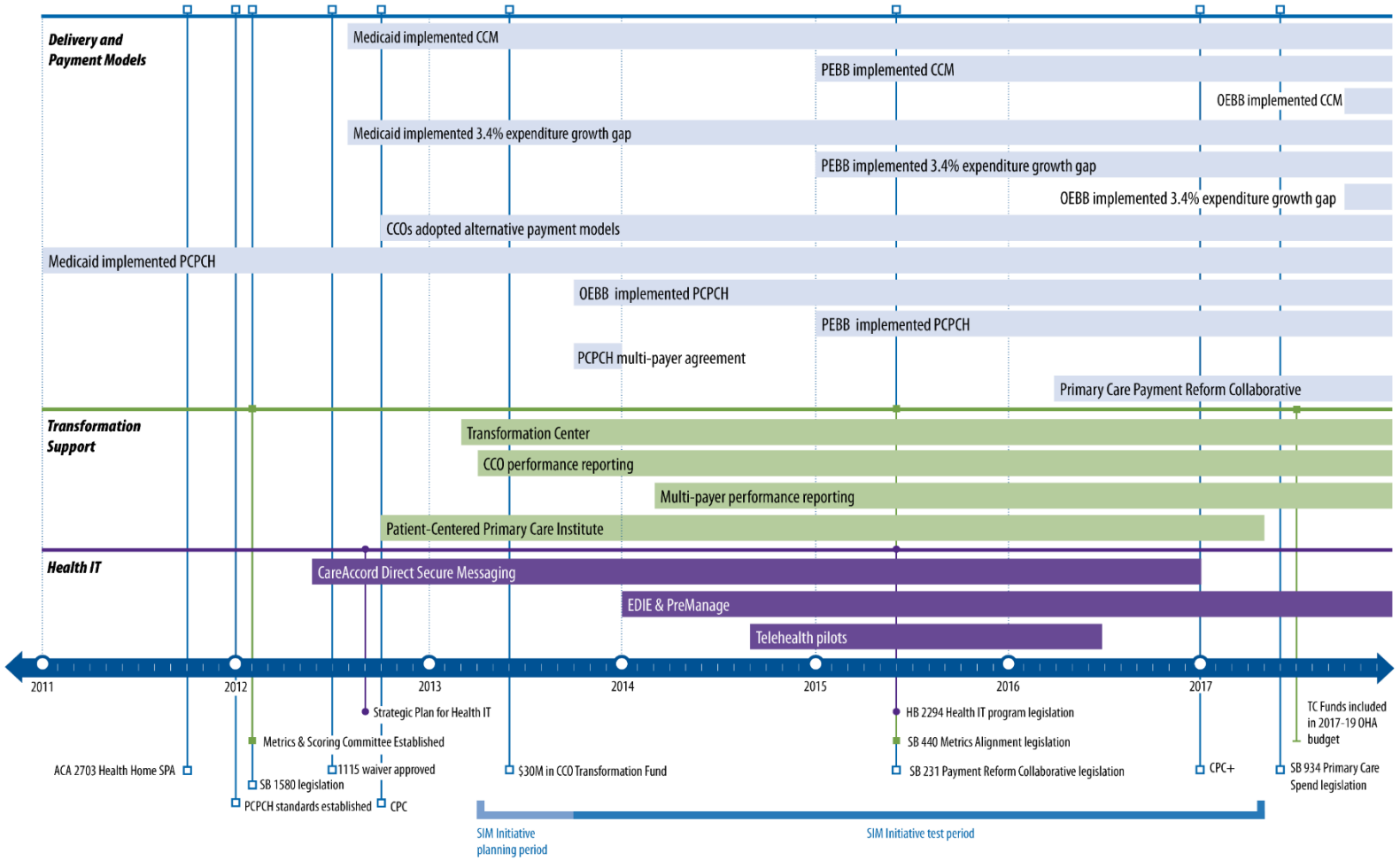
E.1 Oregon SIM Initiative, 2013–2017

Oregon's SIM Initiative test period ran from October 2013 to May 2017.[97] From the start, the state's SIM Initiative centered on strengthening and supporting the Coordinated Care Model (CCM) for Medicaid beneficiaries and spreading major elements of the model to other payers and populations. Oregon used its SIM funds to expand the Patient-Centered Primary Care Home Program (PCPCH), facilitate learning and sharing of best practices across the health care system, and test value-based payment models. SIM funding also supported the health system transformation through investments in health information technology (health IT) and data analytics, quality measurement and reporting, population health and prevention efforts, and workforce development. In addition, Oregon's SIM Initiative funded several small pilots and grant projects that expanded access to specialty health services in rural areas and combined health services with housing and social services.

This section describes the evolution of Oregon's SIM Initiative, beginning with a timeline depicting major health care delivery and payment transformation activities and policies as they pertain to the SIM Initiative (see ***Figure E-1***). An overview of the health care environment in Oregon just prior to implementation of the SIM Initiative begins the discussion. The section goes on to describe major activities Oregon undertook as part of its health system transformation under the SIM Initiative, followed by a review of the successes, challenges, and lessons learned during the test period. The section ends with a look forward to issues of sustainability and further progress in Oregon's health system reform.

[97] The SIM Initiative award began with a 6-month planning period, April to September 2013. Oregon received a no-cost extension to its original 3-year test period, from October 1, 2016, to May 31, 2017.

Figure E-1. Highlights from Oregon's health care system transformation before, during, and after the SIM Initiative



ACA = Affordable Care Act; CCM = Coordinated Care Model; CPC = Comprehensive Primary Care initiative; CCO = Coordinated Care Organization; EDIE = Emergency Department Information Exchange; Health IT = Health Information Technology; HB = House Bill; LTSS = Long-Term Services and Supports; OEBB = Oregon Educators Benefit Board; PCPCH = Patient-Centered Primary Care Home; PEBB = Public Employees Benefit Board; SB = Senate Bill; PA = State Plan Amendment; TC = Transformation Center

E.1.1 Setting the stage for the SIM Initiative in Oregon

Oregon articulated its goal of improving health, increasing the quality of care, and lowering health care costs as early as 2010, when the Oregon Health Authority (OHA), in collaboration with its nine-member oversight entity, the Oregon Health Policy Board (OHPB), produced *Oregon's Action Plan for Health* (Oregon Health Authority, 2010). With Oregon's insurance coverage rates roughly mirroring in the rest of nation in 2010 (49.5 percent employer-based, 6.7 percent individual, 10.7 percent Medicaid/ Children's Health Insurance Program [CHIP], 15.8 percent Medicare, and 17.3 percent uninsured) (State Health Access Data Assistance Center, 2012), the *Action Plan,* developed through an extensive process to engage highly supportive stakeholders, proposed solutions for reforming Oregon's health care system, including setting health care spending targets, moving to patient-centered primary care, expanding the use of health IT, promoting local and regional accountability for health care, developing the health care workforce, and measuring performance (Oregon Health Authority, 2010). To facilitate implementation of these reforms, Oregon agencies began reorganizing and aligning to consolidate their health care programs—including Medicaid, public health, behavioral health, and Public Employee Benefit Board (PEBB) and Oregon Educators Benefit Board (OEBB)—under the OHA (Oregon Health Authority, 2010). With most health care services and purchasing responsibilities under a single state entity, the *Action Plan* set the stage for major delivery system innovations—development and launch of Oregon's CCM and the PCPCH program—that later became the centerpieces of Oregon's SIM Initiative.

Coordinated Care Model—Oregon's vision for better health care. Oregon designed the CCM to streamline and integrate delivery of care, put more emphasis on primary care and prevention, and reduce the growth rate in health care spending. Major attributes of the model include (1) using best practices to manage and coordinate care; (2) sharing responsibility among providers, payers, and consumers for health; (3) increasing transparency in price and quality; (4) measuring performance; (5) paying providers for better quality care and health; and (6) achieving a sustainable rate of health care expenditure growth (Oregon Health Authority, n.d.a).

The CCM was first implemented in Oregon's Medicaid program in August 2012, with the launch of Medicaid Coordinated Care Organizations (CCOs). Almost all of Oregon's Medicaid beneficiaries were enrolled in one of the 16 CCOs operating statewide prior to the SIM Initiative's start date in April 2013 (Oregon Health Authority, n.d.b). CCOs are locally governed networks of physical, behavioral, and dental health providers that offer coordinated services to Medicaid enrollees. Each CCO is paid a global budget based on estimated spending of its patient population over a comprehensive array of services. Having a global budget affords CCOs the flexibility to provide services that may not be deemed "medically necessary," such as services and supports that address social determinants of health. Although they provide some flexibility, CCOs are held accountable for quality of care and health outcomes. In addition, Oregon imposed

a 3.4 percent annual growth expenditure cap on CCOs. Finally, each CCO is required to have a community advisory council (CAC) comprising CCO members and community representatives to ensure that local needs, as expressed by the community, are considered in the CCO's community health improvement plans. The CCO model, which has been likened to the accountable care organization (ACO) model, differs from the ACO model in several aspects such as emphasizing the integration of behavioral and oral health and the acceptance of full financial risk through the global budget (***Table E-1***).

Table E-1. Accountable Care Organization model in comparison to Coordinated Care Organization model

Key feature	ACO	CCO
Governance	Providers, beneficiaries	Providers, beneficiaries, and community representatives (via CACs)
Payment	Primarily fee for service	Global budget; alternative payment models are encouraged
Spending for care that is not deemed medically necessary	Typically not allowed	Explicitly allowed
Accountable for quality	Yes	Yes
Shared savings	Yes, if quality metrics are met	Yes, if quality metrics are met
Spending growth target	Nothing explicit	At or below 3.4%
Integration of behavioral health	Nothing explicit; typically carved out	Funding for behavioral health is part of the global budget and integration with primary care is encouraged
Integration of dental health	Not included	Funding for dental health is part of the global budget and integration with primary care is encouraged
Accountability for population health	Not explicit	Accountable through community health assessment

ACO = accountable care organization; CAC = community advisory council; CCO = Coordinated Care Organization.
Source: McConnell et al., 2014.

Patient-Centered Primary Care Home Program. An important component of the CCM is the PCPCH program, Oregon's version of the medical home model. Established by the Oregon Legislature in 2009 (HB 2009), the PCPCH has six core attributes as defined by the PCPCH Standards Advisory Committee: (1) access, (2) accountability, (3) comprehensiveness, (4) continuity, (5) coordination and integration of services, and (6) person- and family-centered approach (Oregon Health Authority, n.d.c). The Standards Advisory Committee also identified a set of measures and standards that correspond to each attribute of the PCPCH model. Practices began being PCPCH-certified in 2011. By the time the SIM Initiative was implemented in Oregon in April 2013, more than 250 primary care clinics were recognized as PCPCHs (Oregon Health Authority, 2015).

Other programs and strategies that predated SIM funding (2011–2013). Chief among the wide range of other programs and strategies that predated the SIM Initiative in Oregon was a quality measurement and reporting strategy for CCOs developed by the Metrics and Scoring Committee. In addition to reporting core Medicaid performance metrics, CCOs report on 17 outcome and quality measures for which CCOs can earn incentive payments funded by withholding a certain percentage of their global budgets. In another strategy, Oregon established the Patient-Centered Primary Care Institute (PCPCI), which was designed to provide technical assistance and support to primary care providers adopting the PCPCH model of care (PCPCI, 2018). During this pre-SIM period, Oregon finalized its strategic plan (Oregon Health Authority, Health Information Technology Oversight Council, 2012) for statewide health IT systems and implemented CareAccord,[98] a statewide health information exchange platform allowing participating providers to directly and securely communicate with each other. In addition, Oregon developed local partnerships, Regional Health Equity Coalitions (RHECs), which were intended to help reduce inequalities and address social determinants of health, particularly in underserved Oregon communities.[99]

These pre-SIM health care reform efforts took place in a particularly favorable context. Then-Governor John Kitzhaber took the lead in developing health reform plans; rallying supporters; keeping the state government, legislature, and other key stakeholders engaged and motivated in the system overhaul; and garnering a wide range of resources. In 2012, for example, the bill that established CCOs passed the Oregon legislature with bipartisan support (Kost, 2012), and the Governor personally negotiated with CMS the terms of the Section 1115 Medicaid waiver, secured in 2012, that allowed the state to implement CCOs (Cole, 2012). It was Governor Kitzhaber's vision that successful implementation of CCM in CCOs, and subsequently in state-controlled health insurance programs, would inspire transformation in the rest of the Oregon's health system. In addition, the 2013 Oregon legislature appropriated $30 million from state general funds to support CCOs (Oregon Legislature, 2015). Also, Oregon benefitted from participating in several federal demonstrations, including the Medicaid health home program (2011–2013) (U.S. Department of Health and Human Services, 2012) and the Comprehensive Primary Care (CPC) Initiative (Patient-Centered Primary Care Collaborative, 2016) in 2012. Both made additional Medicaid funding available to primary care providers, which incentivized them to obtain the PCPCH certification, because only PCPCH-recognized clinics were able to serve as health homes (Spillman et al., 2012) and practices selected to participate in the CPC Initiative were expected to be PCPCHs (Oregon Health Authority, 2012).

[98] To learn more about CareAccord, visit http://www.oregon.gov/oha/HPA/OHIT-Careaccord/Pages/Flat-file-directory.aspx.
[99] For more information about Oregon's RHECs, see http://www.oregon.gov/oha/OEI/Pages/RHEC.aspx.

E.1.2 Major activities fully or partially supported with SIM funds

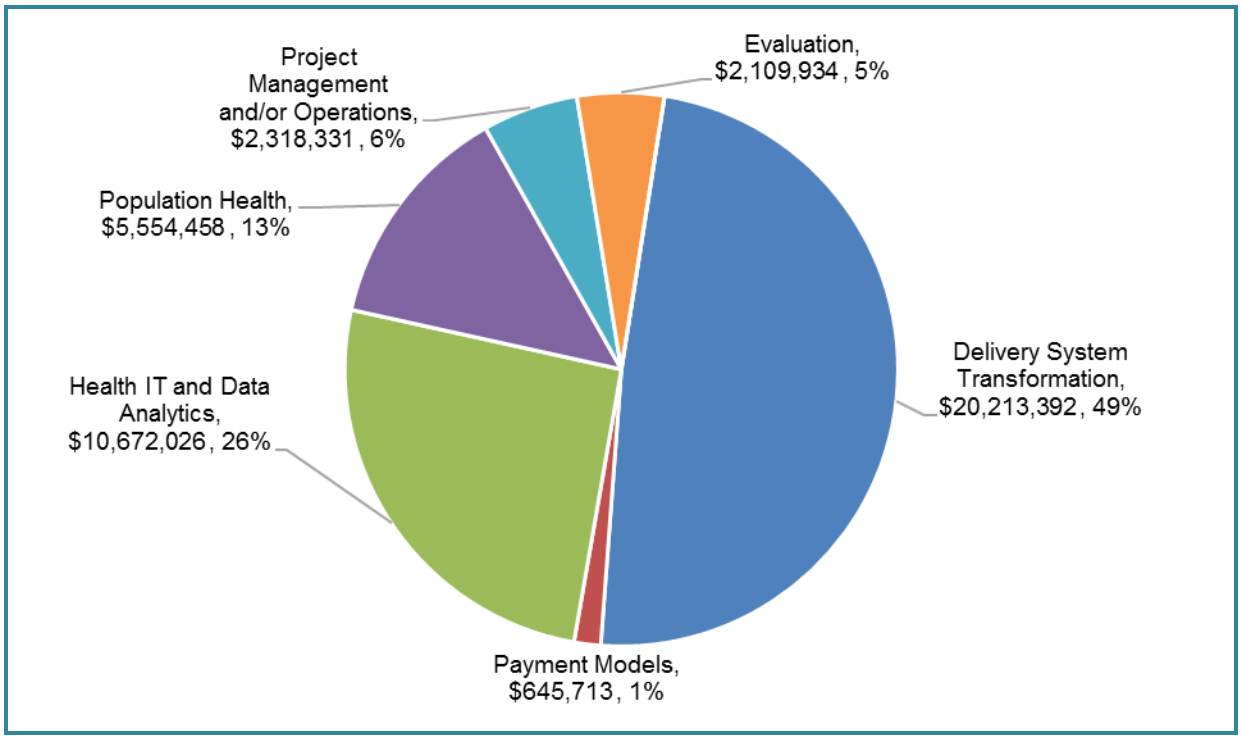
Oregon received a Round 1 SIM Initiative Model Test award of $45 million to help advance many of its existing health system transformation efforts and spur development of new reform initiatives (CMS, 2018). Because prior efforts to change health care delivery and payment focused on the Medicaid program, the state used SIM Initiative resources to further accelerate change in Medicaid and spread the CCM to populations for which OHA is the health care purchaser. By enrolling all state-insured populations in the CCM, Oregon hoped that a "tipping point" would be reached and health system transformation would take place across its entire health care market (Oregon SIM Grant Narrative, 2012). To help achieve this, Oregon proposed as part of its SIM Initiative to facilitate learning and sharing of best practices; improve care integration among primary, behavioral health, and dental care providers; and test new payment models in CCOs. The state's investments in other supporting infrastructure focused on further development and expansion of the PCPCH program and support for health IT infrastructure developments and data analytics, quality measurement and reporting, population health and health equity initiatives, and workforce training and development (see ***Figure E-2***).

OHA took the lead in managing the SIM Initiative activities, under the direction of the OHPB, and devoted a significant share of the SIM Initiative funding to the Transformation Center. Created within the OHA, the Transformation Center was designed to serve as the hub for health system reforms and help the state engage key stakeholders (see **Box 1**), provide direct assistance to CCOs, and spur innovation throughout Oregon's health care system. In addition, the SIM Initiative provided funding for added staff capacity within OHA agencies, including in the PCPCH program (which transitioned under the management of the Transformation Center in 2016), the Office of Health Analytics, the Public Health Division, the Office of Health Equity, and others. The state also used SIM funds to subcontract services from outside consultants, technical assistance experts, and external evaluators.

Box 1: SIM Stakeholder Engagement

The Transformation Center, developed and supported with SIM funding, served as the primary vehicle for stakeholder engagement during the SIM Initiative, engaging payers, CCOs, health systems, providers, and consumers who sit on CCO CACs. Oregon employed a variety of strategies to engage stakeholders, including learning collaboratives for CCOs and CACs, convening the Primary Care Payment Reform Collaborative, curating and disseminating technical assistance resources through the Technical Assistance Bank, and convening Coordinated Care Model Summits. In addition, the state solicited stakeholder input into Oregon's health care reform efforts through numerous work groups and committees, including the Sustainable Health Care Expenditures Work Group, PCPCH Standards Advisory Committee, Metrics and Scoring Committee, and Coordinated Care Model Alignment Work Group.

Figure E-2. Oregon SIM Initiative spending 2013–2017



Similar to policy actions taken during the pre-SIM period, Oregon continued to rely on several policy levers to promote its SIM Initiative goals during the test period. State officials also used policy action to ensure sustainability of some of the major SIM activities when the SIM award period ended in 2017. Besides the state purchasing authority, which was successfully leveraged to spread the CCM to PEBB and OEBB plans, legislative initiatives were deliberated and enacted to promote and solidify health system change, including bills to advance delivery and payment system reforms and health IT infrastructure (see **Box 2**).

Outside of the SIM Initiative, Oregon also pursued other federal funding opportunities, most significantly its 2017 renewal of its Medicaid Section 1115 waiver to continue using CCOs. As the SIM Initiative drew to an end, OHA also succeeded in securing state general funds, albeit at lower levels than available through the SIM Initiative, to sustain programs and activities considered essential to continuing the progress in health system transformation made during the SIM Initiative test period. In addition, the state secured participation in CPC+[100] and through subsequent 2017 legislation (SB 934) required that CCOs make performance-based incentive

[100] CPC+ is a the Innovation Center-funded advanced primary care model that aims to increase access to primary care and to improve the quality, cost, and efficiency of primary care delivery.

payments not only to PCPCHs participating in CPC+[101] but to all PCPCH practices in their networks. More information about Oregon's SIM sustainability is in the last subsection below.

Box 2: Key Legislation

Senate Bill 231 (2015) mandated the Primary Care Payment Reform Collaborative—a multi-payer, voluntary learning collaborative to develop strategies for aligned reimbursement across payers. Additionally, this bill mandated that major health plans, including CCOs, PEBB, and OEBB, annually report the percentage of total expenditures spent on primary care.

Senate Bill 440 (2015) established the Health Plan Quality Metrics Committee to identify quality metrics that could be implemented across CCOs and PEBB and OEBB health plans.

House Bill 2024 (2015) authorized the OHA to develop rules on certification and reimbursement for traditional health workers to provide preventive oral health services.

House Bill 2294 (2015) gave the OHA Office of Health IT the ability to set up statewide health IT services as needed and to charge fees or execute agreements with other stakeholders to implement these services. This legislation specifically allowed OHA to charge user fees to support CareAccord and partner with other stakeholders to operate the Emergency Department Information Exchange.

Senate Bill 934 (2017) requires that CCOs, and PEBB and OEBB health plans spend at least 12 percent of total expenditures on primary care by 2023. The bill also requires CCOs participating in the CPC+ Initiative to offer similar performance-based incentive payments to all PCPCH-certified practices in their networks. In addition, the bill gives the Oregon Department of Consumer and Business Services authority to establish similar requirements for primary care spending and PCPCH payments for commercial insurers.

With Governor Kitzhaber firmly at the helm of Oregon's health system transformation (until his resignation in 2015), the state's role in the SIM Initiative centered on providing the vision and direction for reform, engaging and convening stakeholders, and promoting health system change through its purchasing and legislative authorities. Oregon also continued to pursue alignment with other (non-SIM) state- and federally funded programs to further bolster the SIM Initiative efforts. With varying degrees of success, Oregon implemented most models and strategies it set out to under its SIM Initiative. Brief descriptions of major SIM activities fully or partially funded by Oregon's SIM Initiative follow, beginning with delivery system and payment models and the specific infrastructure supporting model participants, followed by activities designed to improve population health, health equity, and coordination of health care with nonmedical services.

Spread of the Coordinated Care Model beyond Medicaid. The main objective of Oregon's SIM Initiative was to spread major features of the CCM to other populations in the state's purview—namely, state employees, public educators, and individuals who purchased Qualified Health Plans (QHPs) through the state's health insurance Marketplace. If fully implemented, an estimated 2 million Oregonians, about 50 percent of the state's population, were

[101] Only practices recognized as PCPCHs are allowed to participate in CPC+ (http://www.oregon.gov/oha/HPA/CSI-TC/Pages/Comprehensive-Primary-Care-Plus.aspx).

projected to be transitioned into care featuring CCM elements by July 2016 (Oregon SIM Operational Plan Appendices, Appendix J Timeline, 2013). Using the state purchasing authority as a policy lever, the state began a phased-in approach. In its first step, the state imposed the same 3.4 percent annual cost growth cap it had put on Medicaid on both the PEBB and the OEBB health plans. Then, in January 2015, the state included provisions featuring CCM elements in several PEBB health plan contracts; in October 2017 the state did the same in health plans serving the OEBB. However, the spread of the CCM to the QHPs was postponed indefinitely, mostly because of administrative and technological challenges with establishing Oregon's state-based Marketplace pursuant to the Affordable Care Act (ACA).[102]

Expansion of the PCPCH Program. State officials and many nonstate stakeholders viewed the PCPCH as the foundation of the CCM and crucial to the spread of the model beyond Medicaid. As a high priority, the state directed a significant share of Oregon's SIM Initiative funding to further develop and expand the PCPCH program through certification and technical assistance to eligible primary care providers. SIM funding supported the work of the PCPCH Standards Advisory Committee in developing and refining the PCPCH model. The SIM Initiative award also funded PCPCH program staff to administer the program certification activities and to conduct verification site visits with certified practices, during which these staff provided one-on-one technical assistance to practices on implementing the PCPCH standards of care. SIM funding also supported primary care in practice transformation through funding for the PCPCI, which provided guidance, technical assistance, and training resources to providers seeking or upgrading their PCPCH recognition.

Transformation Center. The state invested substantial SIM resources in creating the Transformation Center. State officials considered the Transformation Center essential to promoting and facilitating development of the CCM in Medicaid and in spreading the model throughout Oregon's larger health care system. Major ways in which the Transformation Center pursued its mission included facilitating Learning Collaboratives, assembling and disseminating technical assistance and resources, engaging stakeholders through networking and work groups, convening the Council of Clinical Fellows program (see **Box 3**), and supporting CCO CACs. The Transformation Center, through SIM funding, also developed and provided training, technical assistance, and other tools to help facilitate adoption of integrated delivery models (see **Boxes 4 and 5**) and alternative payment models in the 16 CCOs in the state.[103] In a separate but parallel

[102] Oregon currently runs a State-based Marketplace-Federal Platform. Oregon is responsible for performing all Marketplace functions for the individual market and the Small Business Health Options Program, except that the state relies on the federally facilitated Marketplace IT platform. This means that Oregon consumers and small employers and their employees apply for and enroll in coverage through healthcare.gov.

[103] In this section, the term "alternative payment model or method" is used as it is defined in Oregon and not under CMS's Quality Payment Program established by the Medicare Access and CHIP Reauthorization Act of 2015.

effort to adopt new payment approaches in CCOs, Oregon promoted multi-payer participation in recognition payments for PCPCH practices. For example, in 2016, the state, via the Transformation Center, convened the Primary Care Payment Reform Collaborative to develop recommendations for achieving payment reform in primary care. One recommendation, which would require all payers to spend a set percentage of their overall spending on primary care services, was included in Senate Bill 934 and signed into law in June 2017, although only CCOs, and PEBB and OEBB health plans are currently required to achieve the primary care spending goal (see **Box 2**).

Box 3: Council of Clinical Innovators

The Council of Clinical Innovators is a program developed and administered by the Transformation Center to promote clinical innovation and develop future leaders with expertise in quality improvement and the CCM. The initiative provides year-long learning experiences to multidisciplinary cohorts of emerging leaders, known as Clinical Innovation Fellows. Over the SIM Initiative test period, the program engaged 40 such leaders representing all 16 of the state's CCOs. The fellows undertook research projects on diverse topics, including pain education, access to tele-dermatology services, and intensive case management. As of May 2017, the Transformation Center was convening the third cohort of Clinical Innovation Fellows.

Box 4: Behavioral Health Integration

CCOs were required to integrate behavioral health services with primary care services and establish contractual agreements with behavioral health providers. To promote behavioral health integration, the Transformation Center provided technical assistance to CCOs as part of learning collaboratives and through the Technical Assistance Bank. In addition, OHA developed behavioral health–related CCO incentive metrics and included behavioral health integration standards (ranging from screening for mental health, substance use, and developmental conditions to fully integrating behavioral health services) in the PCPCH recognition criteria.

Box 5: Oral Health Integration

CCOs were required to integrate dental services and establish contractual arrangements with dental providers by July 1, 2014. However, there were no specific requirements for how to achieve this integration administratively within the CCO and at the practice level. To promote dental integration under the SIM Initiative, OHA hired its first Dental Director in 2015 to coordinate and direct oral health integration initiatives, conducted an environmental scan of nationwide examples of dental integration, and developed a toolkit and roadmap on dental integration for the state, CCOs, and providers. Pursuant to House Bill 2882 signed into law in July 2017, CCOs are required to include a representative from at least one dental care organization on their governance boards.

Quality measurement and reporting activities. Even though development of quality metrics for CCOs and metrics alignment efforts was not funded by Oregon's SIM Initiative, the state devoted substantial SIM resources to support OHA's data analytics capabilities, which included collecting and analyzing CCO metrics data and producing regular reports on CCO performance in improving care.[104] State officials viewed tracking the CCOs' progress in improving health care quality as important, not only in itself, but also to demonstrate CCM success so that commercial payers would be encouraged to adopt key elements of the model, with the goal of establishing the CCM as a standard care model for all Oregonians. Toward that end, other SIM-funded analytic activities included supporting the All Payers All Claims database and fielding the Oregon Health Insurance Survey and a Consumer Assessment of Healthcare Providers & Systems survey (including oversampling to generate CCO-level estimates) to Medicaid beneficiaries to monitor member experience under the CCM.

Shoring up Oregon's health IT infrastructure. The state deemed SIM investments in health IT essential to support the CCM, particularly the collection and exchange of patient information for care integration, coordination of services, and quality monitoring. SIM funds financed expert consultants and stakeholder engagement in developing and planning for robust and financially sustainable state health IT services to support coordinated care, including electronic exchange of patient data and the ability to use clinical data for quality reporting. For example, Oregon invested SIM funds to help accelerate adoption of the CareAccord direct secure messaging platform. The state's plan was to run 10 CareAccord integration pilots, but interoperability challenges with provider electronic health records (EHRs) led to only one pilot in place by the end of the SIM test period. Oregon also used SIM funds, in partnership with the Oregon Health Leadership Council, to implement the Emergency Department Information Exchange (EDIE) in all of Oregon's hospitals. EDIE is used to identify frequent users of emergency department (ED) services and help direct them to more appropriate care settings. In addition, PreManage services, which allow health plans and providers to receive real-time hospital notifications, were also launched in Oregon during the SIM Initiative, although only a small proportion of SIM funding was used to pilot PreManage for Assertive Community Treatment teams. Finally, as a promising solution for health care professional shortages in rural communities, Oregon's SIM Initiative supported five telehealth pilots and expanded Project ECHO to enable videoconferencing between primary care providers and specialists (see **Box 6**).

[104] For available reports, see http://www.oregon.gov/oha/HPA/ANALYTICS-MTX/Pages/HST-Reports.aspx.

Smaller-scale health system change efforts. The SIM Initiative allowed Oregon to support several smaller-scale health system change initiatives (see ***Table E-2***), including efforts to align health care delivery with other state systems such as public health and education. One example of such an effort was Oregon's promoting collaboration between CCOs and public health departments to advance population health and prevention objectives, including prevention projects focusing on rural areas. Another was the Early Learning System, which aimed to get CCOs to promote kindergarten readiness. The SIM Initiative also supported efforts to improve and coordinate care for older people and people with disabilities, including providing startup funding for the Housing with Services (HWS) program. Funding for long-term care innovator agents to work with CCOs on coordinating with long-term services and supports (LTSS) providers is yet another example. SIM funds were also used for administrative alignment between Medicare and Medicaid to help better coordinate care for Medicare-Medicaid beneficiaries enrolled in CCOs.

Box 6: Telehealth to Support Rural Health

OHA partnered with the Office of Rural Health to fund five telehealth pilot projects that sought to increase access to specialty services in rural or remote areas of the state. The pilots focused on promoting (1) direct-to-home specialty dementia care, (2) oral health care, (3) medication management for persons living with HIV/AIDS, (4) psychiatric services for children, and (5) reduction of hospital readmissions through telehealth consultations with community paramedics.

In another effort, the Oregon Rural Health Practice-based Research Network completed a five-session Project ECHO pilot that focused on team-based care strategies to enhance the integration of behavioral health into the primary care environment. In addition, the Oregon Health & Sciences University convened a child psychiatry ECHO clinic for 17 rural clinics.

Finally, Oregon continued some of its existing efforts to address health disparities and inequity among the state's underserved communities. Examples of SIM funding for this purpose include a second cohort of RHECs, which are cross-sector coalitions of community stakeholders that come together to identify and address health disparities. Two cohorts of the Developing Equity Leadership through Training and Action (DELTA) program, which provides education and training opportunities for health, community, and policy leaders on topics related to health equity, were also established. Building on earlier state health equity efforts, Oregon also used SIM funding to establish a learning collaborative to train and certify 150 health interpreters to assist CCOs and other providers in delivering culturally and linguistically appropriate care.

Table E-2. Other health system changes under Oregon's SIM Initiative

Other health system changes
Population health. Oregon's SIM funds supported population health through providing funding for staff in OHA's Public Health Division and offering CCOs and local public health departments grant opportunities and other resources to improve population health. Notably, four collaborations between CCOs and local public health departments received 3-year grants to implement community prevention projects focused on the following areas: (1) opiate overdose reversal with naloxone, (2) pregnancy screening and prenatal care, (3) developmental screenings, and (4) tobacco cessation, with the last three targeting rural or underserved areas of Oregon. The SIM Initiative also supported the Oregon Public Health Assessment Tool to help inform prevention and population health efforts and help CCOs develop community health assessment and community health improvement plans, which every CCO was required to submit to the state. In addition, the state supported population health efforts through two CCO incentive metrics: tobacco use prevalence and childhood immunization status.
Early Learning Councils. Early Learning Hubs are regionally based cross-sector coalitions of partners located across Oregon that coordinate and align systems serving families to promote kindergarten readiness. The Oregon SIM Initiative helped infuse resources into these efforts by supporting collaboration between early learning hubs and CCOs such as providing grants to CCOs. For example, the SIM Initiative funded a community grant to support a partnership between the Eastern Oregon CCO and Blue Mountain Early Learning Hub, which supported expanded training efforts around children's oral health, parent education, and developmental screening in rural northeast areas of Oregon. Another way Oregon supported kindergarten readiness and alignment between hubs and CCOs was including a quality CCO incentive measure, developmental screening in the first 36 months of life in 2016 and 2017.
Housing with Services (HWS). The SIM Initiative provided startup funding for the development and launch of the HWS program, which was designed to integrate housing, social services, and health care services for low-income older people and people with disabilities residing in 11 federally subsidized housing buildings in downtown Portland. The evaluation of HWS, also funded by the SIM Initiative, showed that program participants were more likely to use preventive and mental health services, had better access to LTSS, and experienced less food insecurity, compared to residents not enrolled in program.
Long-term Care Innovators. To improve coordination of care and services between CCOs and LTSS providers, the SIM Initiative funded several Long-Term Care Innovator Agent positions. The agents focused on facilitating partnerships among CCOs, Area Agencies on Aging (AAAs), and the Agency for People with Disabilities (APD) to improve health care delivery for CCO members with LTSS needs. As part of this effort, the agents helped establish Memoranda of Understanding between CCOs and AAA or APD offices, covering activities such as establishing member care teams, developing individualized services plans, prioritizing high-needs members, facilitating care transitions, and engaging members in their care.

E.1.3 How Oregon's SIM Initiative changed state health policy: successes, challenges, and lessons learned

The Oregon SIM Initiative's efforts to help foster health system change in the state, as described in the previous section, achieved major successes. Some were more successful than others, however, and many lessons were learned along the way. This section reviews the Oregon SIM Initiative's successes, challenges, and lessons learned during the test period.

Successes

Oregon exceeded its goal of expanding the PCPCH program. The number of primary care practices participating in the model grew each year during the SIM Initiative until, as of March 2017, 67 percent of eligible primary care providers were practicing in 659 PCPCH clinics (Oregon's Quarter 1 Progress Report for 2017; see ***Addendum Table E-1*** for additional information about reach of Oregon's SIM-related models). This exceeded Oregon's goal of certifying 600 practices by the end of the SIM test period. State stakeholders consider the PCPCH program's broad engagement of primary care providers to be one of the most successful components of Oregon's SIM Initiative. The state increased the number of recognition tiers from three to five in 2017, which one stakeholder described as proof of primary care providers' commitment to the program through their willingness and ability to attest to higher standards.

Oregon achieved its goal of spreading the CCM beyond Medicaid. Oregon's SIM Initiative successfully leveraged its purchasing power to spread the CCM to state employees and educators, covering an estimated 270,000 individuals as of February 2017, about 6 percent of Oregon's total population (Loretz & Fairbanks, 2017). In 2015, CCM elements were introduced into the PEBB health plans, covering state employees and their dependents, followed in late 2017 by the OEBB health plans, covering state public educators and their dependents. The Coordinated Care Model Alignment Workgroup, started under the SIM Initiative, helped PEBB and OEBB adopt CCM elements through development of a model contract, a toolkit, and other resources. These resources continue to be available on the state Web site to assist other interested payers in adoption of CCM (Oregon Health Authority, n.d.d).

The Transformation Center was an important source of technical assistance to help CCOs implement the CCM. Both state and nonstate stakeholders agreed that the Transformation Center, a hallmark of Oregon's SIM Initiative, was effective in two areas pertaining to technical assistance: convening the Council of Clinical Innovators Program (see Box 3) and providing technical assistance for behavioral health and primary care integration (see Boxes 4 and 5). To better understand CCO needs and priorities in integration of behavioral health, Transformation Center staff held individual meetings with CCOs in early 2016, which led to development of a package of technical assistance specific to each CCO, including a behavioral health integration resource library containing expert interviews and virtual site visit videos featuring leading health systems and practices in integrated care. The state considered direct engagement of CCOs in technical assistance development a successful strategy and the Transformation Center was planning to emulate this model of technical assistance in other areas, such as dental health integration.

Requiring CCOs to report on a common set of CCO performance metrics helped to drive improvements in care and coordination across sectors, which providers largely viewed as positive. Stakeholders ranging from state officials to CCO leaders, primary care providers, and others credited CCO performance metrics, which are tied to CCOs' overall reimbursement, with

driving changes in health care delivery in the state. In focus groups, reactions by providers who treat CCO members were positive, although with some reservation. Some felt that the performance reports from OHA were helping them to better serve their patients. One provider in particular commented that because of the quality-based incentives, "we've been able to hire extra staff in part funded by the CCO, so that increases our ability to care for all of our patients, so even people that aren't in Medicaid are benefiting in getting better health care because of the CCO." However, others felt they were "fatigued" from checking boxes and monitoring quality metrics, rather than spending time with patients. Still, the metrics focused on population health or childhood development were also credited with helping drive collaborations and partnerships between CCOs and outside social service, childhood education, and other organizations previously viewed, as one CCO executive put it, as "outside the purview of the health care sector."

Integration of behavioral health with primary care, supported by incentive measures, progressed well, if unevenly across CCOs. SIM efforts made inroads in integrating primary care and behavioral health to the degree that one CCO interviewee described the integration as having "crossed a tipping point." Progress varied across CCOs, however, with some including providers with highly integrated services and others continuing to have behavioral health services delivered through a separate system. CCOs credited incentive measures such as screening for depression and alcohol or drug misuse for spurring integration. However, CCOs noted the need to design and implement aligned payment models, and to make data infrastructure investments, to truly advance integration. They noted that these investments were necessary because the infrastructure support, technical, and financial assistance for behavioral health providers to implement health IT lagged far behind those available to hospitals and primary care providers (e.g., Medicare & Medicaid EHR Incentive Program) (CMS, 2016).

All Oregon acute care hospitals were connected to EDIE, and many health plans, CCOs, and providers were subscribing to PreManage. Stakeholders generally saw this progress as a major SIM success. And many anecdotally reported that access to this real-time notification of ED use was helping improve ED patient care through the data available on previous ED visits. Interviewed PreManage users, including CCOs and primary care and behavioral health providers, also felt this tool enabled them to more effectively follow up with members/patients after an ED discharge and potentially divert or prevent future inappropriate hospital or ED utilization.

The HWS program, which integrated health care and social services for eligible Medicaid beneficiaries, received positive feedback from participants. According to reports received during focus groups, participants were generally pleased with the medical care and support services made available in their buildings as part of the program and shared examples such as educational seminars, exercise classes, volunteering opportunities, and other activities promoting social interactions. For medical care, the majority of HWS focus group participants

reported their care was coordinated, their doctors and care teams communicated regularly, and that they received education on self-management strategies, such as proper nutrition and medication adherence.

Challenges

Although Oregon successfully spread the CCM to non-Medicaid payers through PEBB and OEBB plans, the impact on care delivery and cost containment for PEBB and OEBB members has been limited. PEBB and OEBB members have a choice of plans and, despite the incentive of lower premiums for the plans incorporating CCM elements, 42 percent of PEBB members decided to stay with a preferred provider organization (PPO) plan for 2017 rather than moving to a CCM plan (Loretz & Fairbanks, 2017). This caused one state official to worry that members, particularly those with high health care needs, will remain in the PPO plan as long as that option exists. State officials also acknowledged that the spread of the CCM to PEBB and OEBB members had not had the desired impact on costs (PEBB enrollee costs have been increasing since 2015, in contrast to the relatively flat cost trend for commercial plans in Oregon) (Loretz & Fairbanks, 2017).

PEBB members enrolled in a CCM plan expressed mixed experiences with their health care during focus groups.[105] Salem focus group participants rated their health care in CCM plans the same or better than before they enrolled in a CCM plan, Hood River focus group participants had mixed opinions, whereas those in Portland rated their care in CCM plans the same or worse than before. Participants in all three locations expressed frustration over lack of communication regarding covered benefits with CCM plans and perceived reductions in benefits (e.g., limited alternative medicine options). Only some CCM plan members felt that their experience accessing health care was improved, but many felt it was the same or slightly worse than under previous plans. In addition, many PEBB members in a CCM plan expressed that their experience of care had not changed. Further, most noted the reduced premiums and copays as the principal reasons for switching from the PPO to a CCM plan.

The adoption of PCPCH standards varied across providers, and the program's early impacts on health care cost and utilization were inconclusive. Many stakeholders observed a great deal of variation in transformation among PCPCH clinics, with some practices doing the bare minimum to become certified as a PCPCH but others going above and beyond to become high-functioning medical homes (RTI International, 2017). Two recent analyses reached somewhat different conclusions about the impact of the PCPCH program on health care cost and utilization. A state-commissioned evaluation of the program found that the total cost of care per person served by a PCPCH decreased by 4.2 percent between 2011 and 2014. The study also reported that primary care visits increased and that for every $1 spent on primary care, $13 were saved elsewhere in the health care system (Gelmon et al., 2016). The federal evaluation of

[105] Focus groups were held in 2017.

Oregon's PCPCH program, reported in the Year Four Annual Report, similarly found that primary care visits increased between 2011 and 2014 but also found that total cost per person increased when compositional shifts caused by the ACA's Medicaid expansion and Marketplace coverage were taken into account. This increase could, however, be temporary given changing patient use patterns and is unclear (RTI International, 2018).

Oregon did not pursue spreading the CCM through QHPs offered on the state's planned Health Insurance Marketplace, although this reform had originally been planned as part of the SIM Initiative. In the first ACA open enrollment period (October 2013–March 2014), the website supporting enrollment in Oregon's state-based Marketplace, known as Cover Oregon, failed to function as intended, and state staff had to complete all enrollments manually. During the second open enrollment period (October 2014–March 2015) and thereafter, Oregon used the federal enrollment platform to offer plans in its state-based Marketplace under the direction of the Department of Consumer and Business Services. In the following years, the market instability impacting all states occurred in Oregon too; Oregon went from 11 carriers on its exchange in 2014 to only 5 in 2018. This context may have limited Oregon's willingness to impose further regulatory requirements for carriers doing business in the state. Ultimately, Oregon decided to put its plan to spread the CCM through QHPs on indefinite hold.

CCOs did not reach the planned SIM targets for adoption of alternative payment models. Oregon SIM Initiative's work on payment reform was primarily providing technical assistance through the Transformation Center to CCOs implementing an alternative payment model of their choice, a requirement of the 2012 legislation establishing CCOs. But only 35.9 percent of the payments CCOs made to providers were under a model other than fee-for-service as of fourth quarter 2016, according to the state (Oregon SIM Quarterly Progress Report, October-December 2016), falling far short of Oregon's goal of 57 percent by the end of the SIM Initiative test period. One explanation state officials offered for the slow implementation of alternative payment models was that CCOs, as relatively new entities, needed to focus on more basic administrative and operational issues during the initial years of the SIM Initiative. The Transformation Center responded to the slow pace of implementation of new payment models by offering CCOs targeted technical assistance on payment reform, and the state, through its 2017 Medicaid 1115 waiver renewal, strengthened requirements for CCOs to enter into value-based payment contracts with providers (CMS, 2017).

The PCPCH model was not widely supported by payments from CCOs or commercial carriers. The SIM-supported PCPCH model is a certification system recognizing different tiers of PCPCH status based on several standards that have an assigned point value. Depending on total points earned in the attestation process (and thus the level of "medical homeness"), a practice is awarded ascending tiers of PCPCH recognition. Although the state had hoped payers would voluntarily make supplemental payments to support PCPCH-certified clinics, many payers do not make these payments to PCPCHs. The OHA reported that only 9 of the 15 CCOs

paid additional amounts to support PCPCH-certified clinics in 2015 (Oregon Health Authority, 2017), and site visit interviewees added that those amounts varied among CCOs. Only four commercial carriers made additional payments to PCPCH-certified clinics in their network in 2015 (Oregon Health Authority, 2017). Passage of Senate Bill 934 in July 2017—which requires CCOs, PEBB, and OEBB to spend at least 12 percent of total medical expenditures on primary care by 2023—will likely assist the state's goal of directing more resources to primary care providers.

Integration of dental health with primary care lagged behind efforts to integrate behavioral health with primary care. Although the state required each CCO to contract with a dental care organization by July 1, 2014, those contractual relationships have not resulted in integration on a clinical level before the end of the SIM test period. Barriers to dental integration stakeholders identified included dental providers' concerns about loss of autonomy, persistence of the solo practitioner model of dental care versus the team-based care model of primary care, and that successfully meeting the dental-related CCO metrics (dental health assessment and dental sealants) does not in fact require integration. Given the success of incentivized quality metrics in other areas of health care delivery, some stakeholders argued that an incentivized metric was necessary to encourage better integration of dental care with primary care. To accelerate progress, based on recommendations from an environmental scan of dental and primary care integration across the state, Oregon offered targeted technical assistance through the Transformation Center through November 30, 2018. Each CCO could request up to 10 hours of technical assistance on oral and physical health (or behavioral health) integration.

Providers reported transformation fatigue and variable CCO support in practice transformation. Primary care providers reported experiencing fatigue from multiple, concurrent delivery system and payment reform initiatives such as PCPCH and CPC/CPC+, with varying requirements for participating practices. Although providers credited quality metrics with helping to drive quality improvements, they described reporting requirements as burdensome, especially given the sheer number of measures and the lack of alignment across measures among different payers. Moreover, most primary care providers who contracted with CCOs reported that they had either not received, or were not aware of, any support from their CCO to help them adopt the PCPCH model or improve quality of care. However, a few primary care providers with a high volume of Medicaid patients (e.g., federally qualified health centers), and those practicing in rural areas surrounding Hood River, said their local CCOs did support them—including by paying incentive bonuses for meeting quality metrics, analytics support, trainings and learning collaboratives, practice coaching, and supplying ancillary staff or external care managers to coordinate care for high-need patients.

Some consumer and non–health systems organizations felt left out of engagement in Oregon's health system transformation. Although the CCO model required direct consumer engagement through the CACs, CAC implementation was uneven across CCOs, with some

having more influence on CCO decision-making than others. To improve CACs' positions with CCOs, the Transformation Center offered some assistance to CCOs in how to effectively recruit and engage members and community representatives on their CACs. In addition, some consumer groups and social service stakeholder groups reported feeling that they had relatively limited access to state health policymakers being "outside the inner circle of the health care sector."

Loss of the governor's personal leadership following his resignation in 2015 dampened state enthusiasm for health reform. The unexpected 2015 resignation of Governor John Kitzhaber, the architect of and driving force behind CCOs, left a void in state health care leadership and vision for reform, according to several interviewees. Although Governor Kate Brown, Kitzhaber's successor, supported CCOs and SIM efforts to ensure their successful implementation and the spread of the CCM, she did not play Kitzhaber's important role of physician champion. In addition, high turnover in leadership positions at the OHA has marked the years following Kitzhaber's resignation.

SIM efforts to align health care for older people and people with disabilities had little impact. Unlike behavioral health and dental health providers, LTSS providers remain completely carved out of CCO global budgets. Dedicated "innovator agents" supported by the SIM Initiative led to the signing of Memoranda of Understanding (MOUs) between CCOs and LTSS providers. Following MOU execution, however, the innovator agents' ability to achieve alignment was thwarted by lack of engagement by LTSS providers, who remained successful in resisting the potential loss of their autonomy if aligned with CCOs. Similarly, efforts to achieve administrative alignment between Medicare and Medicaid were largely unsuccessful, in part because not all CCOs were aligned or affiliated with Medicare Advantage Plans, but also because Medicare expenditures for Medicare-Medicaid beneficiaries were not accounted for in CCOs' global budget, providing a disincentive for CCOs to invest in these enrollees (Center for Health Systems Effectiveness, Oregon Health & Science University, 2016).

Some stakeholders were disappointed with the overall impact the SIM Initiative had on Oregon's health care system, citing factors such as the loss of Governor Kitzhaber's leadership, the limited reach within Medicaid of sometimes isolated projects and pilots, and the limited reach beyond Medicaid to engage other payers. Although not universal, this sense of disappointment was particularly felt by stakeholders who remembered and were energized by the grand vision of health system transformation put forward by Governor Kitzhaber. Although some stakeholders thought tremendous progress had been made in Medicaid, others believed that larger health care market forces and broad health care trends toward more whole-person and coordinated care were driving these changes and were hesitant to attribute them solely to the SIM Initiative. Further, the Transformation Center, perhaps the most notable effort put forth by the SIM Initiative, generated varied reactions among stakeholders as to its effectiveness in promoting health system change. Although state officials and some stakeholders outside of state government maintained that the Transformation Center was invaluable in helping CCOs

transform how care was delivered and paid for, others, including some CCO representatives, were skeptical about the center's impact on health care in Oregon. Further, even among stakeholders who felt that progress in health system transformation in Medicaid was made, they acknowledged that progress varied greatly among CCOs. Similarly, stakeholders highlighted that even though some highly innovative practices and payment methodologies were implemented throughout the state during the SIM test period, these tended to be isolated projects and pilots that affected small numbers of people. Many stakeholders also remarked that, although the state was on the right path, much work remained, particularly in bringing the commercial market onboard, to make meaningful and lasting changes in health care for all Oregonians. As one stakeholder put it, "Only focusing on making Medicaid better and looking only at Medicaid dollars may be a losing battle." (Although total Medicaid and CHIP enrollment was 962,992 Oregonians as of November 2017 [Medicaid.gov, n.d.], that figure still represents only 23 percent of the state's population.)

Lessons learned

Broad stakeholder support for health system change and strategic use of existing infrastructure and resources strengthened the SIM Initiative impact in Oregon. State officials maintained that achieving broad support for health system change among key stakeholders, and building on Oregon's existing infrastructure and programs rather than starting afresh, helped leverage SIM funding to its fullest potential and strengthened the sustainability prospects of many SIM activities. As Oregon's SIM Initiative took place in the context of "broad community support" for delivery system transformation in its Medicaid program, the state had many models and strategies already planned or underway. These Medicaid activities gave the SIM Initiative a head start by having already identified areas where Oregon should invest financial resources. For example, state agencies were already on the same page and organized around health care reform, and the Transformation Center, thanks to SIM funding, began its work soon after the SIM award. SIM funding also helped expand the existing efforts in data analytics and reporting, health equity initiatives, and population health strategies and allowed the state to test new models and approaches through grant activities and pilots. According to state officials, the SIM Initiative experience, including financial resources, technical assistance, and engagement with other SIM Round 1 states, helped ingrain the CCM reforms in Oregon. State officials were also convinced that the SIM Initiative reinforced collaboration among the state, CCOs, and community partners, which fostered greater commitment and willingness of these stakeholders to sustain the efforts such as population health and health equity initiatives past SIM funding.

Over the course of the SIM Initiative, the Transformation Center refined its approach to practice transformation to increase its impact. The Transformation Center tailored its approach over the course of the test period to make technical assistance more targeted to individual CCO needs. Examples include targeted technical assistance efforts around alternative payment methods and behavioral and dental health integration with primary care. Other lessons

the state learned on practice transformation include the need for more hands-on or one-on-one coaching on integrating new roles into a practice (e.g., a behavioral health provider) to help clinics successfully restructure workflows and leverage the new capacity. Providers were very receptive to peer-to-peer learning and support, for example.

State stakeholders considered their reliance on using the state's convening and purchasing powers, rather than on regulation, a key to success. But several stakeholders outside of state government wondered whether this approach would remain sufficient to propel Oregon far enough along the health system transformation trajectory. Although Oregon's approach may have worked smoothly in sync with the culture of Oregon, it was also associated with the relatively limited spread of the CCM beyond Medicaid and with variable CCO implementation across the key dimensions of alternative payments models, primary care and behavioral health integration, and strong CAC engagement. Although Oregon did pass a number of bills supporting health care transformation, even where the legislation included mandates, great regulatory flexibility remained. For example, Senate Bill 934, passed in 2017, mandates that 12 percent of spending go to primary care by 2023 but requires no specific programs or models that the spending must support. Payers not reaching that threshold must submit a plan to increase spending on primary care by at least 1 percent per year.

Particular concerns nonstate stakeholders expressed included that Medicaid, PEBB, and OEBB combined constituted only about a quarter of Oregon's health care market at the end of the test period. And although state officials firmly believed that concentrating much of the SIM Initiative efforts and resources into the Transformation Center was necessary and beneficial, several nonstate stakeholders expressed doubts that these activities made much of a difference in effecting broad health system changes. For these and similar reasons, a few stakeholders wondered whether a firmer stand from the state in regulating and mandating changes in the commercial market, particularly around multi-payer metrics alignment and adoption of value-based payments, would have had a larger effect on the spread of the CCM to all Oregonians.

E.1.4 Anticipated long-term changes following the SIM Initiative

From the start of the SIM Initiative, state stakeholders—including the governor's office, state legislature, and OHA—were in agreement about the desired direction and scope of delivery and payment reforms in Medicaid and the larger health care system. This consensus enabled Oregon to make provisions for sustaining, at least in the short term, some of the key activities the state considered essential to maintaining the progress made and further advancing the CCM (***Table E-3***). Funding mechanisms included the state budget, Medicaid Section 1115 waiver, user fees (e.g., for EDIE), and other public and private funding sources.

Table E-3. Sustainability of Oregon SIM-funded activities

		SIM Funding Type		Post-SIM Funding	
	SIM-funded activity	One-time or startup investment	Continuous investment	Sustained with state or other sources	Not sustained/ unclear funding sources
Delivery and Payment Models and Supporting Infrastructure	Transformation Center		✓	✓	
	Patient-Centered Primary Care Program		✓	✓	
	• Patient-Centered Primary Care Institute	✓			✓
	Alignment Initiatives				
	• Innovator agents		✓	✓	✓
	• Medicare-Medicaid alignment		✓	✓	
	• Housing with Services	✓		✓	
Data Analytics & Health IT	Testing, Analysis & Evaluation		✓	✓	
	EDIE & PreManage	✓		✓	
	CareAccord		✓		✓
	Telehealth Pilots	✓			✓
	Project ECHO	✓		✓	✓
Health Equity	• RHECs		✓	✓	
	• DELTA		✓	✓	
	• Health Care Interpreters		✓	✓	

DELTA = Developing Equity Leadership through Training and Action; ECHO = Extension for Community Healthcare Outcomes; EDIE = Emergency Department Information Exchange; health IT = health information technology; RHEC = Regional Health Equity Coalition.

Source: Health Management Associates, 2016.

Oregon prioritized sustaining the Transformation Center as an essential activity, to continue supporting CCOs in implementing innovative delivery and payment models to better integrate and coordinate care. Many state officials and some nonstate stakeholders considered the Transformation Center as highly effective in helping CCOs achieve their mission and saw its continued existence important to continue health transformation. Of equally high priority for the state was continued support for the PCPCH program as a foundational element of the CCM and a means for broadening the CCM reach. Oregon also put high importance on maintaining the state's analytic capabilities to track and evaluate progress in implementing and spreading the CCM. As noted earlier, state officials hoped that CCOs' success in implementing the CCM would not only reduce state Medicaid spending but also encourage commercial payers to adopt the model voluntarily. As such, stakeholders put the Transformation Center, PCPCH program, and quality measurement and reporting activities on the high priority list to keep going past the SIM Initiative funding. OHA has followed through by securing funding for these initiatives in its 2017–2019 legislatively approved budget, although funding is lower than these activities received through the SIM Initiative award.

Other SIM activities that Oregon is planning to sustain include health equity initiatives and alignment for Medicare-Medicaid beneficiaries, both of which were emphasized in the state's 1115 waiver renewal (CMS, 2017). EDIE and the HWS program, for which SIM funding provided only one-time or startup investments, both succeeded in securing ongoing financial support—user fees for EDIE and partner contributions and philanthropic support for HWS. Finally, for several activities with unclear paths forward, the state or responsible parties were still looking for funding support at the time of the last site visit to Oregon (April 2017). For example, although the PCPCI training resources were still available online via the Transformation Center, Oregon Quality Corporation, which housed PCPCI, was reportedly working on securing additional funding to continue learning collaboratives and develop new practice transformation resources for primary care providers.

Many stakeholders acknowledged that the SIM Initiative allowed the state to focus on health system transformation to a greater degree than would otherwise have been possible (see **Box 7**). Further, SIM established or fortified infrastructure to facilitate transformation. In addition, some stakeholders felt that the SIM Initiative changed the conversation about health care in general and brought to the forefront topics such as integration of behavioral health with primary care, payment reform, and emphasis on prevention and population health. More concretely, some progress has been made in these areas in part because of the CCO quality metrics.

Box 7: Impact of the SIM Initiative

Summary of view of the SIM Initiative from state officials and stakeholder outside of state government:

- The award moved the state further along a health care transformation path it was already on.
- It accelerated health system changes that would have happened otherwise, but at a much slower pace and on a smaller scale.

Looking ahead, Oregon plans to focus on developing a comprehensive, multi-payer payment reform initiative to leverage progress made under the SIM Initiative and other efforts such as Oregon's renewed 1115 waiver and CPC+. State officials said the main lever to achieve the multi-payer payment reform will be the Primary Care Payment Reform Collaborative, which pursuant to the Senate Bill 934, "will serve as a central convening table" to engage Oregon's payers and providers in efforts to improve and align payment methodologies. Oregon officials believe it is important for the state to act as a convener rather than a regulator—and to encourage, not dictate, the adoption of the CCM by the rest of the health care market—whether this "soft" approach will continue to further reform in Oregon is uncertain.

E.1.5 Summary of SIM Initiative implementation

At the end of the Oregon SIM Initiative, the state had achieved:

- **Sustained and expanded delivery models,** both in the PCPCH (reaching two-thirds of all primary care providers statewide) and the CCM (reaching Medicaid and state employee health plans).
- **Establishment of the Transformation Center, seeded with SIM Initiative funds** and continuing within state government after the end of the SIM Initiative. Among other activities, the Center will continue providing technical assistance to CCOs to further develop alternative payment models and to integrate behavioral health care with primary care.
- **Increased electronic health information exchange** within and among all Oregon hospitals about frequent ED users, and to notify all health plans across the state in real time about enrollee use of an ED.
- **Increased capacity within state government for data analytics to support new delivery models**, especially for monitoring implementation of the CCM.
- **Legislation** that (1) requires an increase and better alignment in quality, cost, and health outcomes performance metrics across all publicly-supported health coverage programs, and (2) mandates that all payors to spend at least 12 percent of their overall spending on primary care by 2023.

Addendum Table E-1. Providers and populations reached by Oregon's SIM Initiative–related delivery system and payment models

Oregon	Participating payers	Participating providers	Population reached
Patient-Centered Primary Care Homes	All participating payers	2,636 (67%)	—
	Medicaid	—	75%
Coordinated Care Model	All participating payers	9,589 (83%)	—
	Medicaid	—	85%
	Medicare-Medicaid	—	54%
	State employees	—	97%

Source: State-reported participation rates by payer—or cumulative across all participating payers—as of March 2017.

Note: Sources for these provider and population data are detailed in the Year Four Annual Report (RTI International, 2018).

Expanding the Coordinated Care Model (CCM) was a major goal in Oregon during the SIM Initiative, which makes it an appropriate focus for rigorous quantitative analyses of the Oregon SIM Initiative's impact on expenditures and key utilization and quality of care outcomes. We analyze the impact of the model comparing utilization, quality, and cost outcomes for public employees to an in-state non-CCM population of state educators before and after implementation of the model.

Section E.2 presents the estimated impact of the CCM in Oregon. We assess the impact of the CCM using data for 4 years before implementation (2011–2014) and 2 years after implementation (2015–2016).

E.2 Model-Specific Impact Findings: *Oregon's Coordinated Care Model Implemented in State Employee Health Plans*

A major goal of Oregon's SIM Initiative was to expand the CCM to populations beyond Medicaid, including state employees and public educators. By the end of the test period, the state had successfully contracted with carriers administering health plans first for state employees and subsequently for public educators to modify their existing plans and added new plan options so that all plan offerings included at least some CCM features. With this change, about 30 percent of Oregonians including Medicaid beneficiaries would be "touched" in some way by the CCM. Looking toward the future, Oregon hopes that once a critical mass of its residents is cared for under the CCM, a "tipping point" in transforming the state's health care system will be reached such that all payers (public and private) will be aligned in emphasizing primary and preventive care and paying for value.

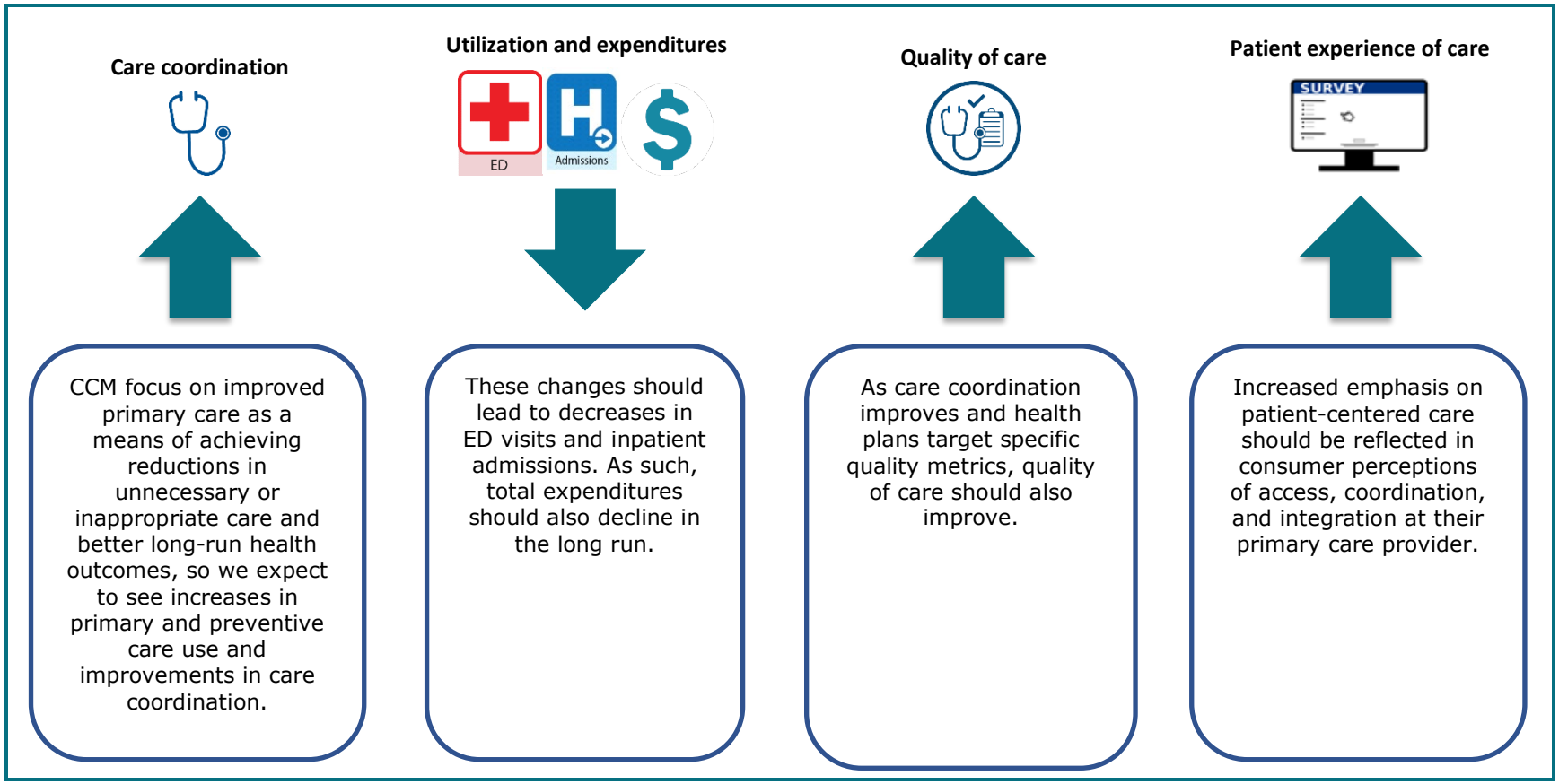
KEY INSIGHTS

- Evidence from the analysis of claims data suggested that the introduction of the CCM increased utilization of primary and specialty care services in the first 2 years after implementation, but the model had no change in inpatient or emergency department (ED) use and few changes in the quality of care. Total medical expenditures per member increased significantly, however.
- The analysis of surveys of Public Employees Benefit Board (PEBB) and Oregon Educators Benefit Board (OEBB) members suggested only a small change in consumer perceptions of quality, coordination, or access, after CCM implementation.
- One explanation for modest findings is low rates of enrollment in health plans with stronger CCM elements. Most PEBB members remained in the same plans they had selected in 2014, and notably the most popular plan was the preferred provider organization (PPO)—the least aggressively coordinated of all PEBB plans. It is also the case that pre-implementation trends in outcomes were generally not stable and often differed between the PEBB and OEBB populations, which suggests that any results should be interpreted with caution. To the extent that, over time, OEBB members switched to plans that resembled the more coordinated PEBB plans, our estimates of CCM impacts may be conservative.

Figure E-3 shows the expected direction of the outcomes. A major emphasis of the CCM is improved primary care, and specifically the patient-centered primary care home (PCPCH), as a means of achieving reductions in unnecessary or inappropriate care and better long-run health outcomes. If the spread of the CCM is successful, we would first expect to see increases in primary and preventive care use including increased preventive screenings. The health plans available to PEBB members in 2015 included incentives designed to increase the use of PCPCH providers, both through per member per month (PMPM) payments to recognized providers and reduced cost-sharing for members using a PCPCH. The CCM framework includes a set of claims-based quality metrics on which all plans are monitored, and consequently we would expect these metrics to show evidence of improvement as the CCM spreads. These include PCPCH enrollment rates; timeliness of prenatal care; adolescent well-care visits; screenings for early childhood development, colorectal cancer, depression, and alcohol and substance abuse; blood pressure and HbA1c control screening and treatment; and ED use. These changes could also lead to reductions in inpatient hospitalization and readmissions. Combined with PEBB-wide caps on spending growth, reductions in use of these high-cost services should result in some bending of the cost curve, but whether and when these potentially longer run changes come to pass is less certain. In addition, improvements in care coordination and quality of care can be measured through enrollee survey reports.

Beginning in 2017, after our study period, a subset of these metrics also began to carry financial incentives for plans in the form of quality withholds from premiums that could be earned back depending on plan performance. Although improvements on these measures were not yet incentivized during the study period, we expect that plans would still make efforts to introduce providers to the new metrics so that they would be better positioned to meet performance targets in 2017.

Figure E-3. Desired and expected direction of outcome measures



CCM = Coordinated Care Model; ED = emergency department.

To assess the effects of Oregon's CCM on care coordination, utilization, expenditures, and quality of care in the state employee population, we addressed the following research questions:

- How did trends in key outcomes for care coordination, utilization, expenditures, and quality of care change among the public employees enrolled in a PEBB health plan after implementation of the CCM relative to the non-CCM comparison group?
- How did trends in patients' experience of care change among public employees enrolled in a PEBB health plan after implementation of the CCM relative to the non-CCM comparison group?

To address each research question, we used a difference-in-differences (D-in-D) quasi-experimental design, incorporating a comparison group to control for underlying changes in the health care environment in Oregon. The design of these analyses uses the staggered implementation of the CCM to the two populations: state employees covered by health plans offered by PEBB and public educators covered by plans offered by OEBB. Beginning January 1, 2015, all plans offered by PEBB were required to conform to key features of the CCM, including incentivizing the use of recognized PCPCHs and standardizing performance metrics. In addition, in aggregate although not individually, PEBB plans were subject to a cap on per beneficiary per month spending growth. The same requirements for OEBB plans were put into place starting October 1, 2017, with the 2017/2018 plan year. This 33-month gap provides an opportunity to identify any early effects of state-mandated plan changes on PEBB relative to a similar population prior to the intervention spreading to OEBB supported by the SIM Initiative.

To address the first research question, we used claims data on PEBB and OEBB members obtained from Oregon's All Payer All Claims (APAC) database for calendar years 2011–2016, providing 2 years of post-CCM implementation data for PEBB members. To answer the second question, we collected repeated cross-sectional survey data on samples of PEBB and OEBB members describing perception of care before and after new requirements on PEBB plans were introduced but before similar requirements were placed on OEBB plans. The baseline survey was conducted in 2015 to assess PEBB and OEBB members' perceptions of the health care they received in 2014, before any exposure to the CCM. Using an independently drawn sample, the second survey was conducted in the fall of 2017 to assess perceptions of care received in the prior 12 months. At the time of the second survey, CCM plans for state employees had been in effect for over 2 years, while the first plan year with CCM plans for public educators had just begun (making the OEBB a useful comparison group to measure against any changes seen in the PEBB population).

For the claims data we constructed annual person-level propensity score weights to balance the CCM group and comparison group on individual and county characteristics. Because the recommended schedule of primary care visits, the types of specialty care required, and appropriate quality measures all vary by age, we present separate sets of results for adults and

children for all analyses. Adults and children in the CCM group and weighted comparison group were similar on key demographic characteristics (see ***Tables E-4*** and ***E-5***). A summary of the analytic methods is included below, and the methods are detailed in ***Sub-appendix E-2***.

Methods Snapshot for Impact Analysis

Claims Analyses

- **Study design:** D-in-D quasi-experimental design using an unbalanced longitudinal panel.
- **Population:** The CCM group included individuals covered by a PEBB plan and the comparison group included all individuals covered by an OEBB plan (not yet exposed to CCM requirements).
- **Data:** APAC data from Oregon, covering years 2011 through 2016, including 4 years prior to implementation (2011–2014) and 2 years of the CCM in the PEBB population (2015–2016).
- **Sample:** All members, both subscribers and dependents, enrolled in PEBB and OEBB plans. Results broken out by children and adults.
- **Measures:** Total expenditures, care coordination (primary care and specialty visits) utilization rates by type of service (inpatient admissions, ED visits, and 30-day readmissions), and quality of care (annual screening rates for Screening, Brief Intervention and Referral to Treatment [SBIRT], cervical cancer, and depression).
- **Statistical analysis:** Ordinary least squares D-in-D models, with comparison group reweighted by inverse propensity score to approximate intervention group. Standard errors were clustered at the individual level to account for within-beneficiary correlation over time. The models adjusted for demographic characteristics, attribution to a PCPCH, number of months enrolled during the year, and metropolitan area fixed effects.

Survey Analyses

- **Study design:** D-in-D quasi-experimental design.
- **Population:** The intervention group included PEBB subscribers and the comparison group included OEBB subscribers.
- **Data:** RTI fielded the Oregon Consumer Experience Survey in early 2015 and late 2017, based on a modified version of the Patient Perceptions of Integrated Care survey.
- **Sample:** State employees and public educators subscribed to PEBB and OEBB plans, respectively.
- **Measures:** Self-reports of respondent perceptions of primary care access, care coordination, and overall quality.
- **Statistical analysis:** Logistic regression, controlling for age, sex, education, marital status, race/ethnicity and self-rated health, using sampling weights.

Table E-4. Unweighted and weighted means and standardized differences, CCM and comparison groups, adults, 2014

	Unweighted			Weighted		
Characteristic	CCM group	Comparison group	Standardized difference[a]	Comparison group	Standardized difference[a]	p-value
N	80,581	85,254		85,254		
Months enrolled	11.8	11.7	−7.5	11.8	−2.5	<0.001
Age	44.6	45.9	6.4	45.1	2.5	<0.001
Female	0.5	0.6	4.0	0.5	−0.2	0.31
CDPS Score	0.3	0.2	−2.1	0.3	−0.3	0.17
MSA of Residence						
Bend	0.02	0.06	13.0	0.02	−0.1	0.38
Corvallis	0.07	0.02	−17.2	0.07	0.0	0.49
Eugene	0.11	0.08	−6.3	0.11	−0.3	0.16
Medford	0.03	0.03	0.4	0.03	0.0	0.46
Portland	0.24	0.37	20.3	0.24	0.5	0.07
Salem	0.30	0.14	−28.1	0.29	−1.3	<0.001
Rest of state	0.23	0.29	10.9	0.23	1.2	<0.001

CCM = Coordinated Care Model; CDPS = Chronic Illness and Disability Payment System (CDPS score is a risk-adjustment score calculated from ICD9 and ICD10 diagnosis codes included on hospital and outpatient claims, with larger CDPS scores corresponding to a larger number of comorbidities or a more severe set of comorbidities); MSA = Metropolitan Statistical Area.

[a] Absolute standardized differences are expressed as percentages.

Source: All Payer All Claims database.

Notes: Ages 0–17. Samples exclude individuals with both PEBB and OEBB insurance in a given year. CCM group = PEBB. CG = OEBB.

Table E-5. Unweighted and weighted means and standardized differences, CCM and comparison groups, children, 2014

Characteristic	Unweighted			Weighted		
	CCM group	Comparison group	Standardized difference[a]	Comparison group	Standardized difference[a]	p-value
N	21,671	19,979		19,979		
Months enrolled	11.9	11.8	−3.7	11.9	1.6	0.01
Age (mean)	11.1	11.1	1.3	11.2	1.6	0.01
Female (%)	0.5	0.5	−0.3	0.5	0.1	0.42
CDPS Score	0.4	0.4	−2.4	0.4	−0.2	0.60
MSA of Residence						
Bend	0.03	0.07	15.2	0.03	0.7	0.15
Corvallis	0.06	0.01	−18.1	0.05	−2.9	>0.99
Eugene	0.10	0.08	−6.6	0.10	−1.2	0.96
Medford	0.03	0.03	0.4	0.03	−0.5	0.78
Portland	0.23	0.36	20.0	0.24	0.5	0.24
Salem	0.30	0.16	−24.1	0.33	4.8	<0.001
Rest of state	0.24	0.28	6.4	0.22	−3.3	>0.99

CCM = Coordinated Care Model; CDPS = Chronic Illness and Disability Payment System (CDPS score is a risk-adjustment score calculated from ICD9 and ICD10 diagnosis codes included on hospital and outpatient claims, with larger CDPS scores corresponding to a larger number of comorbidities or a more severe set of comorbidities); MSA = Metropolitan Statistical Area.

[a] Absolute standardized differences are expressed as percentages.

Source: All Payer All Claims database.

Notes: Ages 18+. Samples exclude individuals with both PEBB and OEBB insurance in a given year. CCM group = PEBB. CG = OEBB.

E.2.1 Did physician visits change among state employees after the introduction of CCM plans?

KEY INSIGHTS

- In the 2 years after the CCM was introduced to Oregon's state employee health plans, the **percentage with a primary and specialty care visit increased** for state employees relative to the comparison group. These findings are in line with the CCM's emphasis on improved primary care.

To evaluate the effects of spreading the CCM to state employees and their dependents enrolled in PEBB plans, we first estimated models of expenditure, utilization, and quality of care using APAC data from 2011 to 2016. ***Table E-6*** presents D-in-D results for primary care and specialist visits, estimated separately for adults and children.

Table E-6. Difference in the pre-post annual change in the percent with physician visits for Oregon PEBB plan members relative to the comparison group, 2 years of CCM implementation (January 2015 through December 2016)

Outcome and population	Pre-period adjusted mean, CCM	Pre-period adjusted mean, CG	Test-period adjusted mean, CCM	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
Percent with a primary care visit								
Adults	72.8	71.1	74.0	69.7	2.6 (2.2, 2.9)	3.5	<0.001	918,442
Children	70.2	73.6	74.9	71.6	6.7 (6.0, 7.4)	9.5	<0.001	265,472
Percent with a specialist visit								
Adults	46.5	43.8	46.5	42.8	1.0 (0.6, 1.4)	2.2	<0.001	918,442
Children	23.7	22.0	23.9	21.2	0.9 (0.2, 1.7)	3.9	0.03	265,472

CCM = Coordinated Care Model; CG = comparison group; PEBB = Public Employees Benefit Board.

Note: CCM group = PEBB. CG = OEBB.

- Analyses of medical service utilization found that the likelihood of both primary and specialty care visits increased statistically significantly for both adults and children relative to the comparison (OEBB) population.
  - Among adults, the likelihood of having at least one primary care visit in the year increased by 3.5 percent, and the fraction with at least one specialty care visit increased by 2.2 percent. Among children, the increases were 9.5 and 3.9 percent, respectively.

E.2.2 Did expenditures and utilization change among state employees after the introduction of CCM plans?

KEY INSIGHTS

- In the 2 years after CCM plans for Oregon PEBB were introduced, an increase in per beneficiary spending was observed compared to OEBB members not enrolled in CCM plans.
- No significant effect on inpatient or emergency care, however, was found. These findings held for both adults and children members.

Table E-7 presents D-in-D results for utilization and expenditures for adults and children.

- Among both adults and children, relative to OEBB members, total spending increased after new CCM plans were introduced in 2015. Among adults the increase was $561 per year, and among children, the increase was $230 per year, representing 11.6 and 17.6 percent of total annual spending, respectively.
- There were no differences in the change in inpatient admissions, ED visits, or 30-day readmission rates for CCM members relative to the comparison group.

Table E-7. Difference in the pre-post annual change in utilization and expenditures for Oregon PEBB plan members relative to the comparison group, 2 years of CCM implementation (January 2015 through December 2016)

Outcome and population	Pre-period adjusted mean, CCM	Pre-period adjusted mean, CG	Test-period adjusted mean, CCM	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
Total PMPM expenditures ($)								
Adults	417	397	461	391	50 (35, 65)	12.0	<0.001	918,442
Children	111	120	133	123	20 (5, 34)	17.6	0.03	265,472
Number of inpatient stays per 1,000 beneficiaries								
Adults	42	45	39	43	−1 (−4, 1)	−3.4	0.28	918,442
Children	13	12	13	15	−2 (−6, 2)	−18.3	0.35	265,472
Number of ED visits per 1,000 beneficiaries								
Adults	179	154	186	159	2 (−4, 9)	1.2	0.58	918,442
Children	148	122	148	116	7 (−4, 17)	4.4	0.31	265,472
Number of 30-day readmissions per 1,000 discharges								
Adults	85	81	79	96	−22 (−47, 4)	−25.4	0.16	33,532

CCM = Coordinated Care Model; CG = comparison group; ED = emergency department; PEBB = Public Employees Benefit Board; PMPM = per member per month.
Note: CCM group = PEBB. CG = OEBB.

E.2.3 Did quality of care improve among state employees after the introduction of CCM plans?

KEY INSIGHTS

- Only one measure of quality, screening for substance abuse, showed a significant increase for PEBB members under the CCM compared to OEBB members.

Measures of quality of care analyzed for adults included the percentage of hospital discharges with readmissions within 30 days and screening rates for substance abuse (SBIRT), cervical cancer, and depression (***Table E-8***).

- Among those outcomes, the only measure to show any significant change in the PEBB population relative to the OEBB population was substance abuse screening. This screening increased in both PEBB and OEBB populations, but its growth among adult PEBB members was significantly greater, by 14.1 percent.
- Among children, only depression screening was performed frequently enough to estimate a D-in-D model, but it showed no significant change in children in a PEBB plan relative to those in an OEBB plan. The large estimate of the relative difference in the model (−1,287.9 percent) results from the very small percentage of children who have any depression screening and the very small change; the relative difference is dividing one very small number by another very small number and producing a very large relative difference.

Table E-8. Difference in the pre-post annual change in quality of care for Oregon PEBB plan members relative to the comparison group, 2 years of CCM implementation (January 2015 through December 2016)

Outcome and population	Pre-period adjusted mean, CCM	Pre-period adjusted mean, CG	Test-period adjusted mean, CCM	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
Percent with SBIRT screening (persons with >= 1 outpatient visit)								
Adults	2.8	2.4	6.6	5.8	0.4 (0.2, 0.6)	14.1	0.002	723,517
Percent with cervical cancer screening (women ages 24–64)								
Adults	24.2	25.4	22.5	23.6	0.1 (−0.4, 0.6)	0.4	0.75	413,708
Percent with depression screening (age >= 12 with >= 1 outpatient visit)								
Adults	0.0	0.0	0.1	0.1	−0.01 (−0.03, 0.01)	−97.3	0.40	681,597
Children	0.00	−0.01	0.11	0.06	0.05 (−0.02, 0.13)	−1287.9	0.26	80,464

CCM = Coordinated Care Model; CG = comparison group; PEBB = Public Employees Benefit Board; SBIRT = Screening, Brief Intervention and Referral to Treatment.
Note: CCM group = PEBB. CG = OEBB.

E.2.4 Did CCM plans affect patient perceptions of their care?

KEY INSIGHTS

- Member survey data showed that relative changes between PEBB and OEBB members in perceptions of care on most measures were largely insignificant.
- However, PEBB members reported improved overall quality of care after new with CCM elements were introduced (statistically significant), while OEBB members reported a decrease in overall quality over the same time period.

Table E-9 shows regression-adjusted odds ratios for the patient experience measures we examined in our 2015 and 2017 member surveys. The odds ratio reflects the likelihood that one group of respondents reported a particular indicator relative to those in another group. The first and second columns of Table E-9 give the changes for each indicator examined between 2015 and 2017 for the state employee (PEBB) and public educator (OEBB) populations. An odds ratio greater than one indicates that the outcome improved for the PEBB or OEBB populations, respectively, between the 2015 and 2017 rounds of the survey. The third column gives the relative changes in each outcome for PEBB relative to OEBB, our comparison group. A value

Table E-9. Patient experience of PEBB and OEBB members related to CCM, 2015 and 2017

Indicator	PEBB 2017 vs. PEBB 2015	OEBB 2017 vs. OEBB 2015	Relative D-in-D change PEBB vs. OEBB
	Odds ratio	Odds ratio	Odds ratio
Overall quality and manageability			
Overall, health care received in past 12 months was high quality	1.08	0.93	1.17*
Health care received in past 12 months was easy to manage	1.01	0.89	1.13
Care coordination			
Usual provider followed up with patient's test results	0.88	0.83	1.07
Usual provider seemed informed that patient received care from a behavioral health provider	0.93	0.77	1.21
Usual provider seemed informed that patient received care from a specialist	1.09	1.03	1.06
Usual provider helped coordinate patient's care among different providers	1.12	1.16	0.97
Usual provider seemed to know important information about patient's hospital stay	0.90	1.09	0.83
Patient-centeredness			
Usual provider seemed to know important information about medical history	0.95	0.88	1.09
Usual provider asked about things in work or life at home that affect health	1.06	0.99	1.07
Usual provider showed respect for what patient had to say	1.10	1.09	1.01
Usual provider talked with patient about specific goals for their health	0.94	0.98	0.95
Usual provider checked in with patient between visits	1.25	1.20	1.04
One provider knew about all of patient's medical needs	1.00	0.98	1.02
Accessibility			
Able to get care from usual provider's office when it was closed	1.15	1.10	1.04
Easy to get appointment with behavioral health provider	0.66	0.80	0.83
Easy to get appointment with specialist	0.82	0.87	0.94

D-in-D = difference-in-differences; OEBB = Oregon Educators Benefit Board; PEBB = Public Employees Benefit Board.
Note: D-in-D estimate is significantly different from 1 (no effect) at the 0.1 level.

greater than 1 in this column indicates that the outcome improved more (or deteriorated less) for PEBB members than for OEBB members. If the CCM improved care, we expect odds ratios in the third column to be greater than 1. On all but 1 of the 16 measures examined, we find no significant change among state employees relative to public educators. The one exception to this finding was the global measure of perceived quality of care, where perceptions improved for PEBB members (odds ratio = 1.08) and deteriorated for OEBB members (odds ratio = 0.93) resulting in a relative improvement among PEBB members (odds ratio = 1.17, $p < 0.10$) after CCM elements introduced to their plans. See ***Sub-appendix E-2*** for descriptive statistics and a discussion of methods.

E.2.5 Discussion and limitations

The claims analysis results indicate increased use of both primary and specialty care with the adoption of the CCM features by PEBB plans. There was no evidence that these increases were accompanied by reductions in inpatient or ED care in hospitals or in hospital readmissions, and total PMPM costs appear to have increased with the CCM, at least in the short run. Along with increases in primary care utilization, however, the CCM appears to have brought increases in several preventive screenings among PEBB members.

The survey analysis results indicate that for all but one of the measures we examined, there was no statistically discernible effect of the CCM on perceptions of state employees after new plans were chosen and offered. Combined with findings from claims data that only the early-stage goals of increasing primary care use had been achieved but little indication of improved quality or reduced expenditures, the evidence for robust impacts of the CCM on PEBB enrollees in the first 2 years is weak.

These findings are not entirely surprising. First, our post-period is just 2 years after introduction of CCM elements in PEBB plans. It is possible that many of the expected changes under the model could be observed in years further out. More importantly, however, the reliance on beneficiary choice in the selection of CCM elements from among a broad range of plan options could limit the potential impact of the reform. Fundamentally, as acknowledged by Oregon officials, the incentives offered to PEBB enrollees to switch to CCM plans were weak. As described in ***Section E.1***, all incumbent plans (those available before CCM elements were introduced in the 2015 plan year) were also offered in 2015. Oregon state officials reported that for the 2015 plan year most PEBB members elected to remain in their 2014 plan. The plan with the highest enrollment, accounting for 61 percent of PEBB members in 2015, was the PEBB Statewide PPO. This share declined more in the following year, reaching 44 percent in 2016, but the PPO is still the largest plan. As state officials acknowledged in our interviews, the PEBB Statewide PPO had the fewest CCM elements of plans offered after 2015. PEBB Statewide, with the least restrictive provider network of any PEBB plan, offers 10 percent coinsurance on in-network primary care visits to recognized PCPCHs compared to 15 percent on other in-network

primary care providers and pays PCPCH providers a monthly per member amount. In contrast, the more coordinated PEBB plans (Providence Choice, Moda Synergy/Summit, and Kaiser Deductible), which together accounted for 40 percent of PEBB enrollment in 2016, feature more restrictive networks and more robust provider incentives and utilization management, and some even require the use of a PCPCH provider. PEBB members were incentivized to choose the coordinated plans through lower premiums and lower contribution shares (1 vs. 5 percent of total premiums). However, compared to other large employers in the United States, even the upper bound 5 percent contribution is very low. Data from the 2017 MEPS Insurance Component show that the average employee contribution to a single plan is 23 percent and the average contribution to a family plan is 28 percent (MEPS, 2018). Thus, although PEBB members were incentivized to choose plans with lower premium contributions, the size of the incentive for single coverage in dollar terms was less than $400 per year. Were Oregon's state employees contributing to their premiums at the national rate, the size of the yearly incentive would be four times that amount. In the current context, PEBB administrators have relatively little leverage to encourage large shifts in plan enrollment, and so they had limited ability to effect meaningful change in delivery models between 2015 and 2017.

In addition to the weak incentives for beneficiaries to choose more coordinated plans, over the time of the study the state had yet to give PEBB plans strong incentives to adopt new models. For example, although preferences for PCPCH providers are present in each plan, only some plans require that beneficiaries use them. Second, the global budget faced by each CCO in the Medicaid program is not applied to individual PEBB plans, but to PEBB as a whole. Third, the financial incentives tied to quality of care metrics did not become effective until after the study period. Combined, the preservation of incumbent plans and the lack of strict requirements on approved PEBB plans (relative to the Medicaid CCOs) effectively makes delivery and payment system reform embodied in the CCM available but largely optional for the state employee population. To the extent that this reflects the voluntary nature of the employment relationship and the need to satisfy employee concerns in designing benefits, it may be predictive of the experience in other states that may seek to use their purchasing power to implement plan-level reform in their public employee populations or any population that has other options for obtaining health coverage.

One important caveat for both the claims and survey results is that the plans available to OEBB members were not fixed over the study period and were themselves evolving to include more CCM elements by the fall of 2017, the end of the study period. Moreover, although the use of PCPCH practices was explicitly encouraged in PEBB plans, the growth of PCPCH statewide affected consumers regardless of payer. ***Table E-10*** shows that the use of PCPCH providers, as measured by the share of enrolled months in which a member was attributed to a PCPCH in the pre-CCM and post-CCM periods, grew in both the PEBB and OEBB populations. Thus, OEBB members are a strong comparison group, given the population and level of detail available about

Table E-10. Share of enrolled months in which PEBB and OEBB members were attributed to a patient-centered medical home, 2011–2014 and 2015–2016

Population and year	PEBB	OEBB	OEBB with PS weights
Adults			
2011–2014	26%	23%	25%
2015–2016	48%	51%	55%
Children			
2011–2014	32%	29%	31%
2015–2016	55%	63%	66%

OEBB = Oregon Educators Benefit Board; PEBB = Public Employees Benefit Board; PS = propensity score.

these public sector plans, but they do not represent pure pre-CCM conditions and therefore could bias findings to be more conservative (i.e., not find an effect when there is one). Still, before CCM requirements were implemented in OEBB in the fall of 2017, the state did not consider any of the OEBB plan options (which all existed throughout the study period) to be compliant with the CCM. The most noticeable change may have been the expansion of low-cost, coordinated plan offerings into two new counties, making such plans available in every county. This is a study limitation that we could not address through a different design because the gradual evolution of OEBB, PEBB, and other commercial plans in the state makes it difficult to establish a clean comparison group.

A second caveat is also important for interpreting results from the claims analyses. A standard assumption for D-in-D models is that trends in outcomes during the baseline period are parallel. In these analyses, however, this assumption is often not consistent with the data. There are often statistically significant year-to-year changes in outcomes within each population that although not systematically divergent from one another, still violate the assumption. Since the assumption of parallel trends is essentially the assumption that similar forces were driving outcomes in the PEBB and OEBB groups before the implementation of CCM, a finding of statistically significant differences in pre-CCM trends suggests the presence of different such forces (e.g., unobserved administrative changes in PEBB or OEBB plans, entrance or exit of important providers). Although our empirical specification controls for pre-intervention differences between PEBB and OEBB separately in each year, not knowing the cause of those pre-CCM differences leaves us with uncertainty that significant post-CCM differences are indeed attributable to SIM-related activities rather than unobserved factors. Thus, caution is warranted in interpreting results as evidence of a causal effect of PEBB plans adopting CCM features.

E.3 Discussion

The SIM Initiative in Oregon began in October 2013 and ended 4 years later in May 2017. Oregon's goals were to strengthen and support health care transformation efforts already underway within Medicaid, mainly adoption of the Coordinated Care Model (CCM) by Medicaid Coordinated Care Organizations (CCOs) and to spread major elements of the model to other payers and populations. Key SIM strategies to advance these goals were the launch of the Transformation Center as a hub for learning, stakeholder engagement, and technical assistance to CCOs; expansion of the Patient-Centered Primary Care Home Program (PCPCH); and investments in supporting the state's health care infrastructure, including health information technology (health IT) and data analytics, quality measurement and reporting, population health and prevention efforts, and workforce development. Over the course of the SIM Initiative, Oregon made some progress toward reaching its stated goals, in part because of broad support among state and nonstate stakeholders for health system change, leveraging state health care purchasing and legislative powers, and strategic alignment with other state and federal funding opportunities.

Successful CCM implementation in CCOs and spread of the model beyond Medicaid were at the center of Oregon's SIM Initiative. The Transformation Center played a central role in supporting CCOs in adoption of the CCM by convening learning collaboratives; facilitating networking, learning, and spreading of innovative practices; and providing direct technical assistance on topics such as integration of care among primary, behavioral health, and dental care providers and adoption of alternative payment models. Although state stakeholders considered the Transformation Center instrumental in helping CCOs transform how care was delivered and paid for, some nonstate stakeholders, including some CCO representatives, were less enthusiastic about the center's impact on health care in Oregon, particularly because progress in key areas of care integration and value-based payments varied greatly among CCOs.

Oregon succeeded in spreading the CCM beyond Medicaid by leveraging state purchasing power to implement selected elements of the CCM in health plans offered to state employees and educators, jointly covering an estimated 270,000 individuals as of February 2017, accounting for about 6 percent of the state's population. By March 2017, Oregon reported that 83 percent of the state's providers were engaged by CCOs and that CCOs served 85 percent of all Medicaid enrollees and 54 percent of Medicare-Medicaid enrollees. In addition, the state reported that 97 percent of state employees were enrolled in health plans with CCM features. But plans to spread the CCM further through qualified health plans (QHPs) offered on the state's Health Insurance Marketplace had to be put on hold indefinitely because of technical issues with the Marketplace and ensuing instability of the health insurance market.

Although Oregon made headway in promoting the CCM to state employees and educators, this effort to date has had limited impacts on costs and quality of care. Indeed, Oregon

officials acknowledged that state employee health care costs had increased since implementation of the CCM in 2015, in contrast to the relatively flat cost trend for Oregon commercial plans. Analysis of all payer claims data found that during the first 2 years of CCM implementation in state employee health plans, both primary and specialty care increased relative to the comparison group, as did the rate of screening for substance abuse, but there was no reduction in inpatient or emergency care. In aggregate, spending per member per month increased by 12 percent among adults and 18 percent among children. In surveys conducted before and after the implementation of CCM in the health plans offered through PEBB, state employees reported little change relative to the comparison group in their perceptions of quality, care coordination, and access to care. One potential explanation for the modest results is that relatively few state employees opted to join the new and most coordinated plans, opting instead to remain in the plan with the least restrictive network. That said, even state employees who switched to a coordinated plan reported in focus groups that their experience with health care in their new plan was the same or slightly worse than under their less coordinated pre-2015 health plan.

Expansion of the PCPCH program was considered one of the most successful components of Oregon's SIM Initiative by state and nonstate stakeholders. The number of primary care practices participating in the program increased each year during the SIM Initiative until, as of March 2017, 67 percent of eligible primary care providers were practicing in 659 PCPCH-certified clinics. This exceeded Oregon's goal of certifying 600 practices by the end of the SIM test period. Both a state-commissioned evaluation and a federal evaluation of Oregon's PCPCH program found that primary care visits for patients seen by providers practicing in a PCPCH clinic increased between 2011 and 2014. Findings on the impact of the PCPCH program on health care cost were less conclusive. The state-commissioned analysis found a decrease in total cost of care per a PCPCH patient by 4.2 percent between 2011 and 2014, while this federal evaluation (RTI International, 2018) reported that total cost per person increased in the same period when enrollee compositional shifts brought about by the Affordable Care Act's Medicaid expansion and Marketplace coverage were taken into account.

Oregon's major infrastructure investments in support of the SIM Initiative goals included enhancements to the Oregon Health Authority's data analytics capabilities. These efforts included collecting and analyzing CCO metrics data and producing regular reports on CCO performance. Stakeholders ranging from state officials to CCO leaders, primary care providers, and others almost universally agreed that requiring CCOs to report on a common set of CCO performance metrics helped to drive improvements in care. Oregon also focused on improving health IT, most notably increasing electronic health information exchange among Oregon hospitals and enabling health plans and providers to receive real-time notifications about enrollee use of emergency departments (EDs). Stakeholders generally saw the relatively robust participation of providers and payers in the health information exchange as a major SIM success, and many anecdotally reported that access to the real-time notification of ED use has helped to improve ED patient care and rates of follow-up after discharge. Oregon's SIM Initiative also

funded population health and workforce development efforts, several small pilots and grant projects that tested new approaches to expanding access to specialty health services in rural areas, and coordination across health, housing, and social services.

In addition to the setback spreading the CCM to QHPs, Oregon's SIM Initiative experienced considerable challenges in launching its payment reform efforts. Despite the CCM emphasis and a legislative mandate on adoption of alternative payment models, and targeted technical assistance offered by the Transformation Center, only 35.9 percent of payments CCOs made to providers were not fee-for-service by the end of 2016, falling far short of Oregon's goal that 57 percent of these payments be other than fee-for-service by the end of the SIM Initiative test period. Similarly, the SIM Initiative tried but had not achieved much success in getting a substantial share of Oregon payers, both CCOs and commercial plans, to make additional payments to recognized PCPCHs. Other major challenges over the course of the SIM Initiative included provider struggles in integration of dental health with primary care, provider fatigue from participation in multiple initiatives and lack of consistent metrics alignment across payers, decline in health care leadership and vision in the governor's office, and high turnover at the Oregon Health Authority (OHA) executive level. Finally, only limited progress was made in state efforts to better align care for older people and people with disabilities.

Concurrent with the relatively substantial reach of CCOs and PCPCHs statewide with their overall focus on primary care, measures of health for Oregon adults statewide showed significant changes between 2013 and 2016 using Behavioral Risk Factor Surveillance System survey data (see ***Sub-appendix E-1*** for details on data source and methods). The proportion of survey respondents who self-reported not having a regular doctor declined as did the proportion who reported not having a routine checkup in the past year. Over the same time period, however, more adults reported being obese and having any days of poor mental health in the last 30 days. In addition, the overall number of poor mental health days increased.

CCOs reached 85 percent of Oregon's Medicaid beneficiaries, which may have had an effect on costs and care delivery for Medicaid beneficiaries statewide relative to a group of comparison states after 1 year of SIM Initiative implementation (see ***Sub-appendix E-1*** for a more detailed description of results), although this effect is likely a result of state activities that preceded the SIM Initiative. In particular, as part of its 1115 waiver terms, Oregon Medicaid imposed a spending growth cap on CCOs, and indeed, in federal fiscal year 2014 expenditures for Medicaid-only-insured Oregonians grew at a slower rate relative to the comparison group. Even so, *Medicaid* spending increased for beneficiaries who were also eligible for Medicare, although only 54 percent of Medicaid-Medicare beneficiaries had enrolled in a CCO. Inpatient admission rates, including admissions for ambulatory care sensitive conditions, declined for Oregon Medicaid-only beneficiaries relative to the comparison group, but outpatient ED visit rates increased. The overall rate of physician visits declined for Oregon beneficiaries, but well-child visit rates by 15 months of age improved. In addition, preventive quality of care metrics,

including flu vaccine rates and breast cancer screening rates, improved. These findings support stakeholders' perception that greater performance measurement and reporting among CCOs led to health care improvement. However, antidepressant medication adherence declined in Oregon relative to the comparison group.

Relative to the comparison group, results for statewide measures of costs, utilization and quality of care in Oregon were inconsistent for commercially insured[106] residents and Medicare beneficiaries dually eligible for Medicaid in the 3 years coinciding with SIM Initiative implementation (October 2013 through September 2016) (see ***Sub-Appendix E-1*** for a more detailed description of results). Primary care use increased for commercial plan members in Oregon but declined among Oregon Medicare beneficiaries dually eligible for Medicaid. Both populations showed a relative decline in the rate of inpatient admissions, a desired relative change, but an increase in the rate of ED visits, an undesired relative change. As noted above, similar trends were observed for the Medicaid-only population. Combined, these results suggest that Oregon was successful in reducing acute inpatient utilization across multiple payers, but these outcomes were likely the result of factors beyond SIM Initiative–related activities. The increase outpatient ED visit rate coupled with the decline in the rate of inpatient admissions suggests that fewer people who came to the ED were subsequently admitted to the hospital.

In terms of costs, there was no difference in the change in total per person per month (PMPM) expenditures for commercial plan members in Oregon relative to the comparison group, but total PMPM *Medicare* spending declined for Medicare beneficiaries also eligible for Medicaid. Results for quality of care measures were also mixed among commercial plan members; similar to the findings in the Medicaid population, preventive quality metrics improved but medication management measures declined. Quality of care measures worsened for Medicare beneficiaries dually eligible for Medicaid.[107] Although statewide trends for Oregon's commercially insured and Medicare-Medicaid populations were likely not influenced by the CCM and PCPCH models, the trends show both improvements and declines in costs, utilization, and quality metrics for Oregon relative to a comparison group during the time period coinciding with the SIM Initiative.

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[106] Based on analysis of MarketScan data, a product of Truven Health Analytics LLC, an IBM company, 2011–2016.

[107] Among the commercially insured population statewide, the following quality of care measures improved relative to comparison group states, during the SIM Initiative implementation period: rate of influenza vaccine between October 1 and March 31 and percentage of women age 41–69 years who had a mammogram to screen for breast cancer during the measurement year. Engagement of alcohol and other drug-related treatment, percentage of patients age 5–64 years with persistent asthma who were appropriately prescribed medication during the year; and two measures of antidepressant medication adherence declined. Among beneficiaries dually eligible for Medicare and Medicaid, no quality measures improved relative to comparison group states during the SIM Initiative implementation period. Rate of influenza vaccine between October 1 and March 31 and percentage of patients age 18 years and older seen for a visit who were screened for tobacco use and received cessation counseling if needed both declined.

At the end of the SIM Initiative, Oregon sustained the Transformation Center, the PCPCH program, and quality measurement and reporting activities with funding from OHA's 2017–2019 budget. State officials believed the success of these efforts throughout the SIM Initiative test period warranted their continued existence to further strengthen and broaden the reach of the CCM. Looking ahead, Oregon plans to focus on developing a comprehensive, multi-payer payment reform initiative to improve and align payment methodologies across payers, public and commercial.

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Sub-appendix E-1. Supplementary Results

This sub-appendix contains additional data relevant to Oregon during the SIM Initiative. ***Sections E-1.1*** presents population-level health status data drawn from a statewide survey to offer some context of changes in the overall population health during the period of the SIM Initiative.

Section E-1.2 presents results from analyses of beneficiaries insured by both Medicaid and Medicare, and of the commercially insured population, comparing these populations in Oregon statewide to statewide populations in the comparison group not participating in the SIM Initiative. These analyses test whether the SIM Initiative activities in Oregon offered enough leverage to change the trajectory of utilization and expenditure outcomes throughout different types of populations statewide. This leverage would occur via two primary mechanisms: first, providers likely make changes in care delivery for all patients, not just those participating in a payment model; second, the state built some infrastructure under the SIM Initiative that could assist a range of providers statewide in improving care.

E-1.1 Oregon Population-level Health Status Measures, 2013–2016

The Behavioral Risk Factor Surveillance System (BRFSS) is a state-based survey conducted annually by state health departments, guided by the Centers for Disease Control and Prevention. The survey is used to collect data from U.S. residents 18 and older regarding health insurance coverage, health risk behaviors, health status, and preventive health practices. The data summarized here provide some context to trends in the health of Oregon's population during the time of the SIM Initiative, but which were unlikely to have been affected by Oregon's SIM Initiative activities. Because these survey data draw from all adults in the state, these trends illustrate the context in which Oregon health care providers are working, including those serving the Medicaid and state employee populations. More detail on the methods used is available in ***Appendix G***.

Table E-1-1 summarizes BRFSS data for the time period of the SIM Initiative (2013 and 2016). In general, there are only small (and generally statistically insignificant) changes in the measures we examined.[108] Statistically significant differences between 2013 and 2016 were the following:

- A 7.9 percentage point drop in proportion of adults who reported they do not have health insurance. This is attributable to increased access to Affordable Care Act–supported coverage.

[108] This comparison of changes between 2013 and 2016 controls for the following individual and family characteristics: sex, age, race and ethnicity, educational attainment, marital status, family and household size, employment status, family income, and home ownership).

Table E-1-1. Regression-adjusted changes in population health for adults in Oregon, 2013–2016

Measure	2013	2016	2016–2013 difference
Self-reported health status is fair or poor	13.9%	14.2%	0.3
Any days physical health was not good in last 30 days	37.0%	38.4%	1.4
Number of days physical health was not good in last 30 days	3.6	3.6	0.0
Any days mental health was not good in last 30 days	38.0%	41.0%	3.0**
Number of days mental health was not good in last 30 days	3.7	4.1	0.4**
Ever diagnosed with diabetes	8.3%	8.8%	0.5
Is obese	25.6%	28.0%	2.4**
Current smoker	14.9%	14.9%	0.1
Current smoker who has not tried to quit in last year	6.6%	6.3%	−0.3
Does not have health insurance	16.3%	8.4%	−7.9**
Does not have a personal doctor	23.9%	20.9%	−3.0**
Did not have a routine checkup in the past year	41.5%	35.3%	−6.2**
Did not have a dental visit in the past year[a]	30.6%	29.6%	−1.1

Source: 2013–2016 BRFSS.

Note: The sample size is 5,937 for 2013, 5,429 for 2016, and 21,936 for the 2013–2016 period.

[a] Information on dental visits is not available for 2013; the 2014 measure is used instead.

*/** Significantly different from zero at the 0.10/.05 level, two-tailed test.

- Consistent with a focus on Oregon's delivery system transformation, and wide reach of the Patient-Centered Primary Care Home (PCPCH) model, these data also show significant decreases in the proportion of adult respondents who report lack of a personal doctor (−3 percentage points) or had a routine checkup in the past year (−6.2 percentage points). However, we did not control for health insurance status in these analyses. Because eligibility criteria for Medicaid expanded for low-income adults and the Health Insurance Marketplaces started during this time, it is possible that the improvements in having a personal doctor and routine checkup may also be a result of these or other reforms implemented during this time period.
- An increased number of respondents reported obesity (+2.4 percentage points), an increase in the proportion reporting any days of poor mental health (+3 percentage points), and an overall number of poor mental health days (+0.4 days). These rates of key self-reported diseases showed slightly negative findings. Results should be interpreted with caution, because improved access to care may increase appropriate clinical diagnosis without sufficient time for clinical treatment to improve health.

E-1.2 Oregon Statewide Claims-based Measures

The data summarized here provide some context to trends in the health care utilization and expenditures of Oregon's Medicaid, Medicare, and commercially insured populations relative to similar populations in other states during the time of the SIM Initiative. Under the SIM Initiative, Oregon expanded two delivery models: PCPCHs and the CCM. By the end of the SIM Initiative, the PCPCH model reached 75 percent of the Medicaid population. The CCM model reached 85 percent of the state's Medicaid population, 54 percent of Medicare beneficiaries dually enrolled in Medicare and Medicaid, and 97 percent of the state employee population.

Here we present findings on changes in outcomes for Oregon's overall Medicaid population using Medicaid Analytic eXtract (MAX) files and for the state's commercially insured population using data from MarketScan Research Databases (©2016 from Truven Health Analytics LLC, an IBM Company).[109] For the Medicare population, we used Medicare fee-for-service (FFS) claims for beneficiaries dually enrolled in Medicare and Medicaid.

Below we summarize the findings from difference-in-differences analyses that compared outcomes for Oregon relative to its comparison groups before and after the SIM Initiative was implemented in October 2013. We analyzed Medicaid claims data over 3 years (October 2011 to September 2014) and Medicare and commercial claims data over 5 years (October 2011 to September 2016). Although the analyses use the SIM Initiative implementation start date to divide the analysis period, these findings are intended not as estimates of SIM-related impacts, since the populations studied are at most only incidentally affected by the initiative. The greatest delivery system changes for the Medicaid population in Oregon began before the SIM Initiative as part of the state's Medicaid Section 1115 waiver. Although all populations in Oregon could have been affected by the practice-based PCPCH initiative, this program began in 2011 and has grown steadily over time. Thus, the post period in these analyses could be characterized as one with higher penetration of the PCPCH model relative to the pre-SIM period. In sum, the trends reported here highlight some of the context in which health care providers participating in delivery system and payment models are working and what changes were occurring in health care use and expenditures in the state during the SIM Initiative, whether or not they were directly related to the initiative.

[109] MarketScan Research Databases include data from commercial health plans that choose to participate.

Specifically, we used claims data to derive the following annual outcomes:

- **Care coordination**
  - Percentage of beneficiaries with any physician visits
  - Broken out by primary care and specialty providers for the Medicare-Medicaid and commercially insured populations
  - Percentage of mental illness–related acute inpatient hospital admissions with a mental health follow-up visit within 7 days and 30 days
  - Percentage of acute admissions with a follow-up visit within 14 days
- **Utilization**
  - Inpatient admissions per 1,000 persons
  - Emergency department (ED) visits per 1,000 persons
  - 30-day readmissions per 1,000 discharges
- **Total per member per month expenditures**
- **Quality of care**
  - Rate of hospitalizations for ambulatory care sensitive conditions
  - Flu immunization rates
  - Breast cancer screening rates
  - Well-child visit rates
    - Number by 15 months of age and any for children age 3 to 6 years
  - Initiation and engagement of alcohol and other drug-related treatment
  - Asthma medication management
  - Depression medication management
  - Tobacco screening rates (for Medicare-Medicaid only)

Because of inherent differences in utilization patterns, we examined rates of physician visits, inpatient admissions, ED visits, and 30-day readmissions along with total expenditures separately for children and adults for the Medicaid and commercially insured populations. We also examined inpatient admission and ED visit rates (all cause and behavioral health related) and expenditures (total and behavioral health related) separately for Medicaid beneficiaries and commercial plan members with behavioral health conditions because this high-risk group may use more health care than the overall population. Detailed methods on these analyses are presented in ***Appendix G.***

E-1.2.1 Trends for the Oregon Medicaid population, 2011–2014

We used Medicaid data from the CMS MAX and Alpha-MAX research files made available through the CCW enclave for Oregon and its comparison states (Michigan and Washington). The MAX data contain all the enrollment and claims information for every Medicaid beneficiary in the state. Because beneficiaries dually enrolled in Medicare and Medicaid do not have complete utilization or expenditure data in the Medicaid claims, we report care coordination, utilization, and quality outcomes for beneficiaries enrolled in Medicaid only. We report the total expenditures for those dually enrolled in Medicare and Medicaid and those only enrolled in Medicaid separately.

Findings for care coordination, utilization, expenditures, and quality of care for the Medicaid beneficiaries in Oregon were mixed. Between 2011 and 2014, key statistically significant changes for Oregon Medicaid beneficiaries relative to the comparison group include the following:

- **Primary care use for children generally improved,** with an increase in the percentage of children who had six or more well-child visits by 15 months of age and a decrease in the percentage of children who did not have any well-child visits by 15 months of age.
- **Overall physician visit rates decreased**, driven by a decrease in the physician visit rate among adults. The physician visit rate among children did not significantly change.
- **Inpatient hospital admission rates decreased** for the overall population and for children and adults separately. The rate of hospitalizations for ambulatory care sensitive conditions (avoidable admissions) also decreased for the overall population.
- **ED visit rates increased** overall and for children and adults.
- **Quality of care findings were mixed**. Rates of breast cancer screening and flu immunizations increased, but antidepressant medication management decreased.
- **Expenditures decreased among overall Medicaid beneficiaries and adult Medicaid beneficiaries.** However, these positive findings did not translate to beneficiaries **dually enrolled in Medicare and Medicaid, who experienced increased total expenditures**.
- Among beneficiaries with behavioral health conditions, utilization trends were similar to those in the general population, with **decreased inpatient admissions and behavioral health–related inpatient admissions**, and **increased ED visits.** However, **total expenditures** and **behavioral health–related expenditures both increased**, indicating less success in reducing costs among this subpopulation.

E-1.2.2 Trends for the Oregon commercially insured population, 2011–2016

We used data from MarketScan Research Databases (©2016 from Truven Health Analytics LLC, an IBM Company), to calculate outcomes for the commercially insured population in Oregon and its comparison group (Colorado, Iowa, and Washington). Individuals represented in the database are those age 1 to 64 years who are covered under plan types with a wide variety of delivery and payment types—including FFS, fully and partially capitated plans, and various plan models (such as preferred provider organizations). Although MarketScan is among the largest available data sources for commercial data, the data is a convenience sample of the commercially insured in each state that overrepresents large employers. As such, employer-sponsored insurance is not necessarily accurately represented for each state. Moreover, the sample varies from state to state and year to year depending on which payers choose to participate. In Oregon, the sample size of commercial plan members in the MarketScan data increases from 2011 to 2012, then declines steadily through 2016. In 2011, 24 percent of Oregon's commercial population is included in the sample. In 2012, 30 percent of the commercial population is included in MarketScan, whereas in 2016, only 17 percent of the commercial population is included.[110]

The overall estimated changes in utilization and quality of care outcomes for the commercially insured population in Oregon were mixed, but outcomes for care coordination were consistently positive. Between 2011 and 2016, key statistically significant changes for Oregon commercial plan members relative to the comparison group include the following:

- **Primary care utilization improved among children, adults, and the overall population,** as evidenced by increased percentages of these commercial plan members with any visit to a primary care provider. Additionally, the **percentage of children age 3 to 6 with any well-child visits increased**. However, the percentage of children with six or more well-child visits by 15 months of age decreased and the percentage of children without any well-child visits by 15 months of age increased, suggesting that positive primary care trends did not apply to the youngest commercial plan members.
- Care coordination, as measured by the percentage of acute admissions with a follow-up visit in 14 days, improved.
- Inpatient hospital utilization declined, with a relative decline in rates of all-cause inpatient admissions among adults commercially insured population. Adults and the overall population also had a decrease in the 30-day readmission rate.

[110] The percentage of the state's commercially insured population included in MarketScan data was calculated by taking the total sample size included in MarketScan in the state in the given year over the number of nonelderly (age 0-64) residents in the state covered by employer sponsored insurance as reported in Kaiser State Health facts (https://www.kff.org).

- ED visits increased among children, adults, and the overall commercially insured population.
- **Quality of care was mixed**. Rates of breast cancer screening and flu immunization increased, whereas rates of engagement in alcohol and other drug treatment, asthma medication management, and antidepressant medication management decreased.
- **Total expenditure results were mixed, with decreased expenditures among children, increased expenditures among adults, and no significant change among the overall commercially insured population.**
- Among commercial plan members with behavioral health conditions, we found similar findings to the overall commercially insured population. **Primary care visits increased, all-cause inpatient admissions decreased, and 30-day readmissions decreased.** Contrary to overall population results, **ED visits decreased as well. Behavioral health–related payment decreased.**

E-1.2.3 Trends for the dually enrolled Medicare-Medicaid population, 2011–2016

We used Medicare claims and enrollment data from the CCW to examine trends for beneficiaries dually enrolled in Medicare and Medicaid. These data include complete enrollment and claims data for dually enrolled Medicare-Medicaid FFS beneficiaries for Oregon and its comparison group (Colorado, Iowa, and Washington).

The overall estimated changes in care coordination, utilization, and quality of care outcomes for the Medicare-Medicaid beneficiaries in Oregon were generally negative, although total expenditures did decline. Between 2011 and 2016, key statistically significant changes for Oregon's dual Medicare-Medicaid beneficiaries relative to the comparison group include the following:

- **Primary care provider visits decreased and specialty care provider visits increased**, both of which represent change in the undesired direction for these measures.
- **The percentage of admissions with a follow-up visit within 14 days declined**.
- ED visits increased, while the rate of inpatient admissions saw no significant change. However, the 30-day readmission rate declined.
- **Quality of care results worsened**. Flu immunization and tobacco screening rates both declined.
- Despite the above trends in care coordination, utilization, and quality of care outcomes, **total expenditures decreased**.

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Appendix F: Vermont SIM Initiative Progress and Findings

Vermont SIM Initiative

Award
$45 million

Period of performance
October 1, 2013 – June 30, 2017

Pre-SIM Landscape

Medicaid Managed Care
Through its "Global Commitment" 1115 waiver, Vermont functions as the managed care entity for its Medicaid enrollees.

Health Information Exchange
Established in 2007 through the Office of the National Coordinator for Health Information Technology to support meaningful use.

Patient-Centered Medical Home Model
All major commercial and public payers have participated in Blueprint for Health since 2008.

Green Mountain Care Board
Independent entity tasked with expanding health care reform and moderating costs through regulation, innovation, and evaluation.

Accountable Care Organizations
Two ACOs began full-year participation through the Medicare Shared Savings Program in 2013.

Strategies

Symbols represent strategies that build on efforts that pre-date SIM.

Support practice transformation
Vermont supported providers via innovation grants and learning collaboratives.

Incentivize quality
Vermont implemented a pay-for-performance program to improve quality and better support Blueprint for Health providers financially.

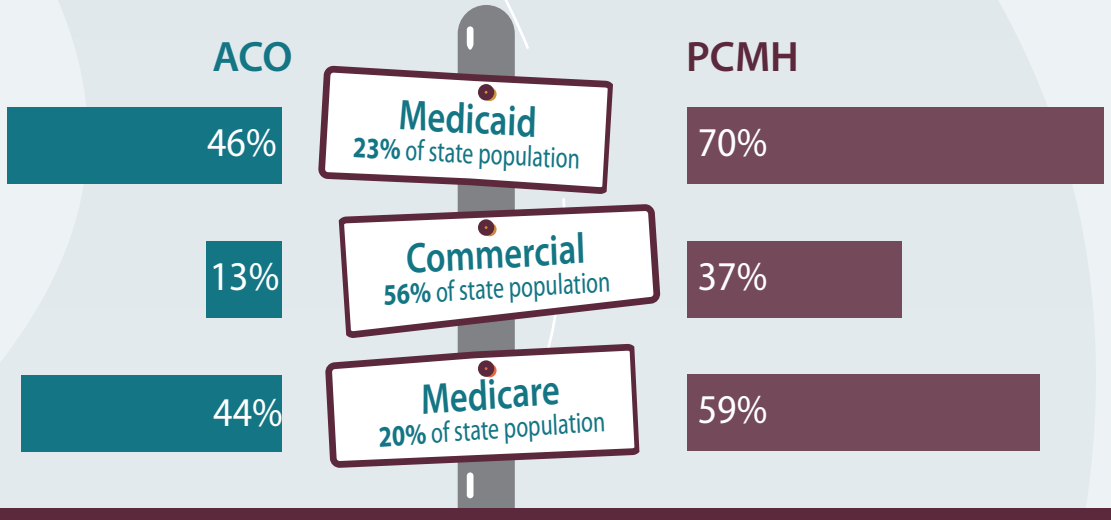
Expand ACO models
Vermont piloted new Shared Savings Programs for its Medicaid and commercially insured populations, that later evolved into an all-payer ACO model.

Strengthen health data infrastructure
Vermont invested in EHR expansion and HIE connectivity and implemented a behavioral health data repository, event notification system, and telehealth pilots.

Reach

as of December 2016

Nearly half (46%) of Vermont's total Medicaid population was served by the state's ACO model.



ACO = accountable care organization; EHR = electronic health record; HIE = health information exchange; PCMH = patient-centered medical home

Impact on Medicaid Population

✅ = Performed better than the CG
❌ = Performed worse than the CG
⚫ = No statistically significant change

Goals

Shared Savings Program

Better Care Coordination

- ✅ Specialty provider visits
  Decreases in specialty care visits could indicate conditions are being managed.
- ⚫ Mental health follow-up visit within 7 days/30 days of mental illness inpatient hospital admission
- ⚫ Primary care provider visits
  The ACO model was expected to increase primary care visits to prevent inappropriate use of higher-cost settings.

Increased Quality of Care

- ✅ Young child developmental screenings
- ⚫ Adolescent well-care visits
- ⚫ Initiation/engagement of treatment after episode of alcohol and other drug dependence

Appropriate Utilization of Services

- ✅ ED visits
  ACOs targeted reducing unnecessary use of the ED to help control costs.
- ✅ Inpatient admissions
- ⚫ 30-day readmissions

Lower Total Spending

- ✅ Inpatient PBPM spending
- ✅ Professional PBPM spending
- ✅ Total PBPM spending
  While total and inpatient facility PBPM spending increased, the increase was lower for Medicaid patients in the Medicaid SSP group than the comparison group.

Improved Population Health

Vermont explored the Accountable Communites for Health model, whch focuses on all patients' health within a geographic area. The state included population health measures in its new All-Payer ACO Model.

Limitations

Because the Medicaid SSP builds on and complements Vermont's strong existing health reform initiatives, including the Blueprint for Health, positive results cannot be attributed solely to ACO and SIM Initiative efforts.

Attributing comparison group providers who participated in the commercial SSP could bias the results to the null. Attributing comparison group providers who chose not to participate in any ACO could bias the results away from the null.

Population changes (e.g., Medicaid expansion) may have affected the Medicaid SSP and comparison groups differently. This was mitigated through propensity score weighting of the samples each year to balance on key characteristics.

Lessons Learned

- ☑ Vermont's efforts were accelerated by the prior foundation of reforms and the existing infrastructure.
- ☑ Wide-scale, state-based reforms require willingness to adapt to evolving priorities and needs.
- ☑ Stakeholder engagement requires significant staff resources and is critical to gaining buy-in and sustaining momentum for reforms.

ACO = accountable care organization; CG = comparison group; ED = emergency department; PBPM = per beneficiary per month; SSP = Shared Savings Program

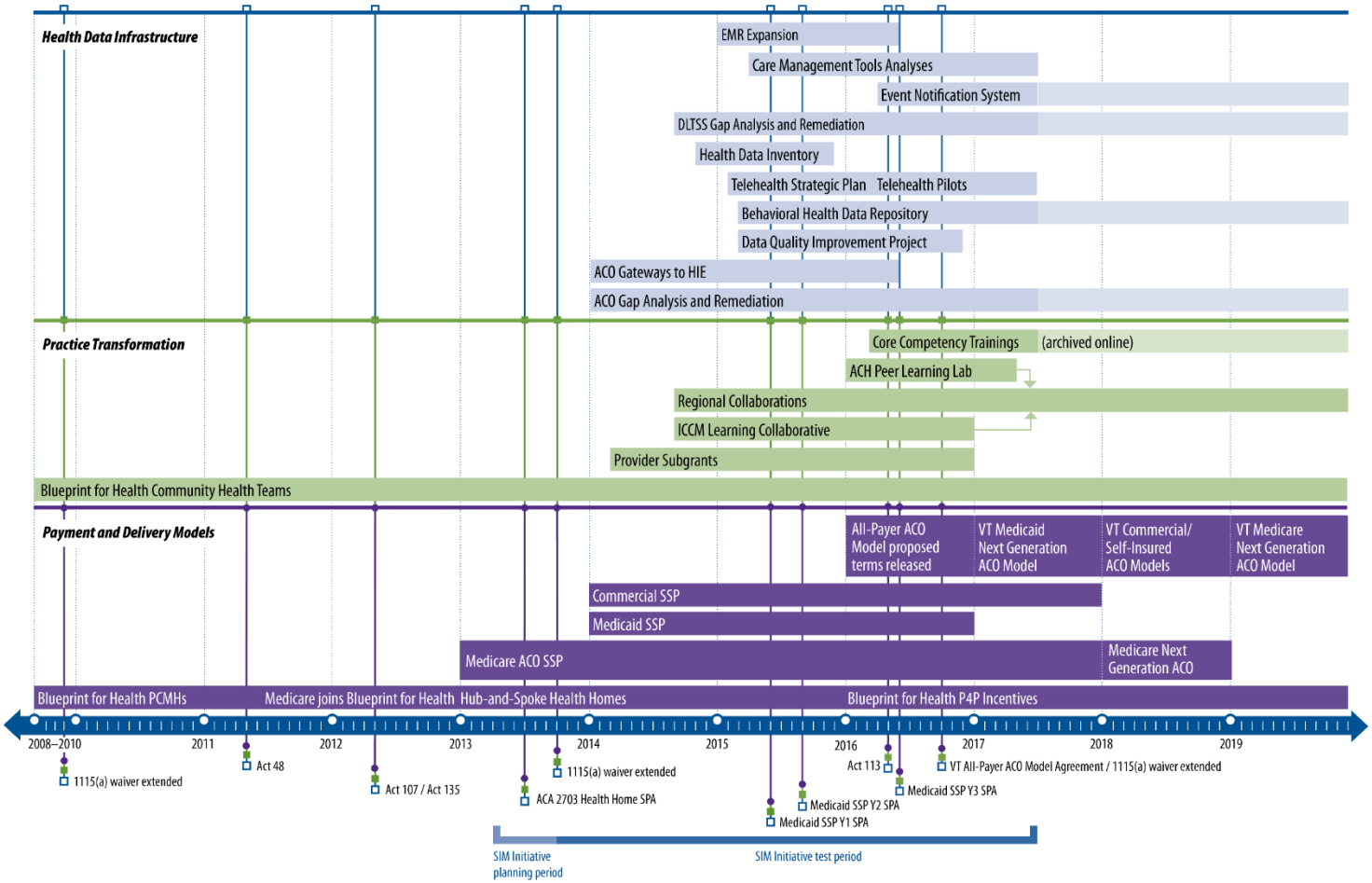
F.1 Vermont SIM Initiative, 2013–2017

Vermont's SIM Initiative test period ran from October 1, 2013, to June 30, 2017.[111] The state's SIM leaders sought to use the award to develop a high-performance health system that achieved full coordination and integration of care throughout a person's lifespan—ensuring better health care, better health, and lower cost for all Vermonters (CMS, 2015). Vermont's SIM Initiative built on the state's ongoing health reform efforts, including the Blueprint for Health patient-centered medical home (PCMH) model and two pieces of legislation passed in 2010 and 2011,[112] respectively, which laid the groundwork for exploration of payment and other reforms to control the rate of growth of health care expenditures in the state. To accomplish its goals, the state focused its SIM efforts on payment and delivery models, practice transformation, and health data infrastructure—including launch of an accountable care organization (ACO) Shared Savings Programs (SSP) for Medicaid and commercial payers, establishment of a series of learning collaboratives for providers, and enhancements to needed technical infrastructure. By the end of the test period, the state entered an ACO-based model for payment and delivery system reform, the Vermont All-Payer ACO Model, which launched in January 2017 with the Vermont Medicaid Next Generation ACO model in four communities.

This appendix section describes the evolution of Vermont's SIM Initiative, known as the Vermont Health Care Innovation Project, beginning with a timeline depicting major health care delivery and payment transformation activities and policies as they pertain to the SIM Initiative (see ***Figure F-1***). The section then provides an overview of the health environment in Vermont leading up to the SIM Initiative. It goes on to describe major activities under the SIM Initiative, followed by a review of the successes, challenges, and lessons learned during the test period. The section ends with a look forward to issues of sustainability and further progress in Vermont's health system transformation. See ***Section F.5*** for a comprehensive list of references.

[111] The SIM Initiative award began with a 6-month planning period, April to September 2013. Vermont received a no-cost extension to its original 3-year test period, from October 2016 to June 2017.
[112] Act 128 of 2010 and Act 48 of 2011 are explained as they relate to the SIM Initiative in ***Section F.1.1***.

Figure F-1. Highlights from Vermont's health care system transformation before, during, and after the SIM Initiative



ACA = Affordable Care Act; ACH = Accountable Communities of Health; ACO = Accountable Care Organization; DLTSS = Disability and Long-Term Services and Support; EMR = Electronic Medical Record; HIE = Health Information Exchange; ICCM = Integrated Communities Care Management Learning Collaborative; P4P = Pay for Performance; PCMHs = Patient-Centered Medical Homes; SIM = State Innovation Models; SPA = State Plan Amendment; SSP = Shared Savings Program; VT = Vermont; Y = Year.

Note: for bars that extend beyond the SIM Initiative test period, darker shading indicates elements continue through ongoing payment and delivery models. Lighter shading indicates continuance through public or private support.

F.1.1. Setting the stage for the SIM Initiative in Vermont

Prior to launch of the SIM Initiative, Vermont had a documented history of nearly two decades of major health reform initiatives. Although some had proven more successful than others, the activities show clear and continual forward momentum toward achieving increased access and improved delivery and quality of care for all Vermonters. In addition to the activities noted below, some distinct features of the Vermont health care market also contribute to its ability to advance health reforms: limited competition between hospitals (Hester, 2018); generally good population health (see ***Sub-appendix F-1*** for more detail); a concentrated private insurance market[113]; low uninsured rate[114]; and small geographic size to enable relationship-building between community-based institutions and state agencies.

Blueprint for Health. The Blueprint for Health, which served as the building block for many of Vermont's health reform activities, was launched in 2003 by Governor Jim Douglas to provide better management of chronic illnesses and to control costs. The initiative was codified in statute in 2006 as part of the Health Care Affordability Act (Act 191), which sought to improve affordability and management of chronic illness for Vermonters (Vermont General Assembly [VGA], 2006). In 2007, the legislature directed the Vermont Blueprint for Health state office to launch a pilot of PCMHs supported by community health teams (CHTs), which worked with the PCMHs to provide care coordination and other supportive services in three regions of the state. To specifically address the needs of the highest cost Medicaid beneficiaries with chronic conditions (top 5 percent), the state also created the Vermont Chronic Care Initiative (VCCI) in 2007, which provides more intensive case management than that of the Blueprint for Health (Department of Vermont Health Access [DVHA], 2015). Act 128 of 2010 required that the Blueprint for Health expand to include at least two PCMHs in each of 14 Blueprint designated health service areas (HSAs) in the state by July 2011 and to include any practice in the state that wanted to participate by October 2013 (VGA, 2010). Primary care practices throughout the state steadily transformed to become PCMHs recognized by the National Committee for Quality Assurance, and CHTs were put in place to support them in all HSAs. CHT extender staff members were added in all HSAs to focus solely on care for older adults and those with special needs through the Support and Services at Home (SASH) program. In 2013, Vermont launched the Hub and Spoke health home initiative under the Blueprint for Health to address issues related to opioid abuse and treatment (Vermont Department of Health, 2015).

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[113] Blue Cross Blue Shield dominates Vermont's private insurance markets with 88 percent of market share for both the individual market and small group market, and 89 percent of the large group market. (Kaiser Family Foundation, 2018b).

[114] Vermont has historically had a low uninsured rate when compared to other states. As of 2016, Vermont had an uninsured rate of 3.7 percent (U.S. Census Bureau, 2017) partially attributed to Vermont's decision to expand Medicaid, high rate of employer-sponsored coverage, and availability of coverage through the health insurance marketplace (Kaiser Family Foundation, 2018a).

Since 2008, all major payers, both commercial and public, have been required to participate financially in the Blueprint for Health. Self-insured employers were not required to participate, although some chose to do so. The state made payments to practices for Medicare beneficiaries,[115] in addition to Medicaid, until Medicare joined the Blueprint for Health as a payer in the Multi-Payer Advanced Primary Care Practice Demonstration in July 2011.

Medicaid 1115 waiver. In 2005, Vermont and CMS reached agreement on a "Global Commitment" Medicaid 1115 waiver that permitted Vermont's Agency of Human Services (AHS) to contract with DVHA to operate as a public managed care-like model on behalf of all Medicaid enrollees in the state (AHS, 2016a). This waiver provided Vermont with operational flexibility in its Medicaid program to advance the state's priorities of health care access, cost containment, system accountability, and quality of care through new payment mechanisms such as capitated payments and funding reimbursements rather than through traditional fee-for-service payments (AHS, 2005).

Medicaid expansion. The most recent expansion of Medicaid eligibility in Vermont occurred in 2014 under authorization from the Patient Protection and Affordable Care Act (ACA), but Vermont had expanded access to public health insurance in several previous iterations. Vermont's Dr. Dynasaur program, which began in 1989, covered uninsured pregnant women and children through age 6. In 1992, Dr. Dynasaur was incorporated into the Medicaid program, which required Dr. Dynasaur to follow Medicaid rules, including the elimination of copays and an expansion of coverage for children up to age 18. In 1998 when the State Child Health Insurance Program was created, Dr. Dynasaur expanded once more to include children with incomes up to 300 percent of the Federal Poverty Level (FPL) (Dr. Dynasaur, n.d.). Health insurance access for the broader population began with the Vermont Health Access Plan (VHAP) (1995–2014) and Catamount Health (2007–2014) (AHS, 2005). The VHAP was a state-run program for the lowest income residents (initially up to 150 percent FPL and later 185 percent FPL) and was similar to traditional Medicaid. Catamount Health, created under Act 70, was designed for lower- to middle-income Vermonters and gave them the option to buy state-subsidized private insurance. In 2014, Vermont expanded Medicaid under the ACA through its health insurance marketplace, Vermont Health Connect, transitioning in the already covered VHAP and Catamount Health individuals plus thousands of new individuals (Vermont Legislature Joint Fiscal Office, 2012).

Health information technology. Vermont Information Technology Leaders, Inc. (VITL) was created in 2005 as a private, nonprofit organization supported by the Vermont Association of Health and Hospital Systems, Vermont Medical Society, and Fletcher Allen Health Care (now University of Vermont Medical Center). VITL's initial focus was sharing patient clinical

[115] This was done by the state for Medicare beneficiaries, not as part of a Medicare waiver.

information, and in 2007 it began its core work to improve electronic health record (EHR) adoption with the launch of the EHR pilot project.[116] As codified under Act 70 of 2007, VITL is designated as the exclusive operator of Vermont's health information exchange (VHIE) (VGA, 2007). The VHIE is statewide and has the capacity to produce care summaries and continuity of care documents; lab and other diagnostic reports; demographics related to admissions, discharges, and transfers; and to pull clinical data from participating EHRs.[117] A telehealth parity law, Act 107, was passed by the Vermont legislature in 2012. Act 107 enabled health coverage for telehealth services delivered to a patient in a health care facility comparable to those provided through in-person consultation (VGA, 2012).

Single payer exploration. In May 2010, the Vermont Legislature passed Act 128, which established broad principles and goals for health reform, and directed the legislature to commission a study of a single payer health care financing system for Vermont (VGA, 2010). In May 2011, Governor Peter Shumlin signed Act 48 to develop a single payer health care system in which all residents receive coverage from a single source (AHS, 2011). However, the system was never implemented.[118]

Green Mountain Care Board. Act 48 (passed in 2011) also created the independent Green Mountain Care Board (GMCB), which is tasked with improving the health of Vermonters and controlling the rate of growth in health care expenditures. Additional GMCB responsibilities included enhancing the patient and health care professional experience of care, recruiting and retaining high-quality health care professionals, and achieving administrative simplification. The GMCB also bears responsibility for review of hospital budgets within the state, giving it unique authority in oversight of payment reform initiatives advanced by any hospital system. A major charge of the Board was (and continues to be) to expand health care payment and delivery system reforms through testing and evaluation.

Accountable care organization model. Two of the three ACOs in Vermont began full year participation in an ACO model through the Medicare SSP in 2013.[119] OneCare Vermont

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[116] VITL continues to offer consulting services to practices for installation and integration of its EHRs (VITL, n.d.; VHCIP, 2016a).

[117] As of January 2017, VITL reports that the VHIE receives 61 percent of available data from Vermont's providers (VITL, 2017). However, because only around 20 percent of Vermonters had been asked to provide consent, only 19 percent of patients' records in 2017 were accessible in VHIE (GMCB, 2017a).

[118] After additional detailed planning for how such a system would operate, and how it would be financed, the single payer model was dismissed in December 2014 because of an estimated 11.5 percent payroll tax for businesses, and up to a 9.5 percent premium assessment for individuals. In addition to economic reasons for the plan's demise, the landscape had changed—the roll out of the ACA health insurance Marketplace was problematic in Vermont, reducing the credibility of the Governor's administration to implement major reform (Mansfield, 2017; Wheaton, 2014).

[119] The third ACO, Community Health Accountable Care (CHAC), began participation in the Medicare SSP in 2014 concurrent with SIM implemented SSPs. CHAC's Medicare SSP network was composed of five FQHCs and the Bi-State Primary Care Association, representing 24 FQHC practice sites and 97 primary care providers, and served

(OneCare) was formed by two academic medical centers, Fletcher Allen Health Care in Vermont (now the University of Vermont Medical Center) and Dartmouth Hitchcock in New Hampshire; OneCare included all employed physicians in both organizations. All 13 of Vermont's hospitals (eight Critical Access Hospitals and five prospective payment system hospitals), including their employed physicians, agreed to participate in OneCare for the Medicare SSP. Additional participants in this ACO included five rural health centers, two federally qualified health centers (FQHCs), the state's only private psychiatric hospital, and 58 provider practices. OneCare initially included about 2,000 physicians and 40,000 Medicare attributed lives. The second Medicare SSP-ACO in Vermont was HealthFirst, also known as the Vermont Collaborative Physicians (VCP) or the Accountable Care Coalition of the Green Mountains (ACCGM).[120] HealthFirst was a much smaller Independent Practice Association-centric ACO, consisting of eight primary care and specialty practices located primarily in Northwest Vermont. The initial number of Medicare attributed lives was estimated at about 6,000 (Vermont Health Care Innovation Project [VHCIP], 2013). Neither OneCare nor HealthFirst earned shared savings in the Medicare SSP—positing that Vermont's starting out with lower costs of care reduced the possibility of achieving savings benchmarks (True, 2014).

F.1.2. Major activities fully or partially supported with SIM funds

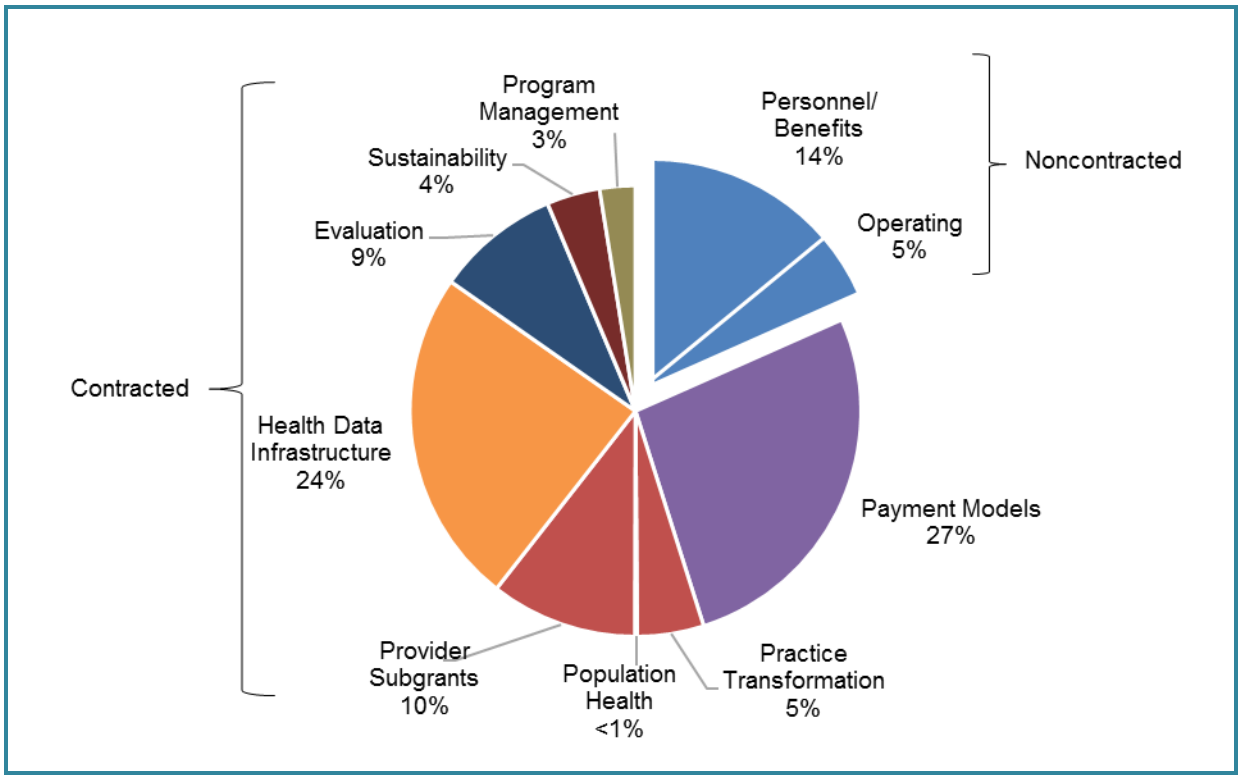
Vermont received a Round 1 SIM Initiative Model Test award of up to $45 million, which both built on existing reform efforts and enabled the state to develop new efforts intended to advance delivery and payment reform. For example, whereas ACOs had already launched into the Medicare SSP, the SIM Initiative enabled Vermont to extend this model to its Medicaid program and to commercial payers. The state's investments in other supporting infrastructure focused on improving connectivity and use of health information technology (health IT) and methods to support practice transformation and increase payment reform readiness—including through strategic efforts to improve coordination across traditional medical and acute care providers, social services providers—including through strategic efforts to improve coordination across traditional providers, social services, and community-based organizations. Vermont emphasized public-private partnerships and stakeholder engagement throughout its planning and implementation activities.

nearly 6,000 Medicare attributed lives. Its Medicaid and commercial SSP networks were more extensive because some FQHCs that aligned with OneCare for the Medicare SSP aligned with CHAC for the SIM implemented SSPs.

[120] HealthFirst is the Independent Practice Association. Its providers created separate ACOs: ACCGM to participate in the Medicare SSP and VCP to participate in the commercial SSP once that was established under the SIM Initiative.

Figure F-2 presents a summary of Vermont's SIM Initiative spending by category, with the chart separation illustrating the budget breakout between noncontracted (Personnel/Benefits = 14 percent; Operating = 5 percent; total = 19 percent) and contracted (81 percent) work. The largest percentage of the budget was allocated for the design and implementation of the payment models (27 percent) followed by health data infrastructure tasks (24 percent).

Figure F-2. Vermont SIM Initiative spending 2013–2017[121]



Source: Vermont State Innovation Models Testing Grant: Performance Period 2 Budget Request (VHCIP, 2015b); Budget to Actuals and Budget Reallocation for PP3 (VHCIP, 2017a).

Then Governor, Peter Shumlin, authorized AHS and the GMCB as joint applicants for the SIM Initiative. Within AHS, DVHA was designated to lead the SIM Initiative. DVHA holds responsibility for all of Vermont's publicly funded health care coverage—including Medicaid and Vermont's health insurance marketplace (Vermont Health Connect)—and programs and initiatives, such as the Blueprint for Health, with an overall mission to "provide leadership for Vermont stakeholders to improve access, quality and cost effectiveness in health care reform."[122]

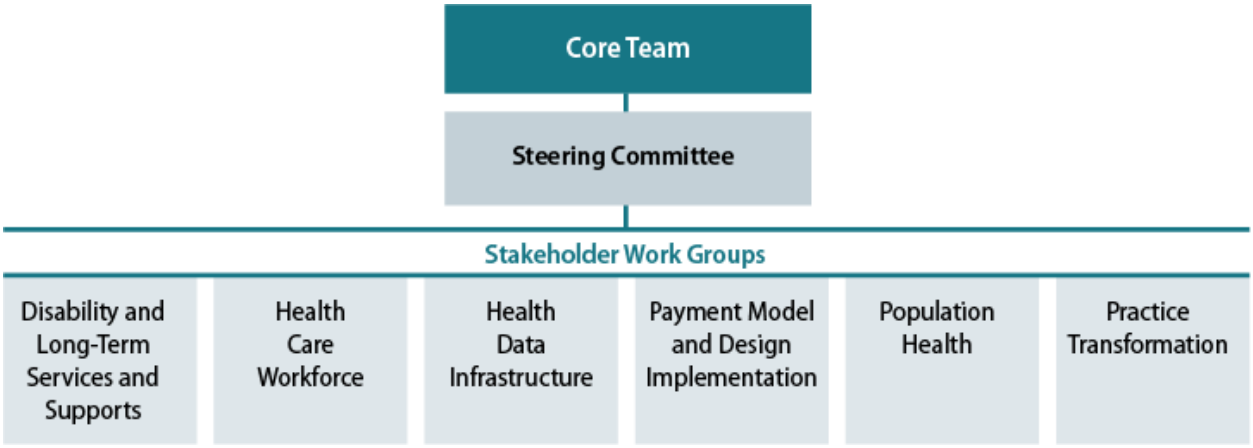
[121] The breakouts in this Vermont budget graphic are more detailed and differ slightly from the corresponding graphic in Chapter 2 of this report, which uses broader categories for cross-state comparison purposes. Personnel/Benefits, Operating, and Program Management in this chart were categorized as Project Management or Operations in Chapter 2; Practice Transformation and Provider Subgrants were categorized as Delivery System Transformation; and Sustainability was categorized as Other (state defined).

[122] From DVHA homepage, http://dvha.vermont.gov/

Given the GMCB's role in evaluating heath reform and managing cost containment efforts in the state, DVHA shared SIM oversight responsibility with the GMCB. Together, DVHA and the GMCB worked on operationalizing the SIM Initiative's payment models, including establishment of necessary regulations, guidelines, and measures. DHVA bore primary responsibility for management and operationalization of other SIM elements, including infrastructure and workforce investments—some of which were contracted out to other entities such as VITL—and management of the SIM Initiative's governance and stakeholder structure.

SIM governance included three parts: a core team with decision-making authority; a steering committee, which advised the core team and whose members participated in various work groups; and a set of topic-specific work groups, comprising a vast array of stakeholders who focused on discrete components of the SIM Initiative (see ***Figure F-3***). The eight-member Core Team was composed of one GMCB member, five state agency representatives (Secretary of Human Services and four Department Commissioners), and two private sector representatives.

Figure F-3. Vermont SIM Initiative governance and stakeholder engagement



Working in the Agency of Administration, the SIM Initiative project director was responsible for day-to-day management and coordination of staff and contractors under the SIM award, reporting to the Core Team on SIM Initiative activities and issues and ensuring that project work was aligned with the strategic direction set by the Core Team. Originally, Vermont established seven work groups (Payment Models, Care Models and Care Management, Health Information Exchange, Health Care Workforce, Disability and Long-Term Services and Supports [LTSS], Quality and Performance Measures, and Population Health). As the work conducted under the SIM Initiative evolved, and Vermont moved from implementation into operation of some of its reforms, the state refined the structure of its engagement, closing the SIM Initiative with six work groups (Disability and LTSS, Health Data Infrastructure, Payment Model and

Design Implementation, Practice Transformation, Population Health, and Health Care Workforce[123]).

In tandem with the SIM Initiative, Vermont had received support for other reform initiatives that also benefited the work accomplished under the SIM Initiative. These included Health Resources and Services Administration investments in broadband, which helped enable rural providers to participate in health IT initiatives

As described earlier, the SIM Initiative built on decades of ongoing multi-payer reforms in the state and continued the state's pattern of evolution and growth of payment reform efforts. More directly, the state's pursuit of shared-savings models and eventual development of the All-Payer ACO Model was a product of Vermont's desire to seek alternative statewide health reform strategies after Governor Shumlin's 2014 withdrawal of the single-payer initiative. Throughout the SIM Initiative, Vermont categorized its work into five major areas:

1. creation and implementation of value-based payment models,
2. practice transformation that supports integrated care delivery and management,
3. improved health data infrastructure to support care delivery,
4. project evaluation to ensure that program goals are being met, and
5. program management to organize activities under the SIM Initiative.

Vermont's primary SIM Initiative focus was on the first area, creation and implementation of value-based payment models, with subsequent activities largely framed around Vermont's goals for payment reform and delivery transformation. Initially Vermont proposed several strategies to achieve these goals including exploration of ACO models, Episodes of Care, and Pay-for-Performance. However, Vermont soon recognized that provider readiness and provider burden were major factors that would enable success or failure of payment reforms. In an effort to mitigate issues with provider fatigue over reforms, Vermont suspended and then discontinued work on proposed Episode of Care (EOC) models and instead concentrated its efforts on the ACO SSPs and strategies to ensure that the SSPs were aligned with other ongoing work in the state, including the Blueprint for Health and other care coordination initiatives.

The SIM Initiative's development of the SSP models and support for the Blueprint for Health eventually led Vermont to develop what is arguably its signature achievement, an All-Payer ACO Model. The All-Payer ACO Model was negotiated and signed during the final year

[123] The Health Care Workforce workgroup was established in statute in 2013 via Executive Order (3 App. V.S.A. ch. 18, § 22).

and a half of the SIM award; 2018 was the first year of full implementation.[124] Brief descriptions of major activities fully or partially funded by the SIM Initiative follow, beginning with delivery system and payment models and the specific infrastructure supporting model participants, followed by activities that reached providers statewide.

Shared Savings Programs/accountable care organizations. In January 2014, Vermont implemented two new SSP models through the SIM Initiative, the Medicaid SSP and the commercial SSP—both one-sided risk ACO payment models, modeled after the Medicare SSP but with some adaptations, including quality measures selected to be appropriate for non-Medicare populations. Under the models, ACOs were eligible to receive a portion of savings if the actual total cost of care was less than the expected total cost of care for an attributed population, and if ACOs met performance expectations on specific quality measures. Both the commercial and Medicaid SSPs were designed as 3-year pilots to be tested during the SIM Initiative test period.

The Medicaid SSP had the furthest reach in Vermont in terms of the percentage of population served (see ***Addendum Table F.1***). As of December 2016, 996 providers participated in the Medicaid SSP, with 67,515 Medicaid covered individuals attributed to an ACO (approximately 46 percent of Vermont's total Medicaid population). Only one commercial payer in the state participated in Vermont's commercial SSP, Blue Cross Blue Shield of Vermont (BCBSVT). BCBSVT's dominant market share in the commercial market (82 percent overall; 86 percent in individual market) positioned it as a significant stakeholder in adopting the commercial SSP, but also imposed a barrier for other payers to garner sufficient attributable lives to participate (Kaiser Family Foundation, 2018b; Vermont Rate Review, 2017). A total of 1,105 providers participated in the commercial SSP, yet only 44,472 individuals (13 percent of the commercially covered population) in the state were attributed to an ACO. The low percentage reached of commercially insured was because only plans in the individual and small group market (approximately 22 percent of the commercially covered population) participated in the commercial SSP program, which left out individuals who receive employer-sponsored coverage through large employers and self-insured plans. This decision was, in part, driven by Vermont's ACO standards work group, which recommended that the commercial SSP program be designed around Vermont's health insurance marketplace, Vermont Health Connect, so that the state could create a "unified marketplace for small group and individual insurance coverage in Vermont" (State of Vermont, 2013). The commercial SSP reach of the commercially covered population *eligible* to participate was 59 percent.

[124] Full implementation of the Medicaid and commercial Vermont All-Payer ACO Model programs began in 2018. Full implementation of the Vermont Medicare ACO Initiative will begin on January 1, 2019.

Vermont had three ACOs participating in the SSPs during the test period, as shown in ***Table F-1***, each with very different provider compositions—OneCare, primarily composed of hospital-based providers and hospital-owned practices; Community Health Accountable Care (CHAC), was composed mostly of FQHCs, rural health clinics, and some CAHs; and VCP, was composed of independent physicians.[125] OneCare and CHAC participated in all three SSPs: Medicare, Medicaid, and commercial. VCP chose not to participate in the Medicaid SSP, based on its ACO experience with the Medicare SSP—noting that current spending was already low and that, because benchmarks would be set based on past performance, the new payment arrangement would disproportionately reward lower performing providers who had more room to improve versus high performing providers who have come closer to maximizing quality and efficiency of their services. In 2016, VCP ceased ACO activities altogether, after completing 3 years in the SIM Initiative commercial SSP.

Table F-1. Vermont ACO participation

	SIM Initiative			
ACO	**Medicare SSP**	**Medicaid SSP**	**Commercial SSP**	**Vermont All-Payer ACO**
OneCare Vermont	2013–2017	2014–2016	2014–2017	Medicaid 2017 pilot; Medicaid 2018–ongoing; commercial 2018–ongoing; Medicare 2018–ongoing
Community Health Accountable Care	2014–2017	2014–2016	2014–2017	Chose not to participate, ceased operations
Vermont Collaborative Physicians	2013–early 2015	Chose not to participate	2014–2016	Chose not to participate, ceased operations

ACO = accountable care organization; SSP = Shared Savings Program; VT = Vermont.

Source: GMCB, 2018.

The commercial SSP program was extended for calendar year 2017, with both CHAC and OneCare continuing. OneCare also transitioned to the Vermont Medicaid Next Generation ACO Pilot in January 2017, as a step toward implementation of the All-Payer ACO Model described in detail below. CHAC ceased all ACO operations following completion of calendar year 2017 participation.

All-payer ACO model. After initial launch of the SSP pilots, some state leaders and stakeholders began to recognize that, rather than different payment models and ACO networks, their small state could benefit from development of a more unified payment and delivery model, in the tradition of the Blueprint for Health and past multi-payer reform initiatives in Vermont. In accordance with this thinking, the state began to explore evolution of its efforts into an all-payer

[125] Because ACO launch and participation varied by SSP, ACO composition varied slightly by SSP (e.g., a provider might align with VCP for the commercial SSP and with CHAC for the Medicaid SSP).

model in 2015. In January 2016, Vermont began to engage with CMS leadership at the Innovation Center on design of the All-Payer ACO Model. In tandem, Vermont coordinated with Medicaid officials to ensure that renewal of its "Global Commitment Medicaid 1115" waiver (which was due to expire in December 2016) would align with its goals for the All-Payer ACO Model. In April 2016, Vermont issued a request for proposals to solicit participation in a Vermont Medicaid Next Generation ACO program, meant to be the first phase of the Model. In May 2016, the Governor signed Act 113, which instructed the GMCB to create a regulatory and certification system for ACOs (VGA, 2016). CMS and Vermont reached an agreement on the All-Payer ACO Model in October 2016, and Vermont entered into a contract with OneCare to become a Vermont Medicaid Next Generation ACO in February 2017 (GMCB, 2016), with implementation beginning in January 2017.

The All-Payer ACO Model features population-based payments for attributed lives paid by each payer to a risk-bearing ACO, although the exact nature of payments varies by payer type. [126] The idea behind this financial structure is to shift some of the stake in patient outcomes from insurers to providers.[127] As rollout of the Medicaid pilot occurred in 2017 (with expanded Medicaid implementation in 2018), Vermont continued its pre-implementation efforts of the Model for commercial and Medicare programs, which began in 2018 (see Section F.1.4, *Anticipated Long-Term Changes*, for post-SIM progress).[128]

Blueprint for Health/pay-for-performance incentives. Although the Blueprint for Health was not directly financed through SIM Initiative investments, many of Vermont's investments in practice transformation activities directly supported Blueprint for Health providers. Additionally, Blueprint leadership was engaged in Vermont's SSP and eventual All-Payer ACO Model development. Responding to provider fatigue and stakeholder confusion over the ultimate direction of Vermont's reform efforts, Vermont concentrated efforts on aligning its two major models, the Blueprint for Health and the ACO SSPs, to make them complementary rather than competitive. As discussed below, Regional Collaborations across the state included Blueprint and ACO representatives among the medical providers and social service participants in those collaboratives. To improve quality and better support providers financially, the Blueprint for Health implemented a pay for performance (P4P) program in 2016—with P4P quality measures selected to align with those used in the SIM Initiative ACO SSPs to reduce provider burden and ensure consistency and coordination across all payment methods. Alignment also

[126] There are currently two commercial programs within the Vermont All-Payer ACO Model, one of which is a one-sided risk SSP that does not include population-based payments.
[127] The Vermont All-Payer ACO Model is considered an Advanced Alternative Payment Model for the providers in the two-sided risk Medicare ACO portion of the model within CMS' Quality Payment Program. Physicians and clinicians participating in the Vermont Medicare ACO Initiative may potentially qualify for the Advanced Alternative Payment Model bonus payments. For more information on this program, visit: https://qpp.cms.gov/
[128] In 2018 only, OneCare is participating in the Medicare Next Generation ACO program, which is considered a Scale Target ACO Initiative under the Vermont All-Payer ACO Model agreement. In 2019, OneCare will participate in the Vermont Medicare ACO Initiative.

enabled Vermont to achieve greater efficiency in building unified infrastructure that can serve both programs, whether through technology like the VHIE, or through other resources tailored toward participating providers.

Medicaid pathway. As Vermont was planning its All-Payer ACO Model, it recognized the need for a strategy to integrate services and providers from across the continuum of care—especially those not participating in an ACO—into alternative payment models. Targeted services and providers included disability and long-term services and supports (DLTSS), mental health, substance disorder treatment, and disability services. To that end, AHS and the Agency of Administration launched in Fall 2015 the Medicaid Pathway project, a planning and systematic review process for "payment models and delivery system expectations across AHS and Medicaid" (AHS, 2016b; VHCIP, 2016b).

These efforts were further strengthened in 2016 with the passage of Act 113, which required AHS to create a process for payment and delivery system reform for additional Medicaid providers and services.[129] Vermont contracted with Burns & Associates, Inc. to develop and evaluate alternative payment models specific to Vermont's designated agencies (DAs), nonprofit providers designated by the Department of Mental Health to provide mental health programs to specified regions in the state, and specialized service agencies (SSAs), agencies designated by the Department of Disabilities, Aging, and Independent Living that provide developmental disabilities services and may operate in more than one geographic area in the state (Burns, 2017; VDDAIL, n.d.). In January 2017, Vermont began an internal review process in coordination with the newly elected Governor's Administration to determine how the Medicaid Pathway could align with the Administration's priorities for the state.

Learning collaboratives and regional collaborations. To support practice transformation, Vermont funded three community-level collaborative programs, each tailored toward supporting adoption of different payment or delivery system models. The Integrated Communities Care Management Learning Collaborative (ICCMLC), launched in late 2014, sought to improve team-based care coordination and communication across health care and social services providers serving individuals with complex health care needs. Community-based teams worked together to identify complex individuals, assess their needs relative to a variety of medical and social determinant of health-related needs, and develop tools and interventions, such as shared care plans, to facilitate communication and coordination across a care team. Following

[129] Section 11 of Act 113 of 2016 required AHS to develop a report for the Vermont Legislature regarding designated agencies (DAs). The law requires that the report contain a plan developed in conjunction with the Vermont Health Care Innovation Project to implement a value-based payment methodology for DAs, specialized service agencies, and preferred providers. Section 12 established the Medicaid Pathway by requiring the Secretary of Human services to create a process for payment and delivery system reform for Medicaid providers and services that addresses all Medicaid payments to affected providers and integrate the providers to the extent practicable into the all-payer model and other existing payment and delivery system reform initiatives (VGA, 2016).

expansion of the ICCMLC to additional communities, the ICCMLC curriculum was augmented with a skills-based Core Competency training series. This training for frontline staff provided resources for care coordination and disability awareness. The trainings were made available to 240 participants statewide through in-person sessions and trainings with web-based content, with all associated curriculum posted on the SIM Initiative website to enable further dissemination. The Regional Collaborations, as noted, enabled Blueprint for Health and ACO leadership in each of Vermont's 14 HSAs to join with local medical and nonmedical providers to target local quality improvement needs and develop strategies for addressing them. Through its Population Health work group, Vermont also explored the Accountable Communities for Health (ACH) model, in which the ACH aligns programs and strategies related to integrated care and services for individuals with community-wide prevention efforts to improve health outcomes within a geographic community, rather than a narrowly defined specific group (e.g., a group defined by specific demographic or disease characteristics). In 2015, the SIM Initiative funded a report titled "Accountable Communities for Health: Opportunities and Recommendations," which profiled ACH models across the country and sites and programs within Vermont whose activities could align with an ACH model (Prevention Institute, 2015). In the following year, it launched the ACH Peer Learning Lab to provide statewide support for providers and community groups interested in pursuing an ACH model. Late in the test period, Vermont integrated the ICCMLC and ACH Peer Learning Lab into the Regional Collaborations for post-SIM sustainability as well as to move toward greater alignment between initiatives ongoing in the state.

Provider subgrants. To foster provider innovation, Vermont's SIM Initiative awarded 14 provider subgrants, totaling nearly $5 million, which supported more than 14,000 Vermont providers in practice transformation, affecting more than 300,000 Vermonters. The subgrants focused on payment and delivery system changes, frequently at a local level, and covered a broad range of topics:

- ACO infrastructure support—the two smaller ACOs used these subgrants for activities such as establishment of ACO governance structures, support for care management trainings, installation of event notification system, and capacity building to conduct quality monitoring and reporting;
- high health care utilizers—projects included health coaches working with a Medicare-Medicaid dually eligible population on chronic disease self-management skills, team-based care to reduce ED visits for at-risk patients, a planning initiative to identify barriers to care for developmentally disabled adults, and two care coordination pilots, one bridging inpatient palliative care and hospice and another focused on improving transitions within a hospital health care system;
- screening and intervention—projects included behavioral health screenings and short-term treatment services at an FQHC and a local employer's worksite;
- health system performance—these projects included elimination of unnecessary laboratory tests for low-risk candidates and data analysis on surgical outcomes; and

- community-wide public health approach—this project supported wellness efforts to reduce obesity by encouraging healthy eating and physical activity.

Vermont conducted three provider subgrant symposiums to enable grantees to introduce programs, share progress to date, and discuss lessons learned (VHCIP, 2015a). Subgrantees submitted interim reports and final reports, which are posted on Vermont's SIM Initiative website (VHCIP, 2018).

Connectivity to the VHIE and data repositories. One of Vermont's major health IT goals under the SIM Initiative was to enhance connectivity in its health data source systems. The systems initially encompassed the VHIE and the state's central registry, DocSite (now known as Covisint), a clinical registry that stores information on wellness assessments, encounter notes, and clinical information. The state focused on ACO connectivity first, beginning in January 2014, to enable data exchanges needed for the ACO SSPs. VITL, as the state's lead health IT contractor, played a major role in multiple ACO-related projects, including gap analysis to identify HIE connectivity issues, gap remediation, HIE data extraction gateways for each ACO, and data quality improvements to make the HIE data more useful for ACOs. The SIM Initiative also funded a second gap analysis and gap remediation project for the DLTSS community, through which Vermont assessed home health agencies' capacity to connect to the VHIE and implemented solutions to improve their connectivity. Moreover, the DLTSS gap work led to creation of the Vermont Care Partners Data Repository, which supports the data exchange of mental health and substance abuse data outside the VHIE by the state's DAs and SSAs.

Electronic health record expansion. Vermont SIM funds also supported acquisition of EHR systems by providers not participating in Medicare or Medicaid EHR incentive programs, including five SSAs and the Department of Mental Health's state psychiatric hospital.

Event notification system and other care management tools. In April 2016, Vermont launched the PatientPing event notification system. PatientPing provided admission, discharge, and transfer data to participating providers, with their costs subsidized by SIM funding until the SIM Initiative ended in June 2017. As of that date, Vermont reported the participating provider count as one ACO (CHAC), all 14 Vermont hospitals and Dartmouth-Hitchcock Medical Center in New Hampshire, nine Home Health Agencies and Visiting Nurse Associations, 16 skilled nursing facilities, the entire SASH program, and more than 250 individual practices (VHCIP, 2017e). The Universal Transfer Protocol (UTP) project aimed to provide standardized data on patients with complex, chronic, or long-term needs to all relevant partners across the health care continuum involved in supporting the patient's goals and improving quality of life. To promote implementation, the UTP project moved to the ICCMLC.

Other health IT and data infrastructure activities. Beginning in 2014, Vermont's SIM Initiative supported statewide planning via a health data inventory, an HIE planning project, and work group input on the state health IT plan. SIM funding also supported a telehealth strategy

report in 2015 and two telehealth pilots that launched in late 2016. One pilot featured telehealth technology to facilitate medication-assisted treatment for patients with opioid dependence. The other involved a visiting nurse organization connecting its telemonitoring system into EHRs so that relevant data (e.g., patient vitals, metrics related to patients' complex health conditions) could be transferred into the VHIE—enabling the sharing of clinical information between the home health team, primary care physicians, and other network providers.

F.1.3. How Vermont's SIM Initiative changed state health policy: successes, challenges, and lessons learned

The Vermont SIM Initiative tested the ACO model as a mechanism for improving health and health care delivery, lowering costs, and accelerating the state's evolution of multi-payer payment reform and delivery system transformation. While the model achieved numerous successes, there were also inevitable challenges and important lessons learned. This section reviews the SIM Initiative's successes, challenges, and lessons learned during the test period.

Box 1: Consumer Perspective

Almost all consumers participating in our test period focus groups (Medicaid and Medicare-Medicaid enrollees) reported having a good relationship with their provider. Consumers mentioned that their doctors know exactly who they are, will listen to them, are patient and do not rush them, are attentive, are thorough, know the medications they are on, and explain different treatment options.

"…they care about you, they're interested in you as a person."

Successes

SIM Initiative ACO SSPs advanced and accelerated payment and delivery reform. Vermont's signature achievements under the SIM Initiative were its efforts to advance payment and delivery reforms in the state, primarily through the ACO SSPs. Although Vermont had a strong foundation of payment model reform through its multi-payer Blueprint for Health and ACO participation in the Medicare SSP, the SIM Initiative brought Medicaid and Vermont's dominant commercial payer, BCBSVT, firmly into a shared-savings structure. This work also brought new providers and provider types into shared savings—including independent practices, FQHCs, home health, and mental health providers. Implementation of the ACO SSPs equipped Vermont with valuable insight on how to structure risk, incentives, and measurement—lessons applied as Vermont has evolved its SSP models into the All-Payer ACO Model. Specifically, the SSPs enabled transition from one-sided to two-sided risk in the Vermont Medicaid Next Generation ACO program, adopted by OneCare in 2017, and in the parallel commercial and Medicare programs. Moreover, although not all providers who participated in Vermont's ACOs will move forward with participating in the All-Payer ACO Model, some may look to draw on infrastructure investments and lessons learned from SIM efforts to explore participation in or implementation of other alternative payment models better suited to their provider and patient composition.

Participating Medicaid SSP ACOs achieved modest savings and quality improvements. In 2014, the initial test year, Vermont reported that its Medicaid SSP achieved $14.6 million in total savings for the program—with both participating ACOs earning shared savings. In 2015, CHAC again earned shared savings, although at a lower rate; OneCare did not. In 2016, the final year of the Medicaid SSP, neither CHAC nor OneCare earned shared savings.[130] Although actual savings decreased each year, the state reported that quality scores for both ACOs increased annually from 2014 to 2016. State-reported Medicaid savings early in implementation were notable, especially considering initial concerns over the ability of the state to achieve savings in Medicaid, a program with known lower reimbursement rates. The lack of sustained shared savings, as noted, may have influenced CHAC's decision to cease operations altogether rather than transition to the All-Payer ACO Model. One state official commented on potential financial concerns facing CHAC because of ongoing uncertainty[131] over the fate of federal funding for FQHCs, CHAC's primary provider group, suggesting that this especially prohibited CHAC's participation in a risk-bearing model at that time. The analysis of the Medicaid SSP's impact relative to other Vermont non-SSP Medicaid providers presented in ***Section F.2*** also supports positive findings related to specific utilization, expenditure, and quality measures, including statistically significant decreases in emergency department visits that lead to inpatient hospitalizations and in professional expenditures and smaller increases in inpatient admissions, total expenditures, and inpatient facility expenditures.

Vermont integrated and aligned its health reform efforts to support providers. Although Vermont's longstanding commitment to multi-payer health reform assists providers in making care delivery changes for all patients, early in SIM implementation stakeholders had expressed confusion over the interaction between Vermont's existing payment reform efforts—namely, the Blueprint for Health—and the new ACO models the state intended to advance under the SIM Initiative. Concerns included the consequences of potential competition between the initiatives, both of which aimed to "own" care management and population health aspects of patient care in the state. To support providers and address these concerns, state leaders engaged in a deliberative process to ensure coordination between the Blueprint and ACO models. At the state level this process was driven in good part by both AHS and the GMCB leadership, which could aid in alignment of goals, definitions, and regulatory requirements—especially between the Blueprint for Health and the All-Payer ACO Model. The process was also driven, however, by conversations among Vermont's SIM Initiative work groups to develop measure sets for the ACO programs that could align as much as possible across programs and payers while also serving productive goals for achievement of improved quality of care at lower cost. As one ACO representative put it, "we have seen movement on quality measures that I can only attribute to

[130] CHAC achieved savings in Year 3 but did not receive them because it did not reach the 2 percent minimum savings rate required for the Medicaid SSP (GMCB, 2017b).
[131] In September 2017, Congress let lapse federal funding for FQHCs, putting into question the financial future of FQHCs, which are dependent on federal outlays to fund their centers. Funding was reinstated in February 2018.

ACO work. I don't think it would have been on their radar [otherwise]." At the local level, alignment was further strengthened through Blueprint for Health and ACO representation on the Regional Collaborations in each of the 14 HSAs.

Strong stakeholder engagement improved care coordination across delivery system "silos." Another key achievement under the SIM Initiative was the success Vermont attained in enabling connections and coordination among providers across the continuum of care, including primary care, specialists, and social services providers. As noted by a behavioral health provider, "I think the SIM grant has leveled that playing field a lot more than it was, giving voice to entire delivery systems as opposed to siloed care delivery."

Box 2: Stakeholder Perspectives

Work group participation: *"We were able to have a DLTSS work group that had members in other work groups so they were able to influence conversation on information technology, finance, practice transformation and training. I think it had an impact."*

Core Competency and Disability Awareness Trainings: *"…we learned most providers felt they didn't have time for long talks and would be happy to go online … in 10-minute increments to learn about the disability core competencies. …we got really positive feedback from the training. …surprised to the degree people had been feeling anxiety when working with our population and needed basic information."*

The improved coordination was spurred, in part, by the SIM Initiative's acceleration of ACO models. Whereas Vermont's Blueprint for Health focused primarily on primary care providers, the ACO models required greater coordination and integration of providers across the participating health systems beyond primary care. However, while implementation of the SSPs drove the necessity of coordination to meet designated targets and savings, several stakeholders across sectors confirmed that it was Vermont's dedicated investments in infrastructure development, practice transformation support, and provider engagement that led to some of the most significant changes in the state. The latter two investments, in particular, increased exposure of providers to other provider types and community resources, which has opened new relationships and communication channels statewide. For example, a state official noted anecdotal evidence of an increase in ad hoc communications between hospitals and primary care locations across the state. The Regional Collaborations, as noted, also enabled coordination of care across Vermont's health service providers involved in the Blueprint for Health and the ACOs. The ICCMLC especially facilitated these relationships through its engagement of diverse providers and agencies—from hospitals to food banks, mental health agencies, and housing agencies.

Vermont's SIM Initiative enhanced capacity within state agencies to promote change and work across agencies. One achievement state agency leaders highlighted was that the SIM Initiative expanded the capacity within state agencies and staff to engage fully in payment reform models in the state. This expansion led to the development of new skill sets and knowledge bases that could be leveraged to enable the state to rapidly and competently move toward

implementation of statewide, sustained delivery system and payment reform efforts. Work on the SIM Initiative exposed state agencies to new connections and resources that, in turn, could translate into more holistic coordinated care models within the state. New communication channels now exist among such agencies as the state's Medicaid agency, the Department of Mental Health, and the Department of Corrections fostered through the relationships developed between agency individuals participating in Vermont's various work groups and collaboratives initiated under the SIM initiative. There is also more deliberate coordination across quality initiatives and discussion of how other agencies can leverage tools developed by their peer agencies, such as health needs assessments and the State Health Improvement Plan. According to one state official, "I think of the world differently because of [the] SIM [Initiative]. … I think about trying to create the Medicaid program where Door 1 (fee-for-service) is the wrong door, and Door 2 is value-based alignment with SIM [efforts]. … Vermont only had the sophistication to make these arguments to Medicaid because of [the] SIM [Initiative]."

SIM funding accelerated and increased adoption and utilization of health IT and data infrastructure. One of Vermont's most significant investment areas was in health IT. Prior to the SIM Initiative, Vermont had laid significant groundwork for health IT, mainly through development of its VHIE. Investment in additional IT infrastructure related to the SSPs supported enhanced data sharing, alignment, and utilization by participating providers. These health IT investments also catalyzed alignment and transfer of data among Vermont's payment programs, such as the Blueprint for Health and the SSPs, for tracking of quality and patient data across programs and providers, enabling improved coordination of patient care and understanding of quality metrics. Furthermore, investments in assessments of infrastructure needs and "gaps" in IT systems equipped Vermont with an improved understanding of where lack of IT infrastructure prohibited optimal coordination across delivery systems and how to target future health IT investments. As described by one state official, "we achieved a greater appreciation for what we needed our technology to give us." Examples of knowledge gaps addressed included an increased understanding in the state of the health IT needs of specialty and community providers, including those focused on behavioral health. This Vermont official also described increased understanding in the state of the importance of data in enabling providers and payers to move forward with value-based payment initiatives.

Challenges

Differing priorities and requirements still inhibit achievement of aligned payment models. Although Vermont has taken meaningful steps toward aligning payment models across its payers—including Medicaid, commercial, and Medicare—certain realities may hinder implementation of a fully aligned payment model. Practically speaking, the health care system is segmented on a number of dimensions: (1) payer and provider population demographics (e.g., providers serving a higher proportion of children within Medicaid or a higher proportion of older patients within Medicare); (2) federal and state requirements on payers (e.g., different benefit

design requirements and reimbursement structures for those benefits); and (3) overall focus areas for targeting future reforms—often tied to the aforementioned differences in patient demographics and payer and provider requirements. These variations require some differentiation in how payment models are applied across payers—as was borne out in variations in SSP ACO implementation between commercial and Medicaid payers (e.g., differences in cost targets and slight differences in quality measures) and across the three ACOs participating in the models.

Lack of regulatory authority and scale impeded Vermont's ability to fully engage commercial payers and self-funded plans in alternative payment models. BCBSVT was a strong and willing participant in Vermont's reform efforts. However, its dominance in Vermont's commercial market meant that other interested commercial payers, such as MVP Health Care, were unable to draw sufficient attributable populations to participate in Vermont's commercial SSP. MVP continued its involvement in SIM work groups, but missed the opportunity of learning from the commercial SSP as an interim step toward potential All-Payer ACO Model participation. Furthermore, while Vermont has shown some progress in engaging employer sponsored and self-funded plans in conversations over these models (e.g., UVM Medical Center will participate in the All-Payer ACO Model as a self-funded plan), lack of state authority to mandate participation in alternative payment models by these plans may prohibit Vermont's ability to realize all-payer statewide reforms.

Because the state, through its Medicaid waiver, operates as a managed care-like entity for its Medicaid population, Vermont had a stronger starting position with its Medicaid SSP as compared to the commercial SSP. Specifically, Vermont had a larger Medicaid population eligible for ACO attribution and pre-period claims data for that population on which cost targets could be set, pre-period trends or areas for improvement could be identified, and Year 1 test period SSP measures could be calculated. In contrast, the commercial SSP-eligible population comprised individuals in the health insurance Marketplace plans. Because these plans were new and coverage had changed from previously offered plans, individuals in the commercial SSP did not have pre-period claims data either that the state could use for setting commercial SSP cost targets or that could be linked to SIM SSP test period claims. This lack of pre-period data inhibited the commercial SSP ACOs from understanding the baseline levels of their population and the state's analytics contractor from calculating some Year 1 measures that required a look-back period. Further, cost targets for the commercial SSP needed to be constructed based on premiums for the first 2 years. None of the three participating ACOs in the commercial SSP earned shared savings in any year throughout the SIM Initiative, which may have been due in part to misaligned cost targets for this new commercially insured population. The end effect was that Vermont made greater advances within its Medicaid SSP during the SIM Initiative, enabling an earlier transition to the All-Payer ACO Model for the Medicaid program. Although the commercial SSP provided the state, BCBSVT as the payer, and the ACOs with initial experience

needed for an ACO model of payment and delivery reform, its SSP reach and design will need to change more than did the Medicaid SSP in its transition to the All-Payer ACO Model.

Health IT adoption has spread, although challenges to sustainability and further spread remain. As described earlier, the SIM Initiative did help catalyze health IT adoption by providers across the care continuum. However, concerns remain over the ongoing sustainability of health IT investments. As one stakeholder described, technology changes rapidly and requires continual investment to keep up. Most of SIM's health IT work constituted one-time investments, and it is unclear how additional development will be financed. At particular risk are providers that are not eligible for the Medicare or Medicaid EHR Incentive Program, but are described as "essential to creating change and innovation across the spectrum of Vermont providers who do not have EHRs" (VHCIP, 2017d).[132] Additionally, multiple data systems and lack of interoperability still impede the realization of data exchange. ACOs at the organization level were supportive of SIM investments in the VHIE and their ability to use it for health care analytics. As expressed in provider focus groups, however, individual providers opted to stay within their network's EHR system rather than separately accessing the VHIE, noting the time and effort needed for accessing multiple systems. The completeness and usability of VHIE data is also an issue. In a recent state-funded VHIE evaluation, 91 percent of respondents believed that the VHIE was critical for Vermont, but only 19 percent responded that it was meeting the needs of their organization. That study noted Vermont has an opt-in policy for consent and because only approximately 20 percent of Vermonters were asked to provide consent, only 19 percent of patient records in VHIE are accessible (GMCB, 2017a).

Lessons learned

Wide-scale, state-based reforms require willingness to adapt to evolving priorities and needs. Although Vermont outlined an ambitious plan for statewide reforms under the SIM Initiative, in practice, the state recognized quickly a need to be nimble and adaptive as it confronted challenges and operational realities that impacted rollout of its planned reforms. For instance, early in SIM planning Vermont explored implementation of EOC payment models and Medicaid pay-for-performance models, in addition to implementation of its ACO SSP models. However, as reforms in the latter program moved forward, concerns grew over development of a consensus structure for EOC and potential provider burnout over implementation of yet another major payment reform on top of other changes. In response to these concerns, Vermont integrated its pay-for-performance efforts into the Blueprint for Health's P4P, ultimately decided to end the EOC program, and focused on ensuring more productive development of its ACOs and eventual All-Payer ACO Model. As one state official summarized this strategic reassessment, "People want to shift to population-based payment, and EOC wasn't a logical stepping stone." Similarly, it was not until Vermont began implementation of its payment models

[132] For additional information, see Vermont's November 2016 State Medicaid Health Information Technology Plan: http://healthdata.vermont.gov/sites/healthdata/files/VERMONTSMHP14Nov2016.pdf

that deficiencies in the capacity of its providers to fully adopt changes could be clearly identified. Acknowledgment of these issues led Vermont to more strategically invest in gap assessments and workforce supports that could more effectively catalyze change.

Vermont's efforts were accelerated by the prior foundation of reforms and infrastructure existing in the state. As already described, Vermont had a long and rich history of implementing reforms prior to receipt of the SIM award, which provided the state with an important foundation from which to build and accelerate reforms. Key pieces of this foundation included the existence of major payment reform initiatives in the state prior to the SIM Initiative, including the Blueprint for Health and Medicare SSP, and prior investments in health IT. The SIM Initiative investments enabled Vermont to build on this work so that the SIM Initiative's reforms could be accepted as an evolution of policies in the state, rather than new programs imposed on its health systems. This more incremental approach likely led to improved buy-in for the models explored under the SIM Initiative by the legislature and stakeholders.

Box 3: Medicaid Consumer Perspective

"… one thing that I really noticed about the health care system here in Vermont is that it's not just reactionary care. It's very much proactive care. It's very much like we're glad you're doing well, but let's make sure that we're still keeping an eye on you. Because it's not just you're healthy so get out the door, it's you're healthy, let's keep you healthy."

Vermont accounted for this evolution in its decision to shift from using SIM funds to invest in multiple payment models, to focusing its SIM investments on (1) growth of ACO models; (2) work to align the ACO models with the Blueprint for Health; and (3) work to support spread and adoption of these models from the ground up, from its Regional Collaborations and Learning Collaboratives to strategically dedicated time engaging with key stakeholders in the design and implementation of the SIM Initiative. Furthermore, Vermont's existing health IT investments, including existence of the VHIE and already accelerated rates of provider adoption of EHRs, enabled Vermont to focus on understanding how to better direct resources toward improving utilization of tools, spread of tools to providers along the continuum of care (e.g., LTSS, behavioral health) or through new modalities (e.g., telehealth), and understanding "gaps" where it was lacking infrastructure or resources necessary to further accelerate its delivery and payment reforms.

Differences in population composition and financing influence provider participation in alternative payment models. Variation in funding sources and populations served affected the ability of some provider types to adopt shared-savings models, especially those that involve risk sharing. Through implementation of the ACO SSPs, some providers in the state, specifically those serving a high proportion of Medicaid patients, expressed appreciation for incentive payments offered under the shared savings models. During focus groups, some primary care providers touted these models as beneficial in enabling practices to maintain infrastructure and staff necessary for their practices. However, other providers noted challenges with the structure

of Vermont's model, especially in how performance-based incentives were set, positing that such models did not provide sufficient incentive for health systems that may already be high performing in the state. It was for this reason that VCP opted not to participate in the Medicaid SSP, noting that the retrospective nature of Vermont's Medicaid SSP model disproportionately rewarded historically poor performing hospitals and physicians as poorer performing hospitals had more room for growth and therefore more earning potential.

For Vermont's two smaller ACOs, VCP and CHAC, the upfront costs of implementing systems and changing behavior in advance of potentially earning shared savings were financially challenging. Although they both ultimately ceased operations, these provider groups wanted to participate in value-based health reform, tested whether the ACO SSP model fit their provider niche (independent physicians and FQHCs, respectively), and made cross-organization and within-system advancements aimed at improving quality and mitigating costs. Their SIM Initiative ACO experiences may enable individual providers, practices, health centers, or other entities to align with OneCare in the All-Payer ACO Model or to participate more fully in other or future health reform initiatives. On the other hand, stakeholders from one ACO advised that states considering payment reforms consider models that provide payments to providers directly, and up front, like the model used for the Comprehensive Primary Care Plus (CPC+) Initiative. They suggested that this approach will offer providers tangible benefits, as opposed to when resources are mostly directed toward a larger health system.

Payment incentives were not the only motivators driving participation in Vermont's reforms. Although concern over payment disincentives dissuaded some providers and ACOs from participating in Vermont's payment reform initiatives, some providers and payers—in recognition of shifting trends in health policy and reform—were, at minimum, willing to be engaged in Vermont's statewide efforts. This willingness was witnessed through continuous engagement of Vermont's other commercial payers, especially MVP Health Care, in conversations over the direction of Vermont's SIM Initiative, during work group meetings and other public presentation of Vermont's future work. More specifically, some providers recognized the benefits of ACO participation beyond payment incentives, such as access to resources for infrastructure and workforce development. As expressed by one ACO representative, "our practices developed [the ACO] not with the mindset that this would be a great money maker. They developed [it] because they wanted to learn how to participate in health reform, to use their data. With that measure of success, we have been successful."

Stakeholder engagement is critical to gaining buy-in and sustaining momentum for reforms. Vermont established an ambitious governance structure as part of its SIM Initiative planning and implementation that engaged leaders and advocates representing a spectrum of health organizations and relevant services. These efforts required significant staffing resources dedicated to the organization and development of content for these meetings, which may not have been possible without the SIM Initiative provision of dedicated funding for this work. Over

the course of the Model Test award, Vermont's engagement efforts were consistently cited as one of the most successful elements of the SIM Initiative. According to one state official, "We didn't anticipate how much stakeholders would value the time they had to connect." While the project was still in implementation mode, stakeholders offered valuable insight and perspective to help shape the elements of Vermont's SIM Initiative, including measure sets, health IT investments, priorities for payment reform, and workforce transformation objectives. As described by one official, the work of the stakeholders had a "multiplier effect" on the SIM Initiative, with participants bringing in "hundreds of hours" of in-kind research and expertise to Vermont's efforts. In addition, by engaging a wide swath of stakeholders across the state, Vermont has fostered a communal sense of investment in the reforms promulgated under the SIM Initiative. As the Initiative evolved, and Vermont transitioned from implementation to operation, Vermont maintained many of the networks established through its engagement efforts and plans to continue to leverage the connections for future reform efforts—recognizing that engagements will take place on a much smaller scale, without dedicated funding to promote them.

Efficacy of reforms, especially those based on new technology, are ultimately limited by the behaviors of individual providers and consumers. Despite the best efforts of states and stakeholders to improve access to care and care coordination, as exemplified by the future outlook of the initiatives undertaken by Vermont, ultimately reforms will only be effective if they can produce and sustain changes in how providers treat patients and in how consumers access and use care. For providers, an ongoing challenge will be to encourage universal adoption of health IT–based initiatives that leverage EHRs. Although focus group discussions with providers indicated that there has been some evolution in utilization of health IT by providers, some participating providers expressed enduring hesitation of switching away from workflows they were more familiar with (e.g., the use of paper records). Similarly, few consumers expressed that they had used or even were aware of resources like the patient portal, indicating that much more educational outreach is necessary if the tool is to become helpful as a resource to help consumers coordinate and manage their own care. During focus groups, providers also reported that they had been providing a greater focus on self-management tools to their consumers, while consumers perceived only minimal such efforts. Differing perceptions of the efficacy of care management and coordination efforts indicate that more work is needed for consumers to understand the care management tools being presented to them and for providers to understand how consumers are absorbing the tools being made available to them.

Consistency in federal staff and oversight would improve efficiency of awardee operations. Although generally speaking positively of the relationship the state team developed with CMS over the course of the SIM Initiative, state officials noted turnover of federal agency officials with whom they worked as one area of potential improvement for future awards. Over the course of the SIM Initiative, the state was given six CMS project officers, for example, which, from the perspective of state officials, led to delays in approvals and overall progress

because of time spent orienting new federal officials to the multiple aspects of Vermont's complex SIM Initiative.

F.1.4. Anticipated long-term changes following the SIM Initiative

Overall, most officials, stakeholders, and participants—who were aware of their participation in the SIM Initiative—spoke positively of the SIM Initiative's influence and progress in Vermont, even when acknowledging challenges with implementation of the program. As highlighted above, many especially recognized the importance and influence of the SIM Initiative to promote alignment, coordination, and communication across state agencies, delivery and payment models, stakeholder communities, and other state initiatives.

The SIM Initiative's most enduring influence will likely be its effect in catalyzing Vermont toward the All-Payer ACO Model, which Vermont describes as "central to sustaining Vermont's SIM investments and provid[ing] critical context for the rest of Vermont's payment model design and implementation activities" (VHCIP, 2017d). Since the Model agreement was signed in October 2016, DVHA as the Medicaid payer and the GMCB as the regulatory authority have worked extensively to design and launch the Medicaid pilot and prepare for the commercial and Medicare initiatives, meeting both CMS and Vermont legislative requirements. In July 2017, the GMCB filed a proposed rule on ACO oversight with the Secretary of State and the Legislative Committee on Administrative Rules, which was made final in November 2017.[133] Since then, the GMCB has been working to integrate ACO regulatory activities and requirements from the Agreement into its other regulatory processes, including hospital budget review and health insurance rate review for Qualified Health Plans (VHCIP, 2017e). In December 2017, the GMCB voted to approve the budget for Vermont's All-Payer ACO Model, at $620 million to cover 120,000 Vermonters, which enabled OneCare to implement the Model in January 2018 (GMCB, 2018). OneCare's ACO reach is estimated to expand from 30,000 Medicaid patients to a total of 120,000 Medicaid, Medicare, and commercial patients. The goal by the end of 2022 is to have 70 percent of Vermonters involved in the All-Payer ACO Model, including 90 percent of Medicare recipients (GMCB, 2016).

Although still nascent in its implementation, Vermont envisions the All-Payer ACO Model spreading statewide to "involve the vast majority of people, payers, and providers" (VHCIP, 2017d). To ease in this transition, non-Medicaid payers will have the option to offer SSPs as a "transitional model" that can help them build toward the All-Payer ACO Model. Ultimately, the All-Payer ACO Model will set a new bar for cost containment in the state, limiting participating ACOs (currently OneCare) to 3.5 percent annual cost growth, a reduction from the 4.9 percent (Medicaid) and 6.5 percent (commercial) growth rates reported for the state as of 2014 (RAND, 2015).

[133] http://gmcboard.vermont.gov/sites/gmcb/files/files/resources/rules/Rule%205.000%20As%20Adopted.pdf

Governor Scott highlighted the All-Payer ACO Model during his January 2018 State of the State Address, a signal of momentum and buy-in from current state leadership (State of Vermont Office of Governor, 2018). However, other experts and officials have spoken with some caution about the future of the Model. The chair of the GMCB said "there are no guarantees in life that anything will work, but this is a great step forward by Vermont to lead the country by trying to move away from a failed system of fee-for-service and toward a system that looks at the overall health care of an individual" (Galloway, 2017). Critics have expressed skepticism. They note that the All-Payer ACO Model was essentially creating a monopoly system in the state, based around a for-profit entity (OneCare). Critics also question whether the Model will in fact achieve savings, given emerging evidence on the effectiveness of ACO models (Galloway, 2017).

Beyond the Model itself, funding designated for the All-Payer ACO Model will also be used to help sustain many of the other payment and delivery reform activities instigated under or further supported by SIM funds. This funding includes the Blueprint for Health, where payments for Medicare beneficiaries participating in the Blueprint for Health will flow to providers via the All-Payer ACO Model. Additionally, through the All-Payer ACO Model Agreement, CMS provided one-time startup funding in 2017 to support the Blueprint for Health's care coordination and community-based collaboration efforts, including some funding for Vermont's Support and Services at Home (SASH) program. Fueled in part by the increased coordination and engagement fostered under the SIM Initiative, Vermont will also continue exploring ways in which its other initiatives may eventually align with the All-Payer ACO Model, such as work explored via the Medicaid Pathway or ACHs. However, sustained communication and coordination may be difficult without dedicated resources to finance cross-agency collaboration and stakeholder engagement. Vermont's Hub and Spoke initiative,[134] which targets Medicaid beneficiaries with chronic opioid addiction, will continue under the state's current State Plan Amendment to establish Health Homes.

Vermont is exploring means of joint public and private investments to sustain additional work the state has identified as having ongoing value in the state.[135] These priorities have been partially informed by an electronic survey Vermont sent to more than 300 of its SIM Initiative stakeholders (with 47 individuals responding) regarding sustainability priorities (VHCIP, 2017d). Among activities stakeholders identified as a priority for sustaining, 80 percent of respondents specifically called out the learning collaboratives. Under the SIM Initiative, Vermont deliberately developed means of ensuring that resources from the collaboratives and its core competency trainings could be accessible to future users, including making many of the

[134] For more information on the Hub and Spoke initiative, visit: http://blueprintforhealth.vermont.gov/about-blueprint/hub-and-spoke

[135] For details on Vermont's plans to sustain SIM investments, please reference Vermont's Sustainability Plan: http://healthcareinnovation.vermont.gov/sites/vhcip/files/documents/Final%20Vermont%20SIM%20Sustainability%20Plan%206.30.17.pdf

resources available via its Health Care Innovation website (available at http://healthcareinnovation.vermont.gov/areas/practice-transformation/projects/learning-collaboratives). Vermont envisions that Blueprint for Health and ACO leadership will take on continuing these efforts as a means to support provider and community collaboration and the training necessary to effectively run their coordinated care models. For example, OneCare has built the ICCMLC model into its provider training program. At this time, however, it is uncertain whether and how the organizations will sustain these efforts statewide. As described earlier, although many of Vermont's investments in health IT were considered one-time investments under the SIM Initiative, continued investment from the state or private sector will be needed if continued spread and upkeep of health IT platforms are to be sustained in the future. Some of this will be supported through the All-Payer ACO Model, which requires significant data sharing and analytic capabilities of its participating providers.

Vermont benefits from a long history of governors and legislatures who have been invested in advancing health initiatives in the state, increasing its propensity—barring any significant shifts in leadership—to continue these efforts. Vermont's SIM staff prepared for the most recent transition in gubernatorial leadership in January 2017 by preparing reports and recommendations to present to the governor early in his Administration to explain various reforms explored under SIM including Vermont's intent to transition into the All-Payer ACO Model. Governor Scott has signaled receptiveness toward these reforms, including continued pursuit of strategies to lower health care costs for consumers. In his 2018 State of the State address, Governor Scott specifically called out the Vermont All-Payer ACO Model's Medicaid pilot, lauding its reach of over 5,000 providers and hope the pilot will meet state goals of improved health, quality, and sustainable costs (Vermont Public Radio, 2018). Through the SIM Initiative, Vermont produced many reports and analytical tools that could easily be leveraged by interested leadership to advance future health-related priorities in the state—such as a population health plan developed to analyze how Vermont could expand its SIM initiative into broader population health efforts (VHCIP, 2017c), findings from the Accountable Communities for Health Peer Learning Lab, workforce assessments (the care management inventory and supply and demand data collection and analysis), and the health IT strategic plan. However, future action based on these reports will ultimately depend on Administrative priorities in the context of other priorities in the state (e.g., investments in health care versus education, infrastructure), state agency or stakeholder leadership, and establishment of dedicated funding streams that could enable Vermont to act on the findings of these reports.

F.1.5 Summary of SIM Initiative implementation

At the end of the Vermont SIM Initiative, the state had achieved the following:

- **Success in using state government to convene payers, providers, and communities to accelerate statewide health transformation.** Vermont set up a broad infrastructure for stakeholder input that yielded collaboration across

communities and state agencies. Through leadership in state government and collaboration with commercial payers, the state integrated and aligned its health reform efforts to support providers.

- **Significant multi-payer reach of alternative payment models.** Building on health system transformation efforts preceding the SIM Initiative, including the primary care-based model Blueprint for Health (a model also supported via a state law mandating commercial payer participation), Vermont achieved alignment across Medicare, Medicaid, and commercial payers on its ACO SSP model. Together, Blueprint for Health and the ACO SSP model reach a significant proportion of residents statewide.
- **Sustained multi-payer alignment in alternative payment methods through a new Advanced Alternative Payment Model, the Vermont All-Payer ACO Model, which was catalyzed and informed by the SIM Initiative experience.** With 70 percent of Vermonters envisioned to be involved in the All-Payer ACO Model by 2022, and participation across Medicare, Medicaid, commercial payers, and a variety of health care providers across the state, this model will test scalability of multi-payer alignment and continued investment in community collaboration to improve health system outcomes.
- **Improved understanding of "gaps" in health IT infrastructure.** In addition to making significant investments in VHIE and creating a behavioral health data repository, the state developed a strong framework for analyzing where shortcomings in health IT prohibited optimal coordination across delivery systems, so it is better prepared to target future investments.
- **Desired outcomes for Medicaid beneficiaries reached by the ACO SSP model**. Both the state's own analysis and the federal evaluation (***see Section F.2***) show significant improvements in quality and expenditures.

Addendum Table F.1. Providers and populations reached by Vermont's SIM Initiative–related delivery system and payment models

Vermont	Participating payers	Participating providers (as of December 2016)	Population reached (as of December 2016)
ACO SSPs	Medicaid	996	46%
	Commercial	1,105	13%
	Medicare	933	44%
Blueprint for Health PCMHs	Participating Payers	795 (43%)	—
	Medicaid	—	70%
	Commercial	—	37%
	Medicare	—	59%

ACO = accountable care organization; PCMH = patient-centered medical home; SSP = Shared Savings Program.

Note: There are no restrictions for providers or enrollees participating in both the ACO SSP and Blueprint for Health models. Thus, there is considerable overlap in the provider counts and population reach.

Note: Sources for these provider and population data are detailed in the Year Four Annual Report (RTI International, 2018).

Vermont's Medicaid Shared Savings Program (SSP) was a major health system reform model in the state during the SIM Initiative. The wide reach of the model makes it an appropriate focus for rigorous quantitative analyses of the Vermont SIM Initiative's early impact on expenditures and key utilization and quality of care outcomes. We analyze the impact of the model comparing utilization, quality, and cost outcomes for the Medicaid SSP ACO-attributed population to an in-state non-Medicaid SSP population before and after implementation of the model.

Section F.2 presents the estimated impact of the Medicaid SSP model in Vermont. We assess the impact of the Medicaid SSP model for 3 years before implementation (2011–2013) and 3 years after implementation (2014–2016).

F.2 Model-Specific Impact Findings: *Vermont's Medicaid Shared Savings Program*

KEY INSIGHTS

- For Vermont ACO-aligned Medicaid beneficiaries relative to the in-state Medicaid comparison group, in the 3 years following the Medicaid Shared Savings Program (SSP) implementation:
  - Total expenditures increased at smaller rates, including decreases in professional expenditures and smaller increases in inpatient facility and prescription drug expenditures;
  - The likelihood of both a primary care and specialty care visit declined;
  - Inpatient admission rates increased less and emergency department (ED) visit rates declined;
  - Care coordination, as measured by follow-up after a mental health-related admission, did not change; and
  - Developmental screening rates for young children increased, but other quality measures did not change.
- Most of the positive findings related to decreases or smaller increases in utilization and expenditures were consistent across various subgroups—children, adults, beneficiaries with behavioral health conditions, and each of the two participating ACOs.
- The reductions in utilization and expenditure growth are expected under a model that promotes improved care management and coordination and aims to provide care in lower cost settings.
- These strong Medicaid SSP results likely indicate a synergistic effect of the ACO model layered upon Vermont's established Blueprint for Health PCMH model.

Two of the three ACOs in Vermont participated in the Medicaid SSP—OneCare and CHAC. By December 2016, the Medicaid SSP served 67,515 Medicaid beneficiaries, or approximately 46 percent of the Medicaid population (RTI International, 2018). In Vermont's Medicaid SSP, ACOs were responsible for managing the majority of care for their beneficiaries, including primary care, specialist visits, inpatient hospitalizations, outpatient hospital services,

FQHC and rural health center visits, laboratory, and home health. Key elements excluded from ACO cost calculations were pharmacy and most long-term services and supports (VHCIP, 2014b). Vermont has specific SSP standards detailing the state's responsibilities and ACO requirements, such as ACO governance, performance measurement, care management standards, and reporting plans for participating provider compensation to ensure alignment of incentives. ACOs were required to report quality measures annually: 8–10 were used for payment purposes (i.e., shared savings quality measure performance was based on that set); 20–24 were required for reporting purposes only, including a subset related to patient engagement (VHCIP, 2014b). Four of the 10 payment quality measures targeted specific subpopulations—two pediatric measures, one mental health measure, and one substance use disorder measure (VHCIP, 2014a).

The Medicaid SSP-eligible population included children and adults with full-benefit coverage enrolled at least 10 months within the calendar year; it excluded Medicare-Medicaid beneficiaries. The Medicaid SSP was a one-sided risk model—ACOs could earn shared savings, but they were not penalized if the cost of care for their attributed beneficiaries exceeded the targeted costs. Vermont's Medicaid SSP used a "gate and ladder" methodology for ACOs to earn shared savings. Actual costs and savings were calculated retrospectively based on the ACO's actual per beneficiary per month (PBPM) costs compared to the target PBPM costs set by the state. If the ACO achieved savings, it also had to meet a minimum quality performance threshold ("gate") to earn savings. Then its quality performance score determined what percentage of savings it earned ("ladder").

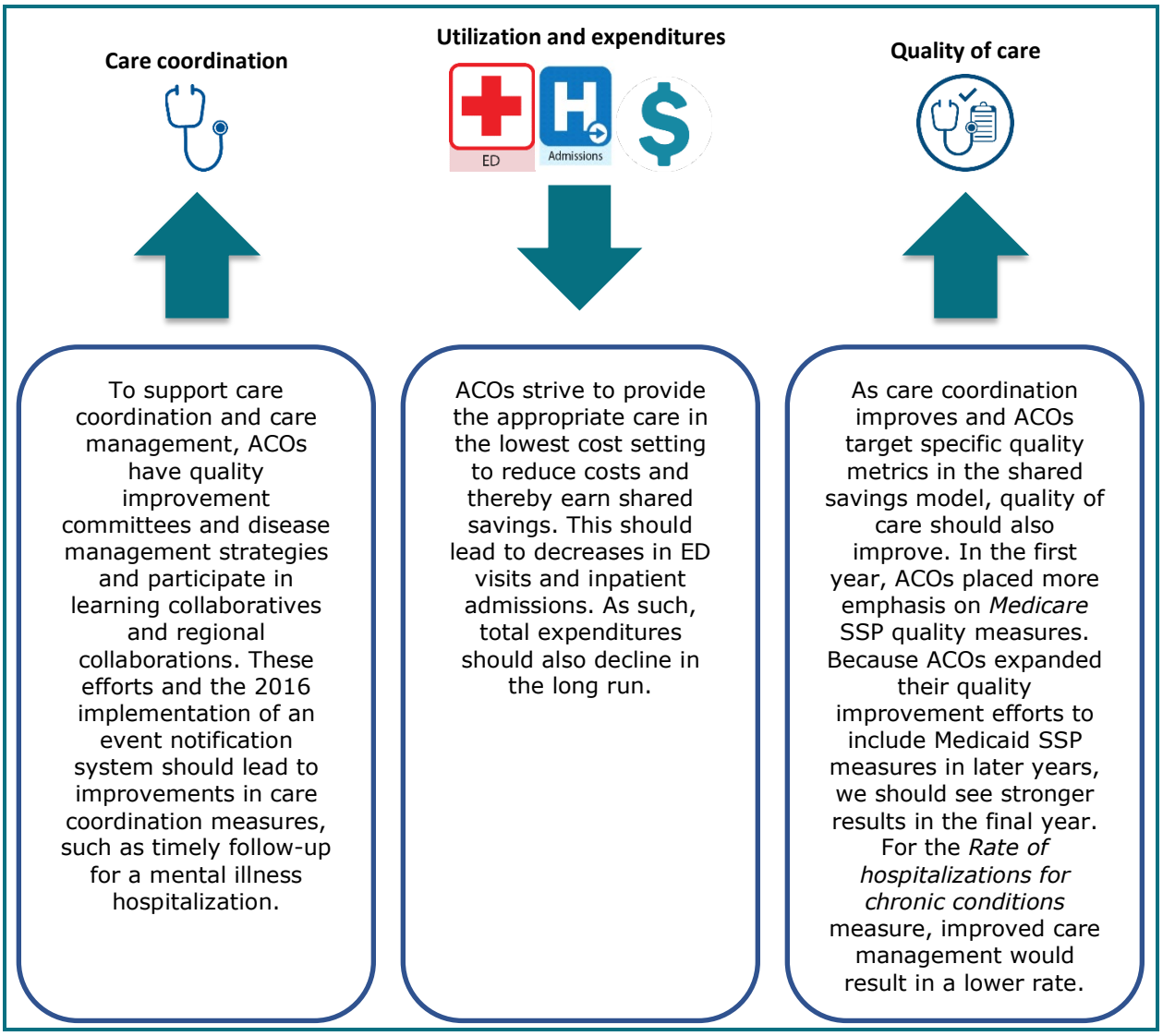
Several SIM Initiative activities supported the Medicaid SSP during the performance period covered in this analysis. We expect the cumulative effect to be greatest in 2016, the third and final year of the model. Provider subgrants in 2014–2015 financed ACO capacity-building, including development of governing board and committees and systems for measure collection and reporting (Bi-State Primary Care Association, 2016). Health IT efforts in 2014–2015 focused on ACO connectivity to the VHIE and improvements in the quality and usability of ACO data. Although most ACO providers or affiliates already had EHRs, SIM funding expanded acquisition in 2015–2016 to the Vermont State Psychiatric Hospital and the five agencies serving people with developmental disabilities. Patient Ping, Vermont's event notification system, launched in 2016. This system was especially beneficial to CHAC, whose providers had not had these notifications within their own EHR systems. OneCare also credited it as a useful tool. Consumers in the Spring 2017 Medicaid focus groups confirmed the reach of EHRs and event notification systems. Nearly all responded that their providers knew if they had been admitted to the hospital or had an ED visit. Also, most stated that their providers knew which medications they were taking. One limitation that both consumer and provider focus group participants voiced was the inability of EHR systems to connect to specialists outside of the primary care provider's network. This could limit communication and coordinated management of a patient's conditions.

Practice transformation activities included within-organization ACO efforts and the statewide learning collaborative and regional collaborations described in ***Section F.1.2***. ACOs' clinical committees and quality improvement committees developed both broad and disease-specific standards of care. For example, CHAC's clinical guideline for COPD Treatment and Prevention of Readmission featured these components: diagnosis and treatment guidelines for provider teams, including step care based on clinical need and disease severity; patient and family education and development of a self-management plan; maintenance and prevention actions, such as flu vaccines and tobacco cessation programs; and transition management guidelines (CHAC, 2015). Building on internal efforts and participation in learning collaboratives and regional collaborations, OneCare developed the OneCare Vermont Care Coordination Toolkit. The toolkit is accessible online and can be used for managing complex patients or for integrating best practices for care coordination within all services. In mid-2016, funded in part through a Robert Wood Johnson Foundation award, OneCare piloted its Care Navigator software platform in four regions, which pulls in clinical, quality, and claims data and allows providers to identify and track high-risk patient groups (OneCare Vermont, 2016). Both consumer and provider focus group participants commented on patient engagement efforts, with responses ranging from successful team effort (patient-provider-community services) that effects change to repeated one-sided provider input.

OneCare and CHAC participated in all three SSPs—Medicaid, commercial, and Medicare. Although many care management strategies overlap all three payer populations, these ACOs' earlier efforts were concentrated on startup activities and the Medicare population. In site visit interviews, ACO representatives stated that they had first targeted reducing ED visits and inpatient readmissions and focused on Medicare quality measures. This evaluation's previous analysis of the Medicaid SSP covering 2014–2015 found statistically significant decreases in ED visits and total PBPM expenditures. As indicated in ***Figure F-4***, we expect stronger effects in Year Three of the Medicaid SSP model as ACOs have longer experience, wider breadth of activities, and expanded targeting of quality measures to those within the Medicaid SSP. Additionally, as reported by the state, although neither ACO achieved costs savings in 2016 in the Medicaid (or commercial) SSP, both ACOs saw steady improvements in quality scores in both programs.

As described earlier in ***Section F.1.1***, Vermont's Blueprint for Health PCMH program and the VCCI, targeted at the highest cost Medicaid beneficiaries, preceded the SIM Initiative. These complementary programs provide a strong foundation for the ACO model. In January 2016, the Blueprint for Health implemented new pay for performance (P4P) expenditures for PCMHs—a quality component, based on four quality measures that are a subset of Medicaid SSP measures, and a reduced utilization component (Department of Vermont Health Access [DVHA], 2018). Two of the quality measures are the pediatric measures (adolescent visits and developmental screenings). Assuming practices responded to the financial incentives, we would expect to see improvement in these measures in 2016 for both the ACO group and the

Figure F-4. Expected direction of outcome measures



ACO = accountable care organization; ED = emergency department; SSP = Shared Savings Program.

comparison group because over 80 percent of beneficiaries are attributed to Blueprint for Health in both groups. We could still observe greater improved performance among the ACO group because of participation in both payment models. One ACO specifically mentioned these pediatric measures as a 2016 area of focus during the Spring 2017 site visit. Similarly, the Blueprint for Health's reduced utilization P4P incentive may result in decreases in utilization or expenditures or both, in the ACO group and the comparison group. Finally, the base payment rate for PCMHs evolved and included participation in the regional collaborations as one criterion. Because these collaborations reinforce care coordination for at-risk beneficiaries to reduce high-cost utilization, we would expect to see improvements in care coordination measures

and reductions in utilization and expenditures for both the ACO group and the comparison group, with greater effects among the ACO participants reached by both payment models.

Compositional changes in Vermont's Medicaid population in 2016 may also affect the Medicaid SSP quantitative results. In 2016, DVHA reevaluated Medicaid eligibility status for beneficiaries, which had not occurred since the initial 2014 Medicaid expansion efforts, and several thousand beneficiaries no longer met the income requirements. The ACO-attributed Medicaid population decreased by roughly 24 percent while the comparison group declined by approximately 14 percent from 2015 to 2016. Because people became ineligible for Medicaid because of a higher income, we would expect that the beneficiaries who were dropped from the sample were on average a healthier population. Because the ACO-attributed population lost a larger portion of the sample, this could lead to more favorable results for the ACO population in 2014 and 2015 when the healthier sample is included in the sample and less favorable results in 2016 when they are dropped. However, the analysis uses propensity score weighting each year to balance the samples on key characteristics, such as gender, age, disability, enrollment through the Medicaid expansion, and Blueprint participation, and we control for the same covariates in the regression model. As such, any differential effect should be minimized because it is controlled for in the analysis.

To assess the effects of Vermont's Medicaid SSP on care coordination, utilization, expenditures, and quality of care, we addressed the following research question:

- How did trends in key outcomes for care coordination, utilization, expenditures, and quality of care change in the ACO-attributed Medicaid population after implementation of the Medicaid SSP relative to Vermont Medicaid beneficiaries in the comparison group?

To address the research question, we used a difference-in-differences (D-in-D) quasi-experimental design, incorporating a comparison group to control for underlying changes in the health care environment in Vermont. We used DVHA Medicaid claims data for 2011–2016 to examine the 3 years before (2011–2013) and the 3 years after (2014–2016) the start of the Medicaid SSP. The Medicaid SSP group comprises beneficiaries who were attributed to providers associated with one of two Medicaid SSP ACOs, OneCare and CHAC. The comparison group comprises within-state Medicaid beneficiaries who were attributed to either providers associated with VCP, Vermont's third ACO which participated in the commercial SSP, or to providers who were not associated with an ACO. The comparison group inclusion of the VCP-associated beneficiaries may limit the ability of this analysis to isolate the effects of Medicaid SSP participation. In Vermont's state-reported 2014–2016 commercial SSP results, VCP had the highest quality scores of the three ACOs; it had the lowest PBPM costs, but was farthest from attaining cost targets. Thus, we may expect to see a smaller distinction between the test group and comparison group in quality measures that overlap the commercial and Medicaid

SSPs—potentially less so in 2016 when OneCare matched VCP's commercial quality score—and a greater distinction in the change in PBPM costs.

Although the Medicaid SSP did not target any subset of the Vermont Medicaid population with particular characteristics, certain subpopulations may be impacted by the model differently because they have different inherent utilization patterns. To assess the impact of the Medicaid SSP on subpopulations, we ran the models for key cost and utilization outcomes (total expenditures, inpatient admissions, ED visits, and 30-day readmissions) separately for the overall, child, and adult populations and for beneficiaries diagnosed with behavioral health conditions.

Beneficiaries diagnosed with behavioral health conditions are among the patients at highest risk of using services, a subpopulation that ACOs might identify for the purpose of focusing care coordination efforts with the aim of containing costs. Additionally, as noted in ***Section F.1***, Vermont's SIM Initiative activities also addressed integration of behavioral health and primary care services. Specifically, the Medicaid SSP includes behavioral health–related quality measures in its quality framework. Moreover, Vermont made notable progress in promoting connectivity of behavioral health providers through more robust electronic health records, data collection and reporting, and data transfer infrastructure. Finally, both behavioral health team members and primary care providers received training in learning collaboratives for care management. As such, we analyzed the impact of the Medicaid SSP for beneficiaries with behavioral health conditions separately, examining behavioral health–related inpatient admissions, total expenditures, and ED visits for this subpopulation. We include the results for the overall and behavioral health population in this chapter; the results for the child and adult subpopulations are summarized in this chapter and the full results are included in ***Sub-appendix F-1***.

Moreover, the main analysis assesses the combined impact of the ACOs participating in the Medicaid SSP. To assess whether individual ACOs had different findings that were masked by the combined analysis, we also conducted a sensitivity analysis to examine the impact of each ACO relative to the full comparison group for the key utilization and expenditure outcomes. We also conduct a sensitivity analysis to determine whether the results for the key utilization and expenditure outcomes differ for individuals who were continuously enrolled in the Medicaid SSP for the full 3 years of the program. The results of the sensitivity analyses are also presented in ***Table F-1-9***.

Following comparison group selection, we constructed annual person-level propensity score weights to balance the Medicaid SSP group and comparison group on individual and county characteristics. The Medicaid SSP group and weighted comparison group were similar at baseline on key demographic characteristics (***Table F-2***). A summary of the analytic methods is included below, and the methods are detailed in ***Sub-appendix F-2***.

Methods Snapshot for Impact Analysis

- **Study design:** D-in-D quasi-experimental design using an unbalanced longitudinal panel.
- **Population**: The Medicaid SSP group comprised Medicaid beneficiaries attributed to ACO providers participating in the Medicaid SSP in 2014, 2015, or 2016. The comparison group comprised similar Vermont Medicaid beneficiaries attributed to providers who did not participate in the Medicaid SSP.
- **Data:** Medicaid claims data provided by DVHA. In this report, we used data from 2011 to 2016 to examine the 3 years before implementation (2011–2013) and the complete 3 years (2014–2016) of the Medicaid SSP.
- **Sample:** Medicaid-only beneficiaries (no Medicaid-Medicare beneficiaries) enrolled annually for 10 or more months. Utilization and expenditures measures included the full sample. Denominators varied for care coordination and quality of care measures. Sub-sample breakouts conducted for utilization and expenditure measures, included children, adults, and beneficiaries with a behavioral health condition.
- **Measures:** Care coordination (annual percentage for number of primary care provider visits, number of specialty care provider visits, percentage of mental illness–related acute inpatient hospital admissions with a mental health follow-up visit within 7 days and 30 days, and percentage of adults with acute bronchitis avoiding antibiotic treatment), quality of care (annual percentage of beneficiaries with a developmental screening, adolescent well-care visits, initiation and engagement of alcohol and other drug-related treatment, and annual number of hospitalizations for ambulatory care sensitive conditions per 1,000 beneficiaries), utilization (annual rates of inpatient admissions, ED visits and 30-day readmissions), and expenditures (annual PBPM in dollars).
- **Statistical analysis:** Logistic regression (binary) and ordinary least squares (expenditures) models weighted by the propensity score times the fraction of time the person was enrolled in Medicaid. Standard errors were clustered at the provider level to account for beneficiary correlation within provider. The models adjusted for demographic and health status variables, practice-level variables, and socioeconomic county-level variables.

Table F-2. Weighted means and standardized differences prior to Medicaid SSP ACO implementation, Medicaid SSP ACO-attributed beneficiaries relative to the comparison group, 2013

Characteristic	Vermont Medicaid SSP group	Vermont Medicaid comparison group	Standardized difference[a]	p-value
Weighted N	64,643	64,796		
Individual-level sociodemographic characteristics				
Female %	53.1	53.3	0.35	0.53
Age <1 %	0.7	0.8	0.86	0.12
Age between 1 & 18 %	53.2	54.6	2.80	<0.001
Age between 19 & 64 %	46.1	44.6	2.95	<0.001
Disabled %	14.3	14.0	0.85	0.13
Participated in Blueprint for Health %	81.4	81.6	0.58	0.30
Participated in Chronic Care Initiative %	16.4	16.6	0.59	0.28
Medicaid enrolled previous year %	74.3	72.7	3.63	<0.001
Enrolled 10 months in current year %	4.4	4.5	0.60	0.28
Enrolled 11 months in current year %	5.9	6.1	0.57	0.30
Attributed via claims (first attribution year) %	79.4	79.7	0.77	0.17
CDPS (previous year)	1.3	1.3	0.91	0.10
Total expenditures (previous year)	4,960.70	4,954.40	0.05	0.93
Inpatient admission (previous year) %	4.5	4.5	0.30	0.59
ED visit (previous year) %	27.3	26.7	1.37	0.01
Federal Poverty Level	67.0	66.9	0.19	0.73
County-level characteristics				
Metropolitan Statistical Area %	22.7	44.5	47.42	<0.001
Median age (2010)	42.2	41.1	32.40	<0.001
Persons <65 without health insurance (2013) %	8.9	8.8	2.28	<0.001
Persons in poverty (2013) %	12.6	12.3	16.65	<0.001
Hospital beds per 1,000 persons	2.4	2	33.91	<0.001

ACO = accountable care organization; CDPS = Chronic Illness and Disability Payment System (CDPS score is a risk-adjustment score calculated from ICD9 and ICD10 diagnosis codes included on hospital and outpatient claims, with larger CDPS scores corresponding to a larger number of comorbidities or a more severe set of comorbidities); ED = emergency department; SSP = Shared Savings Program.

[a] Absolute standardized differences (SDs) are expressed as percentages. <10% SD is ideal for inferring balance between groups. To balance the population characteristics for the claims-based analyses, we estimated propensity scores for all individuals from the comparison group for each year of the analysis. After propensity score weighting, the standardized differences between the weighted comparison group means and intervention group means were all well under the standard 10% threshold for individual-level variables; however, a few county-level variables exceed the threshold. Nonetheless, with the exception of the MSA variable, the differences in the county-level means is still quite small. County-level variables are shown here to provide context. Because there was little variation in county-level characteristics, balancing on these variables difficult. Therefore, to optimize the balance and avoid extreme weights, county-level covariates were excluded from the propensity score model.

F.2.1 Did care coordination change among Medicaid SSP ACO-attributed beneficiaries?

KEY INSIGHTS

- The **percentage of beneficiaries with a primary care visit** decreased overall for both the ACO group and comparison group, but in only one year were the changes significant.
- Overall and in most years, the **percentage of beneficiaries with a visit to a specialty care provider decreased** for ACO-attributed beneficiaries relative to the comparison group which increased.
  - These findings could indicate that ACOs are successfully reducing unnecessary outpatient care and managing beneficiaries' conditions through alternative means such as patient portals or care teams. However, we did expect to see some increase in primary care use with the SSP's focus on developmental screenings for young children and adolescent well-care visits.
- Although Vermont implemented its event notification system in 2016, there were no significant changes for **mental health follow-up visit within 7 days or 30 days of a mental illness–related acute inpatient hospital admission**.

In ***Table F-3*** we present the results of the D-in-D regression analyses for the following care coordination outcomes: percentage of beneficiaries with a primary care provider visit, percentage of beneficiaries with a specialty care provider visit, percentage of mental illness–related acute inpatient hospital admissions with a mental health follow-up visit within 7 days and 30 days, and percentage of adults with acute bronchitis avoiding antibiotic treatment. We report annual regression-adjusted D-in-D estimates individually for the full 3 years after the implementation of the Medicaid SSP, along with an overall D-in-D estimate for all years combined.

- During the first year of the Medicaid SSP, **the percentage of beneficiaries with a primary care provider visit** decreased by 1.5 more percentage points for ACO-attributed beneficiaries relative to the comparison group ($p < 0.10$). However, there were no statistically significant differences in this outcome in Years Two or Three or overall across 3 years of the Medicaid SSP.
  - Taken separately, adult and child ACO-attributed beneficiaries showed slight significant decreases relative to the comparison group for at least 1 of the 3 years. In Year One and overall, the percentage of beneficiaries with a primary care provider visit decreased by 3.1 and 1.5 more percentage points, respectively, for adult ACO-attributed beneficiaries relative to the comparison group ($p < 0.01$). Among children, the percentage of beneficiaries with a primary care provider visit decreased by 1.8 fewer percentage points during the second year of the Medicaid SSP for ACO-attributed beneficiaries relative to the comparison group. (See ***Sub-appendix F-1***.)

Table F-3. Difference in the pre-post annual change in care coordination for Medicaid beneficiaries in Vermont Medicaid SSP ACOs relative to the comparison group, all 3 years of implementation (January 2014 through December 2016)

Outcome and time period	Pre-period adjusted mean, ACO	Pre-period adjusted mean, CG	Test-period adjusted mean, ACO	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
Percentage of beneficiaries with a visit to a primary care provider								767,146
Year One	81.1	82.3	75.4	78.3	−1.5 (−2.8, −0.2)	−1.9	0.06	
Year Two	81.1	82.3	75.8	77.0	0.3 (−0.8, 1.3)	0.3	0.70	
Year Three	81.1	82.3	77.4	79.3	−0.5 (−1.8, 0.8)	−0.6	0.52	
Overall	81.1	82.3	76.2	78.1	−0.5 (−1.2, 0.2)	−0.7	0.21	
Percentage of beneficiaries with any visit to a specialty care provider								767,146
Year One	28.7	28.6	27.5	29.6	−2.2 (−3.1, −1.2)	−7.6	<0.001	
Year Two	28.7	28.6	28.2	29.9	−1.9 (−2.8, −0.9)	−6.5	0.002	
Year Three	28.7	28.6	29.4	30.7	−1.4 (−2.4, −0.3)	−4.7	0.03	
Overall	28.7	28.6	28.4	30.0	−1.8 (−2.4, −1.2)	−6.3	<0.001	
Percentage of mental illness–related acute inpatient hospital admissions with a mental health follow-up visit within 7 days								6,292
Year One	56.1	59.4	57.7	57.5	4.2 (−2.4, 10.8)	7.5	0.29	
Year Two	56.1	59.4	54.0	59.2	−1.1 (−8.8, 6.5)	−2.0	0.81	
Year Three	56.1	59.4	59.9	67.4	−3.8 (−14.2, 6.7)	−6.7	0.55	
Overall	56.1	59.4	56.8	61.0	−0.1 (−4.7, 4.6)	−0.1	0.98	
Percentage of mental illness–related acute inpatient hospital admissions with a mental health follow-up visit within 30 days								6,292
Year One	80.0	81.4	80.3	79.6	2.3 (−2.7, 7.3)	2.9	0.45	
Year Two	80.0	81.4	80.1	81.2	0.4 (−5.7, 6.5)	0.5	0.91	
Year Three	80.0	81.4	83.5	85.4	−0.7 (−9.0, 7.5)	−0.9	0.88	
Overall	80.0	81.4	81.1	81.9	0.7 (−2.9, 4.4)	0.9	0.74	
Percentage of adults with acute bronchitis avoiding antibiotic treatment								7,547
Year One	19.8	15.6	30.0	25.2	−0.9 (−8.3, 6.5)	−4.5	0.84	
Year Two	19.8	15.6	27.2	29.2	−8.0 (−15.2, −0.8)	−40.7	0.07	
Year Three	19.8	15.6	33.0	26.6	0.5 (−8.2, 9.1)	2.3	0.93	
Overall	19.8	15.6	29.6	27.2	−3.6 (−8.1, 0.8) ǂ	−18.4	0.18	

(continued)

Table F-3. Difference in the pre-post annual change in care coordination for Medicaid beneficiaries in Vermont Medicaid SSP ACOs relative to the comparison group, all 3 years of implementation (January 2014 through December 2016)(continued)

ACO = accountable care organization; CG = comparison group; D-in-D = difference-in-differences; SSP = Shared Savings Program.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in the likelihood of a care coordination event in the Medicaid SSP group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in the likelihood of a care coordination event in the Medicaid SSP group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the Medicaid SSP group's baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the difference in likelihood of a care coordination event. The estimates are multiplied by 100 to obtain percentage probabilities. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix F-2* for additional detail.

[Ŧ] Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only. The overall estimate for "Percentage of adults with acute bronchitis avoiding antibiotic treatment" is statistically significant at the 80% confidence interval only (−7.1, −0.1).

Data source: RTI analysis of DVHA Medicaid data, 2011–2016.

  - We expect primary care use to increase as ACOs engage in care management and because some quality metrics such as adolescent well visits require primary care use. However, the ACO-attributed beneficiaries had decreases in the likelihood of a primary care visit. This could be related to Vermont already having a high percentage of beneficiaries with a primary care visit at baseline. It could also be the result of providers managing conditions through alternative means such as patient portals.

- In Years One and Two, the percentage of beneficiaries with a visit to a specialty care provider decreased slightly for ACO-attributed beneficiaries and increased for the comparison group. In Year Three, the percentage of beneficiaries with a specialty visit increased statistically significantly less for ACO-attributed beneficiaries relative to the comparison group. As a result, the overall **percentage of beneficiaries with** a **visit to a specialty provider** declined by 1.8 more percentage points for ACO-attributed beneficiaries relative to the comparison group during the 3 years of the Medicaid SSP.
  - This trend was driven by the percentage of adult beneficiaries with a specialty care provider visit; there were no changes in the likelihood of a visit among children. (See ***Sub-appendix F-1*** for subpopulation breakouts.)
  - The ACO model does not give a clear expected direction for specialty visits. Decreases in specialty care visits could indicate that beneficiaries' conditions were being managed by the ACO either through primary care or specialty care and that fewer specialist visits were needed.

- In Year Two of the Medicaid SSP, the percentage of adults with acute bronchitis avoiding antibiotic treatment increased for both groups; however, the increase was smaller by 8 percentage points for ACO-attributed beneficiaries relative to the comparison group ($p < 0.10$), indicating that the comparison group performed better. There was no statistically significant difference overall.
  - This limited finding may indicate that ACOs did not focus on this measure or that their efforts had no measurable effect to date.
- There were no statistical differences in the change in the percentage of mental illness–related acute inpatient hospital admissions with a **mental health follow-up visit within 7 days or 30 days** between ACO-attributed beneficiaries and the comparison group.
  - The mental health follow-up visit measure is one where the implementation of the Patient Ping ENS could have made an impact in Year Three for ACOs in the context of primary care providers being aware of the inpatient admissions; yet, it appears it did not. Because of data privacy concerns, Vermont created a separate data repository for behavioral health data. Although by Year Three behavioral health providers were able to receive data analytics on their patients, it could be that communication between behavioral health providers and primary care providers was still limited.

F.2.2 Did utilization change among Medicaid SSP ACO-attributed beneficiaries?

KEY INSIGHTS

- Overall and in Years Two and Three of the Medicaid SSP, the **inpatient admission rate increased less** among ACO-attributed beneficiaries relative to the comparison group.
- Overall and in each of the three Medicaid SSP years, the **outpatient ED visit rate decreased more** among ACO-attributed beneficiaries relative to the comparison group.
- Overall there was no difference in the change in **30-day readmissions** among ACO-attributed beneficiaries relative to the comparison group.
- These inpatient and ED utilization findings are in line with the expectations of an ACO and point to the effectiveness of the ACO's strategies to target reducing unnecessary ED visits as one way to mitigate costs.
- The findings could also be the result of the SIM-supported regional collaborations that enabled local participants to develop community-level strategies for care management to avoid or reduce use of high-cost settings.

In ***Table F-4***, we present the results of the D-in-D regression analyses for inpatient admissions and outpatient ED visits per 1,000 beneficiaries and 30-day readmissions per 1,000 discharges. We report regression-adjusted D-in-D estimates individually for the full 3 years after the implementation of the Medicaid SSP, along with an overall D-in-D estimate for all years combined.

Table F-4. Difference in the pre-post annual change in utilization for Medicaid beneficiaries in Vermont Medicaid SSP ACOs relative to the comparison group, all 3 years of implementation (January 2014 through December 2016)

Outcome and time period	Pre-period adjusted mean, ACO	Pre-period adjusted mean, CG	Test-period adjusted mean, ACO	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
Inpatient admissions (per 1,000 beneficiaries)								767,146
Year One	54.1	50.1	55.0	50.6	0.3 (−2.7, 3.2)	0.5	0.89	
Year Two	54.1	50.1	55.3	57.1	−5.7 (−8.8, −2.6)	−10.5	0.003	
Year Three	54.1	50.1	72.9	83.6	−12.1 (−16.0, −8.2)	−22.4	<0.001	
Overall	54.1	50.1	60.7	61.9	−5.8 (−7.8, −3.9)	−10.8	<0.001	
Emergency department visits not leading to hospitalization (per 1,000 beneficiaries)								767,146
Year One	348.9	320.9	311.4	304.1	−19.9 (−26.0, −13.9)	−5.7	<0.001	
Year Two	348.9	320.9	313.4	300.3	−13.8 (−20.2, −7.4)	−4.0	<0.001	
Year Three	348.9	320.9	311.7	299.0	−14.1 (−22.1, −6.0)	−4.0	0.004	
Overall	348.9	320.9	312.3	301.3	−15.8 (−19.7, −11.8)	−4.5	<0.001	
30-day readmission (per 1,000 beneficiaries)								37,547
Year One	92.2	98.3	91.5	77.7	17.9 (1.7, 34.1)	19.4	0.07	
Year Two	92.2	98.3	113.1	136.2	−15.3 (−36.5, 6.0)	−16.6	0.24	
Year Three	—	—	—	—	—	—	—	
Overall	92.2	98.3	103.1	107.9	0.0 (−13.7, 13.7)	0.0	>0.99	

ACO = accountable care organization; CG = comparison group; D-in-D = difference-in-differences; SSP = Shared Savings Program.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in expenditures or in the rate in the Medicaid SSP group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in expenditures or in the rate in the Medicaid SSP group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the Medicaid SSP group's baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The probability estimates are multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries/discharges. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix F-2* for additional detail.

The Year Three 30-day readmission outcome was not calculated because it requires January 2017 data.

Data source: RTI analysis of DVHA Medicaid data, 2011–2016.

- In the last 2 years of the Medicaid SSP, the inpatient admission rates increased for both the ACO-attributed and the comparison group; however, the **admission rate** increased statistically significantly less among ACO-attributed beneficiaries. Overall, inpatient admissions increased by 5.8 fewer admissions per 1,000 beneficiaries for the Medicaid SSP group relative to the comparison group, a 10.8 percent relative difference ($p < 0.001$).
  - Inpatient admission rates increased among ACO-attributed adults in Year One while decreasing for the comparison group, resulting in 12.1 more admissions per 1,000 adult beneficiaries ($p < 0.001$). Although there was no difference in the change in the admission rate for Year Two, the inpatient admission rate increased by 18.3 fewer admissions for ACO-attributed adult beneficiaries relative to their comparison group counterparts in Year Three ($p < 0.001$).
  - The inpatient admission rate declined more for ACO-attributed children in Years One and Two, leading to an overall relative decline of 3.8 admissions per 1,000 beneficiaries ($p < 0.001$). (See ***Table F-1-3***.)
- In each Medicaid SSP year, the **outpatient ED visit rate** decreased statistically significantly more among ACO-attributed beneficiaries relative to the comparison group. As a result, the overall ED visit rate declined by 15.8 more visits per 1,000 beneficiaries during the 3 years of Medicaid SSP implementation ($p < 0.001$).
  - The relative decline in the outpatient ED visit rate was observed in both the adult population (overall and each year) and child population (overall and Years One and Two). (See ***Table F-1-3***.)
    - These inpatient admission and ED visit findings are consistent with what we would expect in an ACO model. To earn shared savings, ACOs must first realize savings, and they targeted reducing unnecessary ED visits as one way to mitigate costs.
    - The SIM-supported regional collaborations enabled local participants to develop community-level strategies for care management to avoid or reduce use of high-cost settings. These collaborations involved ACOs and Blueprint for Health practices.
    - The combined and cumulative effect of both models could have made Year Three results stronger for the ACOs as they moved from early implementation activities to more experienced development and stronger and broader networks. One of the ACOs in the Spring 2017 site visit specifically mentioned a greater emphasis on community partners since the SIM Initiative began.
- In Year One of the Medicaid SSP, the 30-day readmission rate decreased for both ACO-attributed beneficiaries and the comparison group; however, the rate decreased by 17.9 readmits per 1,000 discharges more for the comparison group ($p < 0.10$). There were no statistically significant differences in the change in the **30-day readmission** rate for Years Two and Three of the Medicaid SSP or for the 3 years overall.

F.2.3 Did expenditures change among Medicaid SSP ACO-attributed beneficiaries?

KEY INSIGHTS

- Average PBPM Medicaid expenditures increased overall**. Mean total expenditures** among Medicaid ACO-attributed beneficiaries **increased at a slower rate by $39.92 PBPM** relative to comparison beneficiaries**. This overall finding was robust across the child and adult subpopulations and each of the two ACOs**.
- Three of four subcategories of expenditures contributed to the change in total expenditures:
  - **Inpatient facility expenditures** among Medicaid ACO-attributed beneficiaries **increased at a smaller rate** by $12.29 PBPM relative to comparison beneficiaries.
  - **Professional expenditures** among Medicaid ACO-attributed beneficiaries **decreased** by $21.34 PBPM relative to comparison beneficiaries who had increases.
  - **Prescription drug expenditures** among Medicaid ACO-attributed beneficiaries **increased at a smaller rate** by $4.59 PBPM relative to comparison beneficiaries.
- Most of these results align with changes in utilization. This could indicate that ACO care management and care coordination efforts are reducing the rate at which costs are increasing by providing care in lower cost settings or reducing the need for additional visits.
- The results by individual year show stronger results in Year 3, possibly indicating the effects of greater ACO experience and the combined effects of two established payment models.

In ***Table F-5***, we present the results of the D-in-D regression analyses for total, inpatient facility, other facility, professional, and prescription drug PBPM expenditures. We report regression-adjusted D-in-D estimates individually for the full 3 years after the implementation of the Medicaid SSP, along with an overall D-in-D estimate for all years combined. In ***Figure F-5***, we present the individual and cumulative estimates for the full 3 years of the Medicaid SSP, respectively.

- **Total PBPM expenditures decreased or increased at slower rates** for ACO-attributed beneficiaries relative to the comparison group in each year of SIM implementation and overall. This is evidenced by the negative D-in-D estimates of $29.36 in Year One and $41.85 in Year Two (decreases), $48.11 in Year Three, and $39.92 overall (smaller increases).
- All four estimates were statistically significant ($p = 0.001$; $p = <0.001$; $p = 0.001$; $p = <0.001$) and a moderate magnitude (8.4 percent relative difference overall), indicating that there is an association between Medicaid SSP participation and smaller total cost increases.

Table F-5. Difference in the pre-post annual change in PBPM expenditures for Medicaid beneficiaries in Vermont Medicaid SSP ACOs relative to the comparison group, all 3 years of implementation (January 2014 through December 2016)

Outcome and time period	Pre-period adjusted mean, ACO	Pre-period adjusted mean, CG	Test-period adjusted mean, ACO	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value
Total expenditures (PBPM) ($)							
Year One	477.99	469.41	463.87	484.64	−29.36 (−43.65, −15.06)	−6.1	0.001
Year Two	477.99	469.41	456.28	489.54	−41.85 (−57.57, −26.13)	−8.8	<0.001
Year Three	477.99	469.41	568.38	607.91	−48.11 (−71.04, −25.19)	−10.1	0.001
Overall	477.99	469.41	493.48	519.99	−39.92 (−50.21, −29.63)	−8.4	<0.001
Inpatient facility expenditures (PBPM) ($)							
Year One	58.79	49.32	64.08	57.45	−2.84 (−10.23, 4.55)	−4.8	0.53
Year Two	58.79	49.32	61.11	63.71	−12.08 (−18.50, −5.65)	−20.5	0.002
Year Three	58.79	49.32	78.88	91.39	−21.98 (−30.30, −13.67)	−37.4	<0.001
Overall	58.79	49.32	67.56	68.95	−12.29 (−16.52, −8.06)	−20.9	<0.001
Other facility expenditures (PBPM) ($)							
Year One	70.36	70.85	73.35	76.51	−2.68 (−5.93, 0.57)[Ŧ]	−3.8	0.18
Year Two	70.36	70.85	76.46	79.79	−2.84 (−6.07, 0.39)[Ŧ]	−4.0	0.15
Year Three	70.36	70.85	85.18	84.94	0.72 (−3.62, 5.06)	1.0	0.78
Overall	70.36	70.85	78.20	79.99	−1.68 (−3.76, 0.40)[Ŧ]	−2.4	0.18
Professional expenditures (PBPM) ($)							
Year One	258.53	252.87	243.28	258.98	−21.36 (−30.02, −12.69)	−8.3	<0.001
Year Two	258.53	252.87	230.36	245.58	−20.88 (−31.25, −10.52)	−8.1	0.001
Year Three	258.53	252.87	285.47	301.67	−21.86 (−35.65, −8.08)	−8.5	0.009
Overall	258.53	252.87	251.50	265.77	−21.34 (−27.74, −14.93)	−8.3	<0.001
Prescription drug expenditures (PBPM) ($)							
Year One	90.30	96.37	83.15	91.72	−2.50 (−7.07, 2.08)	−2.8	0.37
Year Two	90.30	96.37	88.32	100.46	−6.07 (−12.35, 0.22)[Ŧ]	−6.7	0.11
Year Three	90.30	96.37	118.42	129.38	−4.89 (−12.61, 2.82)	−5.4	0.30
Overall	90.30	96.37	96.07	105.13	−4.59 (−8.26, −0.93)	−5.1	0.04

ACO = accountable care organization, CG = comparison group; D-in-D = difference-in-differences; PBPM = per beneficiary per month; SSP = Shared Savings Program.

(continued)

Table F-5. Difference in the pre-post annual change in PBPM expenditures for Medicaid beneficiaries in Vermont Medicaid SSP ACOs relative to the comparison group, all 3 years of implementation (January 2014 through December 2016) (continued)

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in expenditures in the Medicaid SSP group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in expenditures in the Medicaid SSP group relative to the comparison group. The regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. The relative difference is the D-in-D estimate as a percentage of the Medicaid SSP group's baseline period adjusted mean.

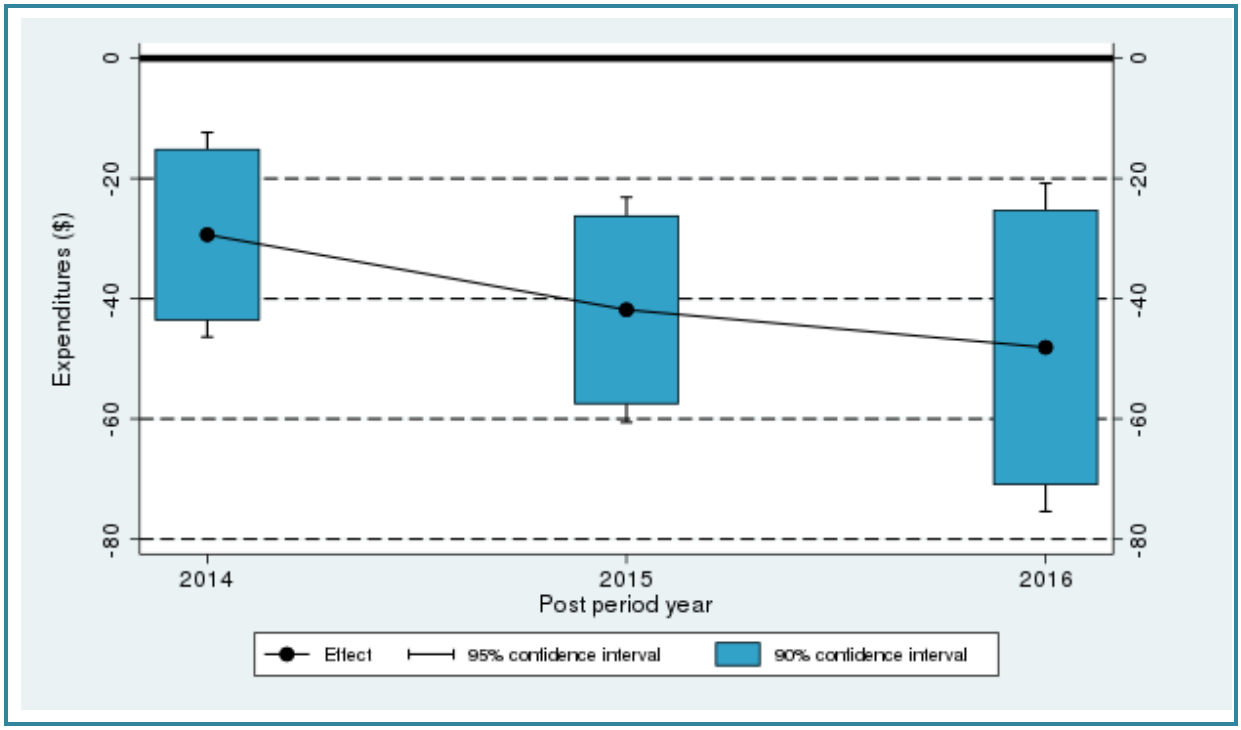
Methods: An ordinary least square model was used to obtain estimates for differences in expenditures. The year-specific regression-adjusted D-in-D may not match the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights across these figures. See *Sub-appendix F-2* for additional detail. The following sample size represent weighted period-years included in the regression model for the entire study period: (N = 767,146).

[Ŧ] Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only. The Year One, Year Two, and overall estimates for "Other facility expenditures (PBPM)" are statistically significant at the 80% confidence interval only ([−5.21, −0.15], [−5.36, −0.33], and [−3.31, −0.06], respectively). The Year Two estimate for "Prescription Drug expenditures (PBPM)" is statistically significant at the 80% confidence interval only (−10.96, −1.17).

Data source: RTI analysis of DVHA Medicaid data, 2011–2016.

- This trend in total PBPM expenditures was observed among children and adults. (See ***Sub-appendix F-1***.) Among children, total PBPM expenditures increased at statistically significant slower rates for ACO-attributed beneficiaries relative to the comparison group overall. Further, in Year Two, total PBPM expenditures decreased for ACO-attributed beneficiaries and increased for the comparison group. Among adults, total PBPM expenditures increased at statistically significant slower rates for ACO-attributed beneficiaries relative to the comparison group overall and in each year of the intervention.
  - The relative decreases in total PBPM expenditures is consistent with what we would expect from a successful ACO model and corresponds to changes we observed in utilization. Through improved care management, ACOs aim to shift resources from higher to lower cost settings. These overall results and the breakouts by spending subcategory below support that hypothesis.
  - The composition of the Medicaid sample during SIM implementation likely affected the direction of change. The influx of new Medicaid enrollees in the 2014 expansion may have contributed to decreases in total PBPM expenditures for the ACO group in Year One, whereas the reevaluations of eligibility in Year Three and the decreased sample size may have contributed to the increase in total PBPM expenditures.

Figure F-5. Annual difference in the pre-post change in total PBPM expenditures for Medicaid SSP ACO-attributed beneficiaries and the comparison group, all 3 years of SSP implementation



ACO = accountable care organization; PBPM = per beneficiary per month; SSP = Shared Savings Program.

Bars indicate 90% confidence intervals (CIs), and lines that extend beyond the bars indicate 95% CIs. CIs that do not cross the origin on the x-axis indicate statistically significant effect estimates; CIs that cross the origin denote statistically insignificant effects.

  - Still, the breakouts by year indicate greater differences between the ACO group and the comparison group in Year Three. This could be associated with the maturation of the ACOs, the implementation of the Patient Ping ENS, cumulative participation in learning collaboratives and regional collaborations, and the combined effect of Vermont's two developed payment models, the Blueprint for Health and the Medicaid SSP.

- Similar to the changes we observed in rates of inpatient utilization, **inpatient facility PBPM expenditures** increased less for ACO-attributed beneficiaries relative to the comparison group in the last 2 years of the Medicaid SSP. Overall, inpatient PBPM expenditures increased by $12 (20 percent) less for ACO-attributed beneficiaries over the 3 years of the Medicaid SSP ($p < 0.001$).
  - We observed the same trend among children and adults overall and in most individual years. (See ***Sub-appendix F-1 Table F-1-6***.)
  - The reduced increases in inpatient facility PBPM expenditures could indicate better care management by ACOs leading to fewer hospitalizations. This could be

related to SIM-supported activities that target high-cost utilizers, such as learning collaboratives and the regional collaborations.

- The relative decrease in total PBPM expenditures was largely driven by changes in professional PBPM expenditures. Professional PBPM expenditures decreased in the ACO-attributed group relative to the comparison group during the 3 years of the Medicaid SSP. As a result, **professional PBPM expenditures** decreased by $21 (8 percent) more over the 3 years of the Medicaid SSP.
  - Among children, the Year Two and overall results for professional PBPM expenditures were statistically significant and parallel to those of the full sample. Among adults, professional PBPM expenditures increased at statistically significantly slower rates for ACO-attributed beneficiaries relative to the comparison group in each year of the Medicaid SSP and overall. (See ***Table F-1-6***.)
  - The decrease in professional PBPM expenditures is likely associated with the relative decreases in inpatient admissions and ED visits (and their associated professional expenditures) and in specialist visits.
- **Prescription PBPM expenditures** declined in the ACO-attributed group relative to the comparison group during the 3 years of the Medicaid SSP (because of either greater decreases or smaller increases); however, the differences in the change in prescription expenditures was not statistically significant in each of the 3 years. Even so, the overall growth in prescription drug PBPM expenditures was $5 (5 percent) less for ACO-attributed beneficiaries relative to the comparison group ($p < 0.05$). The overall difference likely reached statistical significance because of the larger sample size when combining estimates across years.
  - Prescription drug PBPM expenditures also increased statistically significantly less for ACO-attributed beneficiaries relative to the comparison group in the first 2 years of the Medicaid SSP and overall. There was no statistically significant difference in the change in prescription expenditures for children (see ***Sub-appendix F-1***).
  - Prescription drugs are not part of the Medicaid SSP services and costs; thus, we did not expect to see changes based on ACO activities and objectives. We included the prescription drug PBPM expenditure breakouts for informational purposes. Additionally, the desired or expected direction of prescription drug PBPM expenditures is unclear. If increased adherence to prescription drugs reduces exacerbations of conditions that could lead to hospitalizations or ED visits, then increased drug expenditures could help mitigate increases in total expenditures. Alternatively, increased drug spending could indicate new or chronic conditions that have progressed to needing drug therapies.
- There were no statistically significant differences in the change in **other facility PBPM expenditures** for ACO-attributed beneficiaries relative to the comparison group.
  - However, this overall result masks differences we observed among children and adults (see ***Sub-appendix F-1***). Among children, other facility PBPM

expenditures statistically significantly increased for ACO-attributed beneficiaries relative to the comparison group (see ***Table F-1-5***). In contrast, other facility PBPM expenditures increased statistically significantly less among adult ACO-beneficiaries (see ***Table F-1-6***).

F.2.4 Did quality of care change among Medicaid SSP ACO-attributed beneficiaries?

KEY INSIGHTS

- The **likelihood of developmental screenings increased** among ACO-attributed beneficiaries relative to the comparison group.
  - This positive finding could be associated with a targeted focus on this measure by ACOs because this is the only measure for young children and the only payment measure in the Medicaid SSP and not also in the commercial SSP.
- The change in the **overall trends in other quality of care measures**—ambulatory care sensitive condition (ACSC) admissions, adolescent well-care visits, and initiation and engagement of treatment after episode of alcohol and other drug dependence—**were not statistically different** between Medicaid SSP and comparison group beneficiaries.
- The lack of change in ACSC admissions and adolescent care visits is unexpected, given that inpatient admissions increased at lower rates and the adolescent well-care visits measure was a Blueprint for Health P4P measure and a Year Three focus for one of the ACOs.

In ***Table F-6***, we present the results of the D-in-D regression analyses for our quality of care measures. We report regression-adjusted D-in-D annual estimates individually for the full 3 years of the implementation of the Medicaid SSP, along with an overall D-in-D estimate for all years combined.

- The percentage of beneficiaries age 1 to 3 years who had a **developmental screening** increased for ACO-attributed beneficiaries but declined for the comparison group, resulting in a 12.9 percentage point relative increase in developmental screenings for ACO-attributed beneficiaries during the 3 years of the Medicaid SSP ($p < 0.001$).
  - These positive findings continue the trend reported in the Year Four Annual Report (RTI International, 2018). This measure had the greatest pre-period difference between the two groups, with the comparison group beginning at a much higher rate. By Year Three, the ACO-attributed group had exceeded the comparison group's rate.
  - This measure was the only one specifically targeted to the Medicaid child subpopulation, which may have enabled ACO providers to concentrate efforts on it. Further, it was the only payment measure in the Medicaid SSP and not also in the commercial SSP, reducing the spillover effects of commercial SSP ACO participation in the comparison group.

Table F-6. Difference in the pre-post annual change in quality of care for Medicaid beneficiaries in Vermont Medicaid SSP ACOs relative to the comparison group, all 3 years of implementation (January 2014 through December 2016)

Outcome and time period	Pre-period adjusted mean, ACO	Pre-period adjusted mean, CG	Test-period adjusted mean, ACO	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
Hospitalizations for ambulatory care sensitive conditions based on chronic PQI per 1,000 beneficiaries								767,146
Year One	1.4	1.4	1.6	1.6	−0.1 (−0.6, 0.5)	−4.1	0.86	
Year Two	1.4	1.4	2.0	1.6	0.3 (−0.3, 0.8)	17.9	0.43	
Year Three	1.4	1.4	5.7	6.5	−0.4 (−1.2, 0.4)	−26.8	0.42	
Overall	1.4	1.4	3.0	3.0	0.0 (−0.4, 0.3)	−2.8	0.85	
Adolescent well-care visits (%)								162,569
Year One	49.4	54.2	46.7	50.4	1.2 (−0.5, 2.9)	2.4	0.26	
Year Two	49.4	54.2	47.3	51.8	0.4 (−1.5, 2.3)	0.8	0.72	
Year Three	49.4	54.2	50.9	54.8	0.9 (−1.1, 2.8)	1.8	0.46	
Overall	49.4	54.2	48.3	52.1	0.8 (−0.3, 1.9)	1.6	0.22	
Developmental screenings (%)								56,812
Year One	36.1	49.9	41.3	46.4	8.3 (3.9, 12.7)	23.0	0.002	
Year Two	36.1	49.9	42.2	44.9	10.8 (5.0, 16.7)	30.0	0.002	
Year Three	36.1	49.9	55.5	50.4	19.6 (11.1, 28.1)	54.2	<0.001	
Overall	36.1	49.9	46.3	47.1	12.9 (9.2, 16.7)	35.8	<0.001	
Initiation of treatment after episode of alcohol and other drug dependence (%)								26,726
Year One	27.6	29.7	24.6	27.2	−0.6 (−3.4, 2.1)	−2.3	0.70	
Year Two	27.6	29.7	25.5	28.6	−1.1 (−4.4, 2.2)	−4.0	0.58	
Year Three	27.6	29.7	27.4	31.9	−2.3 (−6.7, 2.1)	−8.3	0.39	
Overall	27.6	29.7	25.6	28.7	−1.2 (−3.2, 0.7)	−4.5	0.30	
Engagement of treatment after episode of alcohol and other drug dependence (%)								26,726
Year One	14.6	17.0	11.5	16.6	−2.8 (−5.1, −0.5)	−19.1	0.05	
Year Two	14.6	17.0	12.7	14.6	0.1 (−2.3, 2.6)	1.0	0.92	
Year Three	14.6	17.0	14.4	17.4	−0.6 (−3.9, 2.7)	−4.1	0.77	
Overall	14.6	17.0	12.7	16.0	−1.1 (−2.6, 0.4)	−7.3	0.24	

(continued)

Table F-6. Difference in the pre-post annual change in quality of care for Medicaid beneficiaries in Vermont Medicaid SSP ACOs relative to the comparison group, all 3 years of implementation (January 2014 through December 2016) (continued)

ACO = accountable care organization; CG = comparison group; D-in-D = difference-in-differences; PQI = Prevention Quality Indicator; SSP = Shared Savings Program.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in the likelihood of a quality of care event in the Medicaid SSP group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in the likelihood of a quality of care event in the Medicaid SSP group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the Medicaid SSP group's baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the difference in likelihood of a quality of care event. The estimates are multiplied by 100 to obtain percentage probabilities, or in the case of a PQI admission, multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix F-2* for additional detail.

Data source: RTI analysis of DVHA Medicaid data, 2011–2016.

- In contrast to the developmental screening measure for young children, there were no statistically significant differences in the change in **adolescent well-care visits** among beneficiaries ages 12–21. Although in the 2017 site visit ACO representatives had identified this measure as an area of new focus in 2016, there was no evidence of Year Three improvement.
- Among beneficiaries ages 13–65, there was no statistically significant impact on the **initiation of treatment after episode of alcohol and other drug dependence** for ACO-attributed beneficiaries relative to the comparison group in the full 3 years of the Medicaid SSP. Engagement of treatment after an episode of alcohol and other drug dependence decreased for ACO-attributed beneficiaries at a statistically significant greater rate relative to the comparison group in Year One only, resulting in a relative decline of 2.8 percentage points ($p < 0.05$).
  - This negative finding aligns with state-reported analyses in which the ACOs appeared to perform worse than the control group on this set of measures. In preparation for the Vermont All-Payer ACO model, which includes this measure set and several new measures related to substance use disorders and mental health, OneCare has implemented new efforts related to data sharing and consent and has focused on identifying, testing, and disseminating evidence-based best practices (OneCare, 2017).
- There were also no statistically significant differences in the change in the **rate of hospitalizations for ambulatory care sensitive conditions** based on chronic Prevention Quality Indicator among beneficiaries older than 18 years for ACO-

attributed beneficiaries relative to the comparison group in each year or overall for the 3 years of the Medicaid SSP.

F.2.5 Did expenditures and utilization change among Medicaid SSP ACO-attributed beneficiaries with behavioral health conditions?

KEY INSIGHTS

- We found **statistically significant results in the desired direction overall and in Year Two and Year Three** of the Medicaid SSP for five of the six outcomes among ACO-attributed beneficiaries with behavioral health conditions relative to the comparison group:
  - Overall the **likelihood of having an inpatient admission decreased** significantly among ACO-attributed beneficiaries relative to the comparison group who had increases (12.4 percent relative difference). Overall the **likelihood of having an outpatient ED visit decreased** significantly more among ACO-attributed beneficiaries relative to the comparison group (6.1 percent relative difference).
  - Overall **total PBPM expenditures, inpatient facility PBPM expenditures, and professional PBPM expenditures increased less** among ACO-attributed beneficiaries relative to the comparison group (statistically significant). **Mean total expenditures** among Medicaid ACO-attributed beneficiaries with behavioral health conditions **increased at a slower rate by $61.77 PBPM** relative to comparison beneficiaries (statistically significant).
- These positive findings indicate that even though ACOs did not show statistically significant differences in specific mental health and substance use disorder quality measures, overall care management strategies may have had a strong impact on both the full population and the higher risk behavioral health subpopulation.

We present the results of the D-in-D regression analyses for all-cause inpatient admissions, ED visits, 30-day readmissions, and expenditures in ***Table F-7***. Because beneficiaries with behavioral health conditions are at a higher risk to use more services, we expect that the impact of the care management services offered under the ACOs may have a greater impact on this subpopulation relative to the full population. Additionally, as noted above in ***Section F.1***, Vermont made progress integrating behavioral health and primary care services through inclusion of behavioral health quality metrics in the Medicaid SSP, training behavioral health and primary care providers in care management at learning collaboratives, and improving data sharing for behavioral health providers. We report the D-in-D estimate for each year since the implementation of the model along with an overall estimate for all years combined.

- In the second year of the Medicaid SSP, **inpatient admissions per 1,000** declined by 9.3 more for ACO-attributed **beneficiaries with behavioral health conditions** relative to their comparison group counterparts ($p < 0.05$). Similarly, during the third year, inpatient admissions increased by 21 fewer admissions in the ACO group ($p < 0.001$). As a result, the **overall rate of inpatient admissions** declined by 10.9 more admissions in the ACO group relative to the comparison group.

Table F-7. Difference in the pre-post annual change in utilization and expenditures for Medicaid beneficiaries with behavioral health conditions in Vermont Medicaid SSP ACOs relative to the comparison group, all 3 years of implementation (January 2014 through December 2016)

Outcome and time period	Pre-period adjusted mean, ACO	Pre-period adjusted mean, CG	Test-period adjusted mean, ACO	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
Inpatient admissions (per 1,000 beneficiaries)								237,699
Year One	87.7	83.0	75.5	74.7	−3.8 (−9.9, 2.3)	−4.3	0.31	
Year Two	87.7	83.0	73.5	77.9	−9.3 (−15.9, −2.6)	−10.6	0.02	
Year Three	87.7	83.0	108.5	129.2	−21.0 (−30.3, −11.8)	−24.0	<0.001	
Overall	87.7	83.0	84.4	89.3	−10.9 (−15.1, −6.7)	−12.4	<0.001	
Emergency department visits not leading to a hospitalization visits (per 1,000 beneficiaries)								237,699
Year One	444.7	413.6	391.4	388.1	−27.6 (−38.2, −17.0)	−6.2	<0.001	
Year Two	444.7	413.6	384.8	385.1	−31.2 (−42.3, −20.0)	−7.0	<0.001	
Year Three	444.7	413.6	402.6	392.8	−21.0 (−35.6, −6.4) ǂ	−4.7	0.02	
Overall	444.7	413.6	392.2	388.2	−27.0 (−34.0, −20.1)	−6.1	<0.001	
30-day readmissions (per 1,000 discharges)								19,975
Year One	119.6	129.9	107.8	92.2	21.8 (−2.7, 46.3) ǂ	18.2	0.14	
Year Two	119.6	129.9	131.3	164.6	−23.5 (−56.1, 9.1)	−19.6	0.24	
Year Three	—	—	—	—	—	—	—	
Overall	119.6	129.9	120.5	128.4	−2.6 (−23.5, 18.2)	−2.2	0.84	
Total expenditures PBPM ($)								237,699
Year One	945.84	913.83	969.80	965.31	−27.49 (−62.82, 7.84)	−2.9	0.20	
Year Two	945.84	913.83	963.80	992.14	−60.32 (−99.30, −21.35)	−6.4	0.01	
Year Three	945.84	913.83	1182.71	1253.54	−102.82 (−161.61, −44.02)	−10.9	0.004	
Overall	945.84	913.83	1029.32	1045.91	−61.77 (−87.18, −36.36)	−6.5	<0.001	
Inpatient facility expenditures PBPM ($)								237,699
Year One	110.46	92.89	113.55	93.82	2.17 (−16.54, 20.88)	2.0	0.85	
Year Two	110.46	92.89	98.99	99.21	−17.78 (−32.86, −2.71)	−16.1	0.05	
Year Three	110.46	92.89	136.23	154.45	−35.78 (−56.08, −15.48)	−32.4	0.004	
Overall	110.46	92.89	114.62	110.69	−16.39 (−26.67, −6.11)	−14.8	0.01	
Professional expenditures PBPM ($)								237,699
Year One	567.85	554.92	607.48	619.37	−24.81 (−49.94, 0.33) ǂ	−4.4	0.10	
Year Two	567.85	554.92	595.69	615.77	−33.00 (−62.75, −3.26)	−5.8	0.07	
Year Three	567.85	554.92	713.70	761.19	−60.41 (−104.38, −16.44)	−10.6	0.02	
Overall	567.85	554.92	633.84	653.08	−38.24 (−57.18, −19.30)	−6.7	0.001	

(continued)

Table F-7. Difference in the pre-post annual change in utilization and expenditures for Medicaid beneficiaries with behavioral health conditions in Vermont Medicaid SSP ACOs relative to the comparison group, all 3 years of implementation (January 2014 through December 2016)(continued)

ACO = accountable care organization; CG = comparison group; D-in-D = difference-in-differences; ED = emergency department; PBPM = per beneficiary per month; SSP = Shared Savings Program.

Note: The probability estimates are multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries/discharges.

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in use in the Medicaid SSP group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in use for the Medicaid SSP group relative to the comparison group.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. For expenditure outcomes, the year-specific regression-adjusted D-in-D may not match the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights across these figures. See *Sub-appendix F-2* for additional detail.

The relative difference is the D-in-D estimate as a percentage of the Medicaid SSP group's baseline period adjusted mean.

[Ŧ] Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only. The Year One estimates for "Professional expenditures (PBPM)" and "30-day readmissions" and the Year Three estimates for "ED visits" are statistically significant at the 80% confidence interval only. Their 80% confidence intervals are (−44.40, −5.22), (2.7, 40.9), and (−32.4, −9.6), respectively.

The Year Three 30-day readmission outcome was not calculated because it requires January 2017 data.

Data Source: RTI analysis of DVHA Medicaid data, 2011–2016.

- In each year of the Medicaid SSP and overall, **outpatient ED visits** per 1,000 beneficiaries decreased significantly more among ACO-attributed **beneficiaries with behavioral health conditions** relative to the comparison group. Overall, outpatient ED visits decreased by 27 more visits per 1,000 beneficiaries for ACO-attributed beneficiaries relative to the comparison group ($p < 0.001$).
- Similar to the full population, there was no statistically significant difference in the **30-day readmission rate** for ACO-attributed **beneficiaries with behavioral health conditions** and the comparison group.
- **Overall total PBPM expenditures, inpatient facility PBPM expenditures, and professional PBPM expenditures** increased statistically significantly less among ACO-attributed beneficiaries with behavioral health conditions relative to the comparison group, and the **impacts were larger in the behavioral health subpopulation relative to the full population**. Total expenditures among Medicaid ACO-attributed beneficiaries with behavioral health conditions increased by $62 PBPM less than the comparison group.

- As expected, the **impact of the ACO program on utilization outcomes was greater among beneficiaries with behavioral health conditions relative to the full population**. For beneficiaries with behavioral health condition, we found a 12.4 percent and 6.1 percent relative decrease in the rate of inpatient admissions and outpatient ED visits, respectively. In contrast, we found a 10.8 percent and 4.5 percent relative decline among the same outcomes in the full population. We found a slightly larger impact on total expenditures in the full population: 6.5 percent relative decline in the behavioral health subpopulation versus an 8.4 percent relative decline in the full population.
  - These positive findings align with targeted ACO efforts to reduce higher cost utilization and thereby achieve savings. Both internal care management efforts and SIM-supported learning collaboratives and regional collaborations fostered strategies to identify and provide needed care for high-risk beneficiaries, many of whom have behavioral health conditions. Additionally, Vermont Medicaid SSP standards require that ACOs have at least one seat on their governing body held by a participant from the mental health and substance abuse community of providers.

F.2.6 Did the utilization and expenditure results differ by ACO?

We conducted a sensitivity analysis to determine whether and how trends in key outcomes in utilization and expenditures varied for each of the two participating ACOs in Vermont's Medicaid SSP, CHAC, and OneCare. In ***Sub-appendix F-1, Table F-1-7 and Table F-1-8,*** we present the full results of the D-in-D regression analyses for beneficiaries attributed to CHAC and to OneCare, respectively. In general, the findings for each ACO were consistent with each other and with the findings for the overall sample.

- Similar to the full sample findings, **inpatient admissions** per 1,000 beneficiaries increased significantly less among ACO-attributed beneficiaries relative to the comparison group **for each ACO individually** in the last 2 years of the Medicaid SSP and overall; both ACOs had an approximately 9 percent overall smaller increase in their inpatient admission rate relative to the comparison group.
- **Outpatient ED visits** per 1,000 beneficiaries declined statistically significantly more for OneCare-attributed beneficiaries relative to the comparison group overall and in all 3 years, but there were no statistically significant differences in the change in the outpatient ED visit rate for CHAC-attributed beneficiaries relative to the comparison group.
- The **total PBPM expenditures** results for both ACOs were consistent with the full sample results overall and in each year. (See ***Table F-1-7 and Table F-1-8***.) OneCare had a $40 (8 percent) overall smaller increase and CHAC had a $29 (6 percent) overall smaller increase in total PBPM expenditures relative to the comparison group.
- The findings for the expenditure subcategories for each ACO also mirrored the findings for the full sample.

- **Inpatient facility expenditures** increased less for each ACO relative to the comparison group.
- **Professional PBPM expenditures** decreased for ACO-attributed beneficiaries relative to the comparison group which increased, leading to an overall statistically significant relative decrease in professional PBPM expenditures for each ACO relative to the comparison group.
- There were no statistically significant differences in the change **in overall prescription drug or other facility PBPM expenditures** for either ACO.

F.2.7 Were the utilization and expenditure results different for beneficiaries who were enrolled in the Medicaid SSP continuously for all three years?

We also conducted a second sensitivity analysis to focus on Vermont Medicaid beneficiaries who were attributed to an ACO for all 3 years of the Medicaid SSP to better understand the cumulative effect of ACO efforts. The comparison group comprised beneficiaries who were in that sample for all 3 years. We analyzed key utilization and expenditure measures, which are presented in full in ***Sub-appendix F-1, Table F-1-9***. As hypothesized, Year Three results on average were stronger than those for Years One and Two. We found statistically significant Year Three results in the same desired direction as for the full sample analysis for these measures: inpatient hospital admission rates, total PBPM expenditures, inpatient facility PBPM expenditures, and professional PBPM expenditures. Unlike our full sample analysis, the continuously enrolled sample did not have statistically significant differences in the change in outpatient ED visits or prescription drug PBPM expenditures.

F.2.8 Discussion and limitations

In our analysis of the full 3-year implementation of the Medicaid SSP, we found strong positive effects of this ACO payment and delivery model in reducing higher cost utilization and limiting cost growth. These findings coincide with ACO internal efforts to improve care management, such as OneCare's Care Coordination Toolkit and CHAC's disease- or measure-specific Recommendation Guides. Key SIM Initiative efforts to support ACOs included provider subgrants for ACO development and alignment, practice transformation learning collaboratives and regional collaborations that connected providers and community organizations, and health data infrastructure investments that connected ACOs to the Vermont Health Information Exchange. Notably, there was also significant overlap in participation in the Medicaid SSP and the Blueprint for Health PCMH model; more than 80 percent of beneficiaries in the ACO group were in both models. This multi-model participation likely strengthened effects of the Medicaid SSP. Still, even though the expenditure results were positive in limiting cost growth, they indicated total PBPM expenditures increased overall and in the third year of the Medicaid SSP. These results coincide with the state-reported results for the Medicaid SSP. CHAC earned shared savings in Years One and Two; OneCare earned shared savings in Year One only.

In contrast to the strong positive Medicaid SSP results for utilization and expenditures, most of the quality measure findings in this analysis were not significant. To achieve savings, ACOs may have concentrated on the broader goal of reducing higher cost utilization rather than diffusing efforts to each of the quality measures. Similar to the Year Four Annual Report (RTI International, 2018), we found that the likelihood of developmental screenings for young children among Medicaid SSP-attributed beneficiaries statistically significantly increased relative to the comparison group, but there were no other statistically significant differences in the change in quality outcomes. Several components may have affected this measure's results: it was the only measure targeted to young children, allowing ACOs to focus on it; ACOs had baseline rates much lower than the comparison group, leaving room for improvement; and it was the only measure in the Medicaid SSP and not in the commercial SSP, thereby reducing the spillover effect of ACO participation among providers in the comparison group.

Similar to our full population analyses, we found mixed results in the context of changes in care for beneficiaries with mental health conditions or substance use disorders. There were no statistically significant results for the care coordination and quality measures specific to this subpopulation: follow-up visit within 7 days or 30 days of an inpatient admission for mental health and initiation and engagement of treatment after episode of alcohol and other drug dependence. However, there were again strong positive results in reduced utilization and reduced expenditure increases for beneficiaries with these conditions. This finding may indicate that broader SIM-supported initiatives such as the learning collaboratives and regional collaborations were successful for disseminating strategies for managing high-risk beneficiaries including those with behavioral health conditions. The lack of significant results in quality measures will be a continuing challenge for the state and for OneCare and its affiliated providers as the continuing ACO entity moving forward. The Vermont All-Payer ACO model adds several new population health and quality measures for which ACO provider participants may not have experience, such as reducing the number of deaths from suicide, follow-up after discharge from the ED for alcohol or other drug dependence, and medication-assisted treatment utilization for substance use disorder. Improved communication between behavioral health and primary care providers and better data sharing to support care coordination is needed for success with these measures. Through the SIM Initiative, the Vermont Care Partners data repository was created to house behavioral health data that could not be housed in the Vermont Health Information Exchange. The key next steps involve integrating those data into care management. OneCare specifically identified improved data sharing and consent processes as a current ACO activity in support of behavioral health–related quality metrics.

To better understand how the full sample quantitative results were supported by each of the two participating ACOs, we conducted a sensitivity analysis, repeating the D-in-D regression analyses individually for OneCare and CHAC. Both ACOs had positive statistically significant findings for most utilization and expenditure outcomes. These results should support continued ACO participation in Vermont's ongoing All-Payer ACO Model. OneCare's Medicaid SSP

experience provides the foundation on which to build as it now takes on two-sided risk through global capitation. Although CHAC ceased operations in 2017, its performance as measured through this analysis showed positive achievements. Individual FQHCs, hospitals, and providers who aligned with CHAC for the Medicaid SSP may have gained valuable experience needed to align in the future with OneCare. An expansion of OneCare's participating provider network will be needed for Vermont to achieve its ambitious population reached goals for the All-Payer ACO Model.

We also conducted a second sensitivity analysis to focus on Vermont Medicaid beneficiaries who were attributed to an ACO for all 3 years of the Medicaid SSP to better understand the cumulative effect of ACO efforts. As hypothesized, Year Three results on average were stronger than those for the first 2 years of the Medicaid SSP. However, unlike the full sample, we did not find differences in the change in outpatient ED visits for the continuously enrolled sample. In general, relative to the full sample, the outpatient ED visit rate was lower for the continuously enrolled sample in both the ACO-attributed and comparison groups, and the rate declined similarly over time for both groups. Some studies have found that people visit the ED more often when they first obtain Medicaid coverage (Sommers, Gawande, & Baiker, 2017), so the lack of findings in the ED visit rate could be the result of inherent differences in utilization patterns for people who were enrolled continuously in Medicaid over several years relative to those who lacked continuous coverage or who were newly enrolled during the study period.

There are several limitations to this analysis to consider. First, the comparison group includes beneficiaries who were attributed to providers participating in a commercial SSP ACO. They could be benefitting from spillover effects, which would bias our results to the null. The comparison group also includes beneficiaries attributed to providers who never participated in an ACO. Vermont's SIM Initiative supported providers' desire to create and participate in ACOs specific to their niche—independent physicians, FQHCs, and hospital-led systems. Providers who chose not to align or participate in any of the ACOs may have been systematically different and would bias our results away from the null. Also, as noted in the introductory information there were compositional differences in the ACO-attributed group and the comparison group in terms of Medicaid expansion in 2014 and Medicaid eligibility reevaluations in 2016. The primary means for addressing these differences was through propensity score weighting of the samples each year to balance on key characteristics.

Finally, we reiterate that although this analysis addressed the effects of Medicaid SSP participation on care coordination, utilization, expenditures, and quality of care, this ACO model builds on Vermont's strong existing health reform foundation, including Blueprint for Health PCMHs and the Vermont Chronic Care Initiative. It could be that the synergistic effect of multiple, sustained, multi-payer health reform initiatives is a key driver in improving health, care delivery, and cost containment. In that context, our quantitative analysis results indicate that Vermont's purposeful build of payment and delivery reform was effective.

F.3 Discussion

The SIM Initiative in Vermont began in October 2013 and, because of a no-cost extension, ended in June 2017. Vermont's SIM Initiative focused its efforts on payment and delivery models, practice transformation, and health data infrastructure. Major activities included the launch of ACO Shared Savings Programs (SSPs) for Medicaid and commercial payers, the establishment of a series of learning collaboratives for providers, and enhancements to the Vermont Health Information Exchange (VHIE) to support its use by ACOs and other providers. The SIM Initiative was most instrumental in the development of the Vermont All-Payer ACO Model, with 70 percent of Vermonters envisioned to be involved in the model by 2022 and participation from Medicare, Medicaid, commercial payers, and various health care providers across the state.

Vermont's SIM efforts were strengthened by an extensive history of nearly two decades of major health reform initiatives that provided a solid foundation on which the state could build. Key pieces of this foundation were payment reform initiatives, including the multi-payer Blueprint for Health PCMH program, ACO participation in the Medicare SSP, and prior investments in health IT. Through its multi-payer approach, Vermont aimed to reduce provider burden through consistent reform efforts and improve the health care delivery system for all Vermonters.

Early in the SIM Initiative, Vermont recognized that stakeholder engagement was a critical component to gaining buy-in and sustaining momentum for reform efforts. Stakeholders offered valuable insight and perspectives to help shape the elements of Vermont's SIM Initiative, and relationships were fostered and leveraged for future endeavors.

Vermont also recognized that its plan for wide-scale, state-based reforms required a willingness to adapt to evolving priorities and needs as challenges and operational realities impacted planned reform efforts. Ending exploration of an EOC program, integrating Medicaid pay-for-performance efforts into the Blueprint for Health's P4P, and focusing instead on the development of its ACOs and eventual All-Payer ACO Model are evidence of Vermont's ability to respond and adapt to providers' and other stakeholders' needs.

Vermont supported practice transformation efforts through innovation grants and learning collaboratives. Vermont's SIM Initiative awarded 14 provider subgrants, which supported providers with practice transformation efforts focused on payment and delivery system changes and fostered innovation across a broad range of topics. Teams of health care providers participating in the Integrated Communities Care Management Learning Collaborative worked together to detect gaps in existing services, identify at-risk groups, and test innovative interventions for individuals with complex care needs. The Regional Collaborations enabled Blueprint for Health and ACO leadership in each of Vermont's 14 HSAs to join with local

medical and nonmedical providers to target local priorities related to health and health care delivery and develop strategies for addressing them.

Finally, Vermont focused heavily on strengthening their health data infrastructure by investing in EHR expansion and HIE connectivity, implementing a behavioral health data repository and an event notification system, and developing and executing telehealth pilots.

Vermont's alignment of models (PCMH and ACO) and multi-payer approach was effective in reducing higher-cost utilization (see ***Section F.2***). In the within-state Medicaid SSP analysis, the likelihood of having an outpatient ED visit decreased significantly more among ACO-attributed beneficiaries relative to the comparison group, overall and in each of the three intervention years. The likelihood of having an inpatient admission increased significantly less among ACO-attributed beneficiaries relative to the comparison group overall and in Years 2 and 3 of the intervention. These positive SSP findings indicate that ACOs, through their care management strategies—developed internally and through SIM-supported learning collaboratives and regional collaborations—were able to either reduce or limit increases in the likelihood of higher-cost utilization. Although average PBPM Medicaid expenditures increased overall, mean total expenditures among Vermont Medicaid ACO-attributed beneficiaries increased at a slower rate—by $39.92 PBPM—relative to comparison beneficiaries in the state. Statistically significant results were found for three of four subcategories of expenditures among Medicaid ACO-attributed beneficiaries, which contributed to the changes in total expenditures: a smaller increase in inpatient facility expenditures, a decrease in professional expenditures, and a smaller increase in prescription drug expenditures.

Concurrent with PCMH and ACO implementation in Vermont, few changes in self-reported health or health care outcomes occurred between 2013 and 2016 for low-income adults age 18–64, as measured by the Behavioral Risk Factor Surveillance System survey data (see ***Sub-appendix F-1*** for more detail about the data source and methods). The 10.3-percentage point decrease in self-reported lack of health insurance in the low-income adult population in Vermont (which we also observed in most Test states) is attributable to increased access to Medicaid and other Affordable Care Act-supported coverage. Otherwise, the only other statistically significant change during the SIM Initiative period was a 1.2-day increase in the number of self-reported poor mental health days.

Statewide, a relatively high percentage of the total population received care from providers participating in the PCMH and ACO models. Among the Medicaid population, 70 percent received care under the PCMH model and 46 percent under the ACO model. Among the Medicare population, 59 percent received care under the PCMH model, and 44 received care under the ACO model. Finally, in the commercially insured population, 37 percent received care under the PCMH model and 13 percent under the ACO model. Given this context, statewide trends for each of these payer populations, relative to comparison group states, are not directly

attributable to SIM Initiative efforts (or even past PCMH efforts). We calculated measures of health care delivery in Vermont for Medicare and commercially insured residents statewide[136] in the 3 years coinciding with SIM Initiative implementation (2014 through 2016) and for Medicaid residents statewide with only 1 year of data during the SIM Initiative implementation period, relative to a group of comparison states (see ***Sub-appendix F-1*** for a more detailed description of the results). Across these populations, results were generally more positive in the Medicaid and Medicare populations where the reach of the ACO and PCMH models was higher. Overall, some positive utilization results were found: the rate of inpatient admissions declined among Medicaid and Medicare beneficiaries, and the 30-day readmission rate declined in all three populations. There was a relative decrease in ED visits among Medicaid beneficiaries, an increase among commercially insured residents, and no change among Medicare beneficiaries. Expenditures mirrored the ED trends, with significant improvements only among the Medicaid population (expenditures increased in the commercially insured population and did not change among Medicare beneficiaries). Most care coordination measures worsened across the three populations, although Medicaid beneficiaries did see an increase in the percentage of mental illness-related acute inpatient hospital admissions with a mental health follow-up visit within 30 days. Quality measure results were mixed both within and across the three populations.[137]

Although this evaluation found strong positive quantitative results, Vermont's ACO model success is mixed. ACOs participating in the Medicaid SSP earned shared shavings in some but not all years; ACOs never earned shared savings in either the commercial SSP or the Medicare SSP. Two of three ACOs ceased operations, leaving the largest ACO, OneCare Vermont, as the lone participating ACO in the state moving forward. Among key challenges for the state is how to continue to engage providers who have invested time and effort in these models and are committed to improving health and care delivery for Vermonters.

Overall, Vermont's SIM Initiative was a catalyst in terms of advancing alternative payment methods and innovative delivery models focused on paying for value and quality rather than volume. Many especially recognized the importance and influence of the SIM Initiative for

[136] Based on an analysis of MarketScan data, a product of Truven Health Analytics LLC, an IBM company, 2011–2016.

[137] Among Medicaid beneficiaries, the following quality of care measures improved relative to comparison group states in the first year of the SIM Initiative: percentage of patients age 5–64 years with persistent asthma who were appropriately prescribed medication during the year and two measures of antidepressant medication management. Measures that declined included the rate of influenza vaccine between October 1 and March 31, percentage of women age 41–69 years who had a mammogram to screen for breast cancer during the measurement year, and initiation of alcohol and other drug-related treatment. Among the commercially insured population statewide, no quality of care measures improved relative to comparison group states during the SIM Initiative implementation period. Measures that declined included the rate of influenza vaccine between October 1 and March 31, percentage of women age 41–69 years who had a mammogram to screen for breast cancer during the measurement year, and engagement of alcohol and other drug-related treatment. Among Medicare beneficiaries, improvements occurred in the rate of influenza vaccine between October 1 and March 31 and percentage of patients age 18 years and older seen for a visit who were screened for tobacco use and received cessation counseling if needed.

promoting alignment, coordination, and communication across state agencies, delivery and payment models, stakeholder communities, and other state initiatives. While a solid foundation of health reform initiatives existed in the state, the SIM Initiative was a valuable driver of funding major activities that accelerated the models forward. Strong stakeholder engagement and invested providers who were supported through innovation grants and learning collaboratives were key to Vermont's success. Although still in its early implementation phase, Vermont's All-Payer ACO Model, which was developed under and informed by the SIM Initiative, is expected to continue the momentum of payment and delivery model reform across the state.

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Sub-appendix F-1: Supplementary Results

This sub-appendix contains additional data relevant to Vermont during the SIM Initiative. ***Section F-1.1*** describes results from additional analyses to test the impact of the Vermont Medicaid accountable care organization (ACO) Shared Savings Program (SSP). ***Section F-1.2*** presents population-level health status data drawn from a statewide survey, to offer some context of changes in the overall population health during the period of the SIM Initiative.

Section F-1.3 presents results from analyses of Medicaid-insured, commercially insured, and Medicare-insured populations, comparing the Vermont statewide population to statewide populations in a group comparison states not participating in the SIM Initiative. These analyses test whether the SIM Initiative activities in Vermont offered enough leverage to change the trajectory of utilization and expenditure outcomes throughout different types of populations statewide. This leverage would occur via two primary mechanisms: first, providers likely make changes in care delivery for all patients, not just those participating in a payment model; second, the state built some infrastructure under the SIM Initiative that could assist a range of providers statewide in improving care.

F-1.1 Supplementary Results for the Vermont Medicaid SSP Impact Analysis

This section presents the complete data tables from the difference-in-differences (D-in-D) regression analyses that further explore the impact of the Vermont Medicaid ACO SSP on sub-populations. Following the sub-population analysis, this section also presents the results from two sensitivity analyses conducted, first to compare results from each of the two participating ACOs, and then to examine effects for the population who were attributed to an ACO for all 3 years of the Medicaid SSP.

In ***Table F-1-1*** and ***Table F-1-2***, we present the results of the D-in-D regression analyses for the percentage of beneficiaries with a visit to a primary care and specialty provider for children and adults, respectively. In ***Table F-1-3*** and ***Table F-1-4*** we present inpatient admissions and emergency department (ED) visits not leading to a hospitalization (outpatient ED visit) for children and adults, respectively. We present 30-day readmissions per 1,000 discharges for adults only because the measure is for persons age 18 years and older. In ***Table F-1-5*** and ***Table F-1-6***, we present the results of the D-in-D regression analyses for Medicaid per beneficiary per member (PBPM) expenditures for children and adults, respectively. We report annual regression-adjusted D-in-D estimates individually for the 3 years after the implementation of the Medicaid ACO SSP, along with an overall D-in-D estimate for all years combined. These results are summarized in ***Appendix F, Section F.2***.

Table F-1-1. Difference in the pre-post annual change in care coordination for child Medicaid beneficiaries in Vermont Medicaid SSP ACOs relative to the comparison group, all 3 years of implementation (January 2014 through December 2016)

Outcome and time period	Pre-period adjusted mean, ACO	Pre-period adjusted mean, CG	Test-period adjusted mean, ACO	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value
Percentage of beneficiaries with a visit to a primary care provider							
Year One	85.8	87.2	81.0	82.0	0.8 (−1.2, 2.7)	0.9	0.53
Year Two	85.8	87.2	81.4	81.3	1.8 (0.2, 3.5)	2.1	0.07
Year Three	85.8	87.2	82.9	84.9	−0.4 (−2.4, 1.7)	−0.4	0.77
Overall	85.8	87.2	81.8	82.6	0.8 (−0.3, 1.9)	0.9	0.25
Percentage of beneficiaries with a visit to a specialty care provider							
Year One	23.4	21.4	23.8	21.3	0.4 (−1.0, 1.9)	1.9	0.61
Year Two	23.4	21.4	23.9	23.1	−1.4 (−2.9, 0.1)[Ŧ]	−6.0	0.12
Year Three	23.4	21.4	24.8	23.4	−0.8 (−2.2, 0.6)	−3.5	0.35
Overall	23.4	21.4	24.2	22.5	−0.6 (−1.5, 0.2)	−2.6	0.22

ACO = accountable care organization; CG = comparison group; D-in-D = difference-in-differences; SSP = Shared Savings Program.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in the likelihood of a care coordination event in the Medicaid SSP group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in the likelihood of a care coordination event in the Medicaid SSP group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the Medicaid SSP group's baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the difference in likelihood of a care coordination event. The estimates are multiplied by 100 to obtain percentage probabilities. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix F-2* for additional detail.

[Ŧ] Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only. The Year Two estimate for "Number of visits to a specialty care provider (per 100)" is statistically significant at the 80% confidence interval only (−2.5, −0.3). The following sample size represents weighted period-years included in the regression model for the entire study period: (N = 389,612).

Data source: RTI analysis of DVHA Medicaid data, 2011–2016.

Table F-1-2. Difference in the pre-post annual change in care coordination for adult Medicaid beneficiaries in Vermont Medicaid SSP ACOs relative to the comparison group, all 3 years of implementation (January 2014 through December 2016)

Outcome and time period	Pre-period adjusted mean, ACO	Pre-period adjusted mean, CG	Test-period adjusted mean, ACO	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value
Percentage of beneficiaries with a visit to a primary care provider							
Year One	75.5	76.3	69.9	73.8	−3.1 (−4.5, −1.8)	−4.2	<0.001
Year Two	75.5	76.3	70.2	71.8	−0.8 (−2.0, 0.4)	−1.1	0.26
Year Three	75.5	76.3	71.9	73.4	−0.7 (−2.0, 0.5)	−1.0	0.34
Overall	75.5	76.3	70.6	73.0	−1.5 (−2.2, −0.8)	−2.0	0.001
Percentage of beneficiaries with a visit to a specialty care provider							
Year One	33.8	35.5	31.3	37.4	−4.3 (−5.3, −3.3)	−12.7	<0.001
Year Two	33.8	35.5	32.8	36.4	−1.8 (−3.0, −0.6)	−5.3	0.01
Year Three	33.8	35.5	34.2	37.6	−1.6 (−3.0, −0.3)	−4.8	0.05
Overall	33.8	35.5	32.7	37.1	−2.5 (−3.2, −1.8)	−7.4	<0.001

ACO = accountable care organization; CG = comparison group; D-in-D = difference-in-differences; SSP = Shared Savings Program.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in the likelihood of a care coordination event in the Medicaid SSP group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in the likelihood of a care coordination event in the Medicaid SSP group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the Medicaid SSP group's baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the difference in likelihood of a care coordination event. The estimates are multiplied by 100 to obtain percentage probabilities. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix F-2* for additional detail. The following sample size represents weighted period-years included in the regression model for the entire study period: (N = 377,735).

Data source: RTI analysis of DVHA Medicaid data, 2011–2016.

Table F-1-3. Difference in the pre-post annual change in utilization for child Medicaid beneficiaries in Vermont Medicaid SSP ACOs relative to the comparison group, all 3 years of implementation (January 2014 through December 2016)

Outcome and time period	Pre-period adjusted mean, ACO	Pre-period adjusted mean, CG	Test-period adjusted mean, ACO	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value
Inpatient admissions (per 1,000 beneficiaries)							
Year One	23.8	22.4	18.0	20.8	−4.4 (−6.8, −2.0)	−18.4	0.003
Year Two	23.8	22.4	17.0	20.1	−4.4 (−7.1, −1.6)	−18.3	0.01
Year Three	23.8	22.4	26.8	28.5	−2.5 (−5.7, 0.7) ǂ	−10.5	0.19
Overall	23.8	22.4	20.5	22.8	−3.8 (−5.4, −2.1)	−15.8	<0.001
Emergency department visits not leading to hospitalization (per 1,000 beneficiaries)							
Year One	331.0	306.8	288.6	274.0	−8.3 (−15.9, −0.6)	−2.5	0.08
Year Two	331.0	306.8	283.0	271.6	−11.5 (−20.5, −2.4)	−3.5	0.04
Year Three	331.0	306.8	281.3	266.5	−7.7 (−18.6, 3.1)	−2.3	0.24
Overall	331.0	306.8	284.2	271.0	−9.2 (−14.6, −3.8)	−2.8	0.01

ACO = accountable care organization; CG = comparison group; D-in-D = difference-in-differences; SSP = Shared Savings Program.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in expenditures or in the rate in the Medicaid SSP group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in expenditures or in the rate in the Medicaid SSP group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the Medicaid SSP group's baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The probability estimates are multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries/discharges. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix F-2* for additional detail.

The following sample size represents weighted period-years included in the regression model for the entire study period: (N = 389,612).

ǂ Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only. The Year Three estimate for "Inpatient Admissions" is statistically significant at the 80% confidence interval only (−5.0, −0.05).

The 30-day readmission measure for children was omitted because of small sample size (N = 298).

Data source: RTI analysis of DVHA Medicaid data, 2011–2016.

Table F-1-4. Difference in the pre-post annual change in utilization for adult Medicaid beneficiaries in Vermont Medicaid SSP ACOs relative to the comparison group, all 3 years of implementation (January 2014 through December 2016)

Outcome and time period	Pre-period adjusted mean, ACO	Pre-period adjusted mean, CG	Test-period adjusted mean, ACO	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value	Total weighted N
Inpatient admissions (per 1,000 beneficiaries)								377,735
Year One	83.3	79.7	93.4	77.6	12.1 (7.2, 16.9)	14.5	<0.001	
Year Two	83.3	79.7	90.3	89.3	−2.4 (−7.2, 2.3)	−2.9	0.40	
Year Three	83.3	79.7	118.4	138.3	−18.3 (−24.8, −11.8)	−22.0	<0.001	
Overall	83.3	79.7	99.6	97.3	−2.7 (−5.8, 0.3)[Ŧ]	−3.3	0.14	
Emergency department visits not leading to hospitalization (per 1,000 beneficiaries)								377,735
Year One	368.0	340.9	335.9	329.3	−19.9 (−27.7, −12.0)	−5.4	<0.001	
Year Two	368.0	340.9	339.3	323.4	−10.4 (−18.8, −1.9)	−2.8	0.04	
Year Three	368.0	340.9	347.6	335.8	−14.4 (−25.2, −3.7)	−3.9	0.03	
Overall	368.0	340.9	340.7	328.7	−14.4 (−19.7, −9.2)	−3.9	<0.001	
30-day readmissions (per 1,000 beneficiaries)								36,246
Year One	88.3	93.5	88.8	76.2	16.5 (−0.3, 33.2)[Ŧ]	18.6	0.11	
Year Two	88.3	93.5	111.0	135.9	−18.0 (−40.0, 4.1)[Ŧ]	−20.3	0.18	
Year Three	—	—	—	—	—	—	—	
Overall	88.3	93.5	100.8	107.3	−2.2 (−16.4, 12.0)	−2.4	0.80	

ACO = accountable care organization; CG = comparison group; D-in-D = difference-in-differences; SSP = Shared Savings Program.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in expenditures or in the rate in the Medicaid SSP group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in expenditures or in the rate in the Medicaid SSP group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the Medicaid SSP group's baseline period adjusted mean.

Methods: A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The probability estimates are multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries/discharges. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. See *Sub-appendix F-2* for additional detail.

[Ŧ] Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only. The overall estimate for "Inpatient admissions" is statistically significant at the 80% confidence interval only (−5.1, −0.3). The Year One and Year Two estimates for "30-day readmissions" are statistically significant at the 80% confidence interval only ([3.4, 29.5] and [−35.2, −0.8] respectively).

The Year Three 30-day readmission outcome was not calculated because it requires January 2017 data.

Data source: RTI analysis of DVHA Medicaid data, 2011–2016.

Table F-1-5. Difference in the pre-post annual change in PBPM expenditures for child Medicaid beneficiaries in Vermont Medicaid SSP ACOs relative to the comparison group, all 3 years of implementation (January 2014 through December 2016)

Outcome and time period	Pre-period adjusted mean, ACO	Pre-period adjusted mean, CG	Test-period adjusted mean, ACO	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value
Total expenditures (PBPM) ($)							
Year One	419.67	421.36	418.39	437.34	−17.25 (−37.98, 3.48) ǂ	−4.1	0.17
Year Two	419.67	421.36	392.19	423.37	−29.47 (−51.25, −7.70)	−7.0	0.03
Year Three	419.67	421.36	469.24	488.48	−17.53 (−44.07, 9.01)	−4.2	0.28
Overall	419.67	421.36	425.74	447.58	−21.68 (−35.05, −8.32)	−5.2	0.01
Inpatient facility expenditures (PBPM) ($)							
Year One	29.06	24.11	32.17	38.28	−11.06 (−20.89, −1.23)	−38.1	0.06
Year Two	29.06	24.11	28.62	33.46	−9.79 (−17.67, −1.90)	−33.7	0.04
Year Three	29.06	24.11	36.88	39.98	−8.05 (−15.96, −0.13)	−27.7	0.10
Overall	29.06	24.11	32.45	37.12	−9.62 (−14.55, −4.69)	−33.1	0.001
Other facility expenditures (PBPM) ($)							
Year One	49.97	48.54	53.01	47.26	4.33 (1.48, 7.17)	8.7	0.01
Year Two	49.97	48.54	53.39	49.01	2.96 (0.00, 5.91) ǂ	5.9	0.10
Year Three	49.97	48.54	56.19	51.12	3.64 (0.25, 7.03)	7.3	0.08
Overall	49.97	48.54	54.19	49.00	3.62 (1.84, 5.39)	7.2	0.001
Professional expenditures (PBPM) ($)							
Year One	296.10	296.99	288.71	302.96	−13.35 (−28.02, 1.32) ǂ	−4.5	0.13
Year Two	296.10	296.99	267.76	292.28	−23.63 (−40.97, −6.29)	−8.0	0.03
Year Three	296.10	296.99	321.34	331.85	−9.62 (−30.15, 10.90)	−3.2	0.44
Overall	296.10	296.99	291.95	307.78	−15.78 (−26.01, −5.54)	−5.3	0.01
Prescription drug expenditures (PBPM) ($)							
Year One	44.55	51.72	44.49	48.84	2.83 (−3.27, 8.92)	6.3	0.45
Year Two	44.55	51.72	42.42	48.62	0.97 (−5.47, 7.42)	2.2	0.80
Year Three	44.55	51.72	54.61	65.26	−3.48 (−11.42, 4.47)	−7.8	0.47
Overall	44.55	51.72	47.07	53.59	0.11 (−3.86, 4.07)	0.2	0.97

ACO = accountable care organization; CG = comparison group; D-in-D = difference-in-differences; PBPM = per beneficiary per month; SSP = Shared Savings Program.

(continued)

Table F-1-5. Difference in the pre-post annual change in PBPM expenditures for child Medicaid beneficiaries in Vermont Medicaid SSP ACOs relative to the comparison group, all 3 years of implementation (January 2014 through December 2016) (continued)

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in expenditures in the Medicaid SSP group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in expenditures in the Medicaid SSP group relative to the comparison group. The regression-adjusted D-in-D may not match exactly with the D-in-D calculated from the adjusted means because of rounding. The relative difference is the D-in-D estimate as a percentage of the Medicaid SSP group's baseline period adjusted mean.

Methods: An ordinary least square model was used to obtain estimates for differences in expenditures. The year-specific regression-adjusted D-in-D may not match the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights across these figures. See *Sub-appendix F-2* for additional detail.

[Ŧ] Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only. The Year One estimate for "Total expenditures (PBPM)" is statistically significant at the 80% confidence interval only (−33.40, −1.09). The Year Two estimate for "Other facility expenditures (PBPM)" is statistically significant at the 80% confidence interval only (0.65, 5.26). The Year One estimate for "Professional expenditures (PBPM)" is statistically significant at the 80% confidence interval only (−24.78, −1.92). The following sample size represents weighted period-years included in the regression model for the entire study period: (N = 389,612).

Data source: RTI analysis of DVHA Medicaid data, 2011–2016.

Table F-1-6. Difference in the pre-post annual change in PBPM expenditures for adult Medicaid beneficiaries in Vermont Medicaid SSP ACOs relative to the comparison group, all 3 years of implementation (January 2014 through December 2016)

Outcome and time period	Pre-period adjusted mean, ACO	Pre-period adjusted mean, CG	Test-period adjusted mean, ACO	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value
Total expenditures (PBPM) ($)							
Year One	499.13	473.16	525.77	527.04	−27.04 (−45.03, −9.05)	−5.4	0.01
Year Two	499.13	473.16	542.53	570.53	−53.76 (−74.56, −32.96)	−10.8	<0.001
Year Three	499.13	473.16	669.18	732.05	−88.64 (−119.44, −57.85)	−17.8	<0.001
Overall	499.13	473.16	574.86	595.05	−55.95 (−69.45, −42.46)	−11.2	<0.001
Inpatient facility expenditures (PBPM) ($)							
Year One	83.25	65.48	100.02	76.03	6.29 (−4.39, 16.97)	7.6	0.33
Year Two	83.25	65.48	96.58	96.96	−18.08 (−27.94, −8.22)	−21.7	0.003
Year Three	83.25	65.48	125.35	150.94	−43.29 (−60.12, −26.47)	−52.0	0.01
Overall	83.25	65.48	106.12	102.76	−18.13 (−25.26, −11.00)	−21.8	<0.001

(continued)

Table F-1-6. Difference in the pre-post annual change in PBPM expenditures for adult Medicaid beneficiaries in Vermont Medicaid SSP ACOs relative to the comparison group, all 3 years of implementation (January 2014 through December 2016) (continued)

Outcome and time period	Pre-period adjusted mean, ACO	Pre-period adjusted mean, CG	Test-period adjusted mean, ACO	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value
Other facility expenditures (PBPM) ($)							
Year One	89.23	87.98	93.87	100.75	−8.09 (−12.78, −3.39)	−9.1	0.01
Year Two	89.23	87.98	100.90	108.64	−8.95 (−14.14, −3.76)	−10.0	0.01
Year Three	89.23	87.98	114.54	117.46	−4.13 (−11.51, 3.24)	−4.6	0.36
Overall	89.23	87.98	102.79	107.92	−7.27 (−10.60, −3.93)	−8.1	<0.001
Professional expenditures (PBPM) ($)							
Year One	200.92	191.43	204.99	212.85	−17.30 (−25.62, −8.99)	−8.6	0.001
Year Two	200.92	191.43	202.22	208.63	−15.85 (−27.27, −4.43)	−7.9	0.02
Year Three	200.92	191.43	239.34	262.40	−32.50 (−46.97, −18.03)	−16.2	<0.001
Overall	200.92	191.43	214.03	223.77	−21.21 (−27.96, −14.46)	−10.6	<0.001
Prescription drug expenditures (PBPM) ($)							
Year One	125.74	128.27	126.88	137.45	−7.99 (−14.66, −1.31)	−6.4	0.05
Year Two	125.74	128.27	142.80	156.30	−10.92 (−20.46, −1.37)	−8.7	0.06
Year Three	125.74	128.27	189.28	200.45	−8.58 (−21.14, 3.98)	−6.8	0.26
Overall	125.74	128.27	151.70	160.40	−9.34 (−15.04, −3.63)	−7.4	0.01

ACO = accountable care organization, CG = comparison group; D-in-D = difference-in-differences; PBPM = per beneficiary per month; SSP = Shared Savings Program.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in expenditures in the Medicaid SSP group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in expenditures in the Medicaid SSP group relative to the comparison group. The year-specific regression-adjusted D-in-D may not match the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights across these figures. See *Sub-appendix F-2* for additional detail. The relative difference is the D-in-D estimate as a percentage of the Medicaid SSP group's baseline period adjusted mean.

Methods: An ordinary least square model was used to obtain estimates for differences in expenditures. The following sample size represents weighted period-years included in the regression model for the entire study period: (N = 377,735).

Data source: RTI analysis of DVHA Medicaid data, 2011–2016.

In ***Table F-1-7 and Table F-1-8*** below, we present the full results of the D-in-D regression analyses for beneficiaries attributed to CHAC and to OneCare, respectively. These results are summarized in ***Appendix F, Section F.2***.

Table F-1-7. Difference in the pre-post annual change in care coordination, utilization, and total PBPM expenditures for CHAC-attributed beneficiaries in Vermont Medicaid SSP relative to the comparison group, all 3 years of implementation (January 2014 through December 2016)

Outcome and time period	Pre-period adjusted mean, CHAC	Pre-period adjusted mean, CG	Test-period adjusted mean, CHAC	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value
Percentage of beneficiaries with a visit to a primary care provider							
Year One	79.9	82.5	72.0	78.1	−3.1 (−5.2, −1.0)	−3.9	0.02
Year Two	79.9	82.5	74.7	76.8	1.2 (−0.4, 2.7)	1.5	0.22
Year Three	79.9	82.5	76.7	79.3	0.4 (−1.2, 2.1)	0.5	0.69
Overall	79.9	82.5	74.4	78.0	−0.5 (−1.5, 0.6)	−0.6	0.45
Percentage of beneficiaries with a visit to a specialty care provider							
Year One	27.5	29.0	25.1	29.5	−2.9 (−3.9, −1.9)	−10.5	<0.001
Year Two	27.5	29.0	26.3	29.8	−2.1 (−3.4, −0.7)	−7.5	0.01
Year Three	27.5	29.0	27.2	30.8	−2.0 (−3.3, −0.7)	−7.2	0.01
Overall	27.5	29.0	26.2	29.9	−2.3 (−3.0, −1.6)	−8.4	<0.001
Inpatient admissions (per 1,000 beneficiaries)							
Year One	59.3	52.2	60.1	50.7	2.4 (−1.9, 6.6)	4.0	0.36
Year Two	59.3	52.2	59.7	56.6	−4.4 (−8.6, −0.2)	−7.4	0.09
Year Three	59.3	52.2	76.5	84.6	−14.0 (−19.0, −9.0)	−23.6	<0.001
Overall	59.3	52.2	65.0	62.1	−5.1 (−7.7, −2.5)	−8.6	0.001
Emergency department visits not leading to hospitalization (per 1,000 beneficiaries)							
Year One	355.7	325.3	327.9	304.9	−6.6 (−14.1, 0.9) ǂ	−1.9	0.15
Year Two	355.7	325.3	327.0	302.0	−4.5 (−12.5, 3.6)	−1.3	0.36
Year Three	355.7	325.3	329.4	301.9	−2.0 (−11.7, 7.7)	−0.6	0.74
Overall	355.7	325.3	328.1	303.0	−4.4 (−9.3, 0.4) ǂ	−1.2	0.13
Total expenditures ($ PBPM)							
Year One	489.17	477.90	474.01	484.03	−21.87 (−41.06, −2.68)	−4.5	0.06
Year Two	489.17	477.90	464.78	486.84	−33.90 (−52.98, −14.82)	−6.9	0.003
Year Three	489.17	477.90	588.80	608.56	−31.60 (−59.04, −4.16)	−6.5	0.06
Overall	489.17	477.90	505.86	518.97	−29.20 (−41.80, −16.59)	−6.0	<0.001
Inpatient facility expenditures ($ PBPM)							
Year One	62.17	52.32	68.27	56.29	1.81 (−8.90, 12.51)	2.9	0.78
Year Two	62.17	52.32	65.62	62.42	−6.99 (−14.54, 0.57) ǂ	−11.2	0.13
Year Three	62.17	52.32	86.09	91.74	−15.84 (−25.81, −5.87)	−25.5	0.01
Overall	62.17	52.32	72.77	68.16	−6.78 (−12.20, −1.35)	−10.9	0.04
Other facility expenditures (PBPM)							
Year One	69.65	73.21	72.80	77.11	−0.84 (−5.04, 3.37)	−1.2	0.74
Year Two	69.65	73.21	70.50	79.70	−5.73 (−9.54, −1.91)	−8.2	0.01
Year Three	69.65	73.21	82.56	85.91	0.13 (−5.07, 5.33)	0.2	0.97
Overall	69.65	73.21	74.96	80.44	−2.31 (−4.84, 0.22) ǂ	−3.3	0.13

(continued)

Table F-1-7. Difference in the pre-post annual change in care coordination, utilization, and total PBPM expenditures for CHAC-attributed beneficiaries in Vermont Medicaid SSP relative to the comparison group, all 3 years of implementation (January 2014 through December 2016) (continued)

Outcome and time period	Pre-period adjusted mean, CHAC	Pre-period adjusted mean, CG	Test-period adjusted mean, CHAC	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value
Professional expenditures (PBPM)							
Year One	273.10	252.87	258.13	258.73	−20.96 (−32.77, −9.14)	−7.7	0.004
Year Two	273.10	252.87	247.20	243.75	−16.90 (−30.21, −3.60)	−6.2	0.04
Year Three	273.10	252.87	305.19	300.51	−15.67 (−32.13, 0.79)[Ŧ]	−5.7	0.12
Overall	273.10	252.87	268.61	264.71	−17.87 (−25.87, −9.87)	−6.5	<0.001
Prescription Drug expenditures (PBPM)							
Year One	84.24	99.50	74.79	91.92	−1.89 (−6.75, 2.96)	−2.2	0.52
Year Two	84.24	99.50	81.42	100.96	−4.30 (−11.50, 2.89)	−5.1	0.33
Year Three	84.24	99.50	114.17	129.87	−0.46 (−9.83, 8.91)	−0.5	0.94
Overall	84.24	99.50	89.26	105.52	−2.32 (−6.52, 1.87)	−2.8	0.36

ACO = accountable care organization; CG = comparison group; CHAC = Community Health Accountable Care; D-in-D = difference-in-differences; PBPM = per beneficiary per month; SSP = Shared Savings Program.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in expenditures or in the rate in the specific ACO group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in expenditures or in the rate in the specific ACO group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the specific ACO group's baseline period adjusted mean.

Methods: An ordinary least square model was used to obtain estimates for differences in expenditures. A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The probability estimates are multiplied by 100 (1,000) to obtain an approximate rate per 100 (1,000) beneficiaries/discharges. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. For expenditure outcomes, the year-specific regression-adjusted D-in-D may not match the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights across these figures. See *Sub-appendix F-2* for additional detail. The following sample size represents weighted period-years included in the regression model for the entire study period: (N = 534,201).

[Ŧ] Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only. The Year One and Overall estimates for "Emergency department visits not leading to hospitalization" are statistically significant at the 80% confidence interval only (−12.5, −0.7; −8.2, −0.6). The Year Two estimate for "Inpatient facility expenditures (PBPM)" is statistically significant at the 80% confidence interval (−12.88, −1.10). The overall estimate for "Other facility expenditures (PBPM)" is statistically significant at the 80% confidence interval (−4.28, −0.34). The Year Three estimate for "Professional expenditures (PBPM)" is statistically significant at the 80% confidence interval (−28.49, −2.84).

Data source: RTI analysis of DVHA Medicaid data, 2011–2016.

Table F-1-8. Difference in the pre-post annual change in care coordination, utilization, and total PBPM expenditures for OneCare-attributed beneficiaries in Vermont Medicaid SSP relative to the comparison group, all 3 years of implementation (January 2014 through December 2016)

Outcome and time period	Pre-period adjusted mean, OneCare	Pre-period adjusted mean, CG	Test-period adjusted mean, OneCare	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value
Percentage of beneficiaries with a visit to a primary care provider							
Year One	82.4	82.8	78.4	78.3	0.4 (−1.0, 1.9)	0.5	0.64
Year Two	82.4	82.8	77.1	77.1	0.3 (−0.8, 1.5)	0.4	0.63
Year Three	82.4	82.8	78.5	79.7	−0.8 (−2.2, 0.6)	−1.0	0.34
Overall	82.4	82.8	77.9	78.3	0.0 (−0.8, 0.8)	0.0	0.99
Percentage of beneficiaries with a visit to a specialty care provider							
Year One	29.4	28.4	29.0	29.3	−1.2 (−2.6, 0.1)[Ŧ]	−4.2	0.13
Year Two	29.4	28.4	29.1	29.7	−1.6 (−2.7, −0.5)	−5.4	0.02
Year Three	29.4	28.4	30.6	30.6	−0.9 (−2.1, 0.3)[Ŧ]	−3.2	0.20
Overall	29.4	28.4	29.5	29.8	−1.3 (−2.0, −0.6)	−4.3	0.003
Inpatient admission (per 1,000)							
Year One	50.9	49.7	50.9	49.6	0.2 (−3.1, 3.5)	0.4	0.92
Year Two	50.9	49.7	52.4	56.0	−4.4 (−7.6, −1.1)	−8.6	0.03
Year Three	50.9	49.7	70.5	83.1	−10.0 (−13.8, −6.1)	−19.6	<0.001
Overall	50.9	49.7	57.6	61.0	−4.8 (−6.8, −2.8)	−9.4	<0.001
Emergency department visits not leading to hospitalization (per 1,000)							
Year One	345.1	319.8	300.2	299.8	−23.7 (−31.0, −16.4)	−6.9	<0.001
Year Two	345.1	319.8	304.9	296.8	−15.9 (−23.2, −8.5)	−4.6	<0.001
Year Three	345.1	319.8	300.3	296.4	−19.9 (−28.6, −11.1)	−5.8	<0.001
Overall	345.1	319.8	302.1	297.8	−19.4 (−23.9, −14.9)	−5.6	<0.001
Total expenditures ($ PBPM)							
Year One	478.43	471.87	462.11	484.73	−28.81 (−45.73, −11.88)	−6.0	0.01
Year Two	478.43	471.87	456.71	487.92	−37.39 (−54.72, −20.06)	−7.8	<0.001
Year Three	478.43	471.87	563.78	611.88	−54.28 (−78.21, −30.35)	−11.3	<0.001
Overall	478.43	471.87	491.89	520.52	−40.14 (−51.42, −28.86)	−8.4	<0.001
Inpatient facility expenditures ($ PBPM)							
Year One	57.59	49.34	61.51	57.30	−3.83 (−12.54, 4.87)	−6.7	0.47
Year Two	57.59	49.34	58.73	63.39	−12.71 (−20.16, −5.26)	−22.1	0.01
Year Three	57.59	49.34	74.40	90.96	−24.60 (−33.29, −15.91)	−42.7	<0.001
Overall	57.59	49.34	64.47	68.66	−13.81 (−18.55, −9.06)	−24.0	<0.001
Other facility expenditures (PBPM)							
Year One	71.43	70.25	74.23	75.65	−2.55 (−6.36, 1.27)	−3.6	0.27
Year Two	71.43	70.25	80.08	79.31	−0.35 (−3.84, 3.13)	−0.5	0.87
Year Three	71.43	70.25	86.66	84.34	1.20 (−3.22, 5.63)	1.7	0.66
Overall	71.43	70.25	80.41	79.34	−0.52 (−2.76, 1.73)	−0.7	0.71

(continued)

Table F-1-8. Difference in the pre-post annual change in care coordination, utilization, and total PBPM expenditures for OneCare-attributed beneficiaries in Vermont Medicaid SSP relative to the comparison group, all 3 years of implementation (January 2014 through December 2016)(continued)

Outcome and time period	Pre-period adjusted mean, OneCare	Pre-period adjusted mean, CG	Test-period adjusted mean, OneCare	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value
Professional expenditures (PBPM)							
Year One	255.03	256.73	238.34	261.48	−21.36 (−31.19, −11.54)	−8.4	<0.001
Year Two	255.03	256.73	226.80	246.69	−18.12 (−29.15, −7.08)	−7.1	0.01
Year Three	255.03	256.73	282.28	307.41	−23.36 (−37.88, −8.84)	−9.2	0.01
Overall	255.03	256.73	247.62	268.66	−20.72 (−27.63, −13.81)	−8.1	<0.001
Prescription drug expenditures (PBPM)							
Year One	94.38	95.56	88.02	90.31	−1.08 (−6.82, 4.66)	−1.1	0.76
Year Two	94.38	95.56	91.09	98.52	−6.22 (−13.14, 0.69) ₸	−6.6	0.14
Year Three	94.38	95.56	120.20	128.63	−7.22 (−15.40, 0.97) ₸	−7.6	0.15
Overall	94.38	95.56	99.31	103.71	−5.01 (−9.10, −0.92)	−5.3	0.04

ACO = accountable care organization, CG = comparison group; D-in-D = difference-in-differences; OneCare = OneCare Vermont; PBPM = per beneficiary per month; SSP = Shared Savings Program.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in expenditures or in the rate in the specific ACO group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in expenditures or in the rate in the specific ACO group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the specific ACO group's baseline period adjusted mean.

Methods: An ordinary least square model was used to obtain estimates for differences in expenditures. A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The probability estimates are multiplied by 100 (1,000) to obtain an approximate rate per 100 (1,000) beneficiaries/discharges. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. For expenditure outcomes, the year-specific regression-adjusted D-in-D may not match the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights across these figures. See *Sub-appendix F-2* for additional detail. The following sample size represents the weighted period-years included in the regression model for the entire study period: (N = 616,659).

₸ Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only. The Year One and Year Three estimates for "Number of visits to a specialty care provider (per 100)" are statistically significant at the 80% confidence interval only (−2.3, −0.2; −1.9, −0.01). The Year Two and Year Three estimates for "Prescription Drug expenditures (PBPM)" are statistically significant at the 80% confidence interval only (−11.61, −0.84; −13.60, −0.84).

Data source: RTI analysis of DVHA Medicaid data, 2011–2016.

Table F-1-9 shows the results of the sensitivity analysis on Medicaid beneficiaries who were attributed to an ACO for all 3 years of the Medicaid SSP to better understand the cumulative effect of ACO efforts. These results are summarized in ***Appendix F, Section F.2***.

Table F-1-9. Difference in the pre-post annual change in total PBPM expenditures and utilization for continuously enrolled Medicaid beneficiaries in Vermont Medicaid SSP ACOs relative to the comparison group, all 3 years of implementation (January 2014 through December 2016)

Outcome and time period	Pre-period adjusted mean, ACO	Pre-period adjusted mean, CG	Test-period adjusted mean, ACO	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value
Inpatient admissions (per 1,000 beneficiaries)							
Year One	40.9	39.5	38.3	33.8	3.1 (−0.9, 7.0) ǂ	7.5	0.20
Year Two	40.9	39.5	39.0	38.0	−0.5 (−4.3, 3.3)	−1.3	0.81
Year Three	40.9	39.5	55.0	62.8	−7.5 (−12.2, −2.8)	−18.3	0.01
Overall	40.9	39.5	44.1	43.5	−1.7 (−4.1, 0.8)	−4.0	0.26
Emergency department visits not leading to hospitalization (per 1,000 beneficiaries)							
Year One	327.5	306.0	295.2	279.5	−4.7 (−13.7, 4.2)	−1.4	0.39
Year Two	327.5	306.0	297.1	283.4	−6.9 (−17.2, 3.4)	−2.1	0.27
Year Three	327.5	306.0	296.9	281.1	−4.7 (−15.2, 5.9)	−1.4	0.47
Overall	327.5	306.0	296.4	281.3	−5.4 (−11.2, 0.3) ǂ	−1.7	0.12
Total expenditures ($ PBPM)							
Year One	457.87	462.20	449.77	453.59	−0.21 (−18.05, 17.63)	0.0	0.99
Year Two	457.87	462.20	457.35	465.74	−4.78 (−24.87, 15.31)	−1.0	0.70
Year Three	457.87	462.20	560.21	602.61	−38.79 (−64.41, −13.17)	−8.5	0.01
Overall	457.87	462.20	489.04	500.20	−14.57 (−26.94, −2.20)	−3.2	0.05
Inpatient facility expenditures ($ PBPM)							
Year One	43.80	40.47	42.26	35.76	2.72 (−7.56, 13.00)	6.2	0.66
Year Two	43.80	40.47	45.72	41.94	0.00 (−8.47, 8.47)	0.0	>0.99
Year Three	43.80	40.47	58.70	68.68	−13.77 (−23.24, −4.29)	−31.4	0.02
Overall	43.80	40.47	48.89	47.21	−3.68 (−9.12, 1.77)	−8.4	0.27
Other facility expenditures ($ PBPM)							
Year One	65.41	64.19	66.45	63.68	1.59 (−1.79, 4.96)	2.4	0.44
Year Two	65.41	64.19	70.53	68.19	1.15 (−2.35, 4.64)	1.8	0.59
Year Three	65.41	64.19	77.21	75.20	0.83 (−3.64, 5.29)	1.3	0.76
Overall	65.41	64.19	71.39	68.46	1.19 (−1.01, 3.38)	1.8	0.38
Professional expenditures ($ PBPM)							
Year One	268.73	265.03	262.20	267.52	−9.31 (−21.30, 2.68) ǂ	−3.5	0.20
Year Two	268.73	265.03	257.23	263.35	−10.11 (−24.96, 4.74)	−3.8	0.26
Year Three	268.73	265.03	313.12	331.26	−22.13 (−38.97, −5.29)	−8.2	0.03
Overall	268.73	265.03	277.47	284.37	−13.84 (−22.33, −5.36)	−5.2	0.01

(continued)

Table F-1-9. Difference in the pre-post quarterly change in total PBPM expenditures and utilization for continuously enrolled Medicaid beneficiaries in Vermont Medicaid SSP ACOs relative to the comparison group, all 3 years of implementation (January 2014 through December 2016) (continued)

Outcome and time period	Pre-period adjusted mean, ACO	Pre-period adjusted mean, CG	Test-period adjusted mean, ACO	Test-period adjusted mean, CG	Regression-adjusted difference-in-differences (90% confidence interval)	Relative difference (%)	p-value
Prescription drug expenditures (PBPM)							
Year One	79.92	92.52	78.85	86.63	4.80 (−0.38, 9.97) ₸	6.0	0.13
Year Two	79.92	92.52	83.87	92.26	4.19 (−3.14, 11.53)	5.2	0.35
Year Three	79.92	92.52	110.87	127.35	−3.90 (−12.94, 5.13)	−4.9	0.48
Overall	79.92	92.52	91.18	100.13	1.70 (−2.54, 5.95)	2.1	0.51

ACO = accountable care organization, CG = comparison group; D-in-D = difference-in-differences; PBPM = per beneficiary per month; SSP = Shared Savings Program.

Note:

How to interpret the findings: A *negative* value corresponds to a *greater decrease* or a *smaller increase* in expenditures or in the rate in the Medicaid SSP group relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in expenditures or in the rate in the Medicaid SSP group relative to the comparison group. The relative difference is the D-in-D estimate as a percentage of the Medicaid SSP group's baseline period adjusted mean.

Methods: An ordinary least square model was used to obtain estimates for differences in expenditures. A logistic regression model was used to obtain estimates of the differences in probability of any utilization. The probability estimates are multiplied by 100 (1,000) to obtain an approximate rate per 100 (1,000) beneficiaries/discharges. The regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated with a different method. For expenditure outcomes, the year-specific regression-adjusted D-in-D may not match the D-in-D calculated from the adjusted means because of rounding. Additionally, the overall regression-adjusted D-in-D may not match the D-in-D calculated from the overall adjusted means because we use different weights across these figures. See *Sub-appendix F-2* for additional detail. The following sample size represents the weighted period-years included in the regression model for the entire study period: (N = 378,697).

₸ Standard statistical practice is to use confidence intervals of 90% or higher. Eighty percent confidence intervals are provided here for comparison purposes only. The Year One estimates for "professional expenditures (PBPM)" are statistically significant at the 80% confidence interval (−18.65, 0.03). The Year One estimates for "Prescription Drug expenditures (PBPM)" are statistically significant at the 80% confidence interval (0.77, 8.83). The Year One estimates for "Inpatient admissions" are statistically significant at the 80% confidence interval (−0.01, 6.1). The overall estimates for "Emergency department visits not leading to hospitalization" are statistically significant at the 80% confidence interval (−9.9, −0.9).

Data source: RTI analysis of DVHA Medicaid data, 2011–2016.

F-1.2 Vermont Population-level Health Status Measures, 2013–2016

The Behavioral Risk Factor Surveillance System (BRFSS) is a state-based survey conducted annually by state health departments, guided by the Centers for Disease Control and Prevention (CDC). The survey is used to collect data from U.S. residents 18 and older regarding health insurance coverage, health risk behaviors, health status, and preventive health practices. The data summarized here provide some context to trends in the health of Vermont's population during the time of the SIM Initiative, but which were unlikely to have been affected by Vermont's SIM Initiative activities. Because these survey data draw from all low-income adults age 18–64 in the state, these trends are likely not influenced by the SIM-supported Medicaid payment model, the Medicaid accountable care organization (ACO) Shared Savings Program (SSP). However, these trends illustrate the context in which health care providers participating in delivery system and payment models are working. More detail on the methods used is available in ***Appendix G***.

Table F-1-10 summarizes BRFSS data for the time period corresponding to the SIM Initiative (2013 and 2016) and for low-income, non-aged adults. We chose to look specifically at low-income, non-aged adults because the Vermont SIM Initiative made changes to payment models in Medicaid, which serves this population. In general, there are only small (and generally statistically insignificant) changes in health-related measures of interest.[138] Statistically significant differences between 2013 and 2016 included the following:

- A 10.3 percentage point decrease in self-reported lack of health insurance for the low-income adult population in Vermont (which we also observe in all most states), attributable to increased access to Medicaid and other Affordable Care Act–supported coverage.
- A 1-day increase in the number of poor physical health days and a 1.2-day increase in the number of poor mental health days, out of the last 30 days.

The prevalence of key self-reported diseases shows little evidence of statistically significant change between 2013 and 2016. The number of respondents in Vermont who reported that they are current smokers, have not tried to quit smoking, and are obese increased in 2016. With increased health care provider attention to prevention and to people at high risk for adverse health utilization and outcomes, these increases—although statistically nonsignificant—may represent improved focus or access to care leading to increased appropriate clinical diagnosis, without sufficient time for clinical treatment to improve health status.

[138] This comparison of changes between 2013 and 2016 controls for the following individual and family characteristics: sex, age, race and ethnicity, educational attainment, marital status, family and household size, employment status, family income, and home ownership). We did not control for health insurance status in these analyses.

Table F-1-10. Regression-adjusted changes in population health for low-income adults 18 to 64 in Vermont, 2013–2016

Measure	2013	2016	2016–2013 difference
Self-reported health status is fair or poor	16.8%	18.6%	1.8
Any days physical health was not good in last 30 days	41.4%	46.7%	5.2
Number of days physical health was not good in last 30 days	4.4	5.4	1.0*
Any days mental health was not good in last 30 days	49.9%	55.2%	5.3
Number of days mental health was not good in last 30 days	5.5	6.8	1.2**
Ever diagnosed with diabetes	6.0%	6.7%	0.7
Is obese	24.4%	27.5%	3.0
Current smoker	27.8%	31.6%	3.8
Current smoker who has not tried to quit in last year	10.6%	14.5%	3.9
Does not have health insurance	17.3%	7.0%	−10.3**
Does not have a personal doctor	20.2%	17.2%	−3.0
Did not have a routine checkup in the past year	38.0%	36.3%	−1.7
Did not have a dental visit in the past year[a]	38.5%	37.9%	−0.6

Source: 2013–2016 BRFSS.

Note: Low income is defined as income at or below 138% of the federal poverty level. The sample size is 1,056 for 2013, 1,128 for 2016, and 4,503 for the 2013–2016 period.

[a] Information on dental visits is not available for 2013; the 2014 measure is used instead.

*/** Significantly different from zero at the 0.10/0.05 level, two-tailed test.

F-1.3 Vermont Statewide Claims-based Measures

The data summarized here provide some context to trends in the health care utilization and expenditures of Vermont's Medicaid, commercially insured, and Medicare populations relative to similar populations in other states during the time of the SIM Initiative. Under the SIM Initiative, Vermont implemented an ACO model, the Medicaid SSP and the commercial SSP. Concurrently, Vermont ACOs also participated in the Medicare SSP. Moreover, the ACO model built on a preexisting patient-centered medical home model in Vermont, the Blueprint for Health model, which included all payers. By the end of the SIM Initiative, the ACO model reached 46, 13, and 44 percent of the state's Medicaid, commercially insured, and Medicare populations, respectively. The Blueprint model reached 70, 37, and 59 percent of the state's Medicaid, commercial, and Medicare populations, respectively. We present findings on changes in outcomes for the statewide Medicaid population using Medicaid Analytic eXtract (MAX) files, for the commercially insured population using data from MarketScan Research Databases (©2016 from Truven Health Analytics LLC, an IBM Company), and for the Medicare population using Medicare fee-for-service (FFS) claims.

We summarize the findings from difference-in-differences analyses that compared outcomes for Vermont relative to the comparison group from before and after the SIM Initiative started in October 2013. We analyzed Medicaid claims data over 3 years (October 2011 to September 2014) and commercial and Medicare claims data over 5 years (October 2011 to September 2016). Although the analyses use the SIM Initiative implementation start date to divide the analysis period, these findings are not intended as estimates of SIM-related impacts. These trends do not show the impact of the SIM-funded models because the analysis is conducted with the entire Medicaid and Medicare populations and the commercially insured population with data included in the MarketScan database, not just those served by model-participating providers. As such, the populations studied are at most only incidentally affected by the initiative. In sum, the trends reported here highlight some of the context in which health care providers participating in delivery system and payment models are working and what changes were occurring in health care use and expenditures in the state during the SIM Initiative, whether or not they were directly related to the initiative.

Specifically, we used claims data to derive the following annual outcomes:

- **Care coordination**
  - Percentage of beneficiaries with any physician visits (broken out by primary care and specialty care providers for commercially insured and Medicare)
  - Percentage of mental illness–related acute inpatient hospital admissions with a mental health follow-up visit within 7 days and 30 days
  - Percentage of acute admissions with a follow-up visit within 14 days
- **Utilization**
  - Inpatient admissions per 1,000 persons
  - Emergency department (ED) visits per 1,000 persons
  - 30-day readmissions per 1,000 discharges
- **Total per member per month (PBPM) expenditures**
- **Quality of care**
  - Rate of hospitalizations for ambulatory care sensitive conditions
  - Flu immunization rates
  - Breast cancer screening rates
  - Well-child visit rates
    - Number by 15 months of age and any for children age 3 to 6 years
  - Initiation and engagement of alcohol and other drug-related treatment
  - Asthma medication management

- Depression medication management
- Tobacco screening rates (for Medicare only)

Because of inherent differences in utilization patterns, we examined rates of physician visits, inpatient admissions, ED visits, and 30-day readmissions along with total expenditures separately for child and adult Medicaid beneficiaries and commercial plan members. We also examined these core outcomes separately for Medicare beneficiaries dually enrolled in Medicare and Medicaid and those enrolled in Medicare only. In addition, we examined inpatient admission and ED visit rates (all cause and behavioral health related) and expenditures (total and behavioral health related) separately for Medicaid beneficiaries and commercial plan members with behavioral health conditions because this high-risk group may use more health care than the overall population. For each analysis, we use a statistical significance level of $p < 0.10$. Detailed methods on these analyses are presented in ***Appendix G***.

F-1.3.1 Trends for the Vermont Medicaid population, 2011–2014

We used Medicaid data from the CMS MAX and Alpha-MAX research files made available through the CCW enclave for Vermont and its comparison states (Connecticut and Iowa). The MAX data contain all the enrollment and claims information for every Medicaid beneficiary in the state. Because beneficiaries dually enrolled in Medicare and Medicaid do not have complete utilization or expenditure data in the Medicaid claims, we report care coordination, utilization, and quality outcomes for beneficiaries enrolled in Medicaid only. We report the total expenditures for those dually enrolled in Medicare and Medicaid and those only enrolled in Medicaid separately.

In general, the findings for care coordination, utilization, expenditure, and quality of care outcomes for the Medicaid beneficiaries in Vermont were mixed. From 2011 to 2014, key statistically significant changes for Vermont Medicaid beneficiaries relative to the comparison group include the following:

- **The likelihood of a physician visit declined for the overall and adult populations**. There was no difference in the change in the likelihood of a physician visit for children; however, there was some evidence of waning primary care use for children as **the percentage of children without any well-child visits by the time they were 15 months old increased** and the **percentage of children age 3 to 6 years who had any well-child visits in the year decreased**.
- **Care coordination, as measured by rates of follow-up within 14 days after a hospitalization and rates of mental health follow-up within 7 days after a mental-illness related hospitalization, declined.**
- Even so, **inpatient and outpatient hospital utilization improved**, as evidenced by relative declines in the rates of inpatient admissions, including rates of ambulatory care–sensitive condition admissions and 30-day readmissions, and ED visits. These

findings were generally consistent across child and adult populations, although there was no difference in the change in the inpatient admission rate for children.

- **Preventive quality metrics generally declined**, including declines in the flu immunization rate and breast cancer screening rate.
- However, **medication management quality metrics**, including asthma medication management and depression medication management, **improved**.
- **Total PBPM expenditures declined** for beneficiaries dually eligible for Medicare and Medicaid and those enrolled in Medicaid only. Likewise, total PBPM expenditures declined for both children and adults.
- Among beneficiaries with behavioral health conditions, we found similar findings to the overall population. **Inpatient admission rates** (all cause and behavioral health related) **and ED visit rates** (all cause and behavioral health related) **declined, as did the rate of physician visits.** Likewise, **total PBPM expenditures** and **behavioral health–related expenditures declined**.

F-1.3.2 Trends for the commercially insured population, 2011–2016

We used data from MarketScan Research Databases (©2016 from Truven Health Analytics LLC., an IBM Company), to calculate outcomes for the commercially insured population in Vermont and its comparison group (Iowa, Connecticut, and New Hampshire). Individuals represented in the database are those age 1 to 64 years who are covered under plan types with a wide variety of delivery and payment types—including FFS, fully and partially capitated plans, and various plan models (such as preferred provider organizations). Although MarketScan is among the largest available data sources for commercial data, the data is a convenience sample of the commercially insured in each state that overrepresents large employers. As such, employer-sponsored insurance is not necessarily accurately represented for each state. Moreover, the sample varies from state to state and year to year depending on which payers choose to participate. In Vermont, the sample size of commercial plan members in the MarketScan data declines steadily from 2011 to 2016. In 2011, approximately 12 percent of Vermont's commercial population is included in the sample whereas in 2016, approximately 5 percent of the commercial population is included.[139]

In addition, we used the all-payer claims data from Vermont's all-payer claims database (APCD) to obtain a more complete picture of the commercially insured population (see ***Section G.2*** in ***Appendix G***). MarketScan may not be as representative of the state's

[139] The percentage of the state's commercially insured population included in MarketScan data was calculated by taking the total sample size included in MarketScan in the state in the given year over the number of nonelderly (age 0-64) residents in the state covered by employer sponsored insurance as reported in Kaiser State Health facts (https://www.kff.org/other/state-indicator/nonelderly-0-64/?dataView=1&currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D).

commercially insured population as the APCD, for example it overrepresents the self-insured market, but it provides similarly constructed comparison state data not otherwise available.

The overall estimated changes in care coordination, utilization, and quality of care outcomes for the commercially insured population in Vermont were mixed. From 2011 to 2016, key statistically significant changes for Vermont commercial plan members relative to the comparison group include the following:

- **Improvements in primary care use.** The likelihood of a primary care visit increased for the overall population and for children and adults. Likewise, the **percentage of children with no well-child visits by 15 months of age declined and the percentage of children age 3 to 6 years with any well-child visit increased.**
- **The likelihood of a specialty care visit also increased.**
- **Care coordination**, as measured by the percentage of admissions with a follow-up visit within 14 days and the percentage of mental illness–related admissions with a mental health follow-up visit within 7 or 30 days, **declined**.
- Inpatient admission rates did not change, but **the rate of 30-day readmissions declined.**
- **ED visit rates increased** for the overall population, which was driven by an increase among adult commercial plan members.
- Likewise, **total PMPM expenditures increased in the overall and adult populations.**
- **Preventive quality metrics generally declined**, including declines in the flu immunization rate and breast cancer screening rate.
- In addition, **engagement with alcohol and other drug treatment also declined.**
- **Among commercial plan members with behavioral health conditions**, primary care use increased and behavioral health–related expenditures declined.

F-1.3.3 Trends for Medicare beneficiaries, 2011–2016

We used Medicare claims and enrollment data from the CCW. These data include complete enrollment and claims data for Medicare FFS beneficiaries for Vermont and its comparison group (Iowa, Connecticut, and New Hampshire).

The overall estimated changes in care coordination, utilization, and quality of care outcomes for the Medicare beneficiaries in Vermont were mixed. From 2011 to 2016, key statistically significant changes for Vermont Medicare beneficiaries relative to the comparison group include the following:

- The likelihood of a physician visit changed in the undesired direction for primary care—that is, **the likelihood of a visit to a primary care provider declined. The likelihood of a visit to a specialty care provider increased**.
- **Care coordination**, as measured by the percentage of admissions with a follow-up visit within 14 days, **declined**. However, the **percentage of mental illness-related admissions with a mental health follow-up visit within 30 days increased**.
- **Inpatient hospital utilization improved**, as evidenced by relative declines in the rates of inpatient admissions and 30-day readmissions. These findings were driven by relative declines observed for beneficiaries who were not also eligible for Medicaid.
- There was **no difference in the change in the rate of ED visits**.
- Likewise, there was **no difference in the change in total PBPM expenditures**.
- Although there were a few improvements in preventive quality metrics—both **flu immunizations and screenings for tobacco use increased**—in general, there were few changes in quality outcomes.

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