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Health Care Innovation Awards (HCIA) Meta-Analysis and Evaluators Collaborative

Annual Report Year 1

Prepared for

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HEALTH CARE INNOVATION AWARDS (HCIA) META-ANALYSIS AND
EVALUATORS COLLABORATIVE

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EXECUTIVE SUMMARY

Our first annual report for the Health Care Innovation Awards (HCIA) Meta-Analysis and Evaluators Collaborative highlights key implementation and impact findings from the seven independent Front Line Evaluators (FLEs) tasked with evaluating the activities and performance of the 108 HCIA grant recipients. In addition to exploring innovation program components and characteristics as reported in FLE quarterly and annual reports, our preliminary implementation results include target population, implementation process, implementation effectiveness, context, and workforce development findings. Our review of FLE assessment and reporting of workforce development is supplemented by results from RTI's workforce survey, which was fielded between January and May 2015. This report consists of three sections: overview of HCIA, implementation and impact findings, and conclusions.

Our main sources for implementation findings were FLE First Annual Reports, which contained findings from site visits for most awardees. Our systematic coding of innovation components and characteristics was also updated to include additional concepts based on requests from the Centers for Medicare and Medicaid Services (CMS). Identifying and understanding variations in core measure definitions were conducted through assessing methods extracted from awardee reports.

Implementation Findings: Our review of implementation documents and data provided many insights into lessons learned by awardees. Inadequate planning caused by a short planning period in the proposal process and inadequate assessment of organizational readiness, was a source of some implementation obstacles. Because many innovations require significant commitment from participants, many awardees also had difficulty enrolling and retaining patients. Additionally, many innovations target vulnerable populations that may face barriers to access. When staffing their innovations, awardees must weigh the benefits and drawbacks of hiring new staff versus using existing staff. Depending on the innovation and innovation context, the optimal staffing strategy will vary.

Impact Findings: Our review of current core four measure data availability (total cost of care, ED visits, readmissions, hospital admissions) revealed that we have some data for 57 awardees. Since the First Annual Reports from the seven FLEs lacked estimates for many of the outcomes and awardees, data were not yet available for quantitative analysis of the impact for this report. Using the workforce survey to measure satisfaction and team functionality, we found considerable variation in satisfaction and teamwork across respondents and awardees. We also used path analysis to examine the relationship among awardee structural characteristics and ratings reported by FLEs. In future reports, we look forward to continuing to provide feedback and guidance on analytic issues and to expanding the scope and reach of our analysis as more data becomes available.

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SECTION 1 BACKGROUND

Section 1115A of the Social Security Act (added by Section 3021 of the Affordable Care Act [ACA]) authorizes the Center for Medicare and Medicaid Innovation (CMMI) to test innovative health care payment and service delivery models that have the potential to lower Medicare, Medicaid, and Children's Health Insurance Program (CHIP) expenditures while maintaining or improving the quality of beneficiaries' care (42 U.S.C. 1315a). Under the law, preference is to be given to models that improve coordination, efficiency, and quality. CMMI has launched a number of models to test innovative models that aim to improve care. CMMI has funded Health Care Innovation Awards (HCIA) to encourage additional grassroots innovation that addresses locally perceived needs. The first round of HCIA awards was made in July 2012 for a 3-year period of performance. These HCIA awardees have proposed compelling new service delivery and payment models that will drive system transformation and deliver better outcomes for Medicare, Medicaid, and CHIP beneficiaries. The initiative was not prescriptive, but rather open-ended, with specific, shared goals of improving outcomes and reducing costs.

CMS seeks to learn from the efforts of the diverse group of awardees. For evaluation purposes, the awardees were categorized into three groups based on their principal focus and into 10 groups for their similarity of objective. These groups were divided and assigned to 7 independent Front Line Evaluators (FLEs) who interact directly with HCIA awardees, identify and convene comparison groups when possible, conduct analyses, and produce summary reports of those efforts. To maximize efficiency and the scientific value and utility of findings for CMS, RTI coordinates with the FLEs evaluating the different awardee groups in aggregate. RTI works with the FLEs to ensure that (1) the full set of available outcomes and data is understood and carefully managed, (2) RTI thoroughly understands the interventions and study designs across the projects, (3) RTI has the opportunity to suggest and influence changes or additions to data collection through CMS representatives for the frontline evaluation, and (4) RTI collect the analytical outputs from the frontline evaluators that inform the overarching evaluation. For outcomes based on claims data, RTI focuses on developing and collecting standardized measure calculations. For measures from awardee measurement and monitoring plans, RTI focuses on understanding the extent to which awardees across groups include the same measures. For additional outcomes, particularly qualitative ones, RTI also engages in upfront coordination to maximize the set of available and relevant measures to characterize key overarching features of interventions, settings, and contexts. For this evaluation, RTI relies on FLE's data analyses reported in the FLE's reports to CMS.

Through the meta-evaluation presented in this, and the meta-analyses presented in future reports, CMS hopes to obtain an overarching perspective on the learning from all HCIA awardees so that general conclusions may be drawn across these specific interventions about which approaches are most promising, for which populations, and in what conditions and settings they are most appropriately implemented. Specific cross-cutting service delivery issues will also be assessed across awardees developing strategies for pediatric populations, rural populations, and populations with behavioral health needs. Moreover, RTI plans to assess how interventions can be scaled up to wider practical use and how they can best be subjected to broad-based testing and ongoing quality improvement. To address these questions, RTI will assess the entire awardee portfolio, allowing comparisons between groups and within and between specific subpopulations of interest.

This report is separated into three major sections. The first section presents an overview of the HCIA awardees and awardee groups included in the evaluation and the data and methods used in this Annual Report. Next, preliminary findings and early results are presented. The report closes with a brief discussion of the conclusions which can be drawn from this early work and describes next steps to be followed to discover associations between awardee activities, options, and populations and their impact on health care expenditures and utilization.

1.1 Overview and Characteristics of HCIA Awards

CMS grouped the HCIA awards by similarity of objective into 10 groups (see *Table 1*). These 10 groups fall into 3 broad categories that derive from their principal focus. These three foci are managing medically fragile populations in the community, interventions in hospital settings, and community interventions. The “Management of Medically Fragile Patients in the Community” group’s awardees are characterized by a focus on high-risk patients who are receiving care primarily in community health care settings with a goal of controlling costs by improving care quality and reducing emergency department (ED) visits and hospital admissions. The “Hospital Setting Interventions” group’s awardees are characterized by a focus on care of hospitalized patients with a goal of reducing the length of stay, intensity of utilization, and readmission. The “Community Interventions” group’s awardees are focusing on various aspects of how care is delivered, rather than certain categories of patients, although some may also be focusing on subgroups of patients. Some are focusing on better coordination and use of services and health information technology, including care management, while others are focusing on different forms of primary care redesign, such as medical homes or the integration of depression care. Even within these broad groups, the awardees are a heterogeneous set, which creates both challenge and promise in the research synthesis process. Understanding the data available from awardees will be essential in accurately characterizing the interventions and in analyzing qualitative and quantitative outcomes across groups.

Table 1
HCIA Award Overview and Characteristics

Category/Group	Selected Intervention/Population	Selected Outcomes
Management of Medically Fragile Patients in the Community		
1. Disease/condition-specific targeting (18 awardees)	Tailored, home-based comprehensive care program for diabetics	HbA1c, low-density lipoprotein (LDL), blood pressure (BP) in highest-risk group; mortality, stroke, myocardial infarction (MI), heart and renal failure; costs
	Community oncology medical home (COME HOME) for people with cancer	Patient satisfaction, Quality Oncology Practice Initiative measures, ED visits and inpatient admissions, episode-of-care costs
	New England Asthma Innovations Collaborative for people with asthma	Improved symptom control, asthma action plans, asthma education services, urgent care visits, costs

(continued)

Table 1 (continued)
HCIA Award Overview and Characteristics

Category/Group	Selected Intervention/Population	Selected Outcomes
2. Complex/high-risk patient targeting (23 awardees)	Post-Acute Care Transition Program for post-acute care patients	Readmissions, costs, worker satisfaction, worker attrition, care plans, percentage of kept appointments, mortality, Do Not Resuscitate status, healthcare proxy status
	Patient-centered medical home (PCMH) model for people with disabilities and complex medical conditions	PHQ-9 depression score, hospital days, readmissions, costs, care plans, telemedicine visits, patient activation
	CAPABLE model to improve functional ability at home for frail dually eligible older adults	Fall risk, depression, medication review, pain management, patient satisfaction, home modifications
3. Behavioral health patients in community care (10 awardees)	A recovery-oriented approach to integrated behavioral and physical health care for a high-risk population	E-prescribing, electronic lab results, tobacco use assessment, tobacco cessation intervention, adult weight screening, lipid and HbA1c assessment, body mass index (BMI), costs, ED visits, hospitalizations, workforce burnout, patient satisfaction
	Prevention and Recovery in Early Psychosis (PREP) model for persons with schizophrenia	Percentage of patients employed or in school by 6 months, cumulative 3-year cost savings
	Use care managers and technology to improve the care of patients with schizophrenia	Improved mental health status, improved care quality, lower costs
Hospital-Based Interventions		
4. Condition-specific targeting (4 awardees)	The Sepsis Project to increase the delivery of optimal care (defined as perfect bundle compliance for sepsis) among hospital inpatients	Mortality, costs, length of stay, family satisfaction
	Improved training, evidence-based and systematic screening for sepsis, and more timely treatment for adult inpatients	Organ failure rates, mortality, length of stay, patient outcomes, costs
	Education, recognition, and prevention efforts by newly certified aides to prevent delirium among Medicare and Medicaid beneficiaries	Admissions, readmissions, care transitions

(continued)

Table 1 (continued)
HCIA Award Overview and Characteristics

Category/Group	Selected Intervention/Population	Selected Outcomes
5. Acute care management (3 awardees)	Innovative care model to address the hazards of immobility during hospitalization	Hospital-acquired pressure ulcers, ventilator-associated pneumonia, quality of care, patient satisfaction, length of stay
	Multidisciplinary teams—including registered nurses, licensed practical nurses, social workers, and medical assistants led by comprehensive care physicians (CCPs)—to provide consistent care to Medicare beneficiaries	ED visits, HbA1c, blood pressure, BMI, flu vaccination, admissions, intervention intensity
	Integrate geriatric care with ED care in three large, urban acute care hospitals	Patient safety and satisfaction, hospitalizations, return ED visits, unnecessary diagnostic and therapeutic services, medication errors, falls, avoidable complications
6. Improvement in ICU care, remote ICU monitoring (3 awardees)	Improved critical care performance for Medicare/Medicaid beneficiaries in intensive care units using a system that combines a centralized data repository with electronic surveillance and quality measurement of care responses	ICU complications, costs, discharge to home, discharge to other facility, catheter-related infections, ventilator-associated events, length of stay, hospital mortality
	Nurse practitioners and physician assistants deployed to underserved and rural hospitals using tele-ICU services	Worker satisfaction, patient satisfaction, medication management, mortality, 1-year survival, costs, length of stay, readmissions, guideline adherence
	Remote ICU monitoring and care management provided by physician intensivists working in teams with care providers and coordinators in rural southwestern and central Idaho and eastern Oregon	ICU mortality, pressure ulcers, ICU length of stay, readmission, hospital-acquired complications, guideline adherence

(continued)

Table 1 (continued)
HCIA Award Overview and Characteristics

Category/Group	Selected Intervention/Population	Selected Outcomes
Community-Based Interventions		
7. Community resource planning, prevention and monitoring (24 awardees)	Comprehensive community-based approach to reducing inappropriate imaging by establishing a data-exchange system between primary care and imaging facilities for beneficiaries in southeastern Michigan	CT and MRI volume, imaging costs
	Asian and Hispanic youth and veteran case workers as nonclinical health workers/patient providing services to Asian Americans in San Jose	ED visits, diabetes and cancer prevention services
	Innovative home visitation program for individuals diagnosed with chronic disease, persons at risk of developing diabetes, vulnerable seniors, and homebound individuals, as well as young children and hard-to-reach county residents in New Mexico	Annual foot and eye exams for diabetics, annual primary care exams for chronically ill, BP, pneumonia and flu vaccination, costs
8. Primary care redesign (14 awardees)	Expand Atlantic General Hospital’s infrastructure to create a patient-centered medical home in Berlin, MD	PCMH certification, e-prescribing, flu and pneumonia vaccination, tobacco assessment, tobacco cessation, HbA1c, blood pressure, ED visit rate, admissions, cost per beneficiary, patient satisfaction,
	CareFirst’s total care and cost improvement program in Maryland	Inpatient admissions, readmissions, care plans, total costs, ASC admissions, medication reconciliation, PCP satisfaction
	Multicommunity partnership between TransforMED, hospitals in the Veterans Health Affairs system and a technology/data analytics company to support transformation to PCMH of practices connected with the hospitals and development of a “Medical Neighborhood”	Total costs, patient satisfaction, unnecessary ED use, availability of same-day appointments, availability of after-hours appointments, inpatient admissions, inpatient days, unplanned readmissions, BMI, blood pressure, Primary Care Provider panel size, HbA1c, lipid profile, drug costs, overused procedures

(continued)

Table 1 (continued)
HCIA Award Overview and Characteristics

Category/Group	Intervention/Population	Selected Outcomes
9. Shared decision making (3 awardees)	Implement shared decision making interventions for preference-sensitive decisions (hips, knees, spine) and patient engagement interventions (e.g., decision tools, motivational interviewing, navigation skills) for patients with diabetes or congestive heart failure.	Hemoglobin A1c poor control, Blood Pressure management, LDL Management and control, Cost and Resource Use, Total Medicare Part A & B Cost Calculation, ED Visit Rate, change in hospital admissions, change in ED visits
	Testing a Quality Medical Management System (QMMS) which helps patients make treatment decisions with educational materials and physician advice.	ED Visit Rate, Total Cost of Care, Population-based PMPM Index, Response rate, Patient Empowerment Assessment, provider satisfaction
	Applies decision-making support, health care information services, and peer counseling, to help patients better understand treatment options and reduce the incidence of inappropriate surgeries	Inpatient Utilization, Readmissions, Total number of surgical procedures, overall cost of surgical procedures, # of beneficiaries reached by outreach
10. Medication Management (6 awardees)	Promotes shared access to electronic medical records between pharmacists and physicians to improve medication adherence and management.	Hospital readmission rates, Asthma Emergency Department Visits, Total Cost of Care, Influenza Vaccination, Tobacco Use and Assessment, Percent of patients that receive medication care plan
	Collaboration between health plans and the Pharmacy Society of Wisconsin to reach out to recently discharged Medicare beneficiaries and the uninsured who are non-adherent to prescribed medications.	Falls in the elderly, adverse drug events, Percentage of elderly patients taking potentially inappropriate medication, cost savings per participant, patient satisfaction scores
	Integrating comprehensive clinical pharmacy services, which includes medication management and counseling, into patient-centered medical homes.	Hemoglobin A1c Poor Control, Blood Pressure Management, Low Density Lipoprotein (LDL) Management and Control, Congestive Heart Failure Admission Rate, ED Visit Rate

1.2 Data and Methods

1.2.1 Implementation Analytic Approaches

For this Annual Report, we conducted a thematic analysis of Front Line Evaluator (FLE) Annual Reports, focusing mainly on findings from site visits. We conducted the thematic analysis using NVivo to code text associated with implementation findings from all seven FLE Annual Reports and associated appendices, when applicable. We achieved intercoder reliability kappas of 0.7 or greater for most codes. The various content and format differences across the FLE reports and appendices provided the major challenge in text coding and synthesis. Some of these differences may be unavoidable because of the variation in types of awardees and nature of the different awardee innovations. In addition to thematic analysis, we also developed a structured and systematic coding scheme for innovation components and characteristics.

We also collected data from FLEs through a structured assessment form, or the Annual Awardee Summary Form (AASF). This form asked FLEs to provide information about key awardee characteristics, staff deployment models, program design, and project history. FLEs were also asked to rate the awardee's implementation process, innovation complexity, leadership, organizational capacity, and program effectiveness based on site visits and their review of project documents. In addition to using the reported information to understand each awardee's implementation, we use the AASF data with other supplementary data to predict degree of implementation.

1.2.2 Impact Analytic Approaches

FLEs were requested to calculate Medicare total costs using only Medicare Parts A and B, quarterize (prorate) payments for patients with less than a full quarter's eligibility (except patients who die or for the first inpatient admission in a quarter), and to not standardize, risk-adjust or down weight for partial eligibility. All cause hospital admissions were defined as the number of patients who were admitted to the medical-surgical units and excludes patients kept overnight in observation beds. Patients with multiple admissions in a quarter were counted each time they were admitted, and estimates were to be quarterized. Risk adjustment was to be done during construction of the comparison group, although further adjustment using diagnostic characteristics was possible for estimating intervention effects. All cause readmissions were to be similarly quarterized and risk adjusted and were defined as an unplanned follow-up admission to any short-term acute general or long-term care hospital within 30 days of a discharge from another hospital of the same type. Finally, all cause ED utilization includes any overnight ED visits without a hospital admission including overnight ED observation visits without a hospital admission. The First Annual Reports from the seven FLEs were expected to provide these estimates. However, these reports lacked estimates for many of the awardees and it was decided to postpone analysis of these outcomes until more complete data were available.

The identification of new models of workforce development and deployment is a primary objective of HCIA. While a few awardees plan to collect survey data on workforce development and deployment, the tools used are not consistent across awardees. In order to collect data on workforce models, RTI conducted an employee survey across all awardees that measured job satisfaction, perceptions of teamwork, and daily activities of employees in

specialized roles (patient navigators, community health workers, care coordinators, and case managers). This survey was fielded between January and May 2015.

At this stage, we were also interested in assessing degree in implementation among the awardees. Using path analysis, we analyzed the relationship among the AASF responses, and other awardee features compiled by RTI and FLEs. Path analysis is a statistical technique for estimating linear associations among a set of variables arranged in a presumed, hierarchical causal sequence. We evaluated FLE ratings of the proportion of program components that had been implemented as intended more than 2 years after the start of the demonstration to determine why some awardees were able to get their innovations up and running more quickly than others.

Non-core Data from FLE Reports

In addition to core measures, FLEs presented information in their reports about non-core measures that can be classified into four general categories: dose, implementation process/process of care, health outcomes and supplemental measures in the four core measure categories (**Table 2**). Measures in two of these categories (dose and implementation process) were also captured in RTI's Annual Awardee Summary Form. As Table 6 shows, FLEs provided data on these measures for a relatively low number of awardees. In cases in which multiple FLEs reported data in a given category, measures used tended to be inconsistent, making cross-FLE comparison difficult. Given this limitation, the Annual Awardee Summary Form data appear to be the best source of standardized non-core measure information.

In addition to the categories of non-core information presented in Table 6, data on satisfaction with intervention services was provided by one awardee, and FLEs indicated that they intend to collection information on patient or provider satisfaction with the invention from many other awardees.

Table 2
Summary of non-core four measures

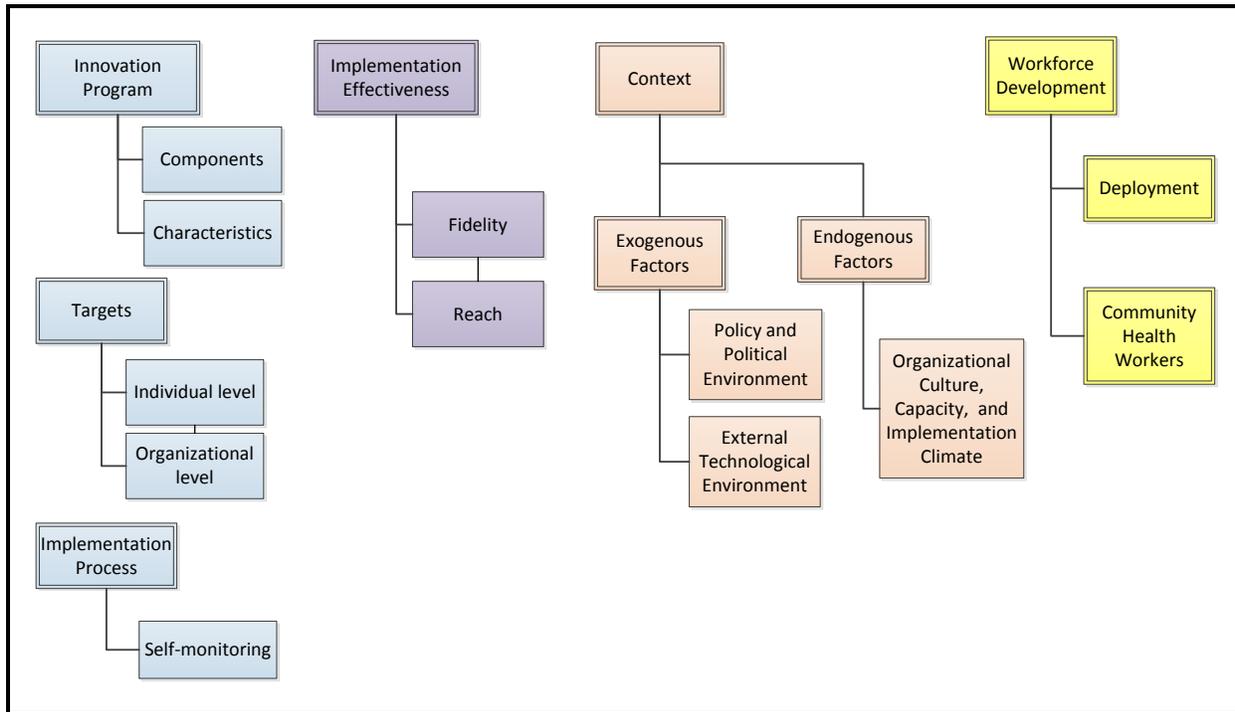
Measure Category	Definition	Number of Awardees out of Total Awardees with Data in Category—Reports	Number of Awardees out of Total Awardees with Data in Category—Annual Awardee Summary Form
Dose	The specific quantity, amount, duration, or intensity of services or intervention(s) an individual receives in terms that are specific to the context and nature of the innovation. Examples include number of enrollees who received certain decision aid components and number of appointments provided.	<ul style="list-style-type: none"> ▪ Behavioral Health: 3/10 ▪ Community: 10/24 ▪ Complex: 0/23 ▪ Disease-Specific: 0/18 ▪ Hospital: 0/10 ▪ Med. Mgmt. and Shared Decision-Making: 1/9 ▪ Primary Care: 3/14 	<ul style="list-style-type: none"> ▪ Behavioral Health: 10/10 ▪ Community: 18/24 ▪ Complex: 16/23 ▪ Disease-Specific: 12/18 ▪ Hospital: 10/10 ▪ Med. Mgmt. and Shared Decision-Making: 3/9 ▪ Primary Care: 7/14
Implementation Process/Process of Care	Adherence to intended implementation design/extent to which specific intervention components are implemented. Examples include metabolic screening of patients on antipsychotics, timeliness and frequency of appointments, and number of ultrasounds received during maternity care.	<ul style="list-style-type: none"> ▪ Behavioral Health: 2/10 ▪ Community: 2/24 ▪ Complex: 0/23 ▪ Disease-Specific: 0/18 ▪ Hospital: 0/10 ▪ Med. Mgmt. and Shared Decision-Making: 0/9 ▪ Primary Care: 1/14 	<ul style="list-style-type: none"> ▪ Behavioral Health: 10/10 ▪ Community: 24/24 ▪ Complex: 23/23 ▪ Disease-Specific: 18/18 ▪ Hospital: 10/10 ▪ Med. Mgmt. and Shared Decision-Making: 9/9 ▪ Primary Care: 14/14
Health Outcomes	Relevant health-related outcomes of intervention participants; may be general or condition-specific. Examples include alcohol and drug use, mortality rate, and percentage of patients who are overweight or obese.	<ul style="list-style-type: none"> ▪ Behavioral Health: 3/10 ▪ Community: 3/24 ▪ Complex: 0/23 ▪ Disease-Specific: 0/18 ▪ Hospital: 9/10 ▪ Med. Mgmt. and Shared Decision-Making: 4/9 ▪ Primary Care: 0/14 	N/A
Supplemental Measures in Four Core Measure Categories	Measures related to spending, inpatient admissions, unplanned readmissions, and ED visits other than those specified as core measures. Examples include length of inpatient stay, ED visits that result in hospitalization, number of hospital days, and all surgeries (including inpatient and outpatient).	<ul style="list-style-type: none"> ▪ Behavioral Health: 0/10 ▪ Community: 0/24 ▪ Complex: 0/23 ▪ Disease-Specific: 2/18 ▪ Hospital: 9/10 ▪ Med. Mgmt. and Shared Decision-Making: 4/9 ▪ Primary Care: 0/14 	N/A

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**SECTION 2
PRELIMINARY FINDINGS/RESULTS**

In this section, we describe findings relating to implementation of HCIA awardee innovations. The organizing framework for evaluating implementation across HCIA awardees is in **Figure 1**. We provide both quantitative and qualitative findings wherever possible based on information supplied by FLEs. We note that data for some domains are more readily available, rigorously measured, or both, as compared to data in other domains. In the first part of this section, we provide descriptive categorizations of awardees and themes identified across the implementation effectiveness, context, and workforce development areas. In this section, we also provide findings from a typology analysis using qualitative comparative analysis that offers additional ways of categorizing awardees based on shared combinations of innovation components, staffing features, or target population. In subsequent reports, these awardee groupings can be used to assess differences in implementation effectiveness or impact.

**Figure 1
Organizing framework for implementation evaluation within the
meta-analysis of health care innovation awards^a**



^a This figure represents an abridged version of the organizing framework and only includes the domains for which we have available data to report.

2.1 Key Implementation Findings

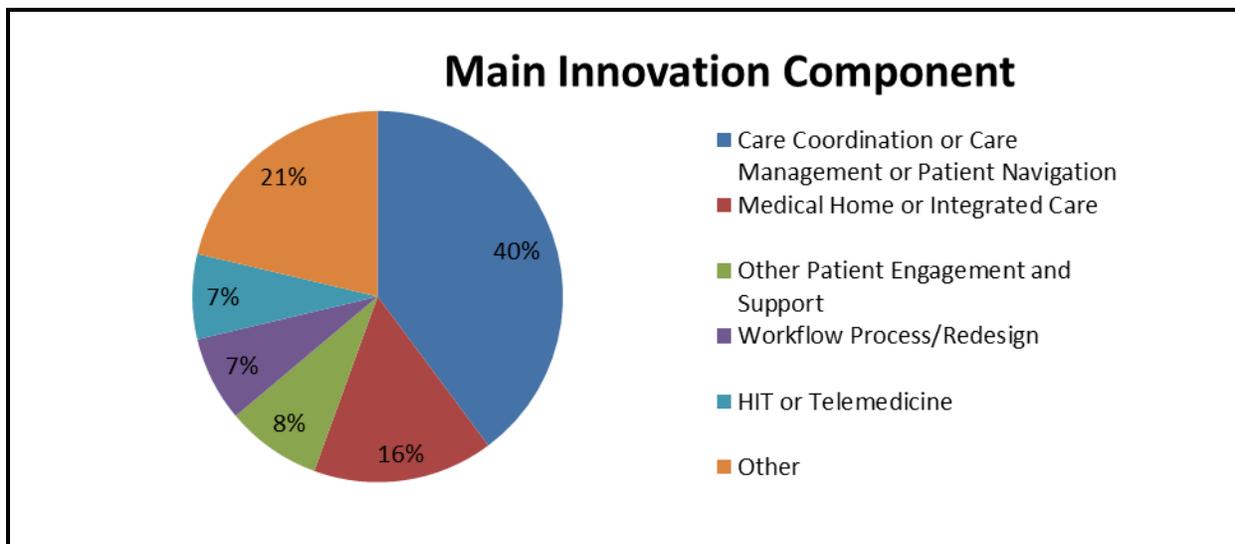
2.1.1 Innovation Program Components, Characteristics, and Typologies

The innovation program refers to both the innovation components—the specific services, care, or activity that comprise the innovation—and innovation characteristics—its complexity, its

history, or other features that characterize the nature of its components. Most FLEs had completed awardee site visits at the time of their Annual Report submission, though some FLEs noted that additional detail and analysis would be provided in subsequent reports.

Although many awardees include multiple components as part of their overall innovation program, we identified a main component for each awardee to facilitate further quantitative and qualitative analysis. We caution against over-interpretation of findings using the main component, as many programs include multiple and interdependent components. We identified five clusters of awardees categorized by main component as depicted in **Figure 2**. The category “other” includes awardees with main components such as shared decision making, medication management, direct care provision, isolated workforce training, alternative professional staffing models, and infrastructure development.

Figure 2
Main component present in health care innovation awardees (N = 108)



Two-thirds of awardees included some kind of care coordination component, even if not considered the “main” innovation component (See **Appendix A** for the categorization of awardee components). We identified innovations with care coordination components as falling into one of three archetypes: 1) innovations involving only transitional care coordination associated with time-limited involvement during transition from inpatient to skilled nursing facility or home/community, 2) outpatient care coordination involving longitudinal coordination of services across various outpatient providers, or 3) innovations that involved elements of both transitional and outpatient coordination. In innovations with both types, some awardees targeted different populations for the transitional component and the outpatient component; in other cases the innovation might begin with transitional care coordination and over time the services become similar to typical outpatient care coordination.

Of the innovations with a care coordination component (N = 72), 50% (N = 36) involved strictly outpatient care coordination, 14% (N = 10) were limited to transitional care coordination, and 36% (N = 26) involved both types.

Beyond specific innovation components, innovations can also be categorized based on various characteristics such as whether they are disease-focused or whether they include the use of telemedicine or health information technology (HIT). Additional innovation characteristics are listed in *Table 3*.

Table 3
Innovation characteristics of Health Care Innovation Awardees (N = 108)

Characteristic ^a	% of Awardees
<i>Direct</i> —provides new, additional, or enhanced services directly to individuals ^b	81
<i>Disease specific</i> —targets patients or care for specific clinical condition(s) ^b	39
<i>Behavioral health</i> —includes component that provides/enhances mental health or substance abuse care or services ^b	29
<i>Telemedicine</i> —component included ^b	16
<i>Health informatics</i> —component included ^b	47
<i>Complexity</i> ^c —moderately or very complex (vs. not very complex)	81
<i>History of innovation</i> ^b —new program (vs. expanding reach or scope or both of existing program)	41

^a Note: the characteristics described here do not refer to the same Front-line Evaluator Portfolio groupings that may use the same or a similar name to describe the awardees.

^b Data source: structured coding of 1Q, 2Q, and Annual FLE reports

^c Data source: Annual Awardee Summary Form

Eighty-one percent of innovations (N = 87) include at least one component that involves the provision of additional or enhanced services or care directly to individually identified or targeted patients or community members. We consider these innovations as “direct,” regardless of the funding source (e.g., HCIA award, in-kind contribution, operational funds) supporting the provision of care and/or services. We note that some awardees with direct innovation components also include components that are not considered direct; for example, a health information technology component. The 19% of innovations that are not direct include innovations that are broad community-, system-, or unit-level interventions; workflow redesign; isolated workforce training; or practice transformation innovations that are designed to change the approach to care or services for any and all patients who receive care in the implementing community, system, practice, or hospital unit. *Appendix B Tables 1 and 2* categorize awardee innovations by whether they are direct, indirect, or not able to be categorized based on available data.

Thirty-nine percent of innovations (N = 42) are designed to target individuals or populations characterized by specific disease, illness, or disability conditions. For some awardees, the disease focus is quite narrow (e.g., pediatric asthma), and for other awardees, the disease focus may include a constellation of similar diseases or disorders (e.g., neuromuscular disabilities). *Table 4* lists the specific diseases or conditions covered by awardees with a disease-specific innovation program. Some awardees target multiple specific diseases or conditions.

Table 4
Diseases and conditions that are the foci of 39% of
Health Care Innovation Awardees with a disease-specific innovation program

Asthma
Acute psychosis
Cancer
Cardiovascular disease/Ischemic heart disease
Chronic pain syndromes
Diabetes
Delirium
Dementia
Dementia or depression or both
End-stage renal disease on peritoneal dialysis
Heart failure
Multiple diseases, but very specific (e.g., dementia or depression or both)
Neuromuscular disabilities
Oral health/dental
Pre-diabetes
Schizophrenia
Sepsis
Serious mental illness
Stroke

Twenty-nine percent (N = 31) of awardees are implementing an innovation that includes a behavioral health component. Behavioral health refers to mental health or substance abuse conditions, or care and treatment for psychiatric or psychological disorders. It does not refer to care and treatment for health behaviors (e.g., tobacco, nutrition, physical activity). For 6 of these awardees, the innovation is exclusively behavioral health, meaning the innovation focuses solely on patients and populations defined by mental health conditions or is delivered or linked to existing or newly established mental health care settings. For the remaining 25, behavioral health is an included component of the overall innovation, but the innovation also includes other nonbehavioral health components. Examples of these include innovations designed to integrate the provision of behavioral health into primary care settings. The remaining awardees (N = 75) have no discernible component that is associated with behavioral health. **Appendix B Tables 3, 4, and 5** categorize awardee innovations by whether they include a behavioral health focus.

Sixteen percent (N = 17) of awardees include a telemedicine component, and 47% (N = 51) include an HIT component. When one or both of these components are present within an awardee’s innovation, they are typically not the main innovation component. Rather, they

support the main component or other innovation components that are present. We used a standardized definition of telemedicine that is fairly narrow and refers to innovations that use dedicated telemedicine equipment (store and forward technology, real-time video consultation between patient and provider or between referring and consulting providers) or telemonitoring for remote supervision of mid-level providers or physiologic patient monitoring. We used a standardized definition for health informatics that includes both health informatics and analytics. We characterize health informatics as the collection and sharing of health information about individuals, with or without contextual or external information (e.g., clinical guidelines), for the purposes of providing and coordinating care for individual patients. We distinguish innovation components as being related to health analytics if they involve the aggregation of information across patient panels or populations for the purpose of identifying trends, generating performance reports, predicting risks, or targeting interventions. Given the secular trend towards electronic health record (EHR) and health information exchange (HIE) adoption and implementation, it was sometimes difficult to discern whether HIT components were supported through the HCIA award, or whether the HCIA award was leveraging existing HIT efforts already in place and under way at the awardee, its partner's sites, or both. We did not consider EHR adoption and implementation in the absence of any change or new patient-directed services or health care delivery to be an HIT component. **Appendix B Tables 6 and 7** categorize awardee innovations by whether they include a telemedicine or HIT component.

Lastly, we categorized awardees based on the complexity and history of their innovations. We hypothesize that the more complex an intervention, the less likely an awardee is to be successful with respect to implementation effectiveness. Similarly, we hypothesize that innovations that are designed to extend the reach or scope of an existing program may have more successful implementation than those designed as new programs. We asked FLEs to assess the complexity of each awardee's innovation program and 65% of awardee innovations were judged to be moderately or very complex (versus not very complex) by FLEs. We judged 41% of innovations (N = 44) to be new programs, 26% (N = 28) to expand the reach, 6% (N = 7) to expand scope, and 22% (N = 24) to expand both the scope and reach of existing programs. One program appears to be designed to improve efficiency of existing workflow processes related to test ordering and interpretation. This categorization can be used in future quantitative and qualitative analyses to evaluate the impact on both implementation effectiveness and possibly impact effectiveness.

Typology Analysis

We also used qualitative comparative analysis (QCA) to develop typologies of the innovations. QCA is a method of data analysis based on set relationships, not correlational relationships, and can accommodate text and numeric data. Although outcomes for most innovations are not yet available, we can nevertheless assess how the innovations compare to one another or cluster together based on combinations of innovation components and characteristics. As Schneider and Wagemann (2012) explain, "Typologies can be seen as concepts for which information is not aggregated into a one-dimensional scale of set membership, but where cases are classified on multiple dimensions." Using our structured innovation coding, we assigned each innovation a set membership in several condition sets. The term "condition" in QCA does not refer to a clinical condition or disease, but represents various categories (i.e., sets) on which the innovation can be characterized. We used a crisp-set (i.e., binary or dichotomous) calibration scheme, and using information from FLE reports, we assigned a condition set-membership value

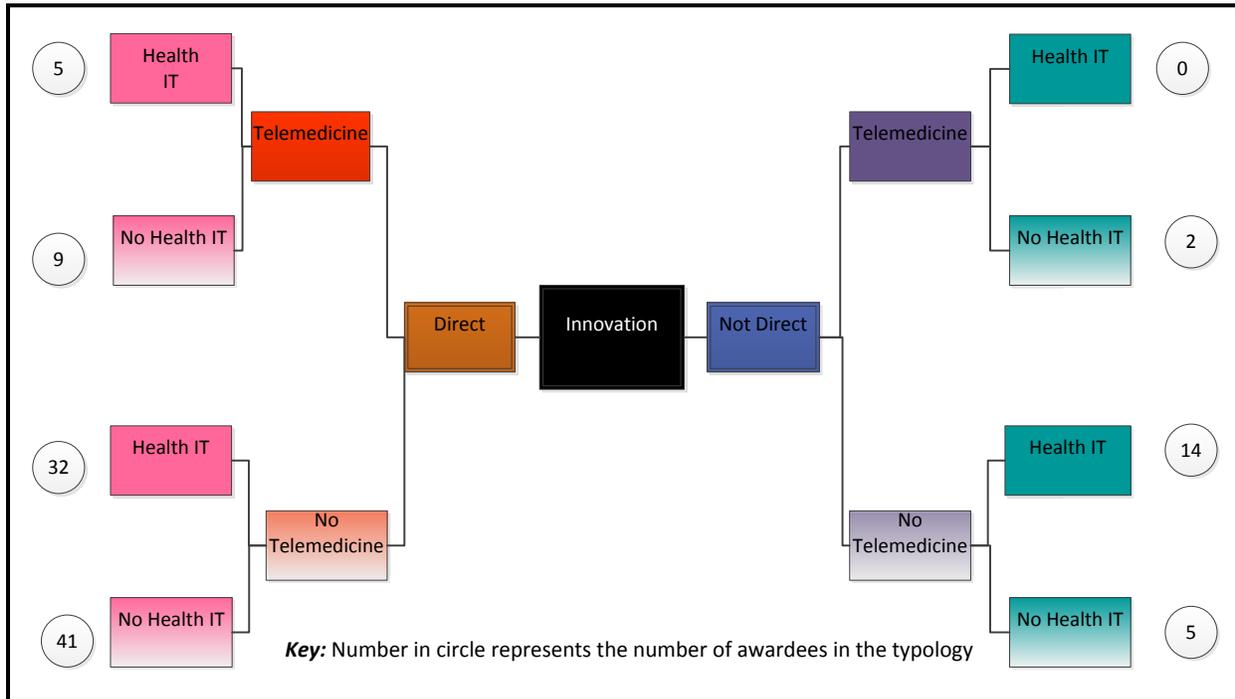
that characterizes the awardee as exemplifying the condition or not exemplifying the condition. The optimal number of condition sets to include in any one analysis depends on the total number of cases involved and the number of typologies that would provide meaningful categorization, yet avoids the problem of having only one or two cases in each typology. For a portfolio the size of the HCIA awardees (N = 108), three or four conditions in any one typology analysis is optimal.

For these analyses, we used the following innovation conditions to generate several different typologies: 1) includes a direct innovation component, 2) includes a telemedicine component, 3) includes a health information technology component. *Appendix C* summarizes the definitions and condition set membership values. We selected these conditions for inclusion in typology analysis because they have direct relevance to how future health care delivery or payment policies can be designed or implemented and allow for the most number of awardees to be included in the analyses. However, because FLEs' knowledge of awardees may change over time with additional data collection, we may revise awardee classifications based on new data in future reports.

After coding each innovation on each these conditions, we selected conditions to include in the typology analysis. For a given number of conditions, an analysis resulting in many typologies suggests less similarity among awardees than an analysis resulting in fewer typologies. Once the conditions for the typology analysis are selected, then each awardee has an array of values (zeroes and ones) that represent its configuration for the included conditions. The number of logically possible configurations is calculated by 2^k , where k represents the number of included dimensions. With 3 conditions, 2^3 or 8 configurations are possible. With 4 conditions, 2^4 or 16 configurations are possible. We used the QCA module in STATA version 13 and R 3.1.1 to assess the configurations and group awardees that share the same configuration (Dusa and Thiem, 2014). Some logically possible configurations may not be represented by awardee configurations; and some awardees' configurations may be unique, such that they are the only empiric representation of a possible configurations. For this report, we generate one typology analysis based on the configurations of the following conditions: Use of direct innovation, use of a telemedicine component, and use of an HIT component (3 conditions, 8 possible configurations).

Typology Analysis—The analysis classified awardee innovations by whether the innovation included a direct innovation component, a telemedicine component, or an HIT component. *Figure 3* summarizes the typologies across the awardees; in *Appendix D*, we display the awardees in their typology. All 108 awardees are represented in one of the eight logically possible typologies. The most common typology was innovations with a direct component but without a telemedicine or HIT component (N = 41), followed by innovations with a direct component and an HIT component but no telemedicine component (N = 32). The configuration with the lowest frequency was the combination of not having a direct component, not having HIT, and having a telemedicine component. Also, of note, very few innovations, direct or indirect, included both a telemedicine and an HIT component (N = 5); this rare combination tends to emerge in specific circumstances. Because telemedicine and HIT implementations rely on significant organizational infrastructure, awardees that simultaneously implemented both components tended to be academic medical centers or have existing capacity to build upon for their HCIA innovation.

Figure 3
Typology analysis



2.1.2 Target Population Findings

This section describes and discusses findings related to innovation target populations. Similar to the description of awardee innovation components, the terms used by the awardee to describe its target population vary. We systematically evaluated the target population for each awardee to determine how innovations focused on different ages and different payer beneficiary groups. **Figure 4** shows that distribution of awardees by various age groups and **Figure 5** shows the distribution of awardees by payer status. Most innovations have the adult population aged 18 or older as an intended population; 8% focused exclusively on children. Another 17% (N = 18) included but were not limited to children. A small proportion (7%) focused on elders only. Many awardees include more than one payer target, and the majority of innovations target Medicare fee-for-service, Medicaid, or dually eligible beneficiaries. However, 29% also include commercial plan members as a target population. Some awardees did not indicate any specific payer group as a target of their innovation, and others indicated that beneficiaries of any payer (e.g., Medicare, Medicaid, commercial) and the uninsured were eligible to receive the innovation.

Estimating and Targeting “High Risk” Patients

The extent to which innovations target “high risk” populations depends heavily on the definition of high risk. Not unexpectedly, awardees and FLEs do not necessarily use the term high-risk consistently when describing their target populations. Across the portfolio, we often found high risk populations defined in terms of their risk for future health care use based on their pattern of past health care use (e.g., high inpatient or ED use). We also found high risk defined in

terms of a patient’s clinical status or socioeconomic circumstances and risk for worsening health (e.g., multiple comorbidities, behavioral morbidities, homelessness). We sometimes encountered target populations defined as populations with “complex needs”, similar in principle to the idea of high risk populations. For some awardees, the entire innovation is targeted to a high risk population; for other awardees, innovation components provided to any one individual may differ depending on whether the individual is considered to be high risk.

For those awardees that target high risk populations, we identified a variety of approaches to identify participants. These include identifying patients in real or near real-time using clinical data systems; awardees enrolling participants within inpatient settings often used this approach. For example, one awardee identifies potentially eligible participants by screening a daily list of patients generated from an algorithm programmed within the EHR. Some awardees also used clinical information to identify participants, but not in real-time. For example, querying disease registries or retrospective reviews of medical records. A very common approach awardees used to identify eligible patients was through administrative or clinical information found in claims data. By definition, this approach was retrospective, and typically then required outreach to individuals to assess interest in innovation participation. Some awardees combined one or both of the above approaches with an approach involving provider referral. For example, one awardee uses claims data combined with utilization criteria to identify eligible children for participation, but also accepts children based on provider referral. Lastly, some awardees identify eligible high-risk participants through community outreach activities. For example, one awardee used door-to-door recruitment and community events to identify participants.

Summing up: Estimating risk. It seems clear that “risk status” is a broad concept that, appropriately, can be applied to patient, social, condition, or disease characteristics, and the anticipated need for extensive, complex, or advanced health care services. This has implications for how and which innovations are implemented and to which populations results may generalize. This implies that when discussing at risk patients, it is appropriate to ask “at risk for what?” The response to such a question may provide a reasonable grouping of innovations for analysis, although it is likely that these distinctions are not independent. Many patients are at risk due to multiple personal, social, and medical challenges, and the accretion of these challenges likely increase exponentially the difficulty in identifying, recruiting, and retaining patients in effective health care services.

Figure 4
Target population of Health Care Innovation Awards by age

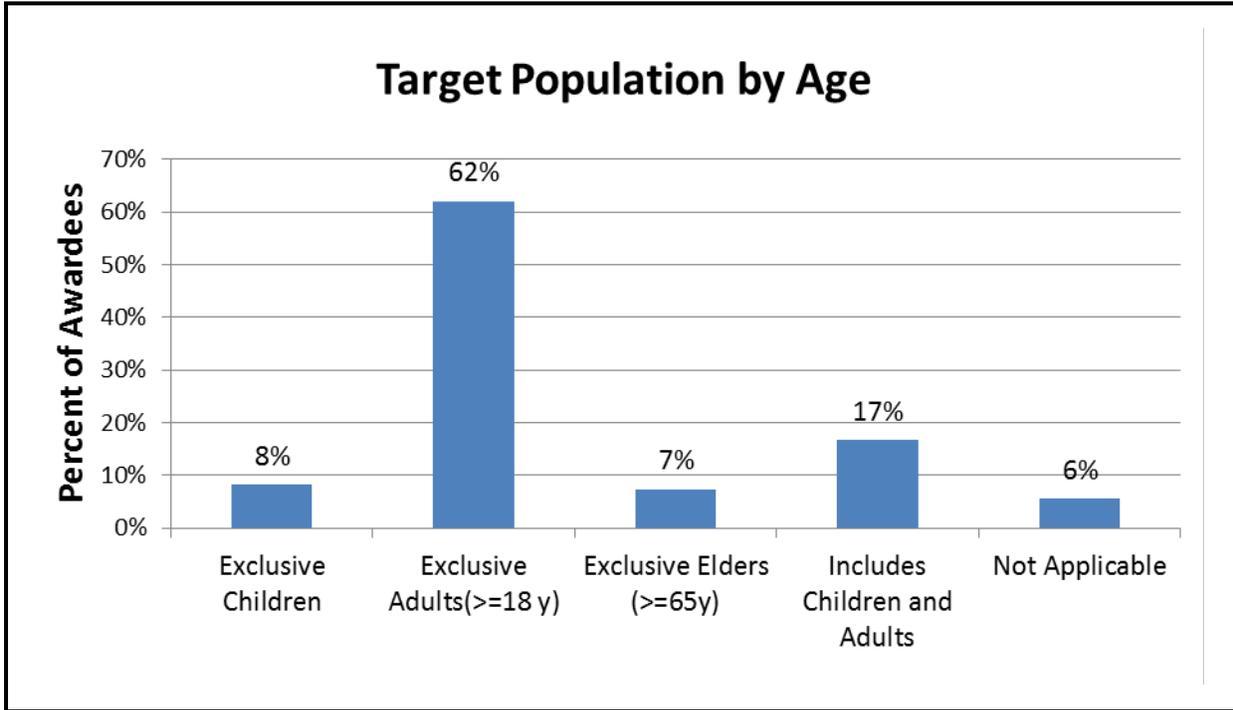
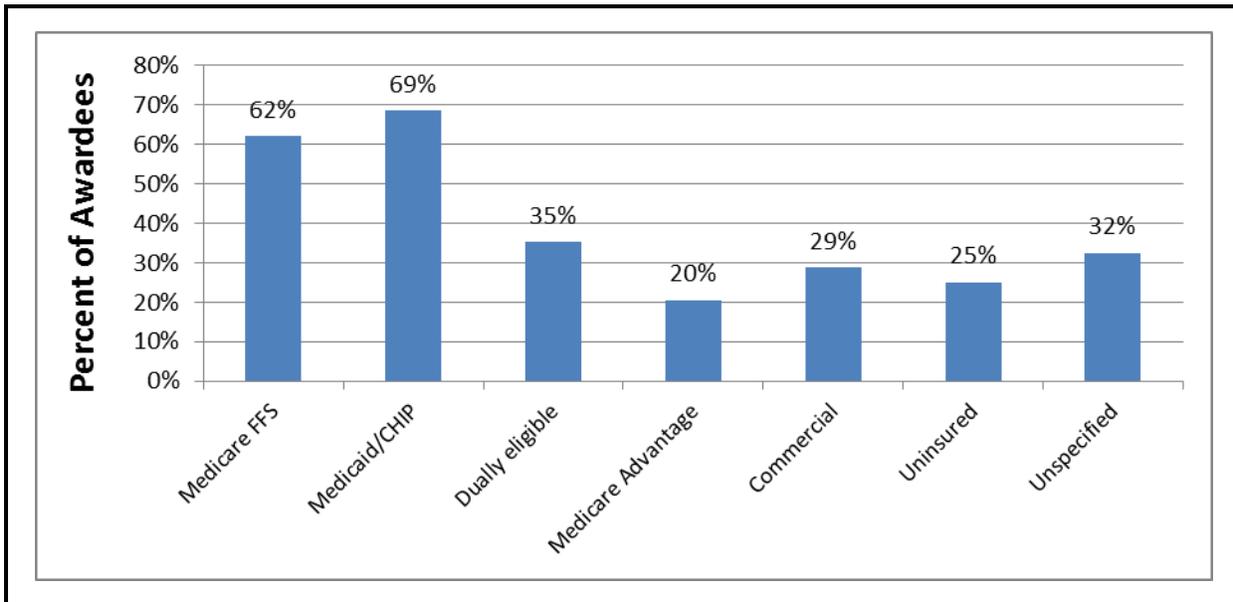


Figure 5
Target population of Health Care Innovation Awards by payer^a



^a Innovations may target more than one type of payer beneficiary

Patient Identification, Enrollment, and Engagement

In addition to evaluating target population characteristics, we examined common issues awardees experienced when enrolling or engaging members of the target population. Many awardees encountered barriers when enrolling patients. Sometimes these enrollment challenges arose because the intended population for the innovation faced health and access challenges. Individuals with complex health issues had difficulty enrolling and participating, and those from other vulnerable populations experienced socioeconomic barriers. Other times, challenges developed because innovation design did not account well for the patient population or clinical realities. In spite of these setbacks, awardees identified multiple approaches to improve enrollment. This section describes awardees' challenges with enrollment and strategies for managing lower than expected enrollment.

Awardees experienced difficulty enrolling vulnerable populations that hindered awardees' ability to meet enrollment projections. Many awardees opted to work with vulnerable populations because those individuals often represent the highest risk and highest ED users. However, by definition, these complex patient populations have extensive health, socioeconomic, and access challenges that often require resource intensive efforts. Although awardees recognized the challenges these populations face, many, nevertheless, experienced difficulties in enrolling these patients. Several awardees indicated that members of the intended population distrusted the health care system because of mental health issues or negative experiences with health care providers. One awardee reported distrust rooted in historic mistreatment of racial and ethnic minorities in the community. Other awardees noted that a host of related socioeconomic challenges limited their ability to enroll vulnerable populations. For example, community health workers (CHWs) in one awardee found that before enrolling patients in the innovation, they needed to address patients' concerns about navigating unsafe neighborhoods, managing poor housing conditions, and getting adequate transportation. In many of these instances, awardees tried to manage this challenge by designating CHW or clinical staff for outreach.

The initial design of some awardees' enrollment strategies did not align with the extant clinical or partner realities or target population needs. After beginning enrollment, many awardees recognized that their enrollment projections were not feasible goals because the innovation design limited the potential pool of participants. In some instances, the target population already consisted of a small subset of patients, and the eligibility criteria further limited the potential participants. In a few awardees, the timing of enrollment did not fit well with clinical settings and patient needs. For example, several awardees planned to enroll patients during an ED visit, but all learned that patients could not decide to enroll in the innovation while they (or their caregivers) were making important health care decisions. Since then, each awardee adjusted the timing of enrollment to fit with patients' needs and clinical workflows. Additionally, the enrollment criteria for one awardee required patients to switch to a new primary care provider associated with the innovation; potential participants did not want to lose their trusted providers in order to participate and refused to participate. A small number of awardees planned to enroll participants through partners, but soon learned that partners could not reach adequate numbers of potential participants. In the case of one awardee, the loss of key partners because of external factors meant the loss of their main source of participants.

Lack of data hindered awardees' ability to identify and enroll patients. Sometimes deficiencies in administrative data contributed to low enrollment at the outset of the innovation. Several awardees discovered that EHRs, provider files, or state databases lacked complete or correct contact information for potential participants. Awardees used a variety of strategies to obtain better patient information for enrollment. In one awardee, innovation staff collected patient phone numbers at the initial educational session with patients and used the information to update the health care system's EHR. Another awardee supplemented the information they received from the state database with their own health system databases and asked partnering managed care organizations to share contact information for patient follow up.

Awardees expanded innovation enrollment criteria to manage the challenge of lower-than-expected enrollment. Many awardees had difficulty in meeting their initial enrollment goals because of some of the difficulties outlined above, but identified ways to enlarge the potential pool of patients. Awardees expanded the criteria for innovation participation by broadening the age range of eligible patients, extending the geographic area, increasing the enrollment window of time, expanding to additional health conditions, and allowing patients with payers other than the original target payers to participate. For example, one awardee intended to provide specialized follow up for individuals receiving abdominal surgery in the critical access hospital; however, after implementing the innovation, staff realized that the hospital performed too few of those surgeries to meet enrollment goals and decided to include all types of surgery. Other awardees initially defined enrollment criteria to highest risk patients with a health condition (e.g., diabetes, hypertension), but to increase enrollment, they opened the innovation to all patients with a particular condition. A small number of awardees allowed patients with Medicare Advantage to participate.

Awardees also used a variety of other strategies to identify additional participants, such as improving marketing and outreach, increasing the number of partners, and collaborating more closely with primary care providers (PCP). Although expanding enrollment criteria offered one option for increasing enrollment, awardees used other techniques to engage patients in the innovation. After initial disappointments, one awardee hired a marketing consultant to review and revise their outreach materials; because, according to the consultant, the materials were not culturally appropriate and contained too much jargon; she redesigned the materials to align with the intended population. In a few instances, awardees added clinical sites to their innovation, which expanded their patient population. Finally, recognizing that patients often trust their PCPs, a few awardees began working more closely with PCPs; these awardees expanded outreach to PCPs and asked them to encourage their patients to participate in the innovation. Another awardee integrated multiple strategies to improve enrollment; awardee staff 1) co-branded outreach materials with payer organizations who supported the innovation so that patients would recognize the innovation as coming from a reliable and trusted source, 2) conducted follow-up enrollment calls at different times during the day and over weekends to reach patients at more convenient times, and 3) developed scripts to respond to patient concerns about the programs.

Innovations, requiring substantial commitment from and collaboration with patients, can lose patients to follow up, but some awardees identified strategies for managing this challenge. Many awardees identified participant attrition as a challenge. Innovations that serve individuals with complex conditions and vulnerable patients often depend on multiple contacts with patients to provide education and follow-up care. However, patients can find such ongoing contact

burdensome, or as described above, difficult to maintain because of health and access (e.g., transportation) issues. Depending on the patient population and its needs, awardees used different approaches to support patients and encourage their continued participation. For example, a few awardees provided transportation or transportation vouchers for participants. Others offered incentives for achieving innovation participation benchmarks. Another awardee designated one staff person to track and locate patients, adjusted the clinical team's work hours to make the team more accessible to patients, and asked lay health workers, who consistently met with patients, to provide regular feedback to the clinical team on how best to support patients.

Summing up: Enrollment. The challenges encountered identifying, recruiting, enrolling, and retaining eligible patients, and inventiveness of innovators in meeting these challenges, has implications for how future research might be funded by CMS. Requiring awardees to provide, in their award application, estimates of enrollment, along with a valid and reliable basis for that estimate, may reduce enrollment delays and increase fidelity to initial and proposed enrollment criteria. Alternatively, funding small-scale pilot projects may help future health researchers in anticipating and developing responses to enrollment challenges. When such challenges were encountered, most innovators developed effective responses that increased enrollment and improved patient participation, but which may have delayed innovation implementation or subject recruitment. Better anticipation of these challenges may accelerate innovation testing and evaluation.

2.1.3 Implementation Process Findings

In this section we describe findings related to the innovation implementation process. This includes a summary of findings from standardized reporting by FLEs on the Annual Awardee Summary form along with thematic findings from FLE Annual Reports. This domain covers concepts related to single site versus multisite implementation, use of formal change management processes for implementation, innovation adaptations during implementation, self-monitoring, involvement of partners, and HIT-related implementation issues.

Of 108 awardees, 81% (N = 87) implemented the innovation at multiple sites, defined as sites that are geographically or organizationally distinct. Of these sites, we identified findings from FLE reports suggesting variable innovation implementation across sites for 57% (N = 50) of these sites. We identified variable innovation implementation across multiples themes throughout this section, as well as in Section 2.1.4 Implementation Effectiveness, and Section 2.1.6 Workforce Development. This issue will be critical to consider when evaluating innovation impact across a multisite innovation.

Use of a Formal Improvement or Change Management Process

Some awardees used formal improvement frameworks or change management processes to implement innovations, such as Plan-Do-Study-Act (PDSA) quality improvement cycles, Lean, and Six Sigma. Formal improvement processes first gained popularity among manufacturers in the late twentieth century, after increasing global competition led companies to seek out strategies for increasing efficiencies and minimizing waste. Organizations employing formal processes engage in continuous improvement by iteratively monitoring and modifying their behavior. This section highlights how the use of formal improvement or change management processes affected implementation.

Innovations using formal improvement or change management processes devote considerable time and effort to self-monitoring, whether electronic and outcome-based or through process study to identify opportunities for innovation improvement. Participation in continuous improvement requires critically evaluating organizational processes and outcomes for opportunities to enhance performance. Awardees using formal processes needed to develop new or existing self-monitoring capabilities to make judgments about whether innovation components were functioning well. Self-monitoring typically entailed careful process study or quantitative data capture, coupled with opportunities for staff to discuss self-monitoring results. For instance, one awardee team convened for weekly “case conferences,” during which innovation staff shared qualitative information gleaned from participant interactions regarding patients’ use of and experiences with community-based service providers. Staff used the data exchanged to support rapid-cycle continuous improvement. Another awardee team using PDSA cycles developed an electronic dashboard to display key innovation process and outcome measures, including information on program reach, dose, and post-innovation care-seeking.

Using a formal improvement or change management process enabled awardees to make changes more quickly than if they had not used a formal process. However, formal processes may be especially appropriate to solving health care problems amenable to monitoring and rapid improvement. Awardees implementing a change management process tended to provide care coordination, patient navigation, care management or focused on changing clinical workflows (e.g., changes to sepsis protocols). Success of such innovations may rely on monitoring patient interaction and engagement and provider satisfaction with workflow, which makes implementing a change management process a key element of the innovation. Several awardees communicated that change management processes facilitated fast-paced reform. In a few cases, awardees adopted improvement frameworks with the explicit goal of making changes quickly. One such awardee belonged to a large consortium of providers interested in “accelerating improvement” to health care. PDSAs helped the innovation team identify evidence-based practices to enhance outcomes and reduce costs that could be implemented rapidly for widespread impact. An administrator at another awardee explained that PDSAs encouraged his organization to implement changes more quickly than they would have otherwise.

Summing up: Change management. Innovations vary in terms of how easily associated health care practices can be measured and modified. Formal systems may require considerable investment, potentially limiting the benefits associated with formal change management systems especially in under-resourced settings. Formal change management systems are most appropriate for awardees focusing on specific conditions or adopting or adapting well-defined care protocols than they will be for awardees developing innovations that require flexibility, cooperation across organizations, or patient engagement and participation, or those that enroll diverse patient populations.

Innovation Adaptations

Ongoing monitoring of implementation enabled awardees to make changes to their implementation plan. Awardees frequently modified innovations in order to overcome challenges, enhance efficiency, or improve the fidelity of innovation delivery. This section describes the adaptations awardees made over the course of implementation.

Awardees allowed and sometimes encouraged flexibility in implementation processes to accommodate differences in health care providers, organizations, and patients. Many awardees modified implementation plans to increase the flexibility with which they delivered key components. Flexibility allowed awardees to develop programs that were responsive to the needs and preferences of different providers, organizations, and patients.

Providers vary considerably in their roles and responsibilities, clinical practices, and leadership styles, and a few awardees modified innovation plans to accommodate these differences. For instance, one awardee ceased defining a controversial medical procedure as an essential element of innovation delivery after some participating physicians objected to its use. Providers subsequently used their personal discretion to determine whether the procedure was warranted.

The unique staffing, patient, and physical resources available at different organizations responsible for implementation encouraged some awardees to adapt their innovation plans. Often, awardees discovered that they could better execute their innovation components by taking advantage of existing personnel or services. One awardee improved work flow by integrating lay patient navigators into established nurse navigator programs. Leveraging existing care teams resulted in more efficient and effective care.

Some awardees modified innovation plans to better address patient needs. For example, one awardee adapted treatment procedures, outreach, and educational content after learning more about the problems and knowledge of targeted patients. Such changes can require new expertise or additional resources; a small number of awardees needed to hire new providers to accommodate changes. One awardee added home visits to its innovation, which necessitated hiring a new provider. Another needed clinicians specializing in behavioral health. Static and uniform care plans could not achieve innovation goals. However, because FLEs documented these changes in the first round of site visits, implementation of the adaptations could have been recent. We will explore whether the adaptations resolved difficulties or resulted in new challenges in our analysis of future reports.

Awardees standardized innovation roles, workflow, and care to improve the consistency of service delivery. Just as many awardees determined that their planned innovations were not sufficiently flexible to meet the diverse needs of providers, organizations, and patients, many found that innovations required standardization to ensure the delivery of core resources and services. Awardees requiring standardization commonly needed to manage early uncertainty because of innovation newness or inconsistent leadership. For instance, one awardee described implementation as a learning process, whereby participating organizations slowly reduced ambiguity in staff roles and responsibilities using their shared experiences. Staff frustrated with uncertainty left the innovation until leadership worked to define innovation components, troubleshoot problems, and streamline processes. A few other awardees standardized processes after identifying best practices for patient care.

Awardees increased patient access to key services and resources after innovation implementation exposed unmet patient needs. During implementation, many awardees identified unanticipated patient needs that they addressed to successfully realize innovation goals. Needs typically related to the provision of care at home, mental health or substance abuse, specialty care, extending the length or course of care, and patient communication. For example,

one awardee found that their target population included an unexpectedly high number of patients with mental health and substance abuse problems. They subsequently invested in staffing, increased referrals, began offering psychotherapy, and provided toxicology screenings.

Awardees prioritized patients at high risk for poor health outcomes over those at lower risk for poor outcomes, often because of capacity problems and lessons learned during early implementation phases. Some awardees found that they could best accomplish innovation goals by segmenting patient populations in terms of risk, and then targeting high-risk populations for more frequent or intense service delivery. Several awardees developed formal stratification models to identify patients in greatest need of care, and then focused caregiving efforts among patients with the most urgent problems. In a few cases, staff prioritized patients because they could not deliver services as planned to everyone enrolled in the innovation. One awardee stopped requiring “touches” for patients classified as low risk in order to spend more time assisting patients with relatively complicated needs.

Summing up: Adaptation. Adaptation of innovations is a common consequence of implementation. Identifying which components of an innovation are essential and immutable, and which can be modified without adversely impacting innovation fidelity and effectiveness, may increase the generalizability of innovations and improve the identification and adoption of effective practices. Also evident is the observation that innovations often expose unmet patient needs, which may require additional resources. Unmet needs and the need to devote additional resources in meeting those needs may interact with innovation capacity. When patient needs exceed innovation capacity, triage and prioritization of health care services becomes necessary. This may affect estimates of innovation effectiveness because the same innovation delivered with the same intensity will show a stronger result when implemented in a high-risk versus a low-risk population.

Self-monitoring

Self-monitoring plans enable awardees to assess their implementation progress, identify midcourse corrections, and determine whether they are meeting innovation objectives. This section details awardees use of self-monitoring plans and barriers to their use. According to FLE assessment of awardees as part of the Annual Awardee Summary Form, 35% (N = 38) of awardees had fully executed their self-monitoring plans, 24% (N = 26) had mostly executed plans, 27% (N = 30) had somewhat executed plans as of fall 2014 (i.e., the submission of the first draft of the FLE annual reports). The remaining awardees either had no self-monitoring plan to execute (N = 4) or the FLE was unable to assess (N = 10).

Self-monitoring varies widely among awardees based on the nature of the innovation, awardee data infrastructure, and capacity and culture for measurement. Awardees focused on workflow or process redesign innovations often monitored key steps or processes of care involved in the redesign in order to assess success with implementation; often these involved manual audits of charts or in some cases, automated and time-stamped extracts from an EHR. Awardees with innovations focused on providing new or enhanced services to individuals, typically in the community, largely focused on tracking the number and frequency of patient “touches”; though, a few awardees established self-monitoring measures specific to their innovation. For example, a measure to monitor how often a patient was receiving a follow-up visit within 2 days of discharge, or how often a patient had to be transported to the ED within 6

hours of diversion to an alternate ED location. Some innovations include data systems that generate periodic “performance reports”; for example one awardee generates weekly “management reports” from a self-monitoring database that compiles various data elements used to assess processes or outcomes and adjust staffing or processes accordingly.

Data challenges are a major barrier to robust self-monitoring, particularly for multisite innovations. One awardee characterized self-monitoring as compiling data from multiple sources, creating databases and analytic capacity, harmonizing and standardizing data elements for multiple purposes including direct care staff, internal improvement, and external reporting (e.g., CMS). This awardee remarked that a systematic plan at the outset that included direct care staff, clinical leaders, and HIT experts would have improved their ability to provide earlier self-monitoring of their innovation. Several awardees describe challenges to self-monitoring created by working across several organizations with inoperable EHR systems or systems with non-harmonized data elements and variation in day-to-day procedures and data collection (see also HIT section below). This results in paper-based tracking systems or stand-alone Web systems that require assembling data retrospectively for manual data entry, as opposed to real-time self-monitoring through existing systems.

Summing up: Self-monitoring. Self-monitoring provides a timely, evidence-based resource for implementation and supports innovation implementation. Self-monitoring can also provide an empirical basis for adaptation and quantifying the results of adaptation. However, data-driven self-monitoring requires identification of valid, reliable, and discrete measures and systems to collect, manage, and report findings based on those measures. Self-monitoring requires a robust data infrastructure and sufficient resources to support self-monitoring. Although self-monitoring should be encouraged, which measures are adopted and how monitoring is implemented merits thoughtful consideration of the advantages and requirements of different self-monitoring systems. Adopting a system that best supports the measurement of organizational milestones and innovation progress, but which is unobtrusive, takes advantage of existing data and data collection systems, and which provides timely results is to be encouraged.

Involvement of Partners

Awardees frequently established partnerships with non-HCIA-funded organizations to obtain crucial support or resources for their innovations. Partnering organizations tended to be extremely diverse, as were partners’ roles in innovation processes.

Partners facilitated patient enrollment by providing access to organizational networks, sharing patient data, or engaging in direct outreach. Perhaps most commonly, partners supported awardees by serving as implementation sites, where new or existing patients became eligible for innovation enrollment. Nonimplementing partners could also support enrollment by facilitating direct or indirect patient outreach. For example, some awardees partnered with managed care organizations (MCOs) or consulting organizations to identify eligible patients. Other partners supported enrollment by providing access to their EHRs or referral networks.

Partners provided training essential to innovation delivery. Many partners supported awardees by providing training necessary for implementation. Partners’ training curricula included skills and knowledge extending beyond traditional medical education. For instance, one awardee relied on a partnering organization to train innovation staff in evidence-based medical

care. Other partners prepared staff to assume new roles developed for the innovations—like “better health improvement specialists,” patient navigators, and peer mentors. Finally, a few partners provided technical training on innovation tools and technology.

Partner organizations connected the awardee to the community and ensured that services provided by awardees were responsive to community needs. Many partners connected awardees to local communities, which helped ensure that innovations reached intended populations and addressed relevant patient needs. For instance, one awardee sought to reduce unnecessary ED use among homeless persons and found that partnerships with community organizations aided awardees in identifying and addressing the complex medical and social problems leading to inappropriate hospital use. Another awardee used a community partnership to identify patients who could serve on an advisory board to offer a client’s perspective regarding innovation services.

Partners provided tools and technical expertise supporting the use of HIT. Many innovations required the development of new or existing HIT, and partners frequently provided relevant technology or offered technical support. In some cases, partners were technology companies uninvolved in patient care, while in others, partners simply had more resources or experience with HIT than awardees. Please see the HIT section below for additional information about the use of HIT among awardee innovations.

Partnerships enabled awardees to offer more comprehensive, specialized, or extended care than would otherwise be possible. Partnerships allowed many awardees to expand their services to patients. Partners supported specialty or advanced care that awardees could not always provide themselves. For instance, one awardee partnered with organizations offering dental surgery because regulations prevented innovation staff from delivering care beyond teeth cleaning and basic dental examination. Another awardee targeting high-risk infants and their families for transitional care partnered with a nonprofit organization to ensure that families could obtain special needs care, as appropriate.

A history of collaboration with a partner supported innovation-related partnerships or cooperation. A legacy of collaboration across organizations facilitated the development and successful execution of innovation-related partnerships. Many awardees worked with partners prior to receiving their Health Care Innovation Award, and this allowed them to execute innovations more efficiently. For example, leaders at one awardee and its partnering organization agreed that they developed a positive working relationship prior to receipt of HCIA funding. Another awardee leveraged existing relationships with partners to obtain innovation referrals and identify implementation sites. At least two awardees noted that their lack of history with partner organizations impeded successful implementation.

Administrative, bureaucratic, and contractual processes delayed the formation of partnerships or otherwise interfered with collaboration between partners. Formal organizational processes interfered with the establishment or successful operation of many innovations partnerships. Health care organizations can sometimes be large and bureaucratic, resulting in multistep approval processes and complex contractual procedures. In a few cases, one or more partnering organizations lacked the knowledge, experience, or resources to efficiently establish innovation-required contracts. In other instances, implementation was delayed or prevented during partners’ ethical research review.

Administrative, bureaucratic, and contractual processes specifically relating to funding played a major role in implementation—either facilitating the service delivery and payment, or obstructing the delivery of care. In a few instances, financial relationships with partners provided essential resources that enabled awardees to meet innovation goals. One awardee’s partner provided in-kind support for the innovation, including a technological investment of \$20,000 and access to financial analysts and billing systems. Another awardee and its partner strategized to maximize the number of patients they could reach by dividing their target population into (1) patients already eligible to receive services from the partner, and (2) patients ineligible for partner care and thus most likely to benefit from innovation-funded services.

Some partners lacked financial resources or were unwilling to expend their resources in support of innovations. For instance, one awardee partnered with organizations with severe resource constraints, resulting in slower than expected patient enrollment. Another awardee struggled to establish partnerships because organizational leaders hesitated to invest in the innovation without first seeing evidence of its success.

Summing up: Partners. Clearly, partnerships reinforce and support many HCIA innovations. In addition to sharing patients, knowledge, skills, and resources, partnerships provided opportunities to extend innovation reach and, in some cases, improved the innovation. However, as responsible and independent entities, entering partnerships is not a step many organizations will take lightly. Obtaining memoranda of agreement (MOA), or other formal agreements that define partner roles and responsibilities prior to receiving grant funding may streamline innovation implementation and reduce the potential for setbacks. Building trust among partners and gaining support for innovation often requires time and approval from several individuals and units within health care entities. It is a process that needs to begin early and be reinforced through interaction.

HIT

Implementing most types of HIT requires a significant investment of time and resources and depends on a comprehensive process involving planning, assessment, rollout, ongoing monitoring, and adaptation. Each element of the process ideally helps the HIT to align with an implementing organization’s culture and staff workflow and reduces the chances of operational disruptions and implementation failure. **Table 5** details FLE assessment of the awardees’ technological context surrounding innovation implementation; these data highlight the degree of HIT implementation that may be occurring at awardee organizations, above and beyond any HIT implementation occurring specifically as part of the HCIA-funded innovation. This section details some of the challenges and benefits awardees experienced when implementing HIT as part of their innovations.

The time required to develop new HIT systems to support innovations did not necessarily match the time available to implement innovations. Because successfully implementing HIT depends on a comprehensive process, preparing for and rolling out HIT requires an extended timeline, and for EHRs, the timeline can extend more than 1 year. Although less extensive HIT implementations, such as introducing new functionality in an extant electronic systems, may seem easy to accomplish, the implementation process requires more than mere programming. Establishing stakeholder buy-in, ensuring alignment with workflow (described below), and staff training must occur as part of the implementation process. “Glitches” or “bugs” may also arise in

apparently simple programming. For several awardees that included an HIT component in their innovation, the innovation timeline did not fit with the time demands of implementing HIT. For example, one awardee intended to implement a patient portal into their existing EHR, but discovered that the portal their EHR vendor could provide would not meet the innovation’s needs.

Table 5
HIT context at Health Care Innovation Awardee organizations (N = 108)^a

Type of HIT	Number (%) of awardees assessed by FLEs as being involved in HIT implementation external to the innovation
Electronic Health Record Implementation	46 (43%)
Connecting to Regional or State Health Information Exchanges	19 (18%)
Other HIT Implementation or Initiative	14 (13%)

^a Data source: Annual Awardee Summary Form

HIT that does not map well to workflow delays implementation and generates staff resistance; HIT that maps well to workflows supports communication and enhances workflows. Throughout the HIT implementation literature, researchers identified examining clinical workflow and aligning HIT with that workflow as critical for implementation success. Failure to align HIT can create additional work for and burden busy providers; such burdens, in turn, can generate dissatisfaction with and even abandonment of the innovation. Alternately, when HIT integrates well into workflows, providers find that the innovation enhances patient care and staff communication. Some awardees prepared for HIT implementation and experienced fewer challenges or delays, whereas others did not plan well and encountered challenges. Several awardees indicated that having electronic patient information enabled them to coordinate care across different hospital departments or providers. Clinical staff at one awardee recognized the value of inputting patient information quickly because the HIT helped them identify and eliminate delays in care.

Several awardees pinpointed challenges with integrating HIT innovation components into clinical workflow, which reduced usage of the component or virtually eliminated it. Clinical staff at one awardee preferred the previous pen-and-paper method to the new system and continued using handwritten to record patient information. At another awardee, health system policy prevented providers from linking innovation mobile devices to the EHR; thus, providers had to enter information twice, which created additional work for the staff. Clinical staff at a third awardee recognized that the telemedicine component available as part of the innovation could not allow them to provide urgent care for patients, and thus, they changed the use of the telemedicine component to support follow-up care only.

The financial costs associated with implementing HIT proved difficult to overcome for some awardees and especially unfunded partners. HIT implementation involves significant investment of resources, including the costs of hardware, software, IT programming and support, staff time and training, and ongoing maintenance. In fact, researchers have identified cost as a key barrier to EHR adoption (Desroches et al., 2008; Gans et al., 2005; Lorenzi et al., 2009; Yoon-Flannery et al., 2008). Similar costs and activities arise when integrating other forms of HIT (e.g., new patient assessment tools, clinical triggers and decision support tools, telemedicine) into patient care. Several awardees did not anticipate the costs of HIT implementation. For example, one awardee planned to install software across participating practices, but soon encountered challenges with software compatibility with the practices' varied EHRs, and integrating the software required more labor costs than expected. The costs of HIT implementation also concerned unfunded partners. In a few instances, partners withdrew their participation because of the resources required for maintaining the HIT. Finally, another awardee did not conduct an assessment of technological infrastructure prior to implementation and learned that rural partner health systems lacked adequate data connection lines for the HIT.

Lack of interoperability and standardization of data elements delays implementation, hinders information sharing and communication, and leads to workarounds. According to the Healthcare Information and Management Systems Society, "Interoperability describes the extent to which systems and devices can exchange data, and interpret that shared data. For two systems to be interoperable, they must be able to exchange data and subsequently present that data such that it can be understood by a user" (HIMSS, 2013). Interoperable systems should not only exchange data, but also ideally share standard language and data elements. Many awardees brought together multiple clinical partners, such as individual practices, health care systems, and pharmacies, to coordinate patient care through data exchange. However, because clinical partners often had different EHRs, implementing HIT and sharing information proved more difficult than expected because of poor interoperability. For instance, because partners in one awardee had different IT platforms (and some partners had no EHR), some partners could not integrate the innovation software into their EHR. Staff at partner sites manually entered patient information into a Web-based platform outside of their EHR to send to the awardee. Clinical staff at the awardee then needed to assemble patient information from across 14 partners and their systems to make it useful for the innovation. In another instance, program staff noted that innovation software could not identify key clinical data in their partners' varied EHRs because EHRs differed in how and where they stored information; thus, the software could not consistently perform risk assessment algorithms with all the relevant clinical information.

Many awardees and their partners lacked sufficient capacity (staff, electronic resources) to implement the HIT component of their innovation. HIT implementation, as mentioned above, requires extensive resources, ranging from expertise, staff time, and electronic infrastructure. Many awardees and their partners did not have all of these resources in place at the outset of the award, which limited implementation. In particular, awardees working with rural practices or hospitals or in poor urban settings encountered difficulties with Internet access and connectivity. In these instances, partnering organizations or clinical staff could not share information with the awardee easily. Lacking adequate staff with IT expertise also proved challenging; this issue arose even in some awardees with high IT staff capacity when other HIT implementation were occurring at the same time as the innovation implementation. For example, one awardee, a health care system with over 20 years of experience implementing HIT innovations, encountered

challenges because the system was concomitantly in the process of upgrading the EHR, which meant that in-house IT and compliance staff focused on the system-wide project and could not support the HCIA innovation. Securing compliance approval for one component of the HIT innovation required 8 months for this awardee; ultimately, this awardee contracted with a third party to support the development of their patient engagement and risk assessment tool.

Awardees relied on third parties to develop, implement, and support HIT-related systems. Because HIT development and implementation are complex and requires specific expertise, many awardees partnered with vendors, consultants, and HIT-focused businesses. Many awardees did not have all of the technical expertise in house and sought partners for their innovation. These partners provided a range of support, including designing software, EHR modules (e.g., decision support tools), databases, and patient portals; integrating disparate platforms; supporting connection to health information exchanges; and providing technical support. For example, one awardee contracted with an HIT firm to customize an extant clinical portal for new clinical settings, integrate that tool into partner sites' EHRs, and monitor and support the portal across the partner sites. In another awardee, a vendor provided all of the technology (including video) and support for a telemedicine innovation.

Summing up: HIT. HIT offers great promise for the delivery of patient-centered and patient-customized health care delivery. It may also provide an unprecedented opportunity for health services researchers for building the evidence base necessary for evidence-based research. However, as demonstrated by the multiple challenges encountered by HCIA awardees, adopting new HIT systems and adapting current ones to meet multiple purposes remain difficult. Significant leadership may be required to ensure HIT interoperability and sufficient resources, in terms of dollars, time, and expertise are necessary for successful implementation of innovations utilizing HIT—especially when health innovations require partnering with independent organizations.

2.1.4 Implementation Effectiveness

In this section we describe findings related to implementation effectiveness, specifically findings from FLE assessment and awardee experience with measurement of fidelity, reach, and dosage of innovations. In addition to describing these aspects of implementation effectiveness, we describe barriers and facilitators with respect to evaluating implementation effectiveness, and describe findings relating to spillover effects to organizations and populations other than those targeted by the innovation. The findings demonstrate some of challenges in evaluating implementation effectiveness for innovations implemented in the context of real world care settings and practices, where they may be viewed incremental enhancements and improvements in services, practice or workflow, as opposed to protocol-driven interventions with clear patient targets, intervention features, and direct analytic links to specific outcomes. Lastly, we describe findings related to scalability and sustainability, though these issues were not discussed in detail

- **Fidelity** is described through data that addresses the question “were the intended activities implemented?”
- **Reach** is described as “to what proportion of the eligible population was the innovation delivered?”
- **Dose** is described as “to what extent did those participating in the innovation receive the prescribed frequency, intensity, or amount of the innovation?”

in most FLE reports; thus, findings related to these issues are not representative across the entire HCIA portfolio.

As per the Annual Awardee Summary Form, FLEs report that 75% (N = 81) of awardees have implemented nearly all or many innovation components and are providing them to intended targets as of fall 2014 (i.e., submission of the first draft of the FLE annual reports). We also asked FLEs to assess how successful the innovation has been with respect to implementation effectiveness outcomes of reach, fidelity, and dosage. FLEs were unable to make this assessment for 25% (N = 26) of awardees. FLEs assessed 31% (N = 33) of awardees as mostly successful. FLEs assessed 23% (N = 25) to be moderately successful and 18% (N = 19) to be somewhat successful. FLEs assessed only 5% (N = 5) as having limited success.

Many innovations are not designed using specific evidence-based models; thus innovations are “flexible by design,” and fidelity measurement may not always be appropriate. Most innovations are not based on rigid, protocol-driven processes or procedures and allow staff or implementing sites to be flexible to meet patients’ needs or to adapt services to fit with local culture or available resources. Some awardee innovations are described as a series of process improvements, or transforming the entire care process, or as an iterative process based on feedback from providers and patients. When specific protocols or processes are vague, broadly defined, or iterative by nature, measuring fidelity may not be applicable. As a result, when innovations are “flexible” by design, awardees and FLEs conflate measures of fidelity with measures relating to implementation milestones, such as hiring and training staff, and whether the planned approach has changed in terms of target population or methods through which services will be provided. The trial-and error and continual process improvement that comes with developing and implementing an innovation based on goals and broad concepts in real world practice settings differs substantially from implementing or scaling up specific, discrete evidence-based care practices. Conversely, when innovations are modeled on a clearly identifiable evidenced-based practice, we find examples of robust fidelity measurement. For example, one awardee innovation is based on a specific evidence-based diabetes prevention program; the awardee requires strict fidelity to the curriculum across its implementing sites, even requiring implementing sites to sign a contract to this point. The awardee uses an observation tool to assess fidelity in innovation delivery at regular intervals. Likewise, another awardee monitors and maintains fidelity for the practice facilitation component of its innovation developed during a previous randomized controlled trial, this component is a core, unmodifiable aspect of the innovation.

Few awardees and front line providers can accurately assess reach. An important determinant of impact at a population level is reach, or the extent to which an innovation reaches the eligible population for which it was designed. To determine reach, one needs both measures of how many people have been “touched” by an innovation, but one also needs the number of people in the eligible population. FLEs and awardees had difficulty in determining absolute numbers of patients eligible for an innovation and numbers reached by an innovation because 1) some innovations are not directly touching patients, 2) some innovations have multiple components that touch different groups of patients, 3) many awardees have multiple sites of implementation, 4) some innovations target a larger population than whom the FLE is including in the evaluation, and 5) awardees report the number of direct and indirect participants to CMS based on how HCIA funds are used to support the implementation and this number may differ

from both the numbers “touched” directly and the evaluable population. Many awardees supplied targets for patient enrollment as part of their HCIA application, and they often based these targets on staffing and feasibility considerations. However, these targets may not actually reflect the underlying size of the eligible population. For example, one awardee implementing a specialized ED unit for elderly patients has a capacity of 14 beds and is not open for portions of the day; thus most elderly patient treated at the organization still receive care in the main ED, not the specialized unit. Even though the awardee may have achieved target enrollment numbers based on their application, the actual reach of the innovation may be quite low with respect to the potentially eligible population. In addition, many awardees do not know the size of the potentially eligible population. Reasons vary but include lack of coordinated community and provider data systems to determine population size by different characteristics, transient nature of the patient population being served, and innovations designed to transform entire care processes for all patients, as opposed to those designed to be targeted to a specific population.

FLEs and awardees often use counts of contacts with patients to assess dose; however, this provides limited insight into implementation effectiveness and likely is not comparable across awardees. As per the Annual Awardee Summary Form, nearly half of FLEs could not assess how many individuals “reached” by an innovation received a “minimally effective innovation dose” as defined by the awardee-specific definition of dose (if any). What counts as being “touched” by an innovation varies widely among awardees, and can broadly be defined as any communication or interaction with an individual whether in person (e.g., home visit, clinic visit, hospital interaction, classroom instruction), by phone, or virtually through the asynchronous provision of information. Some awardees define innovation dose as a one-time “touch.” Other awardees prescribe a dose based on patient disease states, and an appropriate dose may span 6 to 9 months, with the number of contacts flexible based on staff assessment or patient needs. Some awardees have a defined number of “touches” in their innovation and monitor participant dosage; for example, one awardee tracks the proportion of patients that complete each of the six steps to its innovation. Another awardee defined dosage criteria for successful program completion and tracks progress at 30, 60 and 90 days. Few innovations have established minimally effective doses with the exception of several innovations modeled after existing evidence-based programs where minimally effective doses have been established. Though many awardees are able to capture crude counts of patient “touches,” few are able to capture the differences in intensity or quality of patient contact that also contribute to patients receiving a meaningful “dose” of the innovation. This inability to capture dose may make it difficult to understand the relationship between dose and impacts.

Several spillover effects resulting from innovation implementation emerged.

Awardees noted some spillover effects at the organizational level; for example, one awardee noted that implementing the innovation allowed for a number of young and innovative clinical leaders to emerge within the organization. Another awardee noted that the innovation had positively affected the way in which community providers interacted with patients, despite community providers not actually being a part of the innovation. Other awardees identified spillover effects in terms of impact on unexpected outcomes. For example a patient mobility program designed to reduce morbidity from pressure ulcer wounds has resulted in less deconditioning, fewer episodes of serious delirium, and reduced catheter associated infections. Lastly, several awardees noted spillover to other populations. These awardees reported that changes in overall clinic process and workflow benefited all patients who receive care within

those environments, even if only a subset of patients are deemed “targets” of the innovation or are populations included in an evaluation. Further, some innovations offer services to all patients who need assistance, though some may not meet strict eligibility requirements.

Awardee focus on scalability reflects their multisite experience prior to and during the HCIA funding period. Awardees that have considered scalability appear to be awardees with innovations that were implemented or spread to multiple sites prior to or during the HCIA funding period. The HCIA period allowed some awardees to test certain features of innovations prior to widespread scaling, for example one awardee tested an intensivist versus distributive model for care management and found the distributive model to be more scalable across its practice sites. Similarly, another awardee used the HCIA funding period to refine processes and procedures and determine the best approaches to opting in participants in its innovation, such that the program can be replicated in additional assisted living communities throughout the country. Realizing that clinical staff not involved in the HCIA innovation had adopted supporting HIT infrastructure developed for the HCIA innovation, one awardee recognized that this unplanned wider spread adoption could mean that the HCIA innovation was scalable: The innovation was apparently easy to adopt and use without extensive training, and the voluntary adoption demonstrated the perceived value of the tool by clinicians.

Future scaling and sustainability of innovations is uncertain beyond the HCIA-funded implementation period. Though some awardees report that the innovation has become a management priority within their organization and likely to be sustained after HCIA funding ends, many report uncertainty about how program can be sustained. As of fall 2014, few awardees have successfully transitioned their innovation into a definite payment model for ongoing sustainment, though some have laid the groundwork. For example, one awardee has negotiated shared savings contracts with Medicaid MCOs and is working towards developing an accountable care organization (ACO). Another innovation, established pre-HCIA through grants, secured a permanent annual allocation from its state legislature for its infrastructure and platform, and is working to establish an ACO or global budgeting approach for sustainment. Sustainment for some innovations is uncertain because of the use of nonlicensed personnel that cannot bill for services.

Summing up: Implementation effectiveness. Fidelity of implementation, reach, and effective dose are all central constructs to assessing implementation effectiveness. As metrics, they provide innovators with valuable data on the integrity of an intervention, and the measured impact it may be expected to have on the diseases and conditions innovations are designed to ameliorate. Nonetheless, such metrics require sufficient background knowledge about the extent of the need, the resources necessary to meet that need, and a routinized model of implementation—conditions which were not met by many of the innovations tested using HCIA funding. Many of these innovations represent a first step in developing this requisite knowledge and the findings provided by these innovators will likely support development of implementation metrics as innovations are routinized and manualized for dissemination. As early tests of innovations, such metrics proved elusive among awardees. Scalability and sustainability likewise represent significant challenges for many awardees, although some have been successful in reaching these goals. Having evidence of the effectiveness of these innovations will likely improve opportunities for sustainability and scaling.

2.1.5 Context

In this section, we describe findings related to the context surrounding the innovation and its implementation. This includes concepts related to endogenous context, such as organizational and innovation leadership, organizational characteristics and culture and implementation climate, and team characteristics. It also includes concepts related to exogenous context, such as external policies, regulations, or market characteristics that impacted the innovation design or its implementation.

Leadership Characteristics

This section describes the roles that leadership played in the innovations, the leadership qualities identified as important for successful implementation of the innovations, and the impact that leadership had on program implementation. Leaders emerged among organizational decision makers, innovation directors, and technical staff, as well as among community members and front line staff. On the Annual Awardee Summary Form, FLEs assessed that most awardees (95%, N = 103) had a clearly designated leader for the innovation implementation process. FLEs also assessed that most awardees (88%, N = 95) had a leader with the requisite experience, skills and authority to marshal resources and make decisions. For 85 awardees (79%), FLEs assessed leadership to be engaged, involved, and accountable for implementation. FLEs were unable to assess leadership commitment across different levels of an organization (senior, middle, front-line) for 18 awardees (N = 17%).

Organizational leaders supported the innovation by allocating resources, generating staff commitment to the innovation, and engaging high-level stakeholders in the innovation. Organizational leaders played indirect roles in implementation by fostering an environment amendable to implementation. In a few awardees, organizational leaders provided matching funds or in-kind support (e.g., funding staff positions with non-HCIA funding). In another awardee, the CEO encouraged representatives from other state health care associations to attend meetings about the innovation and asked for their support and collaboration on aspects of the innovation; another awardee CEO met with CEOs at each of the implementation sites to emphasize the importance of the innovation. The CEO of another awardee identified the innovation as an organizational priority and generated staff support for it. High-level support for innovations was not universal at the outset of the award. In a small number of awardees, innovation leaders needed to build support from organizational decision makers. For instance, in one awardee, because hospital leaders and board members were skeptical about the innovation, the principal investigator educated them how the new innovation staff would enhance the workflow and improve patient satisfaction.

Innovation leadership for most awardees had technical expertise and management expertise to implement the innovations effectively. Such expertise included clinical, administrative (e.g., grants and contract management), and implementation/change management experience. For example, in one awardee a member of the implementation team is an established expert in substance abuse disorder services; this individual lead efforts on integrating such services into the innovation. In another awardee, program leaders at the awardee site coached staff at implementing sites on care coordination and on developing infrastructure to support an ACO. In some circumstances, leaders did not embody all of the requisite knowledge and skills. A federal award was new for a small number of awardees, and program leaders lacked familiarity

with government contracting and reporting. These gaps in experience led to shortcomings in the reporting and administrative responsibilities of the award. However, when awardees lacked expertise, they also hired individuals with content or administrative knowledge to support the innovation.

Champions at the site level obtained buy-in from other stakeholders. Many awardees noted the importance of having champions at the site level; although physicians served as champions in most of the awardees, frontline staff and community members also filled that role in several awardees. The involvement of physician champions established credibility with other clinicians. In one awardee, participating physicians formed panels; physician champions in these panels encouraged other panel members to engage in innovation planning and to support implementation of process changes in their practices. In other awardees, physician champions garnered institutional support from organizational leaders, educated frontline clinical staff about the innovation (e.g., gave presentations to staff), and encouraged colleagues to participate or continue participating in the innovation.

In a few awardees, frontline staff or community members encouraged their colleagues and other community members to participate in the innovation. In one awardee, frontline staff have mentored colleagues and helped colleagues develop processes for patient follow-up. Likewise, community members have provided support for implementation. For example, the founder of one partner organization identifies community leaders and encourages them to participate in the innovation; these community leaders help to educate the public on safe use, storage, and disposal of medication. In another awardee, a community member who learned about the innovation at an innovation outreach event became actively involved in efforts to enhance patient enrollment.

Innovation leadership's openness to input from staff and partners on innovation design and implementation improved program quality, staff engagement, and team relations. Several awardees had committee structures that enabled staff and partners to provide feedback that informed decision making, and others had less formal mechanisms for receiving input, such as an open-door policy. Leaders' openness to feedback not only improved implementation, but also supported buy-in from staff. For example, for one awardee, staff commented that they appreciated leadership's receptivity to feedback because it enabled them to contribute to the evolution and appropriateness of the innovation. Innovation leaders in several awardees empowered frontline staff to adapt their approaches to best suit the needs of individual patients or the processes of different implementation sites; leaders' flexibility and willingness to allow for trial and error facilitated learning and increased staff engagement.

Summing up: Leadership. Successful implementation of any innovation requires leadership at several levels. Organizational leaders are required to provide resources and organizational support for innovation, technical staff can provide leadership for enhancing services, while innovation champions (at several levels and fulfilling several roles) provide the needed impetus for innovation engagement and reach. Leadership styles that encouraged staff and partner feedback and stakeholder participation in decision making improved services and created a growing, learning, and vibrant organizational culture around the innovation, and is a valued leadership style when implementing innovations.

Organizational Characteristics

This section describes organizational characteristics at the awardee and site levels that affected the implementation of the interventions. These include the organizational culture, structure and administrative processes, and experience with the innovation (or something similar to the innovation) prior to the HCIA funding period. In addition, alignment of the innovation with the awardees' broader organizational or corporate goals and strategies, adequacy of physical space, and co-occurring initiatives within the awardee organization or implementing sites affected implementation. **Table 6** provides findings from FLE assessment of the adequacy of various types of resources to support innovation implementation.

Table 6
Resource adequacy for implementation of Health Care Innovation Awards (N = 108)^a

Type of resource	% of awardees for whom FLEs assessed resources to be "Mostly Adequate"
Financial	71
Training	77
Physical space and equipment	69
Staffing	61

^a Data source: Annual Awardee Summary Form, four-point scale: mostly adequate, moderately adequate, somewhat adequate, limited adequacy

Having a strong culture of innovation made staff more willing to take risks and try new approaches. Several awardees identified their openness to innovation as a driving force behind their work; in awardees with a culture of quality improvement, staff expect and are accustomed to implementing new efforts. In such a culture, organizational leadership highly values and prioritizes being at the forefront of medicine and innovation. For one awardee, the CEO had guided staff through a 5-year transition to the patient-centered medical home (PCMH) model; according to staff, this cultivated teamwork among staff and fostered an environment for trying new approaches to care. Another awardee identified differences between sites with quality improvement experience and those without. This awardee noted that teaching hospitals' history of implementing improvement initiatives makes the staff more open to change. In contrast, community hospitals may have less capacity and fewer resources to engage in and support many improvement efforts. Such differences required that awardee staff more strongly encourage community hospitals to participate by presenting evidence the innovation added value.

Integrated organizational structures and streamlined administrative processes at the site level facilitated implementation. Sites that were part of an integrated network had some advantages over independent sites, such as greater ease in recruiting and tracking patients, engaging providers, and scaling up innovations. For example, in the case of one awardee, sites in an integrated network could access inpatient records and therefore could identify and track patients more readily than they could at a site that was not part of a network. For another innovation, the awardee more easily gained physician support from medical groups affiliated with health care foundations than from independent practices. Because foundations directly employed physicians, the physicians supported initiatives undertaken by the foundation, whereas

with independent practices, innovation leadership needed to meet with each physician individually to solicit their support. Sites' administrative processes also affected implementation. For example, one awardee commented that getting permission to make changes required less time and effort at teaching hospitals than community hospitals involved in their innovation, because the teaching hospitals they work with have more streamlined processes and structures.

Awardees that had piloted the innovation or implemented similar programs encountered fewer challenges and delays. Most of the awardees had experience implementing their initiatives, or components of them, prior to receiving HCIA funding. In many cases, the HCIA funding enabled the awardees to expand an existing initiative or accelerate the pace of its implementation. For example, one awardee used HCIA funding to expand an existing program from one site to three. Another had been developing their care coordination model for over the last 10 years, and the HCIA funding enabled them to scale it to additional sites. Other awardees had previously implemented components of their innovations, but used the HCIA award to add new elements or adapt existing components. Piloting the innovations provided them an opportunity to work through any obstacles that arose. Having implemented similar work also meant that awardees often had staff with the necessary expertise or established relationships with relevant partner organizations. Aspects of the innovations new to awardees often posed challenges. For example, one awardee had experience with diabetes prevention programs, but had not worked with the elderly. Working with a new target population required developing new partnerships to recruit participants and learning about different Medicare plans.

Alignment of the innovations with awardees' broader strategies created synergies and contributed to organizational support for the program. Some of the innovations closely aligned with broader programs or initiatives that awardees were also implementing. In these cases, the complementary initiatives laid the groundwork for or enhanced the implementation of the innovations. For example, one awardee had an organizational initiative to improve population health and had worked to improve stroke care as part of that initiative; the components of the HCIA innovation focused on enhancing stroke transitions of care and aligned well with the extant stroke care efforts. Another awardee had transitioned its clinics to become patient-centered medical homes. This transition not only fostered an organizational culture receptive to change, but also provided staff resources (e.g., care coordinators) that the awardee could deploy for its HCIA efforts. For another awardee, the innovation is one of more than 40 projects occurring throughout the system that deal with transitional care; they dedicated staff to synthesizing and operationalizing best practices learned from all of the projects. For another awardee who is implementing an innovation related to integrated care, moving toward integrated care had been a longstanding strategic priority even prior to applying for the HCIA award and the agency had restructured care teams to support this goal.

Lacking adequate physical space hindered implementation. Several awardees that added new staff encountered difficulties because they did not take into account having space for those staff. Some awardees did not have private spaces for staff to make phone calls or conduct health coaching; consequently, they reduced the size of their teams because of lack of space. For innovations that intended to provide team-based care, the spatial configuration of clinics sometimes proved to be a barrier to effective collaboration. Finally, having innovation staff co-located was also identified as an important means to facilitate communication and coordination of the interventions. One awardee found that having innovation staff for one part of the

innovation in a separate location from the rest of the staff led to a lack of awareness of other aspects of the innovation that could support their work.

Competing initiatives or processes within the awardee organizations or the sites affected implementation of the innovations. In a few awardees, sites concomitantly implemented other initiatives with the innovation, which limited the time and energy that staff could devote to the innovation. Some awardees were implementing other quality initiatives, which competed for staff's time. One awardee transitioned from a paper-based records system to an EHR at the same time as the HCIA innovation implementation, which frustrated staff and slowed start-up. For another awardee, implementation of a new EHR and a recent accreditation process distracted the innovation leadership, and consequently, staff had not received adequate feedback. Another awardee underwent a merger, which presented both opportunities (e.g., a larger clinical team and access to additional clinical resources) and challenges (staff turnover and patient perceptions of instability). However, as described above, a few awardees noted that simultaneous implementation of other initiatives could also be an advantage because of synergies between the interventions.

Summing up: Organizational characteristics. Not surprisingly, organizations experienced with adoption of innovative practices or which possessed the organizational structure to support change found it easier to adopt and implement HCIA innovations. Also unremarkable is the observation that alignment of innovations to existing organizational programs and initiatives facilitated implementation. Less obvious is the apparent lack of foresight in anticipating space needs and staff requirements; however, this may be attributable to the unmet patient needs these innovations occasionally exposed (discussed in Section 2.1.3: Innovation adaptations). Finally, health care settings are often dynamic, with multiple ongoing and concurrent quality improvement initiatives competing for staff time and attention. In such settings, thoughtful leadership in assisting staff to prioritize resources may be necessary for maintaining staff engagement and staff morale.

Team Characteristics

This section describes the impact of team characteristics and dynamics on implementation. This includes staff communication and teamwork, clarity of staff roles and responsibilities, workload, and work flow. FLEs assessed 17% (N = 18) of awardees as having formal measures or surveys of teamwork used to measure and facilitate implementation. Six awardees are using TeamSTEPPS questionnaires to assess team functioning. The remaining awardees are using other various instruments, including internally developed assessments. On the AASF, FLEs assessed team functionality; very functional teams were characterized by "team role clarity, authority, collective efficacy, and team communication is adequate with respect to implementation of the innovation." FLEs assessed teams to be very functional at 51% of awardees (N = 55), but this assessment is limited for awardees with multiple implementation sites since FLEs were not able to speak with or site visit each implementation site within an awardee.

The development of care teams and addition of new positions required shifting roles for many existing staff. Several awardees described revising the roles played by various existing staff. In some instances, this redefinition of roles ensured that staff worked at the top of their certification. For example, one awardee shifted tasks such as preventive visit planning (e.g.,

reviewing EHRs to see whether patients are due to have vaccines or tests) and ensuring that patients have adequate services (e.g., transportation to appointments) from physicians to nurses and care managers, so that physicians can focus on providing care to patients during their appointments. Another awardee shifted existing nurse care manager roles to focus on higher-risk patients, and implemented lay patient navigators for lower-risk patients.

Lack of clarity regarding the roles of new staff often generated competition between existing and new staff, inappropriate use of new staff, and discomfort among new staff with the ambiguity of their roles. Many awardees created new staff positions for their innovations. Clearly defining the roles of new staff and communicating those roles to existing staff supported the successful integration of the new staff, but role definition also proved challenging for many awardees. For example, one innovation involved the addition of behavioral health consultants to clinics; their roles and activities were well defined and easily understood by other team members, which contributed to them being well received. In contrast, some awardees did not provide clear guidance about the roles and responsibilities of new staff, which led to problems such as the new staff being misused, and existing staff feeling threatened because of perceived overlap in roles. For example, some implementation sites for an innovation that involved the addition of CHWs initially misunderstood the CHWs' role and limited their outreach efforts (See Use of Community Health Workers section below for additional information about challenges with integrating CHWs into practices). In response to these challenges, awardees clarified the new staff roles by attending providers' meetings to provide more information, or, in one case, developing posters to explain who the new staff are and what they do. One awardee created a set of best practices for explaining the role of a health coach—for example, using terms like “motivational interviewing” that were familiar to the staff. In addition, the new staff often educated their colleagues about their roles through one-on-one conversations.

In some instances, awardees had difficulty in determining the role of the new staff because the role had changed over the course of implementation. Several awardees noted that staff roles evolved over time, as they learned more about what was needed and how new staff fit in to the existing staff structure. Some awardees made adjustments in roles to avoid duplication of efforts. For example, one awardee noted that they were redefining the scope of work for medical assistant and psychiatric nurse roles, seeking ways for the medical assistant to be more involved in patient medical issues without overlapping with the nurse role. Another awardee noted that awardee staff revised the roles of health coaches and panel managers multiple times and added new positions in response to unanticipated patient needs. Awardees also adjusted team structures to address problems with overlapping roles. For example, one awardee created a staff role to be a part of the mobility team, but this caused confusion among the team members over roles and duplication of efforts. The awardee then moved the new role to assist in other hospital units, where overlap of efforts was not a problem.

New staff encountered barriers to integration into the care teams. For some innovations, team structure hampered integration of new staff. For example, for one awardee, health navigators were relatively separate from other program staff in the same location (e.g., they did not attend trainings or meetings with them) and were not fully integrated in care delivery, which limited their ability to meet patient needs. For a few awardees, new staff needed to learn how to work effectively with existing staff. For example, for one awardee, nurses hired for the innovation had to learn how to effectively communicate with existing bedside nurses and

to clarify their respective roles. For another, new staff could integrate their work once they learned the physicians' styles and preferred modes of communication. However, when new staff were familiar with the organization and its culture, they more easily participated in the care teams because they understood the work environment and existing staff patterns of communication. In one awardee, staff hired for the innovation had worked at the hospital and knew the physicians and nurses involved in the innovation.

Educating clinicians about the innovation and demonstrating results generated clinician buy-in. Awardees depended on buy-in from staff within the implementing sites (e.g., clinicians such as pharmacists who are expected to use a new tool or participate in new processes for providing care) and in the community (e.g., physicians who were being asked to refer their patients to the program) to enroll patients and ensure their ongoing participation. However, many physicians initially doubted that the changes added value, perceived that the changes would be burdensome, and expressed concerns about the 1) capabilities of new staff, 2) a possible reduction in the number of fee-for-service visits, and 3) changes to long-established workflows. To manage these concerns, awardees extensively educated internal staff and external providers about the innovations and their potential value. As describe above, physician champions within the implementing sites communicated the importance of the innovation for improving care and patient satisfaction. For one innovation, awardees provided financial incentives to encourage participation. In a few instances, awardee flexibility and willingness to adapt the innovation to the needs of clinicians and patients also facilitated uptake. Finally, demonstrated results (through staff's own experience or through data) fostered buy-in. For example, physicians involved with one innovation were initially hesitant about the value of patient navigators, but after witnessing navigators help with patient communication, they grew to appreciate the innovation. For other innovations, data demonstrated improved patient outcomes.

Effective communication and coordination within and across teams enhanced implementation. Many innovations developed interdisciplinary teams that included both medical (e.g., physicians, nurses, pharmacists) and nonmedical (e.g., healthy families coordinators, social workers, case managers) staff. These teams addressed a broad range of patients' needs, and also enabled staff to work at the top of their degree or certification. Awardees used daily interdisciplinary rounds or team huddles to facilitate communication among team members. Both provided an opportunity for the teams to discuss patient needs. For example, for one awardee, the teams have a huddle each morning to discuss the patients who are to be seen that day. The health coach reviews patients' charts before the meeting to anticipate any services the patients might need, and reviews the information with the rest of the team.

Innovations had mixed impacts on workflow. Sometimes innovations reduced workloads or improved work flow; sometimes innovations increased workload or negatively affected work flow. For example, one innovation that identified patients with the most critical needs improved work flow by letting staff know where to focus their efforts. For another awardee, the addition of a social worker to the team relieved nurses of the responsibility of interacting with patients' family, freeing them to focus on the clinical component of care. In contrast, in a third innovation, nurses found that collecting vital signs and a mental health status assessment disrupted their work flow, because these tasks were expected to be performed at the same time as many other critical activities. Providers for some innovations appreciated the value of new processes (e.g., team huddles), but found it difficult to find time in their busy schedules

for these processes, particularly because their participation was uncompensated. Providers for another innovation found that their workload increased because of the high volume of communication with the PCMH team.

Summing up: Team characteristics. By definition, innovations are disruptive activities intended to improve health care. When new staff accompany an innovation, providing clearly defined roles and expectations during start-up for both new and affected current staff improves implementation and facilitates team building. That these roles and responsibilities may mature over time is to be expected. Enhanced coordination within teams improves patient care while educating staff and partners about the innovation and its expected results improves teamwork across units and organizations. While not all innovations reduce work flow, demonstrating or describing the value of the innovation increases acceptance. Anticipating staff concerns and proactively mitigating those concerns through appropriate guidance, training, and education may ameliorate stress and confusion when implementing innovations.

Exogenous Context

This section outlines some of the exogenous factors HCIA awardees needed to manage. Factors external to the innovation can have an impact on an awardee’s ability to implement the innovation as planned. In some instances, contextual factors, such as policy changes, could limit or support awardees’ implementation processes. **Table 7** describes new payment models that FLEs reported awardees were concurrently participating in.

Table 7
Health care payment models exogenous to the
Health Care Innovation Awards (N = 108)^a

Type of Resource	Number (%) of awardees participating in payment model
Multipayer Advanced Primary Care Practice Demonstration (CMS)	3 (3%)
Federally Qualified Health Center Advanced Primary Care Practice Demonstration (CMS)	4 (4%)
Other Patient Centered Medical Home Program	18 (17%)
Bundled Payments for Episodes of Care	4 (4%)
Accountable Care Organization Models	24 (22%)
Other Payment Model	9 (8%)

^a Data source: Annual Awardee Summary Form

Changes to national, state, and local policies enhanced or hindered implementation of the innovations by influencing the potential pool of participants, providing supports for vulnerable populations, and fostering an environment amenable to improving care. National-level policies played a role in a few awardees. For example, for a few awardees, the Affordable Care Act (ACA) shaped their patient population because the ACA expanded coverage to new populations and enabled awardees to identify additional payers. For one awardee, this made additional

patients eligible for the innovation, but for another, members of the intended population shifted to a new payer, which disqualified their participation in the innovation. Another awardee noted that because the ACA encourages provider accountability and EHR implementation, the HCIA innovation aligned well with existing organization efforts to implement PCMH models.

State-level policies also influenced implementation. Although awardees with sites in multiple states needed to negotiate varying state regulations around provider scope of practice and reporting requirements, state policies could support implementation. In a few awardees, state legislatures provided funding for earlier versions or components of the innovation. For example, in one awardee the state supported integrating care management in practices before the HCIA award; the awardee could draw upon care managers funded through the state initiative and could rely on primary care practices' experience with care management in the HCIA innovation. State regulations defining providers' scope of practice allowed a small number of awardees to reach more vulnerable populations; for instance, one state allowed dental hygienists to perform cleanings without dental supervision, which enabled the awardee to serve patients in rural areas with limited access to dentists.

State Medicaid and relationships with MCOs evolved over the course of implementation. In a few states, capitation levels decreased and for many awardees the impact is, as yet, uncertain. For example, when a major insurer dropped patients after the state's capitation rates decreased, one awardee that included a payer organization experienced an increase in enrollment due to a larger eligible patient population. Changes to MCOs in states created challenges for awardees partnered with MCOs. A few awardees lost MCO partners when the state changed MCOs or needed to develop new administrative processes with an MCO partner when the state revised administrative requirements. Such changes delayed implementation as these awardees needed to establish partnerships and referral agreements with the new MCOs or to create new administrative processes and data sharing agreements to align with regulations.

Finally, local-level policies played a role in implementation in some awardees. A small number of localities offered housing subsidies and transportation waivers; innovation staff could link patients to those services to help patients manage some of their barriers to care and more easily participate in the innovation. However, the inverse also occurred; local housing regulations did not provide adequate standards to support asthma management. In spite of the innovation, without fundamental changes in housing, participants remained in allergenic environments. Initiatives by local insurers supported implementation; in one awardee the local Blue Cross Blue Shield had an ongoing PCMH initiative, which aligned with the awardee's efforts and enhanced provider support for the innovation.

Changes or saturation in local health care market translated into more challenging implementation environments. Consolidation of provider organizations, mergers of MCOs, and the emergence of ACOs altered the local landscape for many awardees and negatively affected their implementation plans. For example, two hospitals that partnered with the awardee underwent consolidation; consequently, staff in these partner organizations needed to work on the organizational changes from the consolidation and could no longer focus on the innovation. In another awardee, the consolidation of MCOs partnering with the awardee meant that awardee staff needed to renegotiate its original partnering agreements.

For a small number of awardees, some market conditions made the HCIA innovation difficult to differentiate from other services or to recruit partners. In one awardee that links patients to social services, in addition to providing care coordination, the community includes a significant number of social services. Although that enabled lay health workers to connect patients to resources, patients did not see the lay health worker as part of a care team or part of the HCIA innovation; rather patients identified the lay health worker as a representative from another social service. Similarly, in one awardee's market, many service providers offered care management and care transition services, which made it difficult for the awardee to delineate the HCIA innovation from other providers' efforts. For another awardee, having a highly competitive health care market made MCOs reluctant to enter high risk contracts.

Fee-for-service payment models did not adequately reimburse for certain services or staff types and limited the chances for sustainability. Awardees identified lack of or insufficient reimbursement for some services (especially care coordination, care management, and comprehensive care) and some types of providers (e.g., community and lay health workers, pharmacists) as a barrier to engaging some practices to participate and ultimately for long-term sustainability of the innovation. One awardee indicated that providers in practices not in the health care system hesitate to participate in the innovation because of lack of reimbursement for care coordination activities; another awardee indicated that even though the provider bills for transitions of care, the reimbursement does not adequately cover the staff time for care management and transitional care. A few awardees attributed this insufficient reimbursement to the fee-for-service payment model, but suggested new capitated models may enable them to extend reimbursement for certain services and providers beyond the funding period.

Summing up: Context. As observed previously, health care organizations are often dynamic entities and we observe here how they exist within an ever-changing environment. Occasionally these exogenous changes facilitate innovation adoption, more often, however, these changes add to the stress of implementation and create challenges for innovators seeking to test and affirm their models. Recent years have seen dramatic changes in how health care is delivered and reimbursed in this country and these changes are likely to continue. Leading-edge innovations may be particularly vulnerable to these challenges, particularly as reimbursement systems struggle to keep pace with the adoption and testing of innovative practices and policies.

2.1.6 Workforce Development

The identification of new models of workforce development and deployment, as well as training and education to support these new models, is a primary objective of the Health Care Innovation Awards Round One. The initiative funding opportunity announcement released by CMMI stated that applicants should include plans to develop and deploy the appropriate workforce to support their proposed models. CMMI attributes the limited diffusion of delivery system innovations to date in part to a dearth of adequately trained health sector employees and suggests that the health care workforce of the future must be trained in "prevention, care coordination, care process reengineering, dissemination of best practices, team-based care, continuous quality improvement, and the use of data to support a transformed system" (CMMI, 2011).

This section summarizes findings from the workforce development domain of the organizing framework. It also includes a summary of findings from a workforce survey

conducted by RTI across all awardees, findings from the Annual Awardee Summary Form, and findings from structured and deductive coding of FLE reports concerning type of staff used, employee recruitment, training, deployment, retention, turnover, and satisfaction. We also include a separate section specifically related to the use of community health workers as part of innovation design and delivery.

Based on information in FLE reports, we use a structured coding process to characterize the type of workforce awardees used to provide the care or services that comprise the innovation components. The information that we synthesized from FLE reports does not correlate exactly with data regarding staffing that awardees report to CMS on a quarterly basis. The reason is that the staffing data reported quarterly concerns new hires or staff salaries being paid directly with HCIA funding. For many awardees, the components of the innovation involving direct patient care or services are not necessarily provided by HCIA-funded staff; rather, they are provided by existing staff within the organization or staff from partner organizations who may take on new roles or have duties reorganized to be able to provide care or services associated with the innovation. For assessing scalability, it is important to understand **all** staffing involved in providing the full innovation program, regardless of the source of salaries.

We categorized staff involved in the innovation program using the following three categories: licensed independent clinical provider (e.g., physician, dentist, nurse practitioner, physician assistant), licensed clinical staff (e.g., registered nurse, pharmacist, social worker, dental hygienist), and nonlicensed clinical support staff (e.g., health coaches, benefits counselor, patient navigator). The scheme we used to categorize the various types of staff reported by awardees and these standardized categories is provided in **Appendix B**. Fifty-six percent of innovations use licensed clinical providers, 82% use licensed clinical staff, and 69% use nonlicensed clinical support staff. We also evaluated whether awardees included CHWs (defined broadly) as part of staffing for innovation program delivery. 41% (N = 44) of innovations use CHWs. **Appendix B Table 8** lists the awardee innovations that include a CHW and a section below provides additional details on awardee experience using CHWs as part of the HCIA-funded innovations.

In addition to categorizing the types of staff used to implement innovations, we asked FLEs to evaluate their awardees' models for staff deployment. Based on initial review of documents, we created three archetypes for staff deployment models, as shown in **Table 8**. However, many innovations contain multiple components, and the same model for staff deployment may not be used for all components. Of the 65% of awardees (N = 70) that use a single model for staff deployment, 61% (N = 48) integrated new staff and roles with existing staff and roles, 16% (N = 11) relied solely on existing staff, and 23% (N = 16) used new staff in new roles that functioned somewhat independent of existing teams and staff. Of the 33% (N = 36) that used more than one model for staff deployment, one-third were using all three models, and nearly half were using existing staff and new staff/existing staff models.

Table 8
Models for staff deployment used for innovation implementation of Health Care Innovation Awards

Staff deployment model	Description
Uses existing staff	Awardee uses existing staff, with redefined roles, redefined care processes, or some other system redesign to implement the innovation.
Integrates new staff/roles with existing staff/roles.	Awardee uses new staff in new roles integrated into existing teams/care processes in place where patient receives care. Some redefinition of existing staff roles/processes and system design with addition of new staff or new roles may occur.
Uses new staff or roles, semi-independent of existing staff/roles.	Awardee uses new staff in new roles, performing functions and processes independent of the team and/or outside of the setting where the patient typically receives his or her health care.

Workforce Training

This section highlights key themes and findings related to workforce training to support the innovation implementation.

Awardees used a range of modalities to deliver staff training in support of the innovation implementation. Widespread variation exists across awardees in types of training used but generally included a combination of formal and informal approaches. Formal training included lectures and in-person classroom training, on-line training workshops, continuing education, and university certifications. Informal training included job shadowing and mentoring of experienced staff, identifying "super-users" to work with individuals one-on-one, and train the trainer models where staff train other staff to providing ongoing instruction to staff. Training is delivered to both clinical and nonclinical staff supporting the innovation and is generally intensive at the start of the innovation and then tapers off with ongoing retraining throughout the year. Many awardees report obtaining and incorporating feedback from trainees to help revise training curriculum and techniques as the innovation progresses. For some innovations, staff considered informal modalities such as shadowing and mentoring to be more effective and practical than didactic training. Further, some awardees reported that training staff with varied backgrounds together fosters a shared understanding of innovation activities and team responsibilities and helped break down divisions across different staff types (e.g., physicians, nurses, social workers). Scheduling training for busy clinicians was noted to be a challenge for some awardees, requiring flexibility in approach.

Awardees using a formal change management process recognized the need for training on change management. Some awardees used formal improvement frameworks or change management processes to implement innovations, including Plan-Do-Study-Act quality improvement cycles, Lean, and Six Sigma. Formal processes specify tools and procedures that organizations can use to iteratively monitor and modify their behavior, and in a few cases,

innovation leaders offered training to support staff's roles in change management. Such training prepared staff to execute process-specific elements, and occasionally led to formal change management certification. For example, one awardee using rapid improvement cycles and Lean management conducted extensive week-long trainings to teach staff about Lean-supported process redesign and monitoring. Innovation leadership augmented classroom training with a "waste walk," during which staff critically evaluated care-related workflow. Staff subsequently attended routine meetings to exchange information regarding improvement-related outcomes and care procedures.

For some innovations, good fidelity to the innovation model was difficult because of insufficient training of staff. For example, one awardee relied on a specific technology to support the innovation, and although the technology was "on," it was not always being used correctly (or at all) in terms of being incorporated into the normal workflow due to insufficient staff training. Within another awardee, the setting and patient population often pushed staff beyond their existing skill sets, and performing the expected functions, duties, and services of the innovation was challenging. Another awardee found that they did not have good training in place at the outset of their innovation; this was recognized later in the implementation process as problems with data standardization and formats were identified and had to be corrected.

Summing up: Training. Innovations often require the adoption of new skills and technologies for implementation. Training, both formal and informal, provides staff the knowledge necessary to implement those skills and technologies and the understanding necessary to utilize those capacities. When innovations include unfamiliar tools or techniques, initial and ongoing training increases staff confidence, staff capability, and improves fidelity of implementation.

Recruitment, Deployment, and Retention

This section highlights key themes and findings related to recruiting and maintaining a stable workforce to support the innovation. Within this section we discuss staff recruitment and deployment, retention, and staff turnover, including issues related to burnout among staff.

Labor market constraints hindered awardees ability to recruit staff. Many awardees reported difficulties recruiting both clinical and nonclinical staff to implement their innovation. Finding the right individual with the right mix of experience and skills was noted by awardees as critical to successful implementation. For several awardees, finding nurses with the appropriate training and background necessary for managing patients with complex conditions was challenging. A few awardees indicated that nurses often have the clinical experience, but not necessarily the patient engagement or interpersonal skills that are needed for working with high-risk patients. Others simply noted that there was a shortage of nurses in their geographic region and that they could not compete with the salaries offered by the larger providers in their area. In addition to experiencing difficulties recruiting clinical staff, several awardees noted obstacles to hiring data analysts and general IT staff. Awardees remarked that the IT industry is competitive and that the salaries supported by the HCIA award were not high enough to attract individuals with these skills. Another awardee highlighted the challenges associated with recruiting individuals with both IT and clinical skills, as these employees were considered essential to helping translate care management needs into effective health information technology tools.

Many awardees staffed their innovations by redefining or expanding the roles of extant staff. Some awardees provided examples of training clinical and nonclinical staff to conduct new responsibilities and functions outside of their traditional roles. Awardees report adjusting staff roles throughout implementation to help maximize efficiency and ensure that each employee's unique skills are applied appropriately. Examples include training licensed practical nurses to conduct patient outreach and education, teaching pharmacy technicians to perform select disease management activities, helping clinical staff develop information technology skills, and teaching research assistants and junior staff to perform minor clinical tasks such as conducting chart reviews for patients. One awardee described expanding the role of psychiatric nurses to encompass treating a patient's overall health and well-being as opposed to just managing a patient's behavioral health condition. A few awardees also reported redefining the role of pharmacists and pharmacy technicians to include the delivery of medication management services—both in inpatient and outpatient settings.

Hiring support staff allows clinicians to devote more attention to direct patient care. Many awardees report hiring a mix of support staff with varied skills and experience to assist clinicians with care coordination and care management functions. Several awardees noted that hiring employees such as administrative assistants or care coordinator assistants helped lighten the workload of physicians and nurses and allowed them to focus more on providing clinical care. Examples of the types of tasks these assistants are performing include helping with patient outreach, recruitment, and enrollment; updating patient care plans; scheduling office visits; monitoring patient's adherence to medication; data collection and management duties; and chart reviews. Support staff can also help address patients' psychosocial needs and nonmedical barriers to care such as financial concerns, transportation issues, and referrals to behavioral health resources.

Some awardees are using volunteers to perform various functions. A few awardees describe using volunteers to assist with implementation. Two awardees report using volunteer nurses and medical students to assist innovation staff with various care coordination activities. Another awardee reports using AmeriCorps volunteers as health coaches, which help provide education and guidance to enrollees on their medical condition. According to one awardee, using volunteers can also relieve staff of certain responsibilities, which can help reduce burnout and stress among employees.

Turnover occurred when staff skills did not align with the skills necessary to implement the innovation effectively. Awardees noted similar challenges to retaining staff as with recruiting staff. For example, several awardees attributed turnover in their organization to hiring individuals that did not have the right mix of skills for the position. One awardee reported that they had focused solely on hiring individuals with technical skills that they did not consider the importance of hiring care managers with interpersonal and communication skills. In some cases, awardees seemed to misjudge the experience and capabilities required to effectively care for their patient population. For example, a few awardees mentioned initially training lower-level clinical staff to serve as care coordinators. However, after experiencing some turnover they realized that more experienced clinical personnel such as nurses and social workers were better equipped to perform these functions. Further, others noted that staff must be dedicated, passionate, and flexible. Individuals without these personal characteristics were less likely to succeed and remain in their positions.

Staff burnout can be a problem due to heavy caseloads and the challenges associated with managing complex patient populations. Burnout and overwork among staff was reported as an ongoing challenge for many awardees. Care management, particularly with high-risk patients, can be stressful and demanding. The work often involves long hours, high caseloads, and managing relationships with patients experiencing significant health and social challenges. As a solution, some awardees shifted certain duties and tasks to lower-level staff to reduce workload among care managers. For example, a few awardees reported removing the management of nonclinical issues such as insurance, housing, and transportation challenges from a nurse care manager's day-to-day responsibilities. By redirecting some of these job functions to other staff, nurse care managers could devote the bulk of their energy and time to addressing the clinical aspects of care. Others described organizing trainings, retreats, and support groups to help employees cope with burnout. Examples of training included strategies for addressing trauma and compassion fatigue, self-care and stress reduction techniques, and how to maintain work/life balance. One awardee even reported recruiting volunteers from a local medical school to help ease the burden on clinical staff.

Turnover can negatively impact implementation. A few awardees described how turnover negatively impacted the implementation of their innovation. At least one awardee mentioned that employees' departures were directly responsible for lower than projected enrollment numbers. Another reported frustrations with having to continually train and onboard new people, thereby slowing down implementation. On a positive side, one awardee noted that turnover was a good learning experience for their organization. It provided them with the opportunity to rethink who they were hiring and recruit individuals more suitable for the job.

Retaining staff, particularly new hires, beyond the award period was a concern for some awardees. Some awardees expressed concern about maintaining staff after the HCIA funding ends. Given that care coordination and care management services are typically not reimbursable by payers, awardees expressed uncertainty about maintaining staff in the coming years. A few awardees identified this as a barrier to recruitment. According to one awardee, some interview candidates mentioned their reticence to accept an award-funded position that they viewed as risky and unstable. Another awardee expressed concern that turnover could increase as employees begin to search for other positions in anticipation of the award ending.

Summing up: Recruitment, deployment, and retention. Innovations face challenges identifying and recruiting staff with the requisite skills and then retaining them in what are often high-stress and multifunction roles. By definition, innovations often require staff to take on new roles and responsibilities or require staff to have diverse skills for which they may not be prepared. Implementing HIT innovations, which may require both technical and clinical skills, presents a particular challenge, as do innovations requiring a mix of technical and interpersonal skills. Recruiting additional staff, both paid and volunteer, may reduce burden, but uncertainty regarding sustainability is a likely impediment to hiring and retaining staff in the competitive health care marketplace. Trial and error represent one approach to recruitment and retention, but providing comprehensive training and ongoing staff recognition and support may improve retention.

Staff Satisfaction and Acceptance

Some innovations generated clinician resistance and dissatisfaction. Some resistance from clinicians stemmed from competitive concerns, for example innovations set outside of traditional health care settings that would “take away” their patients, reduce provider compensation, or cause role conflict with existing staff. Resistance also stemmed from beliefs that clinicians and health care settings are the best sources of information and are better equipped to make care decisions and provide services to patients. Innovations dependent on clinicians to adopt new processes or use new IT systems experienced resistance from clinicians who reported being too busy to learn new systems or processes that interfered with their usual practice or workflows. Issues with data accuracy for attribution, clinical decision making, and in monitoring reports undermined clinician confidence in the innovation for some awardees. Lastly, providers were reluctant to implement innovations and workflow redesigns that would only help a small subset of patients.

Some innovations did not experience active clinician resistance, but did require active and ongoing efforts to engage and promote the innovation among clinicians. For example, one awardee reported having to devise new ways of marketing an HIT tool to physicians who were overwhelmed by other tools and transformation initiatives. Similarly, another awardee expanded its use of a dashboard created to support the innovation to nurses, after recognizing that physicians are less focused on population management relative to nurse care managers. One awardee found low rates of prescriber acceptance of pharmacist recommendations mainly due to lack of prescriber awareness of the innovation, failure to identify their patients as participants in a medication management innovation, and large volumes of information received by fax, resulting in recommendations just getting “lost.”

Awardees used a variety of strategies to gain clinician buy-in before and during innovation implementation. For example, some awardees provided clinician education and training to clarify innovation goals, innovation staff roles, and address clinician concerns. Awardees characterized such efforts as “marketing” rather than actual training in support of innovation implementation. Other awardees leveraged existing regional partnerships to build awareness about the program among providers. One awardee modified its service approach to respond to provider concerns about a competitive primary care market. Lastly, one awardee changed its approach to provider recruitment to work with those most engaged as opposed to those with the highest cost/patient use as had been originally intended.

Summing up: Staff satisfaction and acceptance. Some innovations generated physician resistance over perceived competition and “loss of control” over services provided to patients or disruption to workflow. Some awardees employed active strategies to secure buy in and engagement from clinicians, including activities to raise awareness about the innovation and clarify goals and address concerns. Including clinicians likely to be impacted by an innovation in early planning stages and securing clinical champions are strategies that may mitigate resistance and improve acceptability.

Use of Community Health Workers

Community health workers are traditionally defined as individuals with personal or community experience with the target population or conditions targeted, or respected and active members of their community, and typically come from a nonclinical background. Some

awardees use traditionally defined CHWs, but many use nonlicensed staff other than traditionally defined CHWs to provide direct services to patients as part of one or more components within an innovation. The titles used to describe these roles, specific functions performed, and training and education requirements vary across the HCIA portfolio. The titles used by awardees to describe these lay staff include community health worker, patient navigator, health navigator, care coordinator, information specialist, peer support specialist, peer educator, family resource specialist, promotora, outreach specialist, and lay health worker. The titles reflect in part the diversity of functions performed and suggest specific background experience or requirements to function in these roles. In this section of the report, we describe this emerging component of the workforce, which includes but is not limited to traditionally defined community health workers.

Few awardees require formal education or certification for nonprofessional staff, and training is highly tailored to the innovation and evolved based on the needs of the innovation. Some awardees required at a minimum a high school diploma (or equivalent); one awardee required a bachelor's degree to be included in the Medicaid capitation rate associated with its services. Although many awardees may have had minimal requirements, depressed labor markets in some geographic areas resulted in several awardees utilizing nonlicensed support staff with bachelor's and master's degrees, while others had licensed professional staff (e.g., registered nurses) filling these roles. Some awardees recruited traditionally defined CHWs. For example, awardees using peer support specialists required individuals with personal experiences as a patient or caregiver navigating health care systems or have experienced challenging social circumstances similar to the target population (e.g., formerly incarcerated individuals who have transitioned back to the community). The requirements for CHWs also influenced the ways in which the awardee recruited these individuals, some relied on community partners to identify candidates where a relationship with the community and target population was critical to the CHW role. The training nonlicensed personnel received as part of the innovation also varied; a common aspect of training across awardees was training for documentation or data tracking systems either general to the system (e.g., EHR) or specific to the innovation (e.g., self-monitoring database).

Nonlicensed staff perform diverse and unique roles that are highly tailored to the innovation design and needs. Unlike licensed health care professionals where a simple title (e.g., nurse, pharmacist, physician) conveys meaning with respect to educational background, training, skills, and typical functions performed, the title and duties performed by nonlicensed staff are highly tailored to the innovation such that a patient navigator within one innovation may look entirely different in form, function, background, and training as compared to a patient navigator within a different innovation. Some awardees use nonlicensed staff for innovation planning and design, outreach and recruiting, or identifying community resources and establishing relationships between health care providers and community resources. Other awardees use nonlicensed staff as extensions of their clinical staff across community and care settings. These workers are trained to conduct assessments, support self-management, monitor patient status, and connect patients to services and other care management and coordination activities. Awardees defined nonlicensed roles based on the needs of the innovation, but some awardees changed this role. For example, one awardee had challenges using CHWs within an ED setting, as the CHWs were not emotionally or professionally prepared for the active trauma experienced in an ED.

Nonlicensed staff often perform functions that overlap with existing health care team roles; this requires thoughtful and careful implementation to avoid role conflict and confusion. For example, in one innovation, intensive case management is supported by nurses and community health workers. Both work directly with medical providers, but nurses work with the more complex and elderly patients whereas the CHWs work with younger patients with chronic disease requiring follow up and focus on coordinating preventive services like immunizations. This awardee has a long history of using CHWs for over 20 years, and over time role functions have become increasingly detailed and refined to minimize role conflict. In contrast, another awardee embedded CHWs into a subset of awardee practices that serve high-needs patients to help connect patients to external resources, but several of these practices were unclear on how the CHWs should function and did not give CHWs assignments or work. For some awardees, patients or their families do not understand the role or purpose of using nonlicensed personnel, thus were reluctant to engage or seek out their assistance. One awardee overcame this challenge by simply introducing patients and their families to CHWs while in the clinic and putting up pictures of their CHWs in the clinic, both of which helped to increase awareness about the program and the role of CHWs as an extension of the clinical team.

Many CHWs work under the oversight of clinicians, though some may be administratively managed by nonclinical or external entities. Different models of management and supervision are used across awardees, and sometimes within even the same awardee when multiple implementation sites are present. CHWs at some awardees faced role conflict when hired and administratively supervised by an external partners or agencies, yet functioned day-to-day among a clinical team. The most common types of clinical supervisors included licensed social workers and registered nurses.

Summing up: Community health workers and nonlicensed staff. The use of CHWs and nonlicensed staff is increasingly common and was integral to many of the innovations. These paid and unpaid staff may increase patient and community connectedness with the health care system and aim to reduce professional staff burden. Innovations used CHWs and nonlicensed staff in many capacities, which may cause confusion among staff and patients if the nonlicensed staff's role within the innovation is not described and communicated. Patients especially may require guidance on the role nonlicensed staff will have in their health care and reassurance that these nonlicensed staff are trusted members of the patient's health care team.

2.2 Key Impact Findings

The following summary presents initial findings from our workforce survey. In future reports, we plan to assess the program impacts on total costs of care, hospital and emergency department utilization, and hospital readmission rates and relationships between the outcomes with findings from the implementation analyses. Because estimates for these outcomes were unavailable from the first Annual FLE reports for many of the awardees, key impact findings for the four core measures are not summarized in this report.

2.2.1 Workforce Survey

Comparatively few awardees intended to collect survey data on workforce development and deployment. Those who are collecting workforce development and deployment data do not use the same measures.

In order to obtain consistent information about workforce models across many awardees, RTI conducted an employee survey across awardees. This survey consisted of three components: 1) the Satisfaction of Employees in Health Care (SEHC) survey, intended to measure job satisfaction, 2) the TeamSTEPPS Teamwork Perceptions Questionnaire (T-TPQ), intended to measure perceptions related to team skills and behavior, and 3) a brief series of questions on daily activities that quantifies the amount of time spent on specific functions. The workforce survey is shown in full in *Appendix E*.

Survey Methods

Awardee project directors and data managers at each of the 108 projects were sent an email explaining the survey with suggested text for distributing the survey to employees whose positions are funded by the HCIA award. The project directors were asked to distribute the survey to these employees. The survey link directed respondents to an informed consent form, which provided more information about the purposes of the survey. If an employee chose to participate, he or she had the opportunity to submit his email address in a separate, nonlinkable survey to receive a \$20 Amazon gift code. All research protocols were approved by RTI's Institutional Review Board. Based on reported full- and part-time employees during the last reporting quarter, we estimated a response rate of 54% among the 82 awardees with any respondents. The survey was fielded between January and May 2015.

The survey began with two background questions. The first asked a respondent to indicate the length of time employed in the current position, and the second asked the respondent to indicate his or her job category. All respondents were then directed to complete the SEHC. Next, a screening question to determine whether a respondent should also complete the time allocation questionnaire was administered. Those who indicated that they held a specialized role were directed to the daily activities questionnaire. Finally, respondents who answered "Yes" to the question "Is your program self-contained within a practice or hospital unit, where team members work side-by-side, day in and day out, with substantial interdependence on one another?" were directed to complete the T-TPQ. Respondents could skip any questions they did not wish to answer.

Scoring Methods

Using the "half-rule," respondents needed at least half of the items in a total measure to have nonmissing values to be included in the analysis. Respondents who answered fewer than half of the items were assigned missing values for the computed scale score average. Of the 1,050 survey respondents from 82 awardee organizations, 1,040 answered at least 9 of the 18 items in the SEHC measure; only 10 respondents were dropped from the SEHC analysis. Of the 615 survey respondents who answered any of the 35 TeamSTEPPS questions, 602 respondents answered at least 18 of the questions; 13 respondents answered less than half of the items and were dropped from the total TeamSTEPPS measure calculation.

Individual Likert items were rescaled from 0 (lowest possible score) to 100 (highest possible score). The mean SEHC score was calculated by averaging the first 18 items while the total TeamSTEPPS score was calculated by averaging all 35 items.

Satisfaction of Employees in Health Care (SEHC) Survey

We selected the SEHC because it was developed and validated in a health care setting, but it is broad enough to be relevant for all employees participating in an innovation (Alpern et al., 2013). Because the pool of innovations is so diverse, we wanted a widely applicable instrument. The 20-item SEHC measures employees' 1) level of satisfaction with relationships with management and supervisors, 2) job content, and 3) relationships with coworkers (Alpern et al., 2013). The first 18 items on the SEHC are a series of statements within the three key domains described above with which respondents select their level of agreement using a four-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree." The last 2 items explore employees' global level of satisfaction with their workplace. Item 19 states "I would recommend this health facility to other workers as a good place to work" and allows respondents to select one of four choices on a Likert scale ranging from "Definitely No" to "Definitely Yes." Item 20 asks respondents to rate their health facility as a place to work on a scale of 1 ("the worst") to 10 ("the best").

SEHC Results

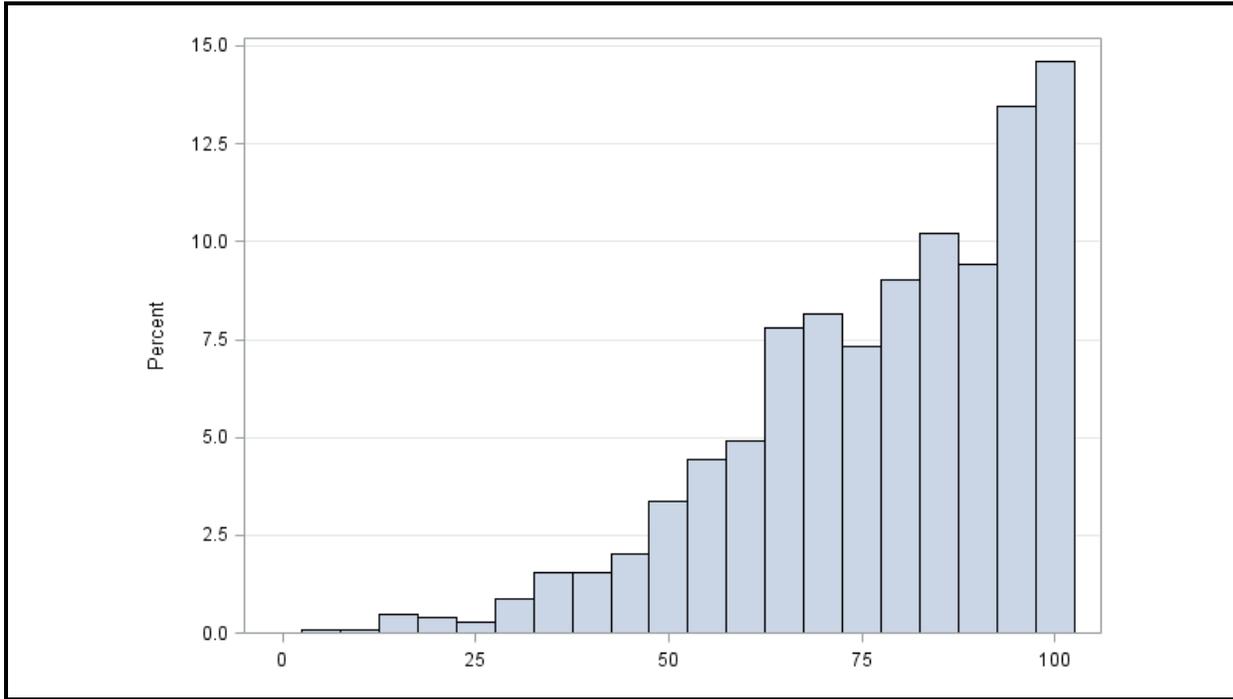
Table 9 presents a summary of the survey results for the respondent-level SEHC score.

Table 9
Mean respondent-level SEHC score

N	Mean	SD	Min	Max
1,040	77.60	18.71	5.56	100

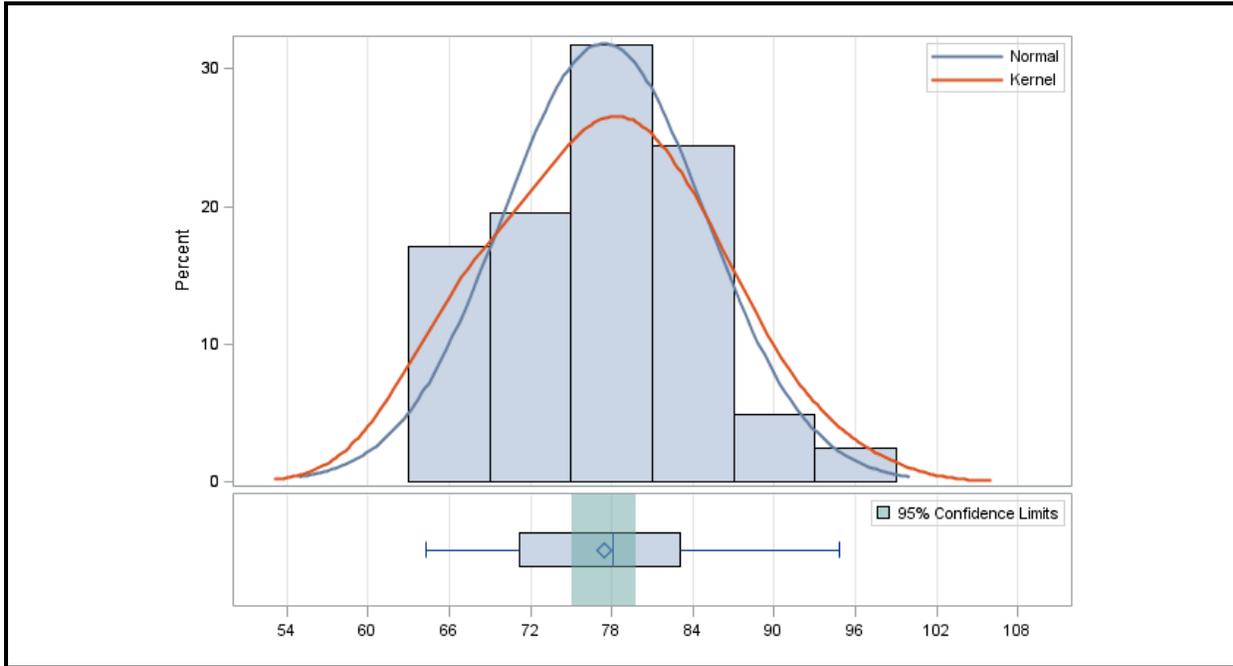
SEHC scores were negatively skewed (*Exhibit 1*). In the absence of detailed scores in the literature, we cannot say how HCIA staff compare to employees in other health care settings. However, the results are broadly similar to select items reported in a study of health care workers in Malawi (Schmiedeknecht et al., 2015).

Exhibit 1
Percent distribution of respondent-level SEHC scores (N = 1,040)



We calculated awardee-level mean scores for each awardee with at least 10 survey respondents. A total of 41 awardees met the 10-respondent criterion. There was considerable variation in awardee-level scores. A few awardees had very high mean employee satisfaction (3 awardees had scores over 88) while over 15% of the 41 awardees had SEHC scores below 70 (*Exhibit 2*).

Exhibit 2
Percent distribution of awardee-level SEHC scores (N = 41)



Respondent Characteristics Results

SEHC scores were assessed by years in their current position (experience) and job title (position). Mean SEHC scores were highest for those with more than 3 years of experience in their current positions. **Table 10** presents the results by experience level.

Table 10
SEHC score distributions, by experience

Experience	N	Mean	SD	Min	Max
FULL SAMPLE	1,040	77.60	0.58	76.46	78.73
Less than 1 year	240	77.41	19.41	9.26	100
1-3 years	549	76.45	18.75	14.81	100
More than 3 years	251	80.27	17.74	5.56	100

No significant differences in SEHC score were found among seven job categories created from respondent job titles.

Awardee Characteristics Results

We analyzed respondent-level SEHC scores by awardee-level structural and intervention features. The awardee characteristics were predominantly those mapped in our qualitative review

of the Front Line Evaluators’ Annual Reports, plus several from the awardees’ grant applications, and two from our Annual Awardee Summary Form (collected in September 2014). *Table 11* provides a complete list of these variables.

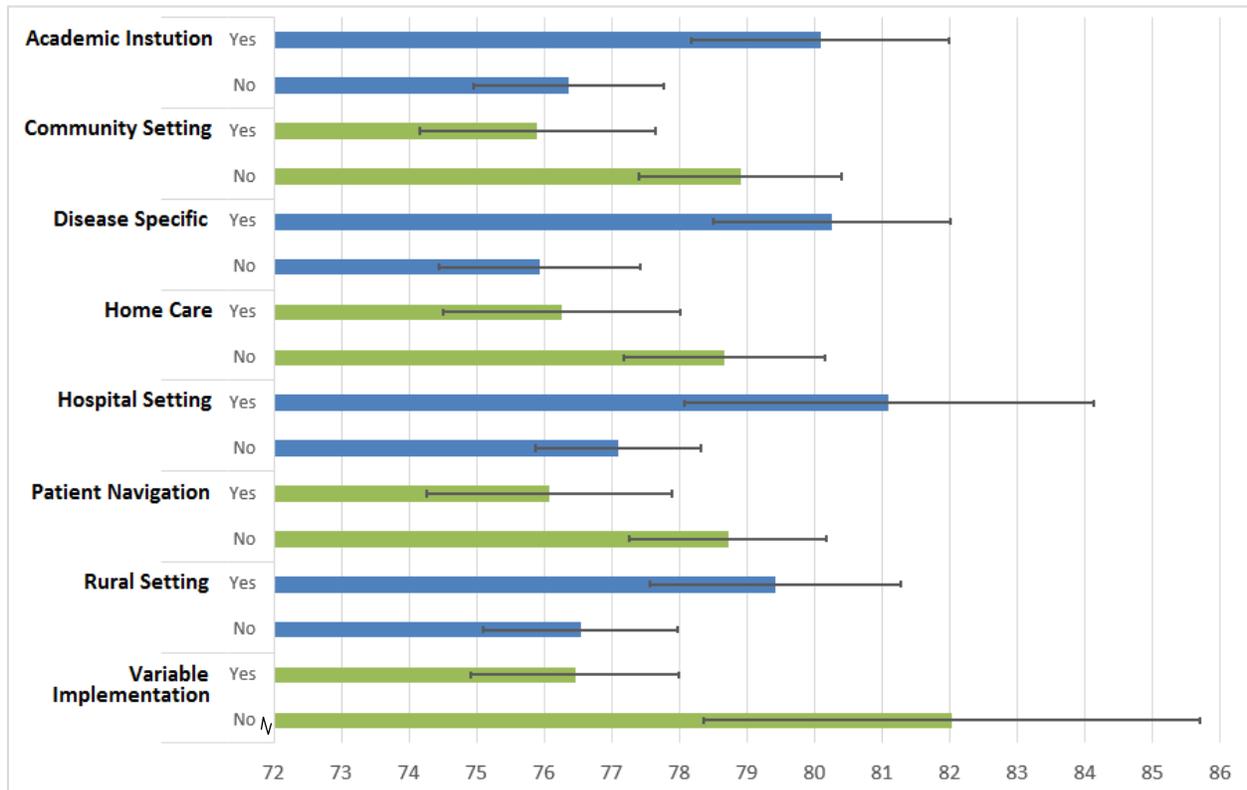
Table 11
Awardee characteristics examined in workforce survey analyses

Characteristic (Variable)	Possible Categories	Data Source
Academic institution	Yes, no	Awardee Grant Applications
Community setting	Yes, no	
Home care setting	Included in intervention, not included in intervention	
Patient navigation	Included in intervention, not included in intervention	
Rural setting	Yes, no	
Adequate staffing	Yes (defined as “mostly” or “moderately”), no (defined as “somewhat” or “limited”)	First Annual Awardee Summary Form
Complex intervention	Yes (defined as “very complex” or “moderately complex”), no (“not very complex”)	
Behavioral health focus or component	Yes, no	Qualitative review of Front-Line Evaluator Annual Reports
Children included in target population	Yes, no	
Intervention type	Direct, indirect	
Disease-specific intervention	Yes, no	
Health information technology	Included in intervention, not included in intervention	
History of intervention	Completely new innovation, builds on existing program	
Multisite intervention	Yes, no	
Treatment-based intervention	Yes (either exclusively treatment-based or treatment- and prevention-based), no	
Telemedicine	Included in intervention, not included in intervention	

Exhibit 3 presents statistically significant bivariate associations between mean SEHC scores and awardee characteristics ($p < 0.05$). We observed that employees in academic institutions, hospital settings, and rural areas report higher satisfaction than those not in these settings while those in community settings report lower satisfaction than those not in a community setting. Similarly, respondents in interventions with disease-specific components

report higher satisfaction than those in interventions without this focus. Alternatively, respondents in interventions with home care and patient navigation report lower satisfaction than those in interventions without these components. For multisite awardees, employees were more satisfied if the implementation process had been uniform rather than variable. It is important to note that while these differences by awardee characteristics are statistically significant, the differences in satisfaction score are only 2 to 4 points.

Exhibit 3
Mean SEHC scores by awardee characteristics (N = 1,040)



Note: “Variable Implementation” is a characteristic we explored in our qualitative analysis of the Front Line Evaluators’ Annual Awardee Reports and describes only interventions with multiple sites (22 of the 41 awardees and 673 of the 1,040 respondents in the analysis).

TeamSTEPPS Teamwork Perceptions Questionnaire (T-TPQ)

The T-TPQ was originally developed for evaluation of the TeamSTEPPS program, a training program created by the Agency for Healthcare Research and Quality and the Department of Defense to improve the ability of health care sector employees to effectively function as teams and thereby better ensure patient safety. The 35-item T-TPQ contains five subscales with seven items each; the subscales assess perceptions of team structure, leadership, situation monitoring, mutual support, and communication. Respondents indicate their level of agreement through a five-point Likert scale ranging from “Strongly Agree” to “Strongly Disagree.” We asked employees who participated in programs that are self-contained within a practice or hospital unit, where team members work side-by-side, day in and day out, with substantial interdependence on one another to complete the survey.

TeamSTEPPS Results

To compute a total TeamSTEPPS score, all 35 item scores were rescaled from 0 to 100 and averaged. Using the half-rule as was done in the SEHC analyses, survey respondents needed at least 18 of the items to have a nonmissing value for the total score to be computed. We did this separately for the total TeamSTEPPS measure and for each of the domain scores (*Table 12*).

Table 12
Mean respondent-level TeamSTEPPS scores

Composite	N	Mean	SD	Min	Max
Total Score	602	54.61	32.67	0.00	100
Team Structure	607	52.35	33.76	0.00	100
Leadership	597	52.58	36.66	0.00	100
Monitoring	601	54.52	32.06	0.00	100
Support	595	55.70	34.32	0.00	100
Communication	588	57.79	35.65	0.00	100

The total respondent-level TeamSTEPPS mean and domain scores ranged from 52 to 58. Scores were uniformly below results published in the T-TPQ manual, whose survey sample had a converted mean total score of 66.8. Mean scores for the communication construct were the highest compared to the other constructs, which is consistent with the literature (Battles and King, 2010). The mean total T-TPQ score in our survey (54.61) was lower than those reported in the literature for Korean hospital nurses (Hwang and Ahn, 2015), Scottish pharmacists (Irwin and Weidmann, 2014), and nurses who had recently completed team training (Tibbs and Moss, 2014), but higher than the score reported for one longitudinal study of U.S. caregivers in acute care hospitals (Spiva et al, 2015). T-TPQ scores have been shown to be affected by workforce characteristics and setting (such as age, job position, and clinical department) (Hwang and Ahn, 2015), and the HCIA sites may influence perceptions of teamwork differently than that reported by nursing teams in many hospitals.

The distribution of total TeamSTEPPS scores was bimodal with a small positive skew (*Exhibit 4*).

Exhibit 5 shows the more normally distributed awardee-level scores. Given the small sample size (only 18 awardees), further analysis of the TeamSTEPPS data at the awardee level was not undertaken.

Exhibit 4
Percent distribution of respondent-level TeamSTEPPS scores reported (N = 602)

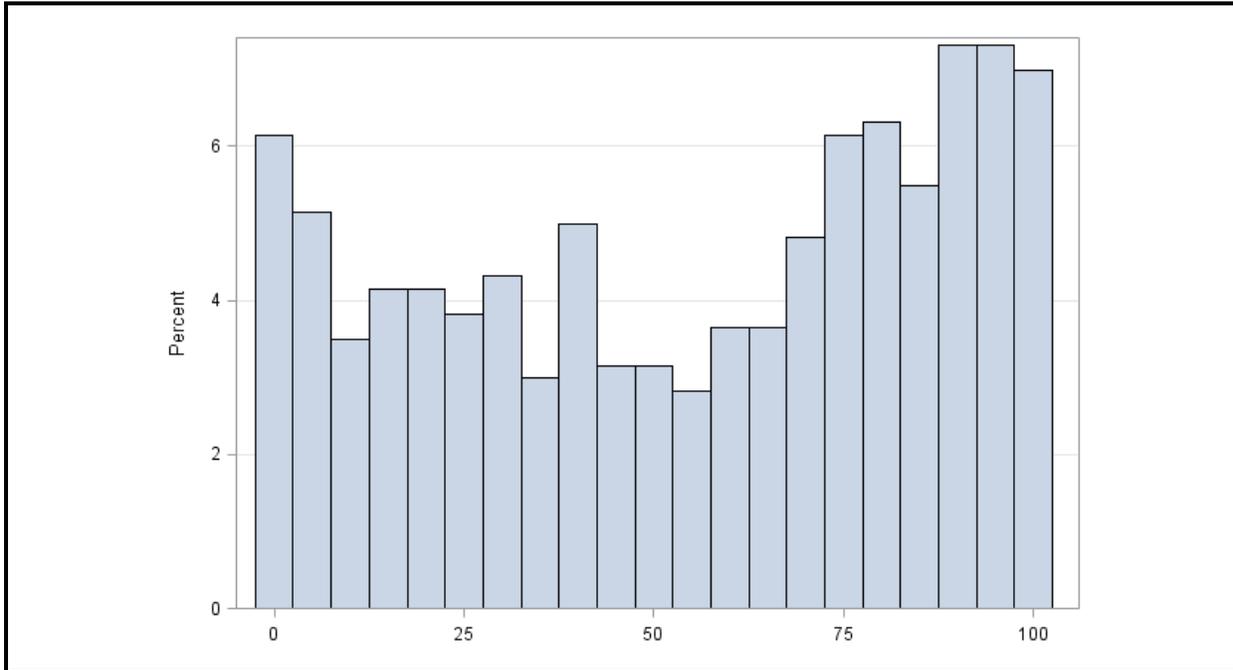
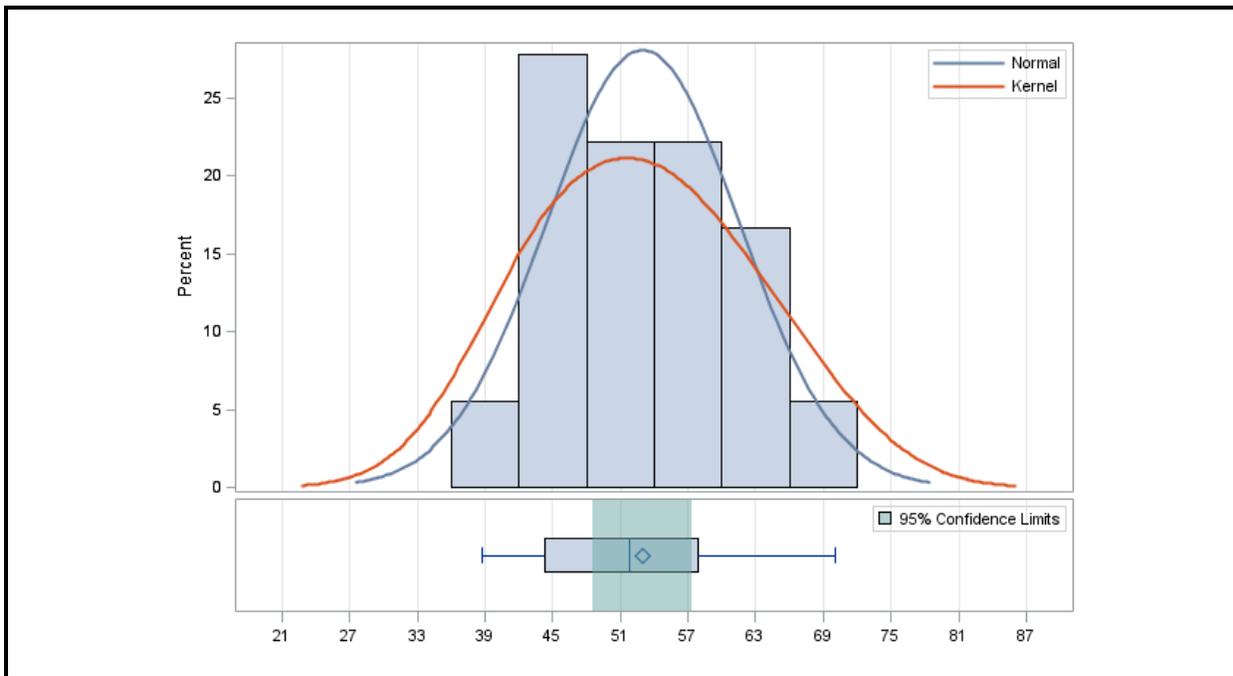


Exhibit 5
Percent distribution of awardee-level TeamSTEPPS scores (N = 18)



Respondent Characteristics Results

As was done with the SEHC instrument data, TeamSTEPPS scores were examined by employee experience and job title. TeamSTEPPS total scores were highest among respondents with less than 1 year of experience (*Table 13*). Scores were similar by job category.

Table 13
TeamSTEPPS score distributions, by experience

Experience	N	Mean	SD	Min	Max
FULL SAMPLE	602	54.61	32.67	0.00	100
Less than 1 year	142	58.63	33.01	0.00	100
1-3 years	317	52.58	32.14	0.00	100
More than 3 years	143	55.13	33.30	0.00	100

Awardee Characteristics Results

Bivariate analyses of the total TeamSTEPPS scores in conjunction with the awardee-level structural and intervention features produced no statistically significant relationships. However, for the Support domain, respondents involved in a patient navigation intervention had a significantly higher mean score (59.1) than those not involved in navigation activities (53.2).

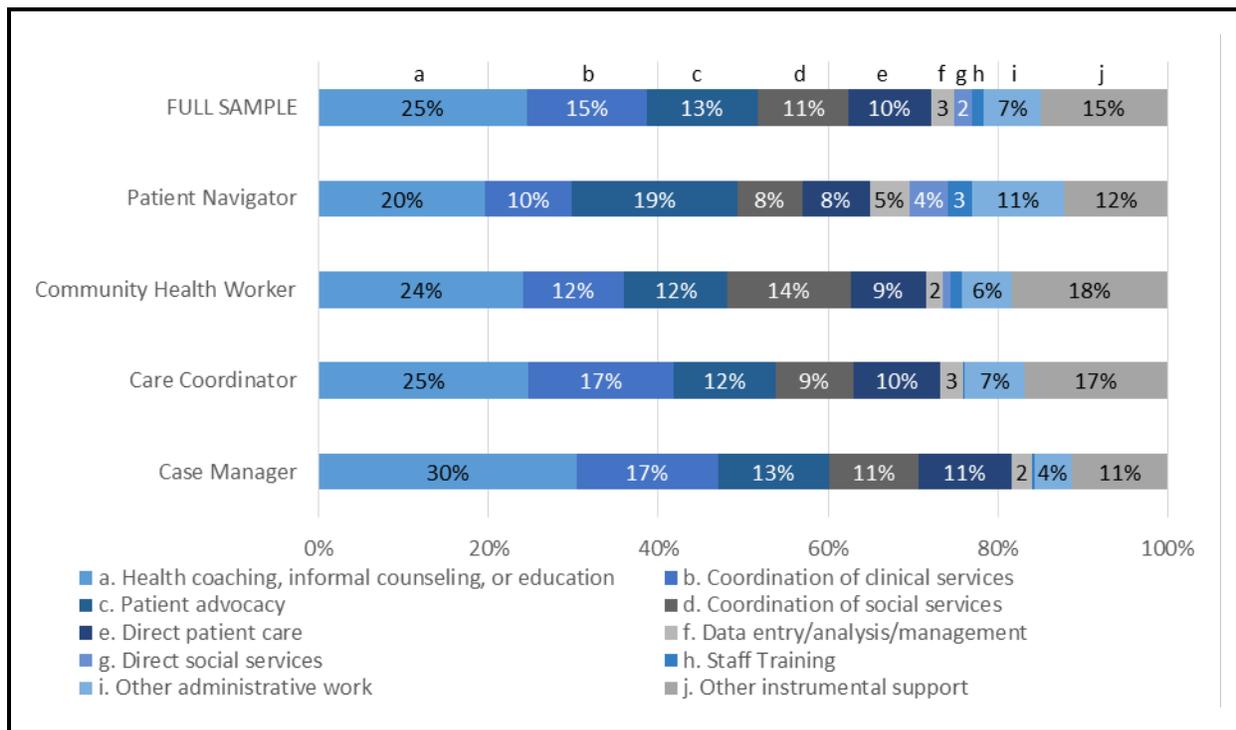
Time Allocation Questionnaire

We asked respondents in four specialized roles—patient navigators, community health workers, care coordinators, and case managers—to report on the number of hours they spent on a series of activities in the week preceding survey completion. These are common job titles, and we wanted to learn more about the actual job duties of employees with these titles. These activities included providing patient health coaching, informal counseling, or education; providing direct patient care; engaging in patient advocacy; coordinating clinical or social services; and providing other instrumental support. Respondents were also asked to indicate if they had performed any other activities in the previous week, which were later reclassified into one of the aforementioned categories if possible.

Time Allocation Results

A total of 214 survey respondents provided responses to the time allocation questionnaire. The time allocation results are presented in *Exhibit 6*, broken out by four types of nontraditional health care providers—community health workers, care coordinators, case managers, and patient navigators (70, 64, 51, and 29 respondents respectively). These were self-assigned designations that in the survey intentionally lacked any definition. No adjustments were made for part-time status of workers as we did not identify these respondents in the survey instrument.

Exhibit 6 Adjusted work time allocation



Note: Hours are adjusted to represent 100% of weekly activities.

Roughly half of the workweek for individuals in each of these roles consists of the same activities—providing patient health coaching, informal counseling, education, coordinating clinical and social services, and engaging in patient advocacy. Community health workers (CHWs) and care coordinators appear to be the most similar, the main difference being that CHWs spend slightly more time on average coordinating the provision of social services and care coordinators spend slightly more time coordinating clinical services. Of the four roles, case managers spend the most time (30%) engaged in health coaching, informal counseling, or providing education to their patients and patient navigators spend the least time (20%) involved in these activities. Across the board, respondents in these roles reported spending from 15% to 24% of their work week engaged in activities not easily classified by the activity categories provided by the survey instrument (represented by the “other administrative work” and “other instrumental support” categories).

Summary

At the awardee level, SEHC scores indicated that satisfaction levels were considerably higher for some awardees than others. Respondents at their current positions for longer than three years reported the highest satisfaction levels. No differences in job satisfaction or perceived team functionality as measured by TeamSTEPPS were observed by job category. We also found that many awardee-level characteristics were associated with reported job satisfaction, namely intervention setting characteristics (e.g., hospital and community care interventions) and intervention component (e.g. patient navigation and home care). Although most awardee employment characteristics were not statistically associated with team functionality, respondents

involved in a patient navigation intervention reported a greater sense of support among their colleagues compared to those not involved in patient navigation. Finally, we found many similarities in the way that patient navigators, community health workers, care coordinators, and case managers allocated their time to daily tasks.

2.2.2 Annual Awardee Summary Form Path Model

Most FLEs were unable to assess several aspects of awardee effectiveness, due in part to limited data about project outcomes at that point in the model. However, nearly all of the evaluators provided ratings of the proportion of program components that had been implemented as intended more than 2 years after the start of the demonstration. In this analysis, we focus on these ratings of degree of implementation as our primary outcome. We supplemented the AASF responses with other awardee features compiled by RTI and FLEs to create a multivariable implementation model. Our objective in this analysis is to learn more about why some HCIA awardees were able to get their innovations up and running more quickly than others.

Measures

We divided our measures into three categories:

1. Outcome measure. Our primary outcome was based on FLE responses to the question “What proportion of program components are implemented/being provided to the intended program targets?” Using a four-point scale (ranging from “nearly all” to “few”), FLEs felt that most awardees had implemented “nearly all” components (76%), while 16% of awardees were judged to have implemented “many” components, and 8% only “some” of their proposed components.
2. Mediators. Mediators are variables that may change over time and that may in turn influence an outcome. We identified four potential mediators that were measured after the innovations had begun.
 - Staff hiring rate. Drawn from the demonstration’s reporting system, this was the percentage of an awardee’s staffing goal that had been hired. On average, awardees had hired an average of 85% of their new employee goals at the time the survey was conducted. We would expect that awardees who have hired a greater percentage of their hiring goal will have implemented a greater proportion of their program components.
 - Overall program complexity. FLEs reported a considerable amount of variation among awardees in terms of the complexity of their programs (35% very complex, 46% moderately complex, 19% not very complex). Given that complex programs are more difficult to implement, we would expect less complex programs will have implemented a greater proportion of their program components.
 - Launch quarter. Most awardees did not begin to implement their programs until after the official start of the demonstration. This variable indicates the calendar quarter (1 = July–September 2012; 7 = January–March 2014) that a program was

launched. It is hypothesized that programs that were launched sooner are more likely to have implemented a greater proportion of their program components.

- Resource adequacy. We created a summary measure of resources by combining FLE perceptions of the adequacy of awardee financial resources, training resources, and staffing. Adequacy of each resource type was scored 1 = limited, 2 = somewhat, 3 = moderately, 4 = mostly. Fifty-nine percent of the awardees received the maximum possible score. It is expected that greater adequacy of awardee resources will be associated with greater implementation of all program components.
3. Covariates. We used four binary structural features as covariates in our model.
- Multisite. This variable distinguishes between awardees with multiple clinical sites and those with only one site based on the way that FLEs reported their AASF responses. About half of the awardees were multisite.
 - Care-focused innovation. This identifies awardees whose main innovation focuses on patient care (care coordination, care management, patient navigation, patient engagement, or integrated health care).
 - Semi-independent new staff. FLEs were presented with several options for characterizing staff deployment models. This variable is an indicator for awardees that “use new staff semi-independently.”
 - New program. This covariate distinguishes awardees that were reported to be introducing new programs.

Many other AASF items were considered for the analysis but had to be dropped because FLEs were unable to assess them. Our statistical analysis was based on complete data for 91 of the 108 awardees. The main sources of missing data were the resource variables. Descriptive statistics for all measures are shown in **Table 14**.

Analysis Methods

We analyzed the relationships among the AASF variables using path analysis. Path analysis is a statistical technique for estimating linear associations among a set of variables arranged in a presumed, hierarchical causal sequence. The results of multiple regression equations are displayed in the form of a model that summarizes the key relationships (or paths) in the data. The magnitudes of individual effects are measured by standardized regression (beta) coefficients. These coefficients indicate how many standard deviations an outcome would be expected to change in response to a one standard deviation increase in an explanatory variable. A beta value of 0.20, for example, indicates that the outcome is expected to increase 0.20 SDs per SD change in the explanatory variable. With all variables in the path model standardized to their respective metrics, larger betas represent larger relative effects. Due to the comparatively small number of awardees available for analysis, we trimmed the model to show all path coefficients with betas of 0.15 or greater in absolute value. This threshold includes all coefficients that differ significantly from zero at $p < 0.10$.

Table 14
Descriptive statistics for path model variables (N = 91)

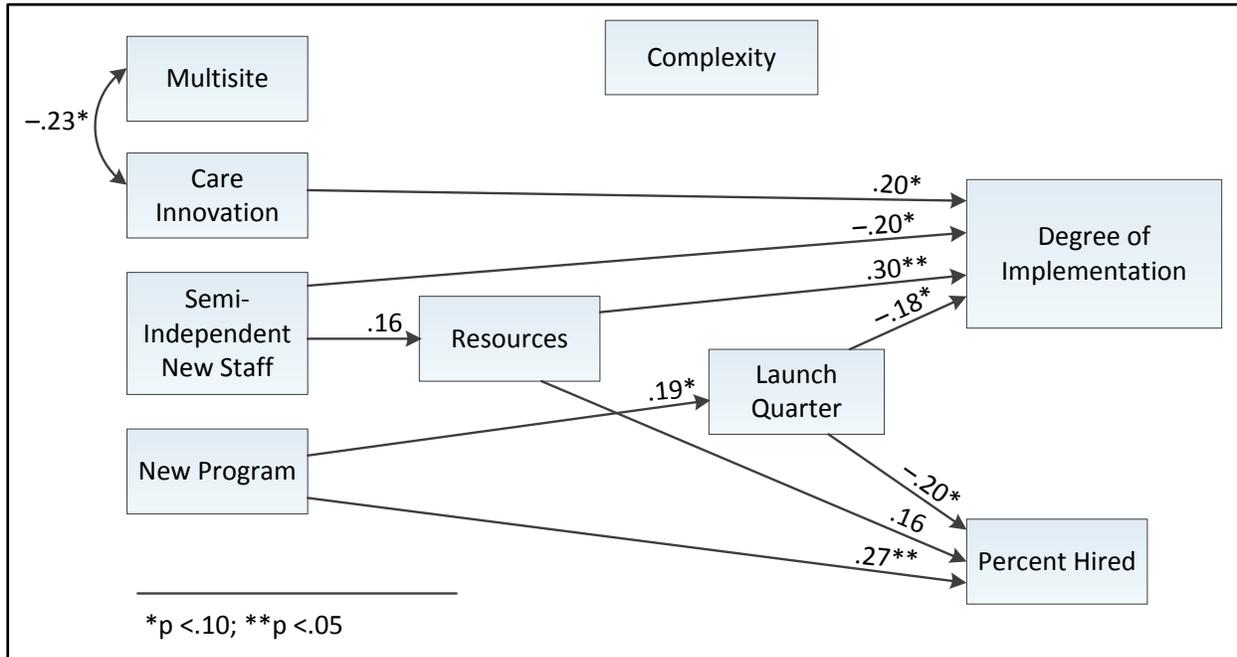
Measure	Mean	SD	Min	Max	Scale
Degree of implementation	3.68	0.61	2.0	4.0	1=few, 4=nearly all
Percent hired	85.30	18.00	27.8	100.0	% of hiring goal
Launch quarter	2.57	1.17	1.0	7.0	Quarter number
Program complexity	2.16	0.72	1.0	3.0	1=not very complex, 3=very complex
Resource adequacy	11.00	1.69	3.0	12.0	3=all resources limited adequacy, 12=all resources mostly adequate
Multisite awardee	0.50	0.50	0.0	1.0	1=yes, 0=no
Care innovation	0.56	0.50	0.0	1.0	1=yes, 0=no
Semi-independent staff model	0.34	0.48	0.0	1.0	1=yes, 0=no
New program	0.60	0.49	0.0	1.0	1=yes, 0=no

Results

The final path model is shown in **Figure 6**. The exogenous covariates are aligned on the left side of the model, mediators ordered sequentially in the middle, and the degree of implementation outcome is to the far right. Lines (paths) between two variables indicate a direct, non-zero relationship between those two measures.

The curved arrow to the left of the model denotes a significant negative association between two of the covariates: multisite awardees were less likely to be implementing care-focused interventions. Semi-independent new staff deployment was somewhat more likely to be found among awardees with greater resources. One reason for delayed launches is that new programs appear to take longer to implement. Several characteristics influenced the rate at which new staff were hired. Hiring rates were higher for new programs and high resource awardees (the latter effect may be an overestimate since staffing was one of the resources types we included). Hiring rates were lower the longer it took an awardee to launch. This relationship is also apparent in this cross-sectional data.

Figure 6
Path model for degree of implementation in the HCIA1 demonstration



In spite of the relatively high level of implementation reported by the FLEs, four variables had sizable impacts on this outcome. The strongest estimated effect was for resource adequacy, with perceived resource adequacy being associated with more complete implementation of the program ($p < .05$). Care-focused programs had greater degrees of reported implementation than other types of innovations ($p < .10$), which may have required more technology or specialized staff to get running. A potentially more demanding deployment approach, using new staff semi-independently, was associated with lower implementation ratings ($p < .10$). Finally, implementation occurred more slowly for awardees that experienced delays in launching their programs ($p < .10$). Together these variables explained 20.7% of the variation in implementation ratings.

Somewhat surprisingly, multisite status and complexity had little to do with the other measures in the model. FLEs did not perceive multisite programs to be of greater complexity, nor did they think that complexity affected implementation. It was expected that it would be more difficult for FLEs to rate multisite programs than single site programs because of the need to distill the performance of several sites into a single, average rating on the survey form.

Contrary to expectations the percentage of staff hired was unrelated to implementation status. While this hypothesized mediator was associated with awardees perception of the innovation being a new program ($p < .05$) and perceived resource availability ($p < .10$), it was unrelated to the proportion of program components implemented/being provided to the intended program targets.

Summary

We used path analysis to examine the relationships among awardee structural characteristics and ratings reported by FLEs on the 2014 AASF. The key findings from this analysis were the following:

- More than 2 years into the demonstration, FLEs reported that 76% of the awardees had implemented nearly all of their intended program components.
- Perceived resource adequacy emerges from this analysis as a key influence on implementation, and its potential role for other outcomes should be investigated. Resource adequacy may also be something that CMMI should carefully consider in the future when selecting awardees for models.
- The results further underline the importance of the timing of the project launch, which was found to impact both hiring rates and implementation.
- Other influences on implementation were type of innovation and staff deployment model.
- Multisite status and program complexity were unrelated to the other variables in the model.
- If degree of implementation affects subsequent outcomes, then all four of the variables influencing implementation in this analysis will be indirectly related to those outcomes as well.

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SECTION 3 CONCLUSIONS AND NEXT STEPS

In our first annual report for the Health Care Innovation Awards (HCIA) Meta-Analysis and Evaluators Collaborative, we used various methods to systematically assess the implementation and impact the 108 health care innovation awardees. While it is not yet possible to make broad conclusions about success of the different innovation programs, we highlight early key findings in implementation and impact.

3.1 Implementation Findings

Some of the barriers awardees encountered arose from inadequate planning; in part, the awardees did not have time for a comprehensive planning process because of the short timeframe imposed by the innovation proposal process. However, some challenges they encountered are well-documented in the literature. For example, HIT implementations require a comprehensive assessment, planning, implementation, and evaluation process (Lorenzi et al., 2009; Brokel and Harrison, 2009; Terry et al., 2008; Crosson et al., 2011; Nutting et al., 2009; Ford et al., 2009). Attempting to implement HIT—even small HIT projects—can generate significant challenges; our findings demonstrated that awardees did experience HIT implementation difficulties, in part because they did not have enough time to assess and plan adequately. With additional planning time, awardees may have been better prepared to address these challenges.

Many awardees had difficulty enrolling, and in some cases retaining, patients in the innovation; this problem was acute for innovations requiring significant time commitment or engagement from patients. Such innovations require patients' willingness and ability to attend or participate in multiple appointments or contacts with staff over time; thus, a patient must be ready and committed to making a health or behavior change. Likewise, since many of these innovations focused on vulnerable populations who may face access barriers, the challenges related to working with these populations are unsurprising. Lack of transportation, homelessness, and complex health conditions hinder patients' ability to participate in innovations, and awardees encountered these well-known obstacles in innovations requiring active and ongoing participant engagement for innovation delivery. Asking such patients to make a long-term commitment to an innovation poses additional challenges that awardees must address to ensure enrollment and retention of patients. Although some awardees implemented strategies to mitigate the barriers that vulnerable populations experience from the start, others did not plan for such difficulties at the outset of the innovation and needed to make midcourse corrections.

Awardees have several considerations when staffing their innovations. Innovations that rely on hiring all or almost all new staff may be more difficult to sustain than innovations that can draw on existing staff by redefining or adding activities to staff roles, especially when the award funds all of the new staff. Several awardees faced challenges in attracting qualified staff when continued funding of the position was uncertain. On the other hand, hiring new and additional staff can add services, enhance care, free up staff time, and prevent gaps in staffing that might be created by solely relying on extant staff. Awardees need to weigh the benefits and drawbacks of hiring new staff versus using existing staff and the "right" balance may depend on the innovation and innovation context.

A qualitative review of the intervention descriptions as well as our analysis of the time allocation data from the workforce survey responses confirm that the roles of lay workers or community health workers vary among awardees using such staff types. Awardees used a variety of titles to describe paid and unpaid lay health workers, and these workers' responsibilities and training were often specific to the particular innovation. As CMS considers whether and how to reimburse for services provided by lay staff or CHWs, CMS may wish to consider what services lay staff or CHWs can appropriately provide, what supervision is required, and how such workers fit into existing fee-for-service payment models, as well as new models such as per member per month care management fees, patient-centered medical home payment models, accountable care organization models, bundled payments for episodes of care, or other value-based payment models.

3.2 Impact Findings

The workforce surveys were important tools to measure satisfaction and team functionality among and across the awardees. We found respondent-level and awardee-level satisfaction and teamwork were considerably higher for some respondents and awardees than for others. Individual respondents who had been at their position for longer than three years reported the highest satisfaction levels while those who had been in their position for less than a year reported the highest perceived team functionality scores. Many awardee-level characteristics were found to be associated with reported job satisfaction, namely intervention setting characteristics (e.g., community) and intervention components (e.g., patient navigation and home care). Although most awardee employment characteristics were not statistically associated with team functionality, respondents involved in a patient navigation intervention reported a greater sense of support among their colleagues compared to those not involved in patient navigation.

After more than 2 years, 76% of awardees have implemented almost all of their intended program components. With path analysis, we identified perception of resource adequacy to be a key influence on degree of implementation. We also found the timing of the project launch was important as this impacts both hiring rates and degree of implementation. This analysis identified important structural characteristics for CMS to be aware of when designing future initiatives.

Since the First Annual Reports from the seven FLEs lacked impact estimates for many of the awardees, data were not yet available for quantitative analysis of the impact for this report. As awardees and FLEs move forward with resolving data acquisition and reporting problems, we hope to have data to produce summary impact estimates across the awardees. These summary impact estimates will help CMS better understand the effectiveness of the HCIA initiative. We also plan to combine the implementation findings and the impact findings to provide more nuanced insights into what conditions, settings, and populations are linked to successful approaches. These general insights into successful innovations will help guide CMS with future innovations.

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