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REPORT

Evaluation of the Medicare Coordinated Care Demonstration: Interim Impact Estimates for the Health Quality Partners' Program

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EXECUTIVE SUMMARY

Since 2002, the Centers for Medicare & Medicaid Services (CMS) has been conducting the Medicare Coordinated Care Demonstration, a large-scale randomized trial of care management programs for Medicare fee-for-service beneficiaries with chronic illnesses. In October 2010, CMS extended the Health Quality Partners' (HQP) program, the sole remaining program in the demonstration (out of the original 15), for a subset of beneficiaries for whom the program had favorable results.[1] HQP could enroll new beneficiaries, as well as continue to serve prior enrollees, who met one of two eligibility categories. (We refer to these eligibility criteria as "current" eligibility criteria). The first type are those who have coronary artery disease (CAD), congestive heart failure, chronic obstructive pulmonary disease, and/or diabetes, plus one or more hospitalizations in the year before enrollment, and for whom the program reduced hospitalizations and total Medicare expenditures (this is the "high-risk" group for whom CMS now pays $281 per beneficiary per month (PBPM) for HQP services). The second type of beneficiaries are those with CAD, but no hospitalizations in the prior year, for whom the program improved survival but did not reduce hospitalizations or expenditures (the "CAD-only" group for whom CMS now pays $83 PBPM).

This interim report describes the impacts of HQP's program on hospitalizations, expenditures, and survival during the recent program extension (2010–2014) and over the full course of the program (2002–2014) among the beneficiaries who meet the current program eligibility criteria. We estimate the program effects as the differences in outcomes between the treatment group (which received HQP services) and the control group (which did not receive HQP services but continued to receive the usual Medicare services), adjusting for any chance differences between the groups at enrollment, despite random assignment. Our final report to CMS will include seven more months of patient follow-up, additional quality-of-care outcomes, and a more complete discussion of factors that may be influencing the results. The study design also plans for the incorporation of perspectives from HQP staff, which is essential for understanding the full range of factors that may have contributed to differences in impact estimates before and after the extension.

Impacts during the extension period (2010–2014). We estimated impacts during the program extension (2010–2014) using two samples: (1) the 409 high-risk beneficiaries (about half in the treatment group and half in the control group) who enrolled during the extension and (2) the 1,111 beneficiaries who enrolled since the program started in 2002, met the current eligibility criteria at enrollment, and were alive and enrolled in fee-for-service Medicare for at least part of the extension period. We also divided the 1,111 beneficiaries into the 663 who were "high-risk" and the 448 who were "CAD-only," and we estimated the effects of the program separately for the two groups.

Overall, we found that HQP did not measurably reduce hospitalizations or Medicare Part A and B expenditures during the extension for any of the samples. We use the phrase "did not

[1] Between 2002 and 2012, the HQP program reduced hospitalizations and reduced Medicare expenditures sufficiently to offset fully the HQP program fees received for this group of beneficiaries. However, we could not conclude with statistical certainty (at a 90 percent confidence interval) that the program generated net savings to Medicare.

measurably change" to denote that the estimated effect was not statistically significant. Due to small samples, our statistical power to detect effects was modest, and it is possible that, even if the program actually reduced hospitalizations by up to 20 percent, we would not see a statistically significant difference. Nonetheless, for the high-risk group, HQP *increased* expenditures by an estimated 17 percent during the extension, after factoring in program fees. It therefore seems unlikely that there are true favorable (but undetected) effects in this extension period. In addition, HQP did not measurably affect survival during the extension, although this may be due to very low power to detect an effect. For example, we only had a 23 percent probability of detecting an impact on two-year mortality rates that was the same size as the impact found for the high-risk group before the extension. These results contrast strongly with the program's impacts on high-risk beneficiaries before the extension, when HQP reduced hospitalizations and two-year mortality rates, and cut total Medicare expenditures (including program fees) by an estimated 28 percent (Schore et al. 2011).

Several factors may explain these differences in impact estimates before and after the extension. We developed this list of possible explanations based on our knowledge of the program gained through multiple site visits over the past 12 years, including two since the 2010 extension. The first factor is HQP's switch from identifying prospective enrollees through physician referrals and patient records to identifying them through hospital discharge records. This change in the way enrollees are identified may have contributed to the higher disease burden we observed among high-risk beneficiaries enrolled after the extension (versus those enrolled before the extension)—and the program may not work as well for the group with higher disease burden. Another consequence of changing enrollee identification may be decreased physician involvement in identifying patients with gaps in care or supports at home who could benefit most from HQP's intervention.

The second factor that may have decreased the effectiveness of the interventions during the extension is HQP's growth, both in terms of hiring new care managers, who need time to learn how to implement the intervention, and expanding into new geographic areas with less opportunity for face-to-face interactions between supervisors and nurse care managers. Third, the disruptions to staffing and supervision of care managers caused by the program's near termination in 2010 and 2013 may have reduced the program's effectiveness in those periods. Fourth, the recent increase in accountable care organizations, medical homes, and transitional care interventions in the region—all of which provide interventions that to some degree overlap with HQP's intervention—may have decreased the marginal effect of HQP's program. Finally, due to small sample sizes, the impact estimates both before and after the extension are statistically imprecise, and the true differences may be smaller than the differences in the point estimates. We also explored, but ruled out, the possibility that differences in patient tenure (length of time spent in the program) explain the differences because the differences in effects persist even after controlling for tenure.

Impacts over the full length of the program (2002–2014). We estimated impacts over the 12 years of program operations for the 1,371 beneficiaries (treatment and control) who enrolled since 2002 and met the new eligibility criteria at enrollment. For this group, the program reduced hospitalizations by 10 percent and substantially improved 2- and 5-year survival rates. The program did not, however, measurably reduce Part A and B Medicare expenditures. For the high-risk subset (n = 778, treatment and control), the program reduced hospitalizations by 14 percent.

Further, Medicare Part A and B expenditures without program fees were $167 (11 percent) lower in the treatment group PBPM than in the control group, but this difference was not statistically significant. Including program fees (which averaged $174), the treatment group's costs were essentially the same as the control's, suggesting the program *may* have been cost-neutral for this group over the full 12 years (in contrast to clearly generating net savings during the first 8 years before the extension). The impact estimates over the life of the program are difficult to interpret, however, because they represent an average of two very different sets of impact estimates: those before and after the 2010 extension.

I. BACKGROUND

In October 2010, the Centers for Medicare & Medicaid Services (CMS) extended the Health Quality Partners' (HQP) program for a subset of beneficiaries for whom earlier analyses had shown improvements in service use, expenditures, and/or survival. HQP could enroll new beneficiaries, as well as continue to serve prior enrollees, who met one of two eligibility categories. The first eligibility category was for beneficiaries who had congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD), coronary artery disease (CAD), or diabetes and one or more hospitalizations in the prior year; this was the "high-risk" group, for whom CMS pays $281 per beneficiary per month (PBPM) for HQP's services during the extension. The second category was for those who had CAD but no prior hospitalization; this was the "CAD-only" group, for whom CMS pays $83 PBPM. In this report, we refer to all beneficiaries who met the current eligibility criteria at enrollment as the "full sample" because our impact estimates are limited to this group and its subgroups (CAD-only and high-risk).[2]

Since the extension, HQP has enrolled new beneficiaries in its original service area in Doylestown, Pennsylvania, as well as in new service areas outside Philadelphia. The mix of these enrollees during the extension period is shown later in this report.

HQP's model of care management during the extension shares core features with the model before the extension, but it is adapted to identify high-risk patients and to meet their needs. The core elements include comprehensive in-home assessments, frequent in-person visits, group education and behavior change classes, and coordination of care between providers (Converse et al., forthcoming). The changes during the extension period include:

- Identifying prospective enrollees through hospital discharge records (to ensure patients meet the high-risk criteria) rather than through referrals from participating physicians or reviews of medical charts
- Changing staffing, including hiring nine new care managers (who serve both fee-for-service [FFS] beneficiaries in the demonstration and Medicare Advantage beneficiaries under a contract with Aetna)
- Reducing target caseloads from 110 to 75 enrollees per full-time-equivalent care manager
- Increasing the number of in-home visits, decreasing group visits, and spending more time coordinating care between primary care providers and specialists

[2] Beneficiaries who enrolled before the extension but did not meet the current eligibility criteria at enrollment are excluded from our analysis and our definition of the "full sample" in this report.

II. OBJECTIVES AND METHODS

This evaluation has three objectives:

1. To estimate the impacts of the HQP program on hospitalizations, Medicare expenditures, and survival during the extension period (2010–2014)
2. To compare the impacts before and during the extension period for enrollees meeting high-risk criteria, controlling for patient tenure in the program
3. To estimate the impacts over the full 12 years of the program (2002–2014) for enrollees who meet post-extension eligibility criteria

To meet these objectives, we used the MCCD's randomized design—the "gold standard" for program evaluation—to generate unbiased estimates of program impacts. The impact estimates are the differences in outcomes between the treatment and control groups, adjusted for beneficiary demographics and chronic conditions measured at baseline (the time of program enrollment). We used an intent-to-treat design, following patients for all months that they are alive and enrolled in FFS Medicare after they enroll in HQP's program, regardless of whether they remain active in the program.[3] Before estimating impacts, we verified that the treatment and control groups were similar at baseline on measured demographics, service use, and chronic conditions, as we would expect following random assignment. All outcomes and patient covariates were constructed from Medicare claims and enrollment data. We collected claims through July 2014, ensuring at least two months claims runout from the end of our outcome period (May 2014). Consistent with prior reports, we used a $p < 0.10$ threshold (two-tailed test) to determine statistical significance.

To identify which beneficiaries met the extension eligibility criteria at baseline, we determined eligibility using claims data for pre-extension enrollees and HQP's own method of identification for post-extension beneficiaries enrollees. Before adopting this approach, we verified—using claims—that virtually all (98 percent) of the beneficiaries HQP identified as high risk did in fact meet these criteria. To be included in the research sample, enrollees must have enrolled early enough to have been followed up for at least six months by the end of the outcome period. We tested the robustness of the results to this assumption by requiring at least one year of follow-up, and the results did not change. We also examined program effects during the second year after enrollment to account for possible lags between enrollment and impacts.

We assessed the extent to which beneficiaries in the treatment group actually received HQP services by calculating the average percentage of a beneficiary's follow-up months for which HQP submitted a bill for services rendered. As seen in the impact tables in the appendix, HQP provided treatment services to beneficiaries for 74 to 96 percent of their follow-up months (depending on the sample and outcome period), verifying that the vast majority of the treatment group received HQP services.

[3] The intent-to-treat design limits the bias in estimates that could result from comparing outcomes for those who actually received treatment to those who did not. We also explored whether program impacts on mortality or entry into managed care (both of which remove a beneficiary from the sample) could bias the impact estimates for key outcomes. We concluded that the possible bias, if any, is very small and does not drive overall findings.

III. RESULTS

For each objective, we first describe the baseline characteristics of the research samples used to estimate the impacts and then describe the estimates.

A. Objective 1: Estimate HQP's impacts on hospitalizations, Medicare expenditures, and survival during the extension period (2010–2014)

We used two approaches to meet this objective. First, we estimated the impacts during the extension (2010–2014) for the 409 beneficiaries (treatment and control) HQP enrolled in the program since the extension began (all 409 met the high-risk criteria). Second, we estimated the impacts during the extension for the 1,111 beneficiaries who enrolled at any point since the program began in 2002, met the current eligibility criteria at enrollment (either as high-risk or CAD-only beneficiaries), and were alive and enrolled in FFS Medicare for at least part of the extension. The second approach increases the statistical power to detect effects but does not exclusively test HQP's current model because the outcomes for earlier enrollees may also be influenced by their time in the program before the extension. The results from the second approach may differ from those of the first approach not only because of the inclusion of earlier enrollees but also because the second approach includes the CAD-only group. For that reason, we also estimated impacts during the extension separately for the high-risk (n = 663) and CAD-only (n = 448) subsets of the 1,111 beneficiaries who were in HQP for at least one month during the extension.

1. Approach A: Impacts for those who enrolled after the extension

Baseline characteristics. Between October 2010 and November 2013, HQP enrolled 409 beneficiaries (treatment and control), 61 percent in the original service area in Doylestown, Pennsylvania, and the remaining 39 percent from the new service areas outside of Philadelphia (Table 1). These enrollees were roughly three times more likely than the national Medicare FFS average to have CAD, CHF, COPD, or stroke. Their average hospitalization rate in the year before enrollment was 1.7—over five times the national average. The extension population is almost exclusively white and non-Hispanic, with few enrollees eligible for Medicaid. (We compare the characteristics of this group to those of earlier high-risk enrollees later in this report).

Impacts. We found no measurable differences between the treatment and control groups for hospitalizations or Medicare expenditures (Part A and B) or Part A only (Table 2.a). [4]However, due to the small samples (Table 2.b) and thus low statistical power (Table 3), it is possible that the program reduced hospitalizations by up to 30 percent, but the impact went undetected. It is nonetheless clear that the program did not reduce hospitalizations by the point estimate reported in the Fourth Report to Congress (39 percent) because our tests were well-powered to detect such a large impact. Including program fees that averaged $263 PBPM, the treatment group's total Medicare expenditures were 21 percent higher than the control group's expenditures. This difference was not statistically significant at conventional levels (p = 0.14) (Table 2.a), but it came close to significance (p = 0.11) after removing high-cost outliers to the 98th percentile (results not shown in a table).

The program did not measurably affect two-year mortality rates—the difference between the treatment and control groups was favorable but small and statistically insignificant (Table 4). However, our statistical power to detect the effects on two-year survival rates was very low, given the small samples.[5]

2. Approach B: Impacts for those who enrolled at any time

Baseline characteristics. Between April 2002 and November 2013, HQP enrolled 1,111 beneficiaries who met the current eligibility criteria at baseline and who were still enrolled in FFS Medicare for at least one day during the extension (Table 5). The enrollees had more chronic conditions and used more services in the year before enrollment than the national average for Medicare FFS beneficiaries. However, compared with beneficiaries enrolled during the extension (Table 1), the sample of all enrollees served during the extension period had fewer chronic conditions and less recent service use. This difference occurs because all enrollees served during the extension period includes both CAD-only and high-risk enrollees, whereas all enrollees who entered during the extension are high risk. Note, however, that the high-risk beneficiaries who enrolled after the extension differ in important ways from the high-risk beneficiaries who enrolled before the extension (as we discuss in Section C.2.).

Impacts. In terms of hospitalizations or expenditures without fees (Table 6.a), we found no measurable differences between the treatment and control groups for all enrollees (n = 1,111), for the high-risk subgroup (n = 663), or for the CAD-only subgroup (n = 448). As with Approach A, the lack of measured effects for the high-risk group may be due to low statistical power. However, given that Approach B has a larger sample for the high-risk group (n = 663 versus n = 409 [Table 6.b]), it has better power and should reliably detect true impacts that are about 20 percent of the control group mean or larger (Table 3). After factoring in program fees, the program increased total Medicare expenditures by an estimated 15.3 percent (p = 0.04) for the entire eligible sample and by 16.8 percent for high-risk enrollees (p = 0.096) (Table 6.a).

[4] We use the phrase "no measurable difference" to denote that the estimated effect was not statistically significant.

[5] For example, our probability of detecting a 32 percent reduction in the two-year mortality rates (the impact seen for the pre-extension high-risk sample; Table 10) was only 23 percent. The sample size for the mortality analysis is smaller than the analyses for other outcomes because we limited the sample to those who enrolled early enough to be followed up for at least two years.

Even though we did not estimate the impacts separately for the 254 high-risk beneficiaries (treatment and control) who enrolled before the extension, rough calculations from the existing data suggest that the difference between the treatment and control groups would be about -0.05 hospitalizations per person per year. If we adjust for the fact that only about 70 percent of these beneficiaries were still receiving HQP services during the extension, the point estimate for the effect *among those receiving services* would be about -0.07. This point estimate has a favorable sign (denoting reduction in hospitalizations) and suggests that the program may still have some small beneficial effect for those who enrolled before the extension. Even though we did not conduct formal statistical tests, this point estimate cannot be statistically significant.

B. Objective 2: Compare impacts before and during the extension for high-risk enrollees, controlling for patient tenure

This analysis provides a head-to-head comparison of program impacts before and after the extension, controlling for patient tenure (how long the patient stayed in the program). The pre-extension period is longer (eight years) than the post-extension period (four years), and thus any differences in impacts during the two periods might be due to differences in average tenure. To control for this possibility, we estimated the impacts in patients' first year of follow-up, second year of follow-up, and first through third years of follow-up, if each of those periods fell fully before or after the extension.

Baseline characteristics. Even though the definition of "high risk" is the same before and after the extension, the post-extension high-risk enrollees have, on average, more chronic conditions and were older than the pre-extension high-risk enrollees (Table 7). The differences were largest for depression (24.7 versus 14.4 percent), CHF (49.9 versus 37.9 percent), and COPD (42.5 versus 25.9 percent). These differences likely resulted from HQP's new method for identifying prospective enrollees—identifying them through hospital discharge records for patients discharged in the past year, rather than through physician referrals or chart reviews.

In contrast to differences in chronic conditions and service use, the post-extension high-risk enrollees did not differ substantially from pre-extension high-risk enrollees in terms of race, ethnicity, or Medicaid enrollment. The beneficiaries in both groups were almost exclusively white and had very low Medicaid enrollment. Therefore, HQP's modest expansion into new geographic areas after the extension has not substantially changed the enrolled population along these dimensions. However, the two populations could differ along unmeasured characteristics such as certain aspects of socioeconomic status. For example, the post-extension high-risk enrollees could have lower income or lower health literacy.

Impacts. *Before the extension*, the program reduced hospitalizations in the second year of follow-up and in the first three follow-up years (Table 8). It reduced Medicare Part A and B expenditures without program fees by $379 PBPM ($p = 0.03$) and Medicare Part A expenditures alone (without program fees) by $282 PBPM ($p = 0.06$). However, the program did not measurably change expenditures with program fees, likely due to low power to detect an effect, although the effect was large in magnitude and indicated a decrease. *After the extension*, the program did not have a statistically significant effect on hospitalizations or Medicare expenditures, except for the second year of follow-up, during which the program increased expenditures with fees by an estimated $772 PBPM ($p = 0.03$).

These results indicate that the differences in impacts before versus after the extension are not due to differential tenure in the program.

C. Objective 3: Estimate impacts over the full course of the program (2002–2014)

We estimated impacts over the full course of the program (April 2002 through May 2014) for all beneficiaries who enrolled since program inception in April 2002 through November 2013 and met the extension period's eligibility criteria. However, given the large differences in impacts before and after the extension, these overall findings are difficult to interpret; they are an average of two very different impact estimates from two different time periods.

Baseline characteristics. The characteristics of 1,371 program enrollees over the full course of the program were very similar to those shown in Table 5.

Impacts. For the full sample, the program reduced hospitalizations by 10.0 percent ($p = 0.094$) (Table 9.a). Medicare Part A and B expenditures without program fees were $64 PBPM (5.2 percent) lower in the treatment group than in the control group, but this difference was not statistically significant ($p = 0.37$) and was not enough to offset the program fees, which averaged $123 PBPM for the full sample over the entire program.

For the high-risk sample, the program reduced hospitalizations by 13.5 percent ($p = 0.08$). Medicare Part A and B expenditures without program fees were $167 PBPM (11.0 percent) lower in the treatment group than in the control group, but this difference was not statistically significant ($p = 0.16$). Including program fees (which averaged $174), the treatment groups costs were essentially the same as the control group's, suggesting the program may have been cost-neutral for this group. The program did not measurably affect hospitalizations or expenditures for the CAD-only population (Table 9.a).

Compared with the program's impacts over 10 years of operations (2002–2012), as discussed in the Fifth Report to Congress (Burwell 2014), the impacts on hospitalizations were 40 percent smaller when examined over 12 years (2002–2014) and were either barely significant or insignificant. Specifically, we found that over 12 years, the program reduced hospitalizations by only 10 percent (Table 9.b) versus 16.7 percent over 10 years (Burwell 2014). These weaker effects are driven by the lack of impacts during the extension.

During the 12 years, the program improved 2- and 5-year survival rates for the full sample, 2-year survival for the high-risk enrollees, and 5-year survival for the CAD-only enrollees (Table 10). The impacts were generally of similar size and significance for 2-year survival for the 10- versus 12-year periods. Compared to the 10-year findings, the impacts over 12 years on 5-year survival were halved for the high-risk enrollees (and thus much smaller for the full sample) and similar for the CAD-only enrollees.

IV. DISCUSSION: POSSIBLE EXPLANATIONS FOR THE DIFFERENCES IN IMPACTS

The differences in impacts before and after the extension raise important questions about what factors may be driving these differences. Identifying these factors would help CMS, HQP, and other stakeholders learn as much as possible from their long-term investment in the HQP model. The results in Objective 2 rule out the possibility that differences in patient tenure explain the differences in program effects. However, several other possibilities remain:

- **Changes in the population resulting from HQP's new method of identifying prospective enrollees**. Before the extension, HQP identified prospective enrollees through referrals from participating physicians or reviews of their patients' medical charts. After the extension, HQP primarily identified prospective enrollees by reviewing hospital discharge records from participating hospitals. This change may have had two effects. First, it may have driven the increase in disease burden we observed in the enrolled population. Although high-risk beneficiaries who enrolled before and after the extension met the same eligibility criteria, those who enrolled after the extension had more chronic conditions (including CHF, COPD, and depression) than those who enrolled before. The post-extension enrollees may have had too high of a disease burden to benefit from HQP's model of care management. Second, the change in identification method may have decreased physicians' involvement in selecting patients who, due to gaps in care or supports at home, would benefit the most from the intervention. It is important to note, however, that even during the extension, participating physicians still have the opportunity to review and approve lists of prospective enrollees generated from discharge records. But in practice, physicians may have become less involved in selecting the best candidates for the program.
- **Changes in staffing and program management**. After the extension, HQP hired nine new care managers to serve new enrollees and to replace some care managers who had left earlier. It is possible that newly hired care managers are not as skilled as care managers who left the program, although HQP leadership has said that the new care managers are very good. Also, with the expansion, care managers spend more time traveling and less face-to-face time in the main office with HQP's management staff. This may have diminished oversight and the ability to ensure care managers consistently deliver a strong intervention. However, again, HQP leadership has said they do not think the expansion has limited effective oversight of care manager activities.
- **Changes in the intervention**. Even though HQP's model is, at its core, the same before and after the extension, a single change could influence the program's effects. In the periods leading up to and following the planned end dates for the program (in 2010 and 2013), HQP needed to increase the caseloads for care managers due to staff turnover. Program managers also decreased their oversight of the remaining care managers to avoid overburdening them. During these difficult transitions, it is possible that HQP was not able to fully deliver its intervention. However, given that these periods were relatively short compared with the full extension period (2010–2014), this is unlikely to fully account for the large reduction in estimated impacts.

- **Changes in the external environment**. The external environment is rather different now than it was before the extension. The two new hospital systems that HQP partners with since the extension have recently started their own transitional care interventions to reduce hospital readmissions. Further, a large accountable care organization now operates in the area, and some local primary care practices have become patient-centered medical homes. All of these entities provide services that overlap to some degree with the types of services HQP provides. It is therefore possible that the incremental value of HQP's program (beyond what beneficiaries would otherwise receive) is lower now than it was 5 to 10 years ago when the program effects were largest.
- **Imprecise impact estimates**. Although the differences in point estimates before and after the extension are very large, the true differences in impacts may not be as large as they appear, given the wide confidence intervals in the impact estimates in both periods. The confidence intervals for the two estimates do overlap somewhat, and it is possible that the true impact over the first 10 years was close to the lower end of the confidence interval, whereas the true impact during the later period was close to the upper end.

In our future work, we plan to explore these possible explanations in more depth through discussions with HQP and, when applicable, with additional quantitative analyses. Although it will not be possible to say, with certainty, what factors drove the change in impacts, we can narrow down this list of explanations and test them against available data to identify which are the most plausible.

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APPENDIX:
TABLES

Table 1. Pre-enrollment characteristics of beneficiaries enrolled during the extension period (2010–2013) (percentages unless otherwise noted)

		FFS Medicare average in 2012 (n = 32 million)	Health Quality Partners' enrollees				
			Treatment and control (n = 409)	Treatment (n = 205)	Control (n = 204)	Difference	p-Value
Age	< 65	16.7	0.0	0.0	0.0	0.0	n.r.
	65–74	45.5	36.7	39.5	33.8	5.7	0.49[a]
	75–84	25.4	38.4	36.6	40.2	-3.6	0.49[a]
	> or = 85	12.4	24.9	23.9	26.0	-2.1	0.49[a]
Male		44.7	42.5	42.9	42.2	0.8	0.88
Race/ethnicity	Black, non-Hispanic	10.4[b]	2.7	2.0	3.4	-1.5	0.36
	Hispanic	2.6[b]	0.2	0.0	0.5	-0.5	0.32
Medicaid Buy-In[c]		21.0	2.7	2.9	2.5	0.5	0.77
Resident of original service area		n.a.	61.4	61.5	61.3	0.2	0.97
Diagnosis[d]	CAD	29.8	77.8	79.0	76.5	2.6	0.54
	CHF	15.3	49.9	51.2	48.5	2.7	0.59
	Diabetes	28.0	45.2	43.4	47.1	-3.6	0.46
	COPD	11.8	42.5	42.9	42.2	0.8	0.88
	Cancer[e]	n.a.	15.9	17.1	14.7	2.4	0.51
	Stroke	4.0	11.7	12.7	10.8	1.9	0.55
	Depression	15.9	24.7	25.9	23.5	2.3	0.59
	Dementia	11.1	8.3	9.3	7.4	1.9	0.48
Number of chronic conditions (out of 12)[f]		1.5	4.1	4.1	4.0	0.1	0.37
In year before enrollment	Annualized hospitalizations (number)	0.3	1.7	1.6	1.7	-0.1	0.58
	Medicare Parts A and B expenditures (dollars PBPM)	860	2,440	2,365	2,516	-150	0.49
	Medicare Part A expenditures (dollars PBPM)	n.a.	1,549	1,466	1,633	-167	0.36

Table 1. *(continued)*

Sources: Medicare National Claims History File, Standard Analytic File, and Enrollment Databases. Medicare FFS totals come from the Chronic Conditions Warehouse, Medicare Beneficiary Prevalence for Chronic Conditions for 2003 through 2012, Table B.2 (https://www.ccwdata.org/cs/groups/public/documents/document/ccw_website_table_b2.pdf). Monthly expenditures and annualized hospitalizations are exceptions and come from the 2013 Annual Report of the Boards of Trustees of the Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds, Table V.D1 (http://downloads.cms.gov/files/TR2013.pdf) and the Health Indicators Warehouse, developed by the National Center for Health Statistics (http://www.healthindicators.gov/Indicators/Hospital-inpatient-Medicare-admissions-per-1000-beneficiaries_2001/Profile/ClassicData), respectively.

Notes: The sample includes beneficiaries enrolled from October 2010 through November 2013. All beneficiaries met the high-risk criteria; that is, they have CAD, CHF, COPD, or diabetes and one or more hospitalizations in the year before enrollment.

[a] The p-value of 0.49 refers to the treatment-control differences for the three age categories (65–74, 75–84, > or = 85) *jointly.* We used a chi-squared test to determine whether the overall age distribution for the treatment group was different from the distribution for the control group.

[b] Includes all (not only FFS) Medicare beneficiaries who were enrolled on or after January 1, 2012. Total beneficiaries are 53.6 million.

[c] Medicaid Buy-In indicates that the beneficiary is eligible for both Medicare and Medicaid. The FFS Medicare average is approximated using the percentage of Medicare beneficiaries who are dual eligibles in 2010. See http://kff.org/medicaid/state-indicator/duals-as-a-of-medicare-beneficiaries.

[d] Diagnoses are based on the CCW definitions, version 1.6. The definitions use a look-back period of one year before enrollment for COPD, stroke, and depression and two years for CAD, CHF, and diabetes. The evaluation used a two-year, look-back period for dementia rather than the three years used by CCW because of the limits of the Medicare claims data extracted for the analysis.

[e] This category excludes skin cancer.

[f] The 12 diagnoses include the 8 listed in the table plus atrial fibrillation, osteoporosis, rheumatoid arthritis/osteoarthritis, and chronic kidney disease.

CAD = coronary artery disease; CCW = Chronic Condition Warehouse; CHF = congestive heart failure; COPD = chronic obstructive pulmonary disease; FFS = fee-for-service; n.a. = not available; n.r. = not relevant; PBPM = per beneficiary per month.

Table 2.a. Program effects on hospitalizations and Medicare expenditures during the extension (2010–2014) for high-risk beneficiaries enrolled during the extension (2010–2013)

	Control group mean	Treatment-control difference, adjusted (90 percent confidence interval)	Difference (percentage)	p-Value
Annualized number of hospitalizations				
Annualized number of hospitalizations	0.788	0.080 (-0.094, 0.255)	10.2	0.45
Medicare expenditures (dollars PBPM)				
Parts A and B without program fees	$1,751	$100 (-$301, $501)	5.7	0.68
Parts A and B with program fees (mean fee = $263 PBPM)	$1,751	$364 (-$37, $764)	20.8	0.14
Part A without program fees	$974	$110 (-$220, $440)	11.3	0.58

Sources: Medicare Enrollment Database, National Claims History File, Standard Analytic File, and Mathematica randomization file

Notes: Sample sizes and the mean follow-up months are shown in Table 2.b.

Outcomes are measured from October 1, 2010 through 31, May 2014 for the 409 beneficiaries (treatment and control) who enrolled from October 1, 2010 through November 30, 2013. All beneficiaries in the sample met the high-risk definition—that is, they had CAD, CHF, COPD, or diabetes and one or more hospitalizations in the year before enrollment. The outcomes are weighted according to the proportion of the follow-up period during which each sample member met CMS's demonstration-wide requirements. The requirements were that the member must be in fee-for-service, have both Parts A and B coverage and Medicare as the primary payer, and have been alive for at least part of any one month. Weights are calculated separately for the treatment and control groups.

Treatment-control differences are adjusted for baseline characteristics to increase the precision of the estimates and to account for chance differences between the treatment and control groups.

The table excludes the few treatment and control group members who did not meet CMS's demonstration-wide requirements or who had an invalid health insurance claim number on Mathematica's enrollment file because Medicare data showing their payments in the fee-for-service program were not available.

Negative estimates of treatment-control differences indicate that hospitalizations or expenditures are lower for the treatment group—a favorable outcome.

Table 2.b. Characteristics of high-risk beneficiaries enrolled during the extension whose outcomes were measured during the extension

	Number of enrollees (treatment and control)	Mean number of follow-up months[a]	Mean percentage of follow-up months during which beneficiaries received treatment[b]
High-risk enrollees	409	22.6	94.8

Sources and notes: See Table 2.a.

[a] Mean number of follow-up months for both the treatment and control group members

[b] Calculated as follows: (1) for each beneficiary, calculate the percentage of follow-up months during which he or she received treatment services, where we consider a beneficiary to have received services in a given month if HQP submitted a bill for services provided to that beneficiary in that or any subsequent month; and (2) find the average across all treatment group beneficiaries.

Table 3. Statistical power to detect program effects on hospitalizations for high-risk beneficiaries during the extension

Sample	Sample size (treatment and control)	Probability of concluding that the program reduced hospitalizations when the program's true effect was to reduce hospitalizations by:				Estimate (and 90% confidence interval) for program effects before extension for high-risk beneficiaries[c]
		10%	20%	30%	40%	
High-risk beneficiaries who enrolled during the extension[a]	409	18	44	72	91	-39% (-61%, -17%)
High-risk beneficiaries who enrolled at any point[b]	663	40	75	94	99	-39% (-61%, -17%)

Note: Power calculations assume a one-tailed test with a $p<0.05$ cutoff for determining statistical significance.

[a] Beneficiaries who enrolled between October 2010 and November 2013 and, per HQP's designation, met high-risk criteria.

[b] Beneficiaries who (1) enrolled between April 2002 and November 2013, (2) per claims analysis or HQP's designation, met high-risk criteria, and (3) were enrolled in FFS Medicare for at least part of the extension period (October 2010 through May 2014).

[c] Estimates are from the Fourth Report to Congress on the Medicare Coordinated Care Demonstration.

Table 4. Program effects on two-year mortality rates for high-risk beneficiaries enrolled during the extension period (2010–2013)

	Number of enrollees (treatment and control)	Percentage who died			
		Control group mean	Treatment-control difference, adjusted	Percentage difference	p-Value
Died within two years of enrollment	203	16.0	-0.3	-1.9	0.94

Sources: Medicare Enrollment Database, National Claims History File, and Standard Analytic File

Notes: Data on beneficiary deaths are captured through May 2014. The outcomes are not weighted.

The research sample includes only beneficiaries who entered HQP's program from October 2010 through May 2012, ensuring that each sample member could receive follow-up for at least two years.

Treatment-control differences are adjusted for baseline characteristics to account for chance differences between the treatment and control groups.

The table excludes the few treatment and control group members who did not meet CMS's demonstration-wide requirements or who had an invalid health insurance claim number on Mathematica's enrollment file because Medicare enrollment data on whether they were deceased and their dates of death could not be linked to our data.

Negative estimates of treatment-control differences indicate that mortality is lower for the treatment group—a favorable outcome.

Table 5. Pre-enrollment characteristics of beneficiaries enrolled at any time during 2002–2013 and observable during the extension period (percentages unless otherwise noted)

		FFS Medicare average in 2012 (n = 54 million)	Health Quality Partners' enrollees				
			Treatment and control (n = 1,111)	Treatment (n = 568)	Control (n = 543)	Difference	p-Value
Age	< 65	16.7	0.0	0.0	0.0	0.0	n.r.
	65–74	45.5	44.1	46.3	41.8	4.5	0.31[a]
	75–84	25.4	41.0	39.1	42.9	-3.8	0.31[a]
	> or = 85	12.4	15.0	14.6	15.3	-0.7	0.31[a]
Male		45.3	48.2	49.3	47.1	2.2	0.47
Race/ethnicity	Black, non-Hispanic	10.4[b]	1.4	0.9	2.0	-1.1	0.11
	Hispanic	2.6[b]	0.2	0.2	0.2	0.0	0.98
Medicaid Buy-In[c]		21.0	2.1	1.9	2.2	-0.3	0.75
Resident of original service area		n.a.	85.8	86.1	85.5	0.6	0.76
Diagnosis[d]	CAD	28.6	87.7	88.4	86.9	1.5	0.46
	CHF	15.3	31.5	32.0	30.9	1.1	0.69
	Diabetes	28.0	37.3	37.7	36.8	0.8	0.77
	COPD	11.8	23.9	22.9	24.9	-2.0	0.44
	Cancer[e]	n.a.	13.1	14.3	11.8	2.5	0.22
	Stroke	4.0	8.2	8.6	7.7	0.9	0.59
	Depression	15.9	14.3	13.7	14.9	-1.2	0.57
	Dementia	11.1	4.4	4.9	3.9	1.1	0.39
Number of chronic conditions (out of 12)[f]		1.5	3.1	3.1	3.1	0.1	0.56
In year before enrollment	Annualized hospitalizations (number)	0.3	0.9	1.0	0.9	0.03	0.71
	Medicare Parts A and B expenditures (dollars PBPM)	860	1,412	1,386	1,440	-54	0.62
	Medicare Part A expenditures (dollars PBPM)	n.a.	842	814	871	-57	0.52

Table 5. *(continued)*

Sources: Medicare National Claims History File, Standard Analytic File, and Enrollment Databases. Medicare FFS totals come from the Chronic Conditions Warehouse, Medicare Beneficiary Prevalence for Chronic Conditions for 2003 through 2012, Table B.2 (https://www.ccwdata.org/cs/groups/public/documents/document/ccw_website_table_b2.pdf). Monthly expenditures and annualized hospitalizations are exceptions and come from the 2013 Annual Report of the Boards of Trustees of the Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds, Table V.D1 (http://downloads.cms.gov/files/TR2013.pdf) and the Health Indicators Warehouse, developed by the National Center for Health Statistics (http://www.healthindicators.gov/Indicators/Hospital-inpatient-Medicare-admissions-per-1000-beneficiaries_2001/Profile/ClassicData), respectively.

Notes: The sample includes beneficiaries enrolled from April 2002 through November 2013 who, at the time of enrollment, met the new eligibility criteria for the second phase of the demonstration, which began in October 2010. Beneficiaries met the criteria if they fell into one of two subgroups: (1) high risk—beneficiaries with CAD, CHF, COPD, or diabetes and one or more hospitalizations in the year before enrollment (for whom CMS pays $281 during the extension) or (2) CAD only—beneficiaries with CAD but no hospitalization in year before enrollment (for whom CMS pays $83 PBPM). Of the 1,111 beneficiaries in the research sample, 663 (60 percent) met the high-risk criteria and 448 (40 percent) met the CAD-only criteria.

[a] Only one p-value is reported for the treatment-control differences in age because a chi-squared test was used to determine whether the overall age distribution for the treatment group was different from the distribution for the control group.

[b] Includes all (not only FFS) Medicare beneficiaries who were enrolled on or after January 1, 2012. Total beneficiaries are 53.6 million.

[c] Medicaid Buy-In indicates that the beneficiary is eligible for both Medicare and Medicaid. The FFS Medicare average is approximated using the percentage of Medicare beneficiaries who are dual eligibles in 2010. See http://kff.org/medicaid/state-indicator/duals-as-a-of-medicare-beneficiaries.

[d] Diagnoses are based on the CCW definitions, version 1.6. The definitions use a look-back period of one year before enrollment for COPD, stroke, and depression and two years for CAD, CHF, and diabetes. The evaluation used a two-year look-back period for dementia rather than the three years used by CCW because of the limits of the Medicare claims data extracted for the analysis.

[e] This category excludes skin cancer.

[f] The 12 diagnoses include the 8 listed in the table plus atrial fibrillation, osteoporosis, rheumatoid arthritis/osteoarthritis, and chronic kidney disease.

CAD = coronary artery disease; CCW = chronic condition warehouse; CHF = congestive heart failure; COPD = chronic obstructive pulmonary disease; FFS = fee-for-service; n.a. = not available; n.r. = not relevant; PBPM = per beneficiary per month.

Table 6.a. Program effects on hospitalizations and Medicare expenditures during the extension (2010–2014) for beneficiaries who meet post-extension eligibility criteria and were enrolled at any time during 2002–2013

	Control group mean	Treatment-control difference, adjusted (90 percent confidence interval)	Difference (percentage)	p-Value
Annualized number of hospitalizations				
Full sample[a]	0.630	0.021 (-0.066, 0.108)	3.3	0.70
High risk	0.752	0.032 (-0.096, 0.161)	4.3	0.68
CAD only	0.500	-0.010 (-0.125, 0.106)	-1.8	0.90
Medicare expenditures (dollars PBPM)				
Parts A and B without program fees				
Full sample[a]	$1,431	67 (-111, 245)	4.7	0.54
High risk	$1,681	46 (-232, 325)	2.8	0.78
CAD only	$1,165	64 (-139, 267)	5.5	0.61
Parts A and B with program fees				
Full sample (mean fee = 152)[a]	$1,431	219 (41, 397)	15.3	0.04**
High risk (mean fee = 236)	$1,681	283 (4, 561)	16.8	0.096*
CAD only (mean fee = 63)	$1,165	127 (-76, 330)	10.9	0.30
Part A without program fees				
Full sample[a]	$776	46 (-94, 186)	5.9	0.59
High risk	$943	79 (-146, 304)	8.4	0.56
CAD only	$598	-10 (-157, 137)	-1.7	0.91

Table 6.a *(continued)*

Sources: Medicare Enrollment Database, National Claims History File, Standard Analytic File, and Mathematica randomization file

Notes: Sample sizes and mean follow-up months are shown in Table 6.b.

Outcomes are measured from October 2010 through May 2014 among 1,110 treatment and control beneficiaries who enrolled from April 2002 through November 2013. The outcomes are weighted according to the proportion of the follow-up period during which each sample member met CMS's demonstration-wide requirements. The requirements were that the member must be in fee-for-service, have both Parts A and B coverage and Medicare as the primary payer, and have been alive for at least part of any one month. Weights are calculated separately for each program's treatment and control groups.

Treatment-control differences are adjusted for baseline characteristics to increase the precision of the estimates and to account for chance differences between the treatment and control groups.

The table excludes the few treatment and control group members who did not meet CMS's demonstration-wide requirements or who had an invalid health insurance claim number on Mathematica's enrollment file because Medicare data showing their payments in the fee-for-service program were not available.

Negative estimates of treatment-control differences indicate that hospitalizations are lower for the treatment group—a favorable outcome.

[a] The full sample includes beneficiaries who, at the time of enrollment, met the eligibility criteria for the second phase of the demonstration. Beneficiaries met the criteria if they fell into one of two subgroups: (1) "high risk"—beneficiaries with CAD, CHF, COPD, or diabetes and one or more hospitalizations in the year before enrollment (for whom CMS pays $281 during the extension) or (2) "CAD only"—beneficiaries with CAD but no hospitalization in year before enrollment (for whom CMS pays $83 PBPM).

* p <= 0.05

** p <= 0.01

Table 6.b. Characteristics of beneficiaries who meet post-extension eligibility criteria, who were enrolled at any time during 2002–2013, and whose outcomes were measured during the extension (2010–2014)

	Number of enrollees (treatment and control)	Mean number of follow-up months[a]	Mean percentage of follow-up months during which beneficiaries received treatment[b]
Full sample[c]	1,111	32.3	81.5
High risk	663	27.8	86.6
CAD only	448	39.0	74.0

Sources and notes: See Table 6.a.

[a] Mean number of follow-up months for both the treatment and control group members.

[b] Calculated as follows: (1) for each beneficiary, we calculate the percentage of follow-up months during which a beneficiary received treatment services, where we consider that a beneficiary received services in a given month if HQP submitted a bill in that or any subsequent month, and (2) find the average across all treatment group beneficiaries.

[c] The full sample includes beneficiaries who, at the time of enrollment, met the eligibility criteria for the second phase of the demonstration. Beneficiaries met the criteria if they fell into one of two subgroups: (1) high risk—beneficiaries with CAD, CHF, COPD, or diabetes and one or more hospitalizations in the year before enrollment (for whom CMS pays $281 during the extension) or (2) CAD only—beneficiaries with CAD but no hospitalization in year before enrollment (for whom CMS pays $83 PBPM).

Table 7. Comparison of pre-enrollment characteristics of high-risk beneficiaries enrolled in the pre-extension period (2002–2010) versus the extension period (2010–2013) (percentages unless otherwise noted)

		Health Quality Partners' enrollees		
		Post-extension high-risk treatment and control enrollees (n = 409)	Pre-extension high-risk treatment and control enrollees (n = 367)	Difference
Age	65–74	36.7	36.8	-0.1
	75–84	38.4	48.5	-10.1
	> or = 85	24.9	14.7	10.2
Male		42.5	51.2	-8.7
Race/ethnicity	Black, non-Hispanic	2.7	1.4	1.3
	Hispanic	0.2	0.3	0.0
Medicaid Buy-In[a]		2.7	2.7	0.0
Resident of original service area		61.4	100.0	-38.6
Diagnosis[b]	CAD	77.8	82.8	-5.1
	CHF	49.9	37.9	12.0
	Diabetes	45.2	42.5	2.7
	COPD	42.5	25.9	16.7
	Cancer[c]	15.9	13.1	2.8
	Stroke	11.7	12.3	-0.5
	Depression	24.7	14.4	10.3
	Dementia	8.3	4.9	3.4
Number of chronic conditions (out of 12)[d]		4.1	3.3	0.7
In year before enrollment	Annualized hospitalizations (number)	1.7	1.4	0.2
	Medicare Parts A and B expenditures (dollars PBPM)	2,441	1,853	588
	Medicare Part A expenditures (dollars PBPM)	1,549	1,279	270

Table 7. *(Continued)*

Sources: Medicare National Claims History File, Standard Analytic File, and Enrollment Databases. Medicare FFS totals come from the Chronic Conditions Warehouse, Medicare Beneficiary Prevalence for Chronic Conditions for 2003 through 2012, Table B.2 (https://www.ccwdata.org/cs/groups/public/documents/document/ccw_website_table_b2.pdf). Monthly expenditures and annualized hospitalizations are exceptions and come from the 2013 Annual Report of the Boards of Trustees of the Federal Hospital Insurance and Federal

Supplementary Medical Insurance Trust Funds, Table V.D1 (http://downloads.cms.gov/files/TR2013.pdf) and the Health Indicators Warehouse, developed by the National Center for Health Statistics (http://www.healthindicators.gov/Indicators/Hospital-inpatient-Medicare-admissions-per-1000-beneficiaries_2001/Profile/ClassicData), respectively.

Notes: The pre-extension sample includes beneficiaries who enrolled between April 2002 and September 2010 and met the high-risk eligibility criteria. The post-extension sample includes beneficiaries who enrolled between October 2010 and November 2013, all of whom met the high-risk criteria. To be high risk, an enrollee must have CAD, CHF, COPD, or diabetes and one or more hospitalizations in the year before enrollment.

[a] Medicaid Buy-In indicates that the beneficiary is eligible for both Medicare and Medicaid.

[b] Diagnoses are based on the CCW definitions, version 1.6. The definitions use a look-back period of one year before enrollment for COPD, stroke, and depression and two years for CAD, CHF, and diabetes. The evaluation used a two-year look-back period for dementia rather than the three years used by CCW because of the limits of the Medicare claims data extracted for the analysis. The evaluation also used a broader definition for cancer than did CCW, capturing all types of malignant neoplasms (other than skin cancer) and using a one-year look-back period.

[c] This category excludes skin cancer.

[d] The 12 diagnoses include the 8 listed in the table plus atrial fibrillation, osteoporosis, rheumatoid arthritis/osteoarthritis, and chronic kidney disease.

CAD = coronary artery disease; CCW = Chronic Condition Warehouse; CHF = congestive heart failure; COPD = chronic obstructive pulmonary disease; FFS = fee-for-service; n.a. = not available; PBPM = per beneficiary per month.

Table 8. Comparison of program effects among high-risk beneficiaries during the first three years of patient follow-up if those years occurred before versus after the 2010 extension

			Before the extension (April 2002 through September 2010)			During the extension (October 2010 through May 2014)		
			First year	Second year	Years 1, 2, and 3[a]	First year	Second year	Years 1, 2, and 3[a]
			I	II	III	IV	V	VI
Sample size (treatment and control)			367	348	367	409	339	409
Mean number of eligible follow-up months			11.7	10.2	29.2	11.2	10.4	22.6
Mean percentage of follow-up months during which treatment group received treatment services			96.2	92.3	94.4	97.7	92.0	94.8
Treatment-control difference, adjusted (p-value)	Number of annualized hospitalizations		-0.123 (0.35)	-0.256* (0.07)	-0.224** (0.03)	0.06 (0.66)	0.13 (0.41)	0.08 (0.45)
	Medicare Parts A and B expenditures (dollars PBPM)	Without program fees	-373 (0.13)	-290 (0.20)	-379** (0.03)	-160 (0.62)	514 (0.15)	101 (0.68)
		With program fees	-256 (0.30)	-176 (0.43)	-263 (0.13)	111 (0.73)	772** (0.03)	365 (0.14)
	Medicare Part A expenditures without program fees (dollars PBPM)		-271 (0.21)	-218 (0.23)	-282* (0.06)	-42 (0.88)	363 (0.24)	111 (0.58)

Table 8. *(continued)*

Sources: Medicare Enrollment Database, National Claims History File, and Standard Analytic File.

Notes: The research sample depends on the outcome period and follow-up year. For impacts before the extension, the research sample includes high-risk beneficiaries who enrolled early enough for the follow-up period to fall completely within the pre-extension period (April 2002 through September 2010). The first year of follow-up and follow-up years 1 through 3, includes enrollees from April 2002 through March 2010 (n = 367, treatment and control). The second year of follow-up includes enrollees from April to 2002 through August 2009 (n = 348). After the extension, the first year of follow-up and first through third years of follow-up includes enrollees from October 2010 to November 2013 (n = 409).The second year of follow-up includes enrollees from October 2010 to April 2013 (n = 339).

We require at least six months of potential follow-up for samples both before and after the extension for the first year of follow-up and for the follow-up for first through third years of follow-up. For the second follow-up year, we allow at least 13 months of follow-up. Enrollees who entered the research sample between March 2010 and October 2010 would be excluded from the analysis over the first year of follow-up because their follow-up period encompasses both pre- and post-extension periods. Because there was no enrollment during this period, no enrollees were excluded.

The research sample includes beneficiaries who met (1) the high-risk definition at randomization and (2) CMS's demonstration-wide requirements for at least one month during the follow-up period. To be high risk, a beneficiary needs to have CAD, CHF, COPD, or diabetes and at least one hospitalization in the year before randomization. To meet CMS's eligibility criteria in a month, a beneficiary needs to (1) be alive and enrolled in Medicare Parts A and B, (2) have Medicare as the primary payer of medical bills, and (3) not be enrolled in a comprehensive HMO.

The table excludes treatment and control group members who did not meet CMS's demonstration-wide requirements or who had an invalid health insurance claim number on Mathematica's enrollment file because Medicare data showing their payments in the fee-for-service program were not available.

Outcomes are measured during the patient follow-up year(s) and are weighted according to the proportion of the months in a year a sample member met CMS's demonstration-wide requirements.

Negative estimates of treatment-control differences imply that hospitalizations or Medicare expenditures (with or without the monthly program fee) are lower for the treatment group—a favorable outcome.

[a] This pooled three-year period helps us take advantage of greater power to detect impacts as compared to one-year analyses.

Table 9.a. Program effects on hospitalizations and Medicare expenditures over 12 years (2002–2014) for enrollees who meet post-extension eligibility criteria and were enrolled at any time during 2002–2013

Sample	Control group mean	Treatment-control difference, adjusted (90 percent confidence interval)	Percent difference	p-Value
Annualized number of hospitalizations				
Full sample[a]	0.632	-0.063 (-0.125, -0.001)	-10.0	0.094*
High risk	0.793	-0.107 (-0.207, -0.008)	-13.5	0.08*
CAD only	0.507	-0.037 (-0.113, 0.039)	-7.3	0.43
Medicare expenditures (dollars PBPM)				
Parts A and B without program fees				
Full sample[a]	1,228	-64 (-182, 53)	-5.2	0.37
High risk	1,516	-167 (-363, 29)	-11.0	0.16
CAD only	1,004	-2 (-134, 129)	-0.2	0.98
Parts A and B with program fees[d]				
Full sample[a]	1,228	59 (-58, 177)	4.8	0.41
High risk	1,516	7 (-190, 203)	0.4	0.96
CAD only	1,004	83 (-49, 215)	8.3	0.30
Part A without program fees				
Full sample[a]	678	-71 (-162, 20)	-10.5	0.20
High risk	872	-106 (-266, 53)	-12.2	0.27
CAD only	527	-59 (-151, 34)	-11.1	0.30

Table 9.a *(continued)*

Sources: Medicare Enrollment Database, National Claims History File, Standard Analytic File, and Mathematica randomization file.

Notes: Sample sizes and mean follow-up months are shown in Table 9.b.

Outcomes are measured from April 2002 through May 2014 among 1,371 enrollees enrolled from April 2002 through November 2013. The outcomes are weighted according to the proportion of the follow-up period during which each sample member met CMS's demonstration-wide requirements. The requirements were that the member must be in fee-for-service, have both Parts A and B coverage and Medicare as the primary payer, and have been alive for at least part of any one month. Weights are calculated separately for each program's treatment and control groups.

Treatment-control differences are adjusted for baseline characteristics to increase the precision of the estimates and to account for chance differences between the treatment and control groups.

The table excludes the few treatment and control group members who did not meet CMS's demonstration-wide requirements or who had an invalid health insurance claim number on Mathematica's enrollment file because Medicare data showing their payments in the fee-for-service program were not available.

Negative estimates of treatment-control differences indicate that hospitalizations are lower for the treatment group—a favorable outcome.

[a] The mean fee that CMS paid for the full sample was $123 PBPM, for high risk was $174, and for CAD only was $85. These rates are an average of the different rates paid before and after the 2010 extension. During the extension, CMS paid $281 PBPM for high-risk enrollees during the extension) and $83 PBPM for CAD-only enrollees. Before the extension (2002–2010), HQP received $50, $110, and $130 per month for beneficiaries HQP identified as low, moderate, and high risk at baseline.

PBPM = per beneficiary per month
*p <= 0.05

Table 9.b. Characteristics of beneficiaries who meet post-extension eligibility criteria, were enrolled at any time during 2002–2013, and whose outcomes were measured over 12 years (2002–2014)

	Number of enrollees (treatment and control)	Mean number of follow-up months[a]	Mean percentage of follow-up months during which beneficiaries received treatment[b]
Full sample[c]	1,371	62.5	88.5
High risk	778	47.9	91.4
CAD only	593	81.5	84.7

Sources and notes: See Table 9.a.

[a] Mean number of follow-up months for both the treatment and control group members.

[b] Calculated as follows: (1) for each beneficiary, we calculate the percentage of follow-up months during which a beneficiary received treatment services where we consider that a beneficiary received services in a given month if HQP submitted a bill in that or any subsequent month; and (2) find the average across all treatment group beneficiaries.

[c] This sample includes beneficiaries who, at the time of enrollment, met the eligibility criteria after the 2010 extension. Beneficiaries met the criteria if they fell into one of two subgroups: (1) high risk—beneficiaries with CAD, CHF, COPD, or diabetes and one or more hospitalizations in the year before enrollment or (2) CAD only—beneficiaries with CAD but no hospitalization in the year before enrollment.

Table 10. Program effects on two- and five-year mortality rates over the full period for enrollees who meet post-extension eligibility criteria (2002–2014)

	Number of enrollees (treatment and control)	Percentage who died			
		Control group mean	Treatment-control difference, adjusted	Percentage difference	p-Value
Died within two years of enrollment					
Full sample[a]	1,160	10.5	-3.6	-34.3	0.02**
High risk	570	13.6	-4.3	-31.6	0.099*
CAD only	590	7.5	-2.8	-37.2	0.13
Died within five years of enrollment					
Full sample[a]	912	23.3	-5.2	-22.3	0.03**
High risk	343	29.0	-4.2	-14.5	0.34
CAD only	569	19.9	-7.3	-36.8	0.01**

Sources: Medicare Enrollment Database, National Claims History File, and Standard Analytic File.

Notes: Data on beneficiary deaths are captured for April 2002 through May 2014. The outcomes are not weighted.

The research sample includes beneficiaries enrolled through May 2012 and May 2009 for the two- and five-year mortality rates, respectively. This sample definition ensures that each sample member could receive follow-up for at least two or five years, respectively.

Treatment-control differences are adjusted for baseline characteristics to account for chance differences between the treatment and control groups.

The table excludes the few treatment and control group members who did not meet CMS's demonstration-wide requirements or who had an invalid health insurance claim number on Mathematica's enrollment file because Medicare enrollment data on whether they were deceased and their dates of death could not be linked to our data.

Negative estimates of treatment-control differences indicate that mortality is lower for the treatment group—a favorable outcome.

[a] This sample includes beneficiaries who, at the time of enrollment, met the eligibility criteria after the program extension. Beneficiaries met these criteria if they fell into one of two subgroups: (1) high risk—beneficiaries with CAD, CHF, COPD, or diabetes and one or more hospitalizations in the year before enrollment or (2) CAD only—beneficiaries with CAD but no hospitalization in the year before enrollment.

* p <= 0.05

** p <= 0.01

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