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Bending The Spending Curve By Altering Care Delivery Patterns: The Role Of Care Management Within A Pioneer ACO

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ABSTRACT Accountable care organizations (ACOs) appear to lower medical spending, but there is little information on how they do so. We examined the impact of patient participation in a Pioneer ACO and its care management program on rates of emergency department (ED) visits and hospitalizations and on Medicare spending. We used data for the period 2009–14, exploiting naturally staggered program entry to create concurrent controls to help isolate the program effects. The care management program (the ACO's primary intervention) targeted beneficiaries with elevated but modifiable risks for future spending. ACO participation had a modest effect on spending, in line with previous estimates. Participation in the care management program was associated with substantial reductions in rates for hospitalizations and both all and nonemergency ED visits, as well as Medicare spending, when compared to preparticipation levels and to rates and spending for a concurrent sample of beneficiaries who were eligible for but had not yet started the program. Rates of ED visits and hospitalizations were reduced by 6 percent and 8 percent, respectively, and Medicare spending was reduced by 6 percent. Targeting beneficiaries with modifiable high risks and shifting care away from the ED represent viable mechanisms for altering spending within ACOs.

Health care delivery in the United States is undergoing an intensive period of experimentation, using changes in payment policies to induce changes in the delivery system. Increasingly, payers such as Medicare are adopting payment alternatives—including accountable care organizations (ACOs)—to fee-for-service reimbursement that involve the sharing of financial risk between payers and providers.¹

The hope is that these alternative payment models will alter care delivery and thereby slow medical spending growth. Several studies have found that Medicare ACOs appear to be associ-

ated with modestly lower spending growth, compared to what would have been expected in the absence of ACOs, but that spending does not decrease, compared to previous levels.^{2–6} There is limited information on how ACOs might lower spending.^{7,8}

Understanding how changes might be occurring is critical for several reasons. First, and perhaps most important, many individual providers and provider organizations are in the early stages of deciding whether to join an ACO or to progress to more advanced permutations of ACOs in which they would share both profits and losses. Therefore, they would likely benefit from information on the strategies and

mechanisms that have or haven't worked among advanced ACOs.

Second, information on the mechanisms that underlie spending reductions could provide information on the likely sustainability of change. Some observers have expressed doubts about the feasibility of achieving savings by improving care or its delivery among Medicare beneficiaries.⁹ Moreover, if ACOs reduce spending primarily through lowering the cost of an input (for example, using less expensive imaging centers), then the spending change could represent a one-time event. This type of reduction changes the level of spending once but does not alter the growth in spending on health care. Alternatively, if ACOs alter the utilization rate of services such as imaging, then spending reduction might be more likely to be sustainable.^{10,11}

Third, evidence supporting a deliberate strategy would increase the plausibility of the overall ACO findings, given the difficulty of isolating the effects of any single policy in an environment with multiple ongoing changes. For example, identifying a valid control group for ACO studies represents a major challenge when there are multiple concurrent changes within health care. Evidence of this type could further inform policy making—for example, guiding refinements to the ACO program or incentives that support (or not) targeting high-risk beneficiaries, particularly in future iterations of Medicare's payment changes.

We used a combination of health system and Medicare data to examine the primary care improvement and cost reduction strategy of a large Pioneer ACO in the Partners HealthCare System.

Background

Before the start of the Pioneer ACO program, one of the main hospitals within the Partners HealthCare System, Massachusetts General Hospital, had participated in the Medicare Care Management for High Cost Beneficiaries Demonstration and had developed an intensive care management program.¹² The study ACO extended this program throughout the Partners HealthCare System with no changes to the basic structure of the program, except for centralizing operations.

The care management program represented the ACO's primary strategy for achieving its contractual cost and quality goals under the Pioneer ACO program. The ACO employed no other contemporaneous, systematic programs. Specifically, the care management program identified beneficiaries who first appeared likely to be at high risk for future spending and then selected the subset of this group whose costs appeared to

be modifiable,¹³ using information from each beneficiary's primary care physician. These beneficiaries with elevated but potentially modifiable risks for future spending were eligible for the care management program.

Determination of program eligibility occurred at the beginning of each year, but entry into the program for each year's eligible participants was staggered over a period longer than twelve months because of capacity constraints. This fortuitous design created a natural experiment in which we used the timing of program entry to examine the impact of the care management program on utilization and spending, while controlling for contemporaneous influences on beneficiary experience. Specifically, we compared each beneficiary's experience after joining the care management program to his or her experience before joining it, and we used the experience of beneficiaries who entered the program at different times as contemporaneous controls.

We used a similar approach to examine the impact on utilization and spending of beneficiary alignment with the Partners ACO. As part of the Pioneer ACO program, each year the Centers for Medicare and Medicaid Services (CMS) aligned beneficiaries with an ACO to define the population for which the ACO and CMS shared risk; beneficiaries were not required or incentivized to receive care from the ACO. Beneficiary alignment took effect at the beginning of 2012 and the beginning of 2013. We compared each beneficiary's experience during the year he or she was initially aligned with the ACO to his or her experience before alignment, and we used the experience of subjects aligned later as contemporaneous controls.

We hypothesized that rates of emergency department (ED) visits and hospitalizations would decline over time with greater exposure to the care management program (in other words, that there would be a dose response). We also hypothesized that spending would increase initially as unmet needs were addressed but then decline in response to the program's effects.

Study Data And Methods

We used Medicare claims data for the period 2009–14 sent from CMS to the Partners ACO. Our ACO study group included all Medicare beneficiaries who were initially aligned with the Partners ACO in 2012 or 2013. We excluded beneficiaries who were initially aligned in 2014, because of the limited follow-up time available. To assess the association between ACO exposure time and the outcomes, we tracked the number of months that each beneficiary had been aligned.

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Our care management program study population included beneficiaries who had been identified in any year between 2012 and 2014 by their primary care physicians as having potentially modifiable elevated risks for future spending and chose to participate in the care management program. Because of capacity constraints, only 33 percent of identified beneficiaries had participated in the program by the end of 2014. The care management program started with an initial assessment of each beneficiary by the care manager; because the care managers had limited capacity, the assessments (that is, program initiations) were staggered throughout the year. We tracked the number of months that each eligible beneficiary was in the program, to assess the association between length of program exposure and the outcomes. We excluded subjects who had not been assessed by the end of 2014. While our study included only those who participated in the program, we examined all beneficiaries who were eligible to participate—including those who chose not to do so—in sensitivity analyses. Additional details about the program and the selection process have been published previously.^{13–16}

TIME-STABLE AND TIME-CHANGING COVARIATES

To analyze changes within each beneficiary over time, we used models with patient-level fixed effects. In these types of models, any unobserved characteristics of people that do not change over time cancel out and essentially drop out of the model. Thus, this approach controls for any time-stable characteristics that could affect the outcome but are difficult to measure and therefore are not specified in models.

We controlled for time-varying covariates, including changes in comorbidity levels and entry into hospice, nursing home, or other institutional care. To control for comorbidities, we used CMS–Hierarchical Condition Categories, which are prospective risk scores used to pay Medicare Advantage plans. These risk scores use inpatient and outpatient diagnostic information from the previous twelve months to predict spending risk in the next calendar year.¹⁷

OUTCOMES We examined ACO and care management program effects on all hospitalizations, all ED visits, and the subset of ED visits for nonemergency conditions (medical conditions amenable to care in a doctor’s office or urgent care facility)—which we identified using a previously validated algorithm.¹⁸ The primary analysis focused on ED visits for conditions with at least a 50 percent probability of being nonemergency or amenable to outpatient care; we varied this threshold in sensitivity analyses.

We analyzed care management program effects on total Medicare Parts A and B spending

Our findings provide evidence to support the expansion of successful programs.

for all beneficiaries in the study and on total spending including prescription drugs for the subset of beneficiaries who received drug coverage through Part D.

ANALYSES Our main analysis followed a difference-in-differences design, with individual-level fixed effects. We conducted two categories of analyses: an examination of the association between ACO alignment and the outcomes, and an examination of the association between participation in the care management program and the outcomes. For each category, we exploited the staggered start dates that naturally created concurrent control groups whose members received their care in the same system. Preprogram trends in the outcomes were similar across the comparison groups, which satisfied the assumption of parallel historical trends required by a difference-in-differences analysis.

We compared beneficiaries who were first aligned to the ACO in 2012 to those who were first aligned in 2013. We also compared beneficiaries who started the care management program in a given month to those who started in subsequent months, controlling for the amount of exposure to the ACO or to the care management program. Analyses that used these exposure variables enabled us to test our hypotheses that rates of ED visits and hospitalizations would decline over time with greater exposure to the program and that spending might increase initially before decreasing as program effects manifested themselves.

We used negative binomial models for analyses of ED visit and hospitalization rates and linear models for analyses of spending. All models used fixed effects estimation methods to account for unmeasured time-stable patient-level effects. The models adjusted for year, month within a given year, and time-changing risk scores.

The data supplied from CMS to the ACO did not specify the exact date of initial eligibility for Medicare, so we used 2009 as that date, to provide the most conservative estimate of any potential findings. We tested alternative dates, such as the first claim date, in our sensitivity analyses. In these analyses, we also tested several alterna-

tive definitions for other variables and other analytic models. All findings of the main analyses were similar to those across the sensitivity analyses.

LIMITATIONS There were several limitations to our analyses. First, assignment to the ACO and the care management program was nonrandom, so there could be potential selection bias from unmeasured time-changing covariates. We assumed that if such unmeasured potential confounders existed, their distribution would be similar across our comparison groups and would not bias the findings. Preprogram outcome trends were similar across comparison groups, which provided some assurance that any unmeasured confounders were evenly distributed.

Second, care managers had considerable latitude in their workflow, including when they first assessed beneficiaries who were newly eligible for the care management program. Thus, it is possible that care managers preferentially entered the sickest patients into the care management program first. If this were the case, it could bias the analyses toward a null result, as the true program effect might be smaller than the difference in severity between earlier versus later entrants. Similarly, if assignment to the program reflected a transient change in a beneficiary's clinical condition, regression to the mean could result in an overstatement of the program effect. An examination of beneficiaries' risk scores did not find any differences across entry times, which mitigated concerns about nonrandom entry into the program.

Third, we assumed that there were no interactions among time-stable confounders. We also assumed that if there was an interaction between the intervention and a beneficiary trait, the proportion of beneficiaries with the trait was constant across the comparison groups. While these are important assumptions, the direction of any potential bias is unclear.

Fourth, the analyses occurred within a single ACO—albeit one of the largest in the country and one that includes multiple hospitals and thousands of physicians. In addition, the process of determining eligibility for the care management program involved physicians' input into the mutability of patients' risk for high levels of future spending. Results could vary in different settings and with different approaches to care management eligibility.

Fifth, the study did not examine differential effects within subgroups of beneficiaries, such as those who were dually eligible for Medicare and Medicaid, members of racial or ethnic minority groups, or people living in poorer areas or farther away from the ACO. It is possible that the effects of either the ACO or the care management

program could differ between the members of these groups and other beneficiaries, depending on the structure of the ACO and on beneficiaries' level of care before being aligned with the ACO.^{6,19}

Finally, the analyses also focused on Medicare spending but did not assess total spending, including program costs. To our knowledge, no other study of ACOs has included program costs in its analysis.

Study Results

BASELINE TRAITS We found significant differences with respect to a number of baseline traits within both the ACO and the care management program study groups (Exhibit 1). For example, beneficiaries who were initially aligned with the ACO in 2012 were older than those aligned in 2013 (72.8 versus 72.1 years, respectively) but had lower risk scores (1.1 versus 1.2, respectively).

EMERGENCY DEPARTMENT VISIT RATES Exhibit 2 shows rates of visits to the ED associated with participation in the ACO and participation in the care management program, relative to the rates of nonparticipants (the relative rates for non-emergency ED visits are shown in online Appendix Exhibit A1).²⁰ Overall participation in the ACO was associated with lower ED visit rates, both for all ED visits (91 percent of the rates of nonparticipants) and for nonemergency visits (86 percent). As beneficiaries' length of participation in the ACO increased, the rate of ED visits—both overall and nonemergency visits—declined in stepwise fashion.

Overall participation in the care management program was also associated with reductions in ED visit rates: Participants' rates for all ED visits were 94 percent of the rates for nonparticipants and, for nonemergency visits, 88 percent (Exhibit 2 and Appendix Exhibit A1).²⁰ Additionally, having spent more time in the program was associated with greater reductions in ED visit rates.

HOSPITALIZATION RATES There was no significant association between overall ACO participation and hospitalization rates (Exhibit 3). However, there was a significant association between participation in the ACO for up to six months and an increase in hospitalization rates, as we originally hypothesized: Participants' overall hospitalization rates were 105 percent of the rates of nonparticipants. By month seven this associated increase became statistically indistinguishable from no change in hospitalization rates (data not shown).

Participants' rates for hospitalizations were 92 percent of the rates for nonparticipants. Again, hospitalization rates increased initially

EXHIBIT 1

Baseline traits of Partners HealthCare System beneficiaries by year of ACO alignment and year of entry into the ACO's care management program, for those in the program

	Initial ACO alignment year		Year of entry into the care management program		
	2012	2013	2012	2013	2014
Number of beneficiaries	42,417	19,649	2,143	1,917	760
Mean age (years)	72.8****	72.1****	74.3	74.5	74.8
Female	60.6%	59.9%	58.9%*	62.4%*	61.2%*
Race					
White	89.0%****	89.0%****	89.1%****	86.1%****	93.6%****
Black	5.1	4.5	5.8	8.4	4.0
Other	5.9	6.5	5.1	5.5	2.5
Eligible for Medicare based on age	80.5%**	79.7%**	73.4%**	70.8%**	75.7%**
Mean CMS-HCC score	1.1****	1.2****	2.4****	2.5****	2.6****
Dually eligible for Medicare and Medicaid	19.8%****	21.4%****	24.4%****	30.7%****	24.6%****

SOURCE Authors' analyses of Medicare alignment and claims data for Partners HealthCare System and of the accountable care organization's (ACO's) care management program data. **NOTES** For ACO participation, baseline refers to the initial alignment year. For participation in the care management program, baseline refers to the year of entry into the program. The Centers for Medicare and Medicaid Services—Hierarchical Condition Category (CMS-HCC) score is a diagnosis-based risk adjustment score that CMS uses for payment (range: 0.12–13.467). Significance refers to statistical significance of observed differences in either the initial ACO alignment year or the year of entry into the care management program. **p* < 0.10 ***p* < 0.05 *****p* < 0.001

after program entry and then declined in a stepwise fashion with increasing length of exposure. The increase was not significant, but the subsequent declines were.

MEDICARE SPENDING Overall participation in the ACO was associated with a reduction in Medicare spending of \$14 per participant per month (Exhibit 4), a decline of 2 percent. This association was not significantly different from no change, but the magnitude of the decline was comparable to estimates in previous studies.^{2,3} The associations between length of ACO participation and reduced Medicare spending were significant.

Overall participation in the care management program was associated with a reduction in Medicare spending of \$101 per participant per month, a decline of 6 percent. The spending reductions increased with longer program exposure, in a stepwise fashion. All associations were significant except that between spending and program participation in the first six months.

Discussion

To our knowledge, this is the first detailed empirical examination of how a Pioneer ACO altered utilization and spending for its aligned Medicare beneficiaries. There were modest overall ACO spending reductions, with magnitudes comparable to those of all ACOs as described in other published reports and generally consistent with the assessment of the Partners ACO by CMS. For example, J. Michael McWilliams and co-

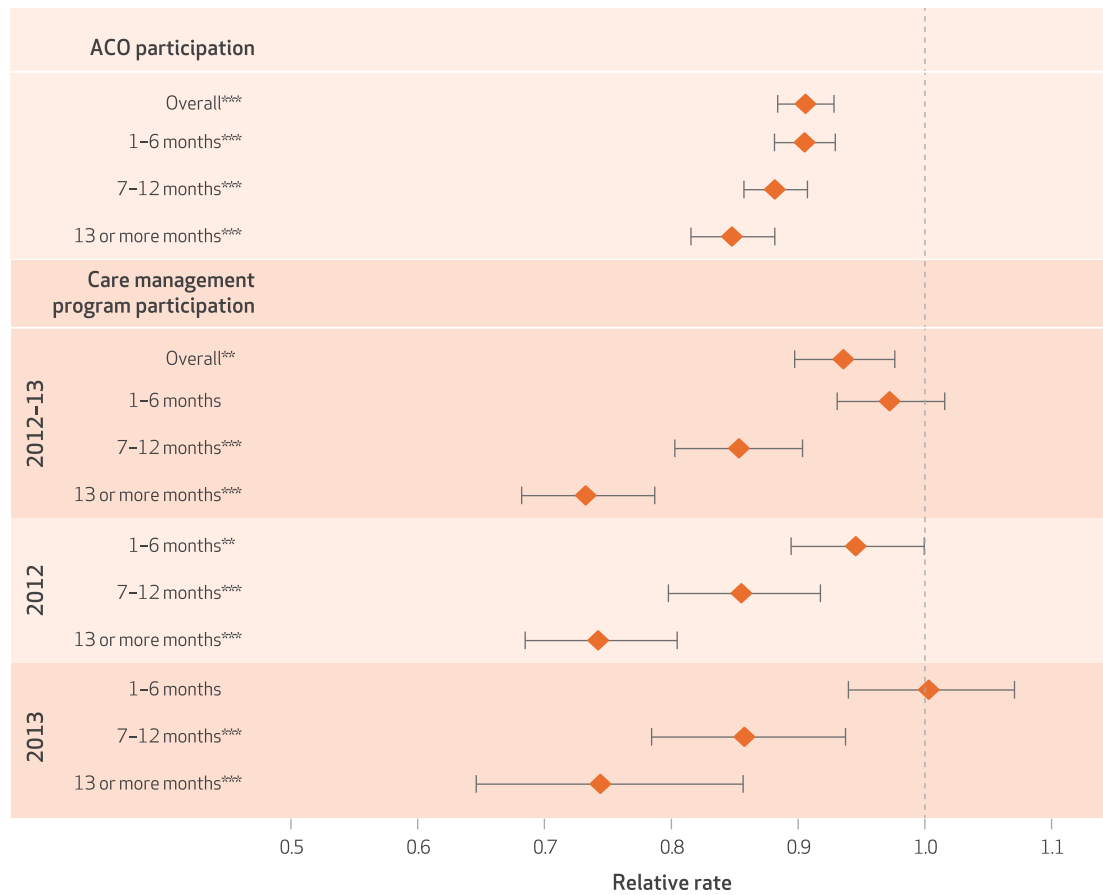
authors found a 1.2 percent reduction in spending associated with joining an ACO,² David Nyweide and colleagues found a 3.8 percent reduction,³ and the Government Accountability Office²¹ and we found a 2 percent reduction. L&M Policy Research (as part of its contract with CMS) found a \$20 reduction in spending per month,²² compared to \$14 in our study. Corroborating the findings of spending effects is critically important, as all studies of ACOs face major challenges in finding valid control groups for their analyses.

Our major overall finding is that participating in an ACO and a care management program lowered utilization and spending. The dose-response pattern further supports the validity of this finding: ED visits decreased relatively quickly, particularly for conditions amenable to outpatient care, while hospitalization rates increased initially before decreasing. The analyses also found similar statistically significant spending changes associated with overall ACO participation.

We found similar results for overall participation in the care management program and participation over time. There were sizable reductions in overall ED visits soon after program entry, particularly for conditions amenable to outpatient care. The reductions in hospitalization rates were associated with being in the program for a longer period of time but not with brief exposures to the program, as we originally hypothesized. Overall, this study's findings on the effects of care management were consistent

EXHIBIT 2

Emergency department visit rates associated with participation in the Partners HealthCare System ACO and its care management program, overall and by length of participation



SOURCE Authors' analyses of Medicare alignment and claims data for Partners HealthCare System and of the accountable care organization's (ACO's) care management program data. **NOTES** The exhibit shows the effects of participation in separate difference-in-differences models of ACO participation (overall and by number of months) and of care management program participation (for 2012-13: overall and by number of months; and for each year of eligibility by number of months of eligibility). The effects are shown as the differences between the changes over time in the rate of ED visits for participants once exposed to ACO (or care management program) participation and the changes over time in the rate for participants not exposed to participation. The error bars indicate 95 percent confidence intervals. Regressions included individual-level fixed effects (to isolate within-person changes) and adjusted for changes in risk scores and the year that the ACO identified the subject as being eligible for the care management program, thus exploiting the staggered program entry over time across subjects. ** $p < 0.05$ *** $p < 0.01$

with those of the Medicare Care Management for High Cost Beneficiaries Demonstration, which was the forerunner of the program we analyzed.¹²

Our findings are promising for several reasons. First, they point toward a potential mechanism responsible for the national findings of reductions in spending growth associated with ACOs. Specifically, targeting beneficiaries with high risks that their primary care physicians believe are modifiable appears to be a viable strategy, as opposed to more diffuse strategies that target broader ACO populations.

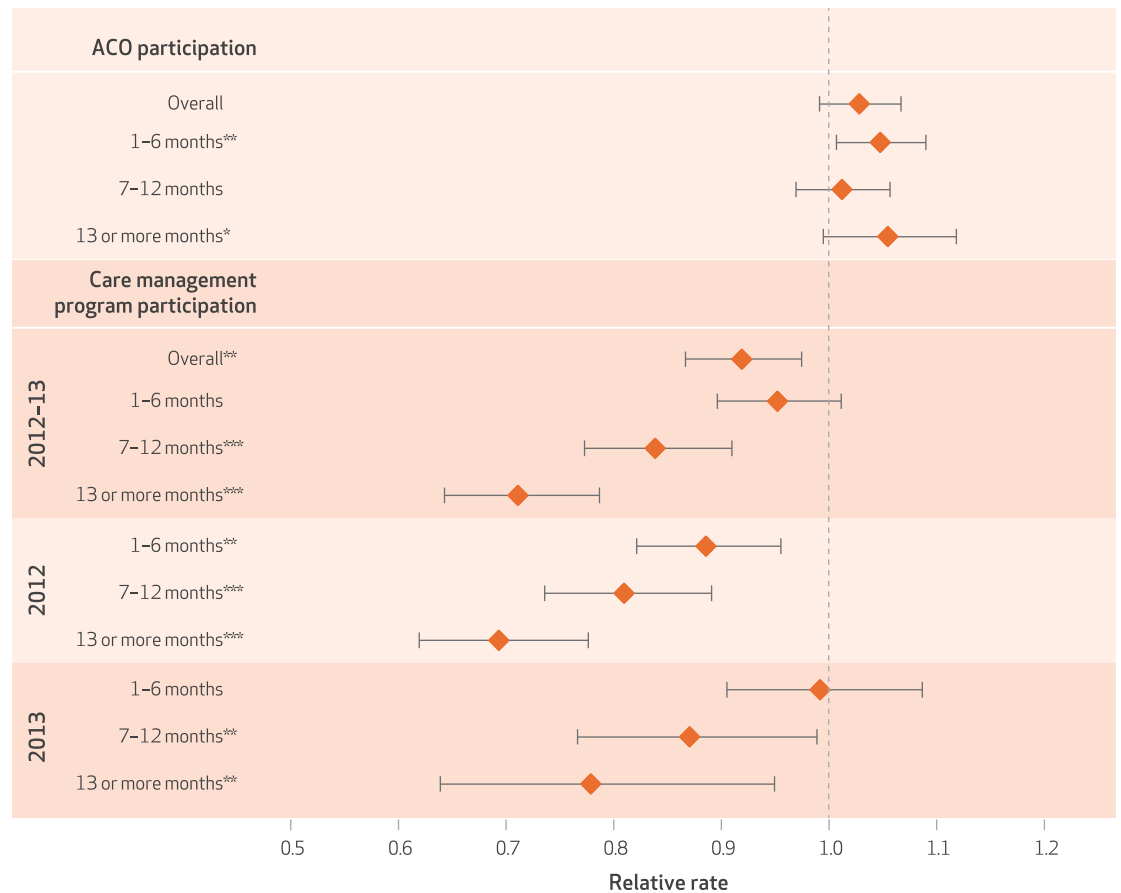
Two components of the ACO were specifically designed to decrease visits to the ED: giving beneficiaries alternative ways to talk with providers when needed and encouraging beneficiaries to

use lower-intensity sites of care, such as urgent care centers, when appropriate. The subsequent changes were not one-time cost shifts but changes in the site of care and reductions in use rates, which increased the likelihood that these changes will be sustainable over time.

Second, our findings provide evidence to support the expansion of successful programs. Even though one of the sites in this study had performed successfully in the Medicare Care Management for High Cost Beneficiaries Demonstration, there was initial uncertainty about whether the care management program could be expanded to some very different sites and remain effective. For example, several of the additional sites within the ACO included commu-

EXHIBIT 3

Hospitalization rates associated with participation in the Partners HealthCare System ACO and its care management program, overall and by length of participation



SOURCE Authors' analyses of Medicare alignment and claims data for Partners HealthCare System and of the accountable care organization's (ACO's) care management program data. **NOTES** The exhibit shows the effects of participation in separate difference-in-differences models of ACO participation (overall and by number of months) and of care management program participation (for 2012-13: overall and by number of months; and for each year of eligibility by number of months of eligibility). The effects are shown as the differences between the changes over time in the rate of hospitalizations for participants once exposed to ACO (or care management program) participation and the changes over time in the rate for participants not exposed to participation. The error bars indicate 95 percent confidence intervals. Regression details are in the Exhibit 2 Notes. * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

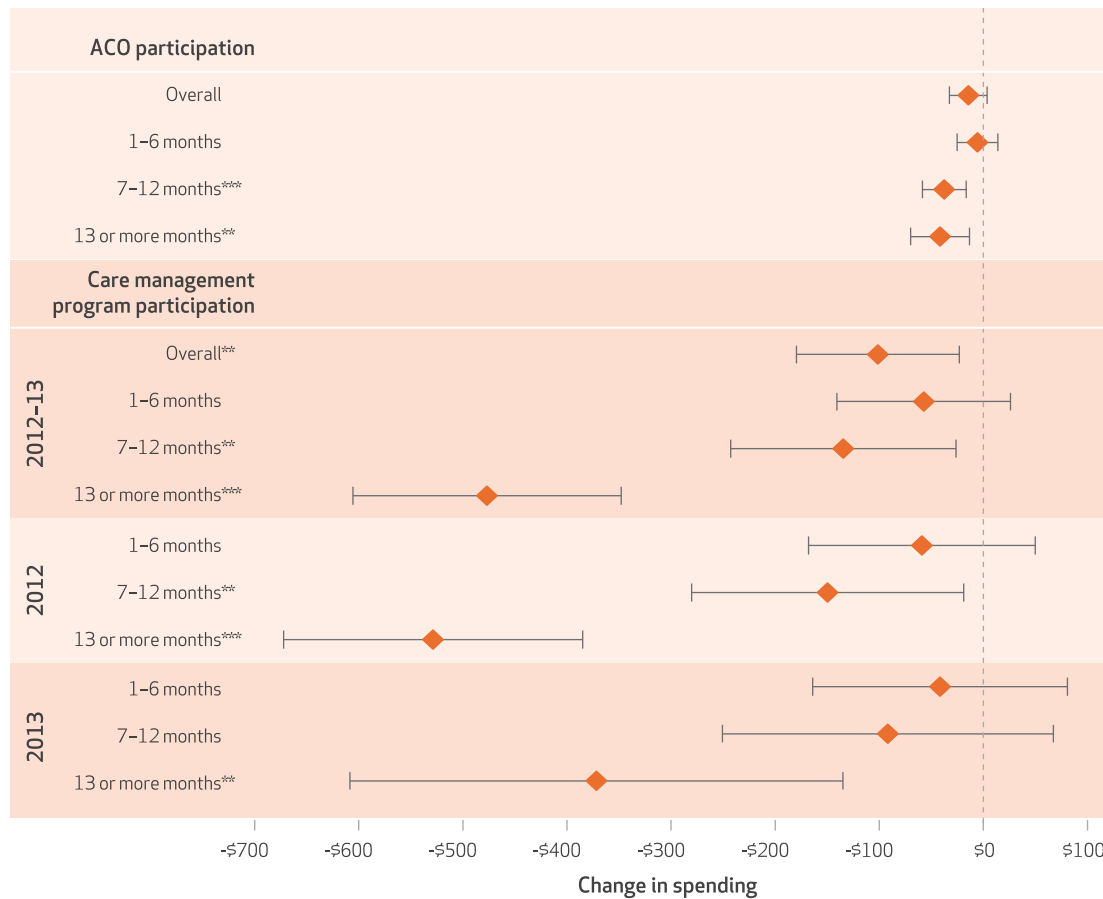
nity-based physicians affiliated with smaller hospitals that had different practice patterns and workflows, compared to the demonstration site. The Partners ACO's care management program was shown to be scalable. Scalability of programs, the next logical goal after efficacy, is particularly important as Medicare expects alternative payment models, including the ACO model, to account for 50 percent of all Medicare spending by 2018.²³

Finally, our findings show that altering care delivery takes time. The early effects of both the ACO and the care management program were modest, with reductions in utilization and spending becoming larger with beneficiaries' greater exposure to the ACO or the program. In any given patient population, there will be a

mixture of unmet needs and opportunities for efficiency. This implies that it could take time and investment before even efficacious programs achieve clinical or financial payoffs, particularly if there was substantial unmet need in the target population before the program started or if the clinical benefits take time to manifest themselves. This is important for Medicare as a whole, for ACOs that are making investment decisions, and for beneficiaries who ultimately bear most of the costs and receive most of the benefits. Previous work¹⁴ has found a substantial amount of turnover within the ACO beneficiary population. Our findings reinforce the importance of using policy solutions to reduce population turnover, such as requiring beneficiaries to join ACOs (instead of simply being aligned with

EXHIBIT 4

Changes in per participant monthly Medicare spending associated with participation in the Partners HealthCare ACO and its care management program, overall and by length of participation



SOURCE Authors' analyses of Medicare alignment and claims data for Partners HealthCare System and of the accountable care organization's (ACO's) care management program data. **NOTES** The exhibit shows the effects of ACO participation, in separate difference-in-differences models of participation (overall and by number of months), and of care management program participation (for 2012-13: overall and by number of months; and for each year of eligibility by number of months of eligibility). The effects are shown as the differences between the changes over time in spending for participants once exposed to ACO (or care management program) participation and the changes over time in the rate for participants not exposed to participation. The error bars indicate 95 percent confidence intervals. Regression details are in the Exhibit 2 Notes. ** $p < 0.05$ *** $p < 0.01$

them) and remain there for minimum periods of time.

Conclusion

The United States is in the midst of a large national experiment in which changes in payment policy are intended to alter the health care system and thereby reduce medical spending growth. Early findings (here and in the literature) suggest that ACOs can generate modest

spending reductions, relative to what would have been spent without ACOs.^{2,3} This study provides some evidence of how one large and successful Pioneer ACO appears to have achieved its stated savings—through an integrated care management program with narrowly targeted beneficiaries. Overall, our findings provide evidence of the effects of payment system changes that are still ongoing, while also demonstrating the importance of giving the changes time to take hold and show results over the long term. ■

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Brigham and Women's Hospital are both part of the Partners HealthCare System).

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