Evaluation of CMMI Accountable Care Organization Initiatives
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Pioneer ACO Evaluation Findings from Performance Years One and Two

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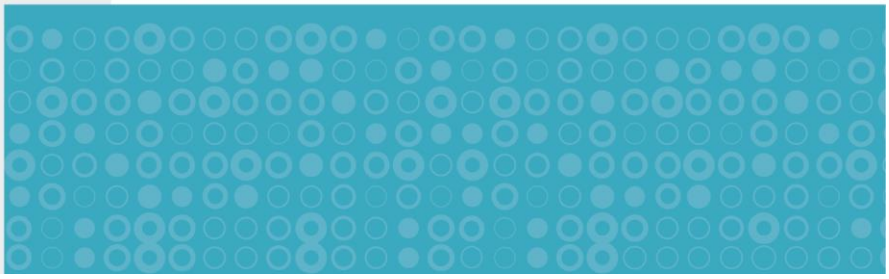

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

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RESULTS AT A GLANCE

- Pioneer ACOs saved a total of $384 million over the first two performance years; most of these savings accrued in the first performance year ($279.7 million in the first performance year [2012]; $104.5 million in the second performance year [2013]).[1]

- Total spending relative to local markets varied for the 32 individual Pioneer ACOs:

  - Ten Pioneers had statistically significant savings in both performance years.

  - Ten Pioneers had statistically significant savings in only one of the two performance years; two of these Pioneers had significant losses the other year.

  - Twelve Pioneers had no statistically distinguishable savings or losses.

- Pioneer ACO features explored to date—including hospital relationships, ability to follow beneficiaries across the care continuum, and ACO leadership—do not appear to explain the differences in Pioneer ACOs' spending performance in the first two years of the model. Provider engagement activities suggest some relationship with Pioneer ACOs' performance. These findings may be attributable, in part, to the somewhat limited variation in observed structural characteristics that can be measured consistently from available qualitative data across all Pioneer ACOs.

- To date, the Pioneer ACO model shows scant evidence of systemic spillover in care delivery from fee-for-service Medicare beneficiaries aligned with a Pioneer ACO to fee-for-service beneficiaries unattributed to a Medicare ACO. Interviews with ACO leadership suggest that Medicare ACOs are positioning provider organizations to be more open to establishing risk-based contracts with commercial insurers.

- Overall spending performance was mainly accompanied by utilization reductions in acute inpatient settings. As a group, Pioneer ACO results showed lower-than-expected utilization in acute inpatient stays and physician services in the first and second performance years compared to local markets. The 10 Pioneers with savings in both performance years had particularly steep reductions in acute inpatient stays.

- Pioneer ACOs collectively had per-beneficiary-per-month savings in 2012 relative to near markets on physician services, inpatient hospital, hospital outpatient, skilled nursing facility, home health, hospice, and durable medical equipment services. However, the magnitude of savings in these settings was lower in 2013.

[1] Thirty-two Pioneer ACOs began participating in the Pioneer ACO model in 2012. By the end of 2013, 23 ACOs continued participating in the Pioneer ACO model. Because the remaining nine ACOs participated through mid-year or full-year 2013, they are included in second performance year results unless otherwise noted.

- Pioneer, Advance Payment (AP) Medicare Shared Savings Program (MSSP), and MSSP ACO leadership cited several areas of focus for the care of beneficiaries:

  - Management of care transitions is widely considered important, with most ACOs employing multiple tactics to manage the transition from inpatient to home or a post-acute care setting; several AP MSSPs, however, are not yet able to provide any support in this area, and there is great diversity across ACOs generally in their capacity to offer robust transition management. This capacity appears affected largely by the availability of timely admissions data, which Pioneer ACOs seem to better positioned to receive than AP MSSPs.

  - Data sharing still remains a developing area for all ACOs, regardless of the sophistication of their information technology systems. Most ACOs in the cohort report navigating multiple electronic health record systems. In addition, building and improving data warehousing capabilities remains a work in progress. Electronic communication, as well as communication generally, is magnified by discontinuities in provider relationships across different care settings. Pioneers are most likely to have developed relationships across diverse provider types, though most ACOs continue to work to encompass the care continuum through both formal and informal provider relationships.

- According to claims-based quality measures compared to near market trends, Pioneer ACOs collectively had (1) statistically significant reductions in acute hospital admissions for COPD, older adult asthma, or heart failure in 2013; and (2) significantly increased rates of post-discharge physician follow-up in the week immediately following an inpatient discharge in 2012 and 2013. For unplanned 30-day acute hospital readmissions or admissions during or after a skilled nursing facility episode, there were no significant differences between the Pioneer ACOs and local markets in 2012 or 2013.[2]

- Consumer Assessment of Healthcare Providers and Systems (CAHPS) surveys of aligned Pioneer beneficiaries found that Pioneer ACOs exhibited few changes in patient experience between the first and second performance year. In addition, most ACOs have similar levels of performance to one another in the domains we examined. There appears to be little relationship between savings and high or low CAHPS scores.

- Pioneer ACOs continue to rely largely on internal sources of learning. Although ACO leadership report gaining insights from consultants, commercial payers, and self-insured employers, they find that as innovators, they have more experience within their organizations that they can draw on than from external sources. Pioneers ACOs had the greatest participation in learning system topics related to cost savings, financial data analysis, and quality results/quality reporting/quality improvement.

[2] As a requirement of participation, Pioneer ACOs were also held accountable for their quality performance on a set of quality measures, which can be found here: http://innovation.cms.gov/initiatives/Pioneer-aco-model/

EXECUTIVE SUMMARY

This report presents emerging findings from an ongoing evaluation of the effects of the Pioneer Accountable Care Organization (ACO) model on Medicare spending, utilization, and quality in their first two performance years, calendar years 2012 (PY1) and 2013 (PY2).[3] The evaluation uses a matched comparison difference-in-differences design to estimate changes in outcomes from a baseline period (calendar years 2010 and 2011) pre-dating the launch of the Pioneer ACO model through each of the performance years. Pioneer ACO outcomes are compared to fee-for-service (FFS) Medicare beneficiaries who were otherwise eligible for alignment with a Pioneer ACO or assignment to a Medicare Shared Savings Program (MSSP) ACO, but who were not aligned or assigned. FFS beneficiaries are part of the "near" market comparison group of each Pioneer ACO if their residence is in or around the counties where a given ACO's providers are located. A second comparison group of otherwise eligible beneficiaries is selected from a market identified as most similar to the Pioneer ACO's market according to a number of market-level factors. This second comparison group, or "far" market, is used as both an additional benchmark for validating results and to test for indications of whether market spillover effects may be affecting beneficiaries in the near market.

We estimate that the 32 Pioneer ACOs significantly reduced Medicare expenditures during the first two performance years compared to their near markets' underlying trends, which reflect how expenditures would have changed in absence of the Pioneer ACO model.[4] These relative reductions translate into a total savings of approximately $384 million in the first two years of the Pioneer model, with the majority of these savings occurring in the first performance year ($279.7 million in PY1; $104.5 million in PY2). The savings translate into $35.62 per-beneficiary-per-month (PBPM) in 2012 and $11.18 PBPM in 2013. These pooled spending and utilization measures in Table 1 aggregate the point estimates for all Pioneer ACOs, and, therefore, the estimated impact of the entire Pioneer model. With the exception of hospital-wide all-cause unplanned readmissions, all of these point estimates are statistically significant at the $p<0.05$ level (also denoted in bold in the table).

Table 1. Pooled Pioneer ACO Results, 2012 and 2013

Outcome	2012	95% CI	2013	95% CI
Aggregated results (N = 32)				
Total spending (in millions)	**-$279.7**	**-$315.0 to -$244.4**	**-$104.5**	**-$148.1 to -$60.8**
Acute care inpatient stays	**-9,926**	**-11,498 to -8,354**	**-8,444**	**-10,288 to -6,600**
Acute care inpatient days	**-40,799**	**-50,993 to -30,606**	**-15,314**	**-26,692 to -3,936**

[3] Thirty-two Pioneer ACOs began participating in the Pioneer ACO model in 2012. By the end of 2013, 23 ACOs continued participating in the Pioneer ACO model. Because the remaining nine ACOs participated through mid-year or full-year 2013, they are included in PY2 results unless otherwise noted.

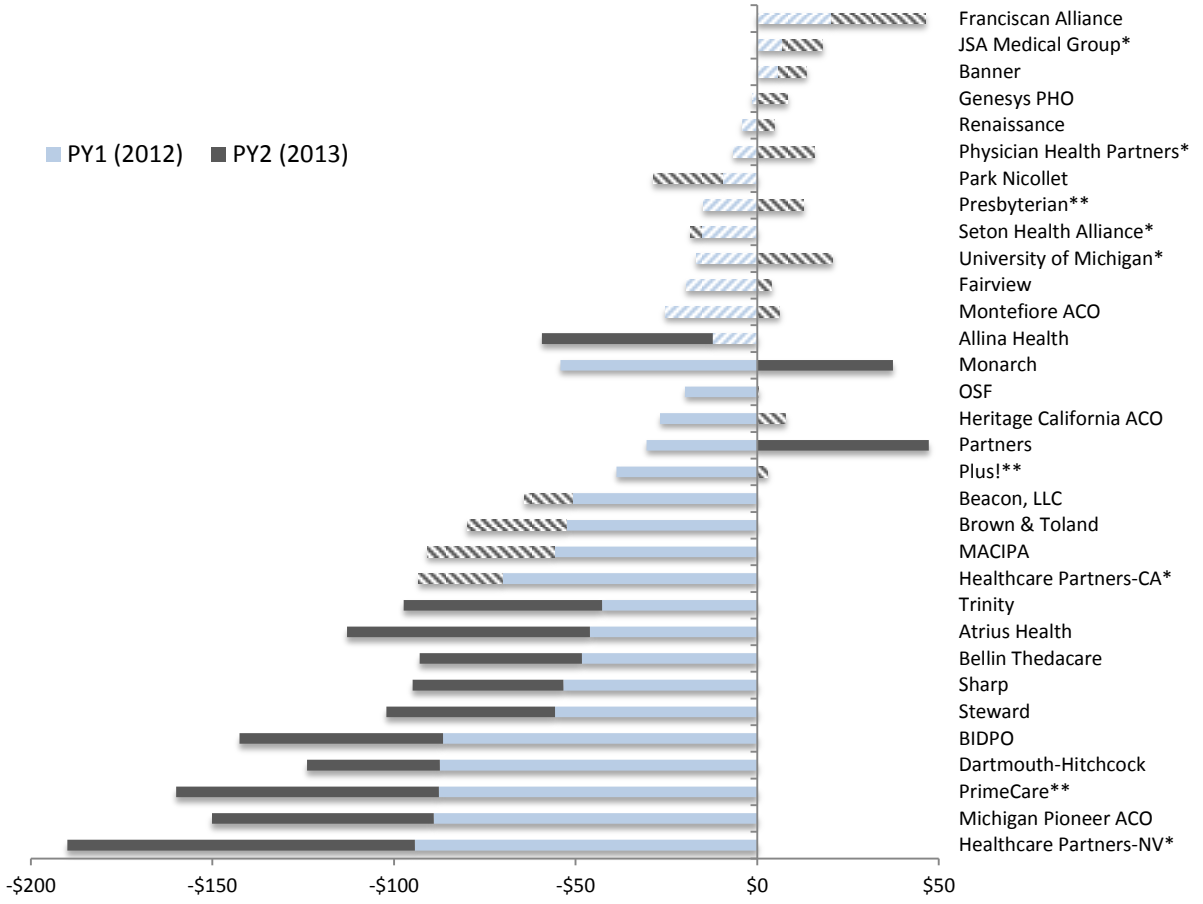
[4] Here and throughout, significance refers to the 95 percent level of statistical significance unless otherwise noted.

Outcome	2012	95% CI	2013	95% CI
Primary care evaluation and management (E&M) services	**-227,500**	**-235,167 to -219,834**	**-246,145**	**-255,778 to -236,512**
Procedures	**-235,901**	**-269,542 to -202,261**	**-184,453**	**-227,791 to -141,116**
Imaging services	**-138,519**	**-151,823 to -125,215**	**-78,768**	**-95,123 to -62,413**
Tests	**-411,107**	**-451,688 to -370,527**	**-404,397**	**452,518 to -356,277**
Hospital-wide all-cause unplanned readmissions	-408	-973 to 157	642	-21 to 1,305
Per beneficiary month / Per admission change (N = 32)				
Total spending (per beneficiary per month)	**-$35.62**	**-$40.12 to -$31.12**	**-$11.18**	**-$15.84 to -$6.51**
Acute care inpatient stays (per 1,000 beneficiary months)	**-1.26**	**-1.46 to -1.06**	**-0.90**	**-1.10 to -0.71**
Acute care inpatient days (per 100 beneficiary months)	**-0.52**	**-0.65 to -0.39**	**-0.16**	**-0.29 to -0.04**
Primary care evaluation and management (E&M) services (per 100 beneficiary months)	**-2.90**	**-3.00 to -2.80**	**-2.63**	**-2.74 to -2.53**
Procedures (per 100 beneficiary months)	**-3.00**	**-3.43 to -2.58**	**-1.97**	**-2.44 to -1.51**
Imaging services (per 100 beneficiary months)	**-1.76**	**-1.93 to -1.59**	**-0.84**	**-1.02 to -0.67**
Tests (per 100 beneficiary months)	**-5.24**	**-5.75 to -4.72**	**-4.33**	**-4.84 to -3.81**
Hospital-wide all-cause unplanned readmissions (per 1,000 admissions)	-2.34	-5.58 to 0.90	3.14	-0.10 to 6.38

Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.
Notes: Total pooled beneficiary months for Pioneer ACOs was 7,851,613 in 2012 and 9,349,724 in 2013. This table pools the estimated effects over all Pioneer ACOs and aligned-beneficiaries that were part of the ACO model at the beginning of the second performance year. See the Methods section for a full list of measures and definitions. Bold estimates indicate statistical significance at the p<0.05 level. Results are risk adjusted using Oaxaca-Blinder reweighting method as discussed in the Methods section.

Estimated Medicare savings varied significantly across the 32 individual Pioneers (Figure 1), as did changes in utilization (Table 1). In the first performance year, 19 of the 32 Pioneer ACOs had statistically significant reductions in PBPM expenditures relative to their respective near markets. Three ACOs with the most total savings in 2012 accounted for nearly 27 percent of pooled first performance year savings (PBPM savings multiplied by total beneficiary months) and included Beth Israel Deaconess, Steward, and Healthcare Partners of California. In the second performance year, 11 of the 32 Pioneers demonstrated statistically significant PBPM savings and two Pioneer ACOs had significantly higher expenditures than expected. The top three significant savers in the second performance year accounted for nearly 70 percent of the pooled second year savings (PBPM savings multiplied by total beneficiary months) and included Steward, Atrius, and Beth Israel Deaconess, all hailing from Boston, Massachusetts. Ten Pioneer ACOs demonstrated statistically significant savings in both performance years.

Figure 1. Pioneer ACOs' Differences in PBPM Spending Compared to the Near Market in 2012 and 2013



Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.
*Notes: *ACOs that ended participation as a Pioneer ACO as of December 31, 2013 and transitioned to being a Medicare Shared Savings Program ACO. **ACOs that ended participation as any Medicare ACO as of December 31, 2013.*
A negative number (left of the y-axis) indicates savings resulting from lower spending growth for the Pioneer ACO relative to the near market comparison group. Solid bars are statistically significant results at the $p<0.05$ level. Hatch marks indicate results that are not statistically significant at the $p<0.05$ level. PBPM is per beneficiary per month.

Using the two-year expenditure performance as a grouping framework, we created three groups—*two-year savers, one-year savers, non-savers*. With these groups we examined relationships between spending performance and ACO features hypothesized to be key drivers of ACO performance. These features are characterized based on information collected through semi-structured interviews and site visits with the ACOs. In descriptive analyses, we did not find clear relationships between ACOs' spending performance in the first two years of the model and the following: hospital relationships, capacity to follow and monitor beneficiaries through the care continuum, leadership, or other market pressures. However, greater provider engagement suggested some relationship with an ACO's ability to achieve savings. We have also begun to investigate the relationship between ACO size and composition of aligned beneficiaries over time and evaluation spending results. Preliminary results suggest a marginally significant

relationship between larger 2013 savings estimates and a higher proportion of 2013 beneficiaries who were also aligned in 2012.

To examine evidence of possible market spillover, where the Pioneer has directly or indirectly impacted the care of beneficiaries unattributed to a Medicare ACO from the near market in which they operate, we compared ACOs' risk-adjusted near- to far-market savings estimates for expenditures in the first two performance years. In this spillover analysis, we found weak evidence of systemic spillover among Pioneers with regard to total Medicare expenditures.[5]

Looking at key utilization measures underlying spending results, we found that Pioneer ACOs with savings in both performance years, relative to their near market, were more likely to show significant and larger reductions in acute inpatient stays—as well as in procedures, imaging, and tests—than Pioneers that had variable or no significant savings across the years. For the vast majority of Pioneer ACOs, independent of expenditure savings/loss estimates, we found reductions in the number of primary care E&M visits for beneficiaries during the first two performance years.

We compared Pioneer ACOs to the near markets on several claims-based quality measures.[6] On average, there is no evidence of systemic reduction in unplanned 30-day acute hospital all-cause readmissions, relative to near market, for the Pioneer ACOs in either performance year. For the preventive quality indicators (PQIs), results indicate an anomalous increase in admissions for heart failure in 2012 but otherwise show statistically significant reductions in admissions for all PQI conditions and specifically for COPD, older adult asthma, and heart failure in 2013. For unplanned admissions during or after a skilled nursing facility episode, we did not find significant differences between the pooled Pioneer ACOs and near markets. For post-discharge physician visits, we found that the Pioneer ACOs appear to have increased their rates of post-discharge physician follow-up in the week immediately following discharge relative to the near market.

To examine data on patient experience, we used responses from Consumer Assessment of Healthcare Providers and Systems (CAHPS) surveys of aligned beneficiaries from all 32 Pioneers in 2012 and the 23 Pioneers continuing into 2014 covering the first two performance years.[7] We examined average scores and top-box scores—the most positive score for a given item—for all experience items across a range of domains and found that Pioneer ACOs exhibited few changes in patient experience between PY1 and PY2. In addition, most ACOs have similar levels of performance to one another in the domains we examined, and there appears to be little relationship between savings and high or low CAHPS scores. At the same time, Pioneer-aligned beneficiaries appear to have slightly higher satisfaction with the timeliness of care, appointments, and information as well as with how well their provider communicates and with their provider

[5] The sensitivity of this analysis to an initial price standardization adjustment of the far market data is discussed in the Methods section of this report.

[6] As a requirement of participation, Pioneer ACOs were also held accountable for their quality performance on a set of quality measures, which can be found here: http://innovation.cms.gov/initiatives/Pioneer-aco-model/

[7] Beneficiaries aligned to ACOs that withdrew from the Pioneer ACO initiative were not surveyed in 2013. As a result, our analyses include more ACOs for PY1 than PY2.

overall compared with FFS beneficiaries and Medicare Advantage beneficiaries. However, the magnitudes of these differences, while statistically significant, are generally small. Further, it is important to note that beneficiaries are aligned or assigned to an ACO because they receive regular care from ACO providers; there is a plausible positive association between having a regular source of care and most of the CAHPS metrics for which Pioneers beneficiaries reported higher values that may be confounding the results.

From more formative analyses of in-progress data collection activities,[8] the team is observing the emergence of some characteristics of care management approaches, health information infrastructure and capabilities, and provider relationships across the care continuum. As of the second performance year, most cohort Medicare ACOs (Pioneer, Advance Payment [AP] MSSPs, and MSSP ACOs) take a generally centralized approach to their care management efforts, particularly among Pioneers. Management of care transitions are widely cited as an important area of focus, with most ACOs employing multiple tactics to manage the transition from inpatient to the home or a post-acute care setting; several AP MSSPs, however, are not yet able to provide any support in this area, and there is great diversity across ACOs generally in their capacity to offer strong transition management. The capacity appears dictated in large part by the availability of timely admissions data, with which AP MSSPs face a particular struggle—a slight majority of the 20 2012 AP MSSPs reported they had timely data for at least half of their assigned beneficiaries, compared to all but one Pioneer reporting availability of these data.

Data sharing still remains a developing area for all ACOs, regardless of their information technology systems. Most ACOs in the cohort report navigating multiple electronic health record systems (EHRs); only six of 23 Pioneers and a single AP MSSP reported any interoperability across EHRs and most ACOs are still developing basic data warehousing capabilities. These challenges are magnified by discontinuities in provider relationships across different care settings. Pioneers are most likely to have developed relationships across diverse provider types, though most ACOs continue to work to encompass the care continuum through both formal and informal approaches to establishing provider relationships.

Finally, as part of the Pioneer learning system portion of the evaluation, the team continued to gather information on how Pioneer ACOs are learning as they progress through the performance years. This most recent data collection effort came through focus groups conducted during the 2014 annual meeting, where 22 of the 23 remaining Pioneers participated. Analyses of the focus group discussions, revealed that internal resources continue to dominate Pioneer ACO approaches to learning, including: trial and error, experience of executives and leadership staff in the ACO, and flow down of experience from the parent organizations' managed care products. Some Pioneers cited use of external consultants, and many expressed the value in networking with other Pioneers and the Pioneer learning activities that help facilitate this interaction.

[8] Given the staggered start dates of the AP MSSPs, and that site visits have been conducted over the course of the second performance year (2013-2014), formative analyses conducted as of the writing of this report do not always include the AP MSSPs that began in 2013 or the nine Pioneers that exited the Pioneer ACO model in 2013.

CHAPTER 1. INTRODUCTION

Pioneer Accountable Care Organizations (ACOs) are provider organizations willing to bear significant risk in transforming their delivery and payment methods. This evaluation of the Pioneer ACO model estimates changes in spending, utilization, and quality relative to a counterfactual of what would have happened if the providers did not participate in the Pioneer ACO model. The ACO "treatment" under investigation is not a prescribed set of activities or interventions. Rather, it is a financial arrangement in which provider organizations attempt to reduce expenditures below a set target while maintaining high quality metrics in exchange for bearing risk for reducing expenditures.[9] The Pioneer model, in effect, creates a structured laboratory in which Pioneer ACOs design and implement methods for cost containment and quality improvement.

Our evaluation examines the effects of 32 Pioneer ACOs on the fee-for-service (FFS) expenditures, utilization, and quality for the populations of aligned Medicare FFS beneficiaries. While nine Pioneer ACOs ceased participating in the model by the end of the second performance year, we report results for all 32 Pioneer ACOs, as each organization was implementing the Pioneer ACO "treatment" for some portion of time in 2013.[10] The evaluation estimates the ACO treatment effect using a modified difference-in-differences framework to compare the growth in per-beneficiary-per-month (PBPM) Medicare outcomes for Pioneer ACO-aligned beneficiaries relative to two comparison groups: (1) FFS Medicare beneficiaries who are not aligned or assigned to a Medicare ACO in the Pioneer ACO's local, or "near" market and, (2) FFS Medicare beneficiaries in a geographically distinct, but similar, market where Medicare ACOs are not present, or "far" market. The first comparison group is used to estimate the impact of the Pioneer ACO on the near market and ultimately to estimate the change in expenditures, utilization, and quality in the Medicare program. The second comparison group is used for validation of the results and to test for indications of market spillover.

The Pioneer ACO treatment effect is measured as the difference in the per-beneficiary spending (or utilization) growth between the Pioneer ACO beneficiaries and their comparison markets from the period prior to participation in the Pioneer model (baseline years, 2010 and 2011) to the first performance year (PY1, 2012) and the second performance year (PY2, 2013). Lower growth can be equated with savings (lower utilization) and higher growth equated with excess spending (utilization) that would not have occurred absent the Pioneer ACO alignment, all else equal. The difference-in-differences approach accounts for time-consistent differences between the beneficiaries of the Pioneer ACO physicians and the comparison groups; it also accounts for changes occurring over time that are common among both the aligned and comparison beneficiaries. Furthermore, we control for time-varying differences in observed characteristics,

[9] See http://innovation.cms.gov/initiatives/Pioneer-ACO-Model/ for more information regarding the contractual arrangements and incentives of Pioneer ACOs.

[10] Six of the nine Pioneer ACOs transitioned to Medicare Shared Savings Program ACOs, while the remaining three ACOs ceased participation altogether as Medicare ACOs. When results are presented for a subset of the 32 Pioneer ACOs, they are specifically noted.

possibly due to selection, through an Oaxaca-Blinder reweighting of outcomes. See the Chapter 6. Methods section for further detail.

Under Medicare's payment rules for the Pioneer model, providers continue to be paid Medicare FFS rates for providing services. The Pioneer ACO can earn payments for achieving savings or may have to pay money back to Medicare if it experiences losses outside of a specified corridor. Savings and losses under the payment formula are calculated with the goal of establishing an incentive to reduce spending compared to a benchmark. The goal of the evaluation is to estimate what costs and other outcomes would have been in the absence of the Pioneer model, which necessitates employing different approaches than those used to calculate payment. The primary variances between the payment and evaluation approaches include different (1) baseline populations (refreshed each performance year versus fixed); (2) comparison populations (national versus local); (3) approaches in trending methods (blended nominal and growth rate versus nominal); and (4) risk-adjustment methods. As such, findings between the financial payment calculations and the evaluation necessarily differ, both at an aggregate level and for individual Pioneer ACOs.

The rapid-cycle nature of the evaluation results in the sharing of information that are in different phases of development – there are results and findings based on more complete and better formulated analyses and others that reflect more formative results based on incomplete and/or variably collected information. This compilation report includes both types of findings.

In addition, there is concurrent testing and refinement of our estimating approach to integrate data and information not previously available. Specifically, we have adjusted the methodology since presenting our report on the first performance year results to incorporate (1) an additional year of baseline data; (2) beneficiaries who would have been aligned to the ACO in the baseline period; (3) decedents during the baseline; and (4) an updated set of risk-adjustment variables. (See the note in the Chapter 6. Methods section for additional details on the differences between the methods employed in the October 2013 report and this analysis.)

The following sections of this report present findings and a discussion of spending, utilization, and patient experience results for the first two Pioneer model performance years, integrating qualitative data and analyses to test hypothesized key drivers (internal and external to the Pioneer ACOs) underlying observed variations in the results; formative findings on ACO care management activities, health information technology use, and care continuum; and key findings related to the Pioneer learning system.

CHAPTER 2. SPENDING, UTILIZATION, AND PATIENT EXPERIENCE FINDINGS

The evaluation findings to date have largely focused on total expenditures and a select set of utilization and quality outcomes. Pioneer ACOs significantly reduced Medicare expenditures from what expenditures would have been in the absence of the Pioneer model.[11] Estimated changes in expenditures were mixed across Pioneer ACOs, and the changes in utilization generally followed the expenditure patterns—reduced expenditures tend to match reduced utilization for six key utilization measures examined: inpatient acute care stays and days, primary care evaluation and management (E&M) services, imaging services, tests, and procedures. Pioneer ACOs with statistically significant savings in the first two performance years more frequently showed reductions in acute care utilization, as well as BETOS procedures, imaging, and tests. However, for the vast majority of Pioneer ACOs, independent of expenditure savings/loss estimates, we found reductions in the number of primary care E&M visits for beneficiaries during the first two performance years. The following sections present aggregate and ACO-level spending and utilization results in further detail, including a discussion of driving factors underlying variation in these results.

2a. Total Spending Results

Pioneer ACOs Saved Over the First Two Performance Years; More Savings Accrued in First Performance Year

Within the first two years, the Pioneer ACO model has shown reduced Medicare expenditure growth compared to the near markets' underlying trends, a reflection of what expenditures would have been in the absence of the Pioneer ACO model. Summaries of spending results from four different approaches to pooling the findings are described in more detail below and shown in Table 2.

Pooling results of all 32 Pioneer ACOs showed savings for the ACO model as a whole. We estimated that total Medicare savings was $279.7 million for 675,712 Pioneer-aligned beneficiaries in 2012 and $104.5 million for 806,258 Pioneer-aligned beneficiaries in 2013.[12] On average, the estimated savings in 2012 for all Pioneer ACO-aligned beneficiaries was estimated to be −$35.62 (95% CI, −$40.12 to −$31.12)[13] per-beneficiary-per-month (PBPM) given the expenditure changes of the near market comparison beneficiaries. In 2013, the estimated savings for Pioneer ACOs was a more modest −$11.18 (95% CI, −$15.84 to −$6.51) PBPM. For Pioneer ACOs that continued their participation into the third performance year, the estimated pooled savings was −$76 million (−$10.6 PBPM) in 2013. This reduction in savings in the second

[11] Here and throughout, results include all 32 ACOs and significance refers to the 95 percent level of statistical significance unless otherwise noted.

[12] These beneficiary counts reflect the number of unique beneficiaries observed in the data and cannot be used to estimate the total effect of the measures, as they do not represent the estimated number of occurrences. In order to estimate the total pooled effects of the measures, we use total beneficiary months, which are 7,851,613 in 2012 and 9,349,724 in 2013.

[13] Negative numbers indicate savings.

performance year is largely from excluding results of the two ACOs with the greatest estimated PBPM savings.

In contrast to the approach described above that calculated the savings for the entire Pioneer model, a second approach to pooling the spending results shown in Table 2 sums the individual spending results only for those Pioneers with statistically significant spending estimates. This approach yields savings estimates of approximately $384 million in the first two years of the Pioneer model, with the majority ($264 million from 19 Pioneer ACOs) occurring in PY1 and $120 million in PY2 (from 11 Pioneer ACOs with significant savings, offset by two Pioneer ACOs with significant losses). Average savings for Pioneer ACOs with significant spending differences compared to their near markets translates into −$52.74 PBPM (95% CI, −$58.49 to −$46.98) in 2012 and −$30.94 PBPM (95% CI, −$38.18 to −$23.69) in 2013. Under this pooling approach, excluding the nine Pioneer ACOs that exited the model by the end of PY2 leaves estimated pooled savings of $87 million (almost $25 PBPM). Elsewhere in this report, reported results include the Pioneers that exited the model by the end of PY2, unless otherwise indicated.

Table 2. Pioneer ACO Total Spending Results, 2012 and 2013

Spending Outcome	2012	95% CI	2013	95% CI
All ACOs (N=32)				
Aggregate total spending (in millions)	**-$279.7**	**-$315.0 to -$244.4**	**-$104.5**	**-$148.1 to -$60.8**
Per beneficiary per month total spending	**-$35.62**	**-$40.12 to -$31.12**	**-$11.18**	**-$15.84 to -$6.51**
All ACOs, excluding Pioneer ACOs that exited by the end of 2013 (N=23)				
Aggregate total spending (in millions)	---	---	**-$76.0**	**-$113.8 to -$38.2**
Per beneficiary per month total spending	---	---	**-$10.6**	**-$15.8 to -$5.3**
Statistically significant ACOs	**(N=19)**		**(N=13)**	
Aggregate total spending (in millions)	**-$263.9**	**-$292.8 to -$235.2**	**-$120.5**	**-$148.7 to -$92.3**
Per beneficiary per month total spending	**-$52.74**	**-$58.49 to -$46.98**	**-$30.94**	**-$38.18 to -$23.69**
Statistically significant ACOs, excluding Pioneer ACOs that exited by the end of 2013 (N=11)				
Aggregate total spending (in millions)	---	---	**-$87.0**	**-$112.9 to -$61.1**
Per beneficiary per month total spending	---	---	**-$24.95**	**-$32.39 to -$17.52**

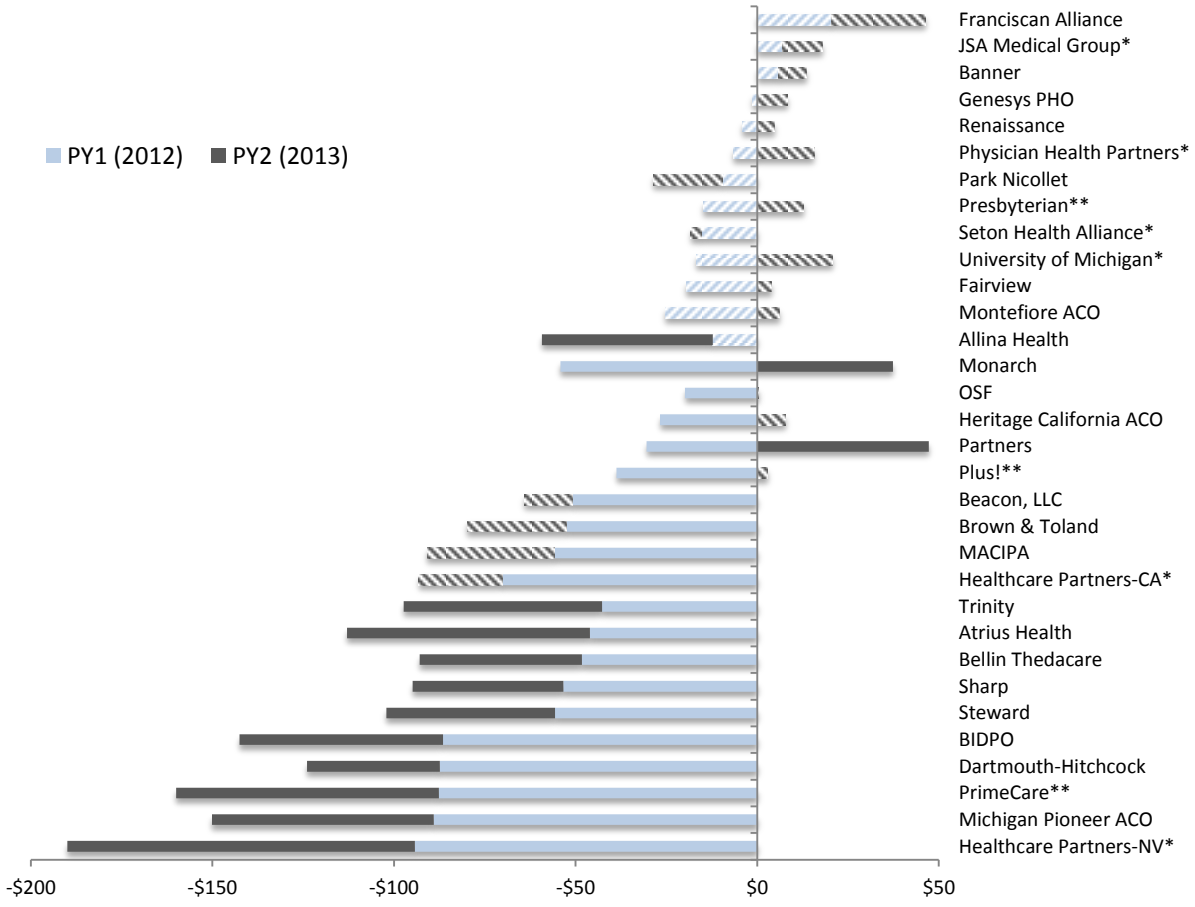
Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.
Notes: Negative numbers indicate savings. Bold estimates indicate overall statistical significance at the p<0.05 level. Results are risk adjusted using Oaxaca-Blinder reweighting method as discussed in the Methods section. --- Indicates no data is present for the subset of organizations reflected.

Spending Results for Individual Pioneer ACOs Varied, with 10 ACOs Showing Savings in Both Performance Years

As discussed above, spending results for both performance years varied across all 32 Pioneer ACOs. In 2012, 19 organizations had statistically significant savings compared to the near market, ranging from about –$20 (95% CI, –$0.13 to –$39.68) PBPM to –$94 (95% CI, –$65.03 to –$123.55) PBPM in savings. (See Figure 2.) The estimated savings and losses compared to the near market for the remaining 13 ACOs were not statistically significant in 2012.

In 2013, 11 Pioneers had significant savings that ranged from about –$37 (95% CI, –$14.42 to –$58.72) to –$95 (95% CI, –$61.23 to –$130.00) PBPM. Of those 11, all but one, Allina Health, had already achieved significant savings in 2012. Among the remaining 21 ACOs, 19 had spending that was not significantly different from their near markets. Two Pioneer ACOs—Partners Healthcare and Monarch—had significantly *higher* spending than their near markets in 2013 totaling $41.7 million, offsetting some of the savings accrued by the 11 Pioneers with significant savings in that year.

Figure 2. Pioneer ACOs' Differences in PBPM Spending Compared to the Near Market in 2012 and 2013



Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.
*Notes: *ACOs that ended participation as a Pioneer ACO as of December 31, 2013 and transitioned to being a Medicare Shared Savings Program ACO.**ACOs that ended participation as any Medicare ACO as of December 31, 2013.*
A negative number (left of the y-axis) indicates savings resulting from lower spending growth for the Pioneer ACO relative to the near market comparison group. Solid bars are statistically significant results at the p<0.05 level. Hatch marks indicate results that are not statistically significant at the p<0.05 level. PBPM is per beneficiary per month.

Pioneer ACOs can be organized into three groups based on their spending results across the first two performance years:

1. *Two-year savers*: Ten Pioneer ACOs with significant savings in the first two performance years. One Pioneer transitioned to becoming an MSSP ACO and another was no longer a Medicare ACO after PY2.
2. *One-year savers*: Ten Pioneer ACOs showed significant savings in one of the two performance years, with all but one (Allina) showing those savings in 2012. As noted above, nine Pioneers in this group showed savings in PY1 and not in PY2, and one showed savings in PY2 but not PY1. Two Pioneer ACOs (Partners and Monarch) in this group had significantly *higher* spending (losses) compared to their near markets in PY2, despite savings in PY1. One Pioneer transitioned to becoming an MSSP ACO and another was no longer a Medicare ACO after PY2.
3. *Non-savers*: Twelve Pioneer ACOs had no significant savings or losses compared to their near market in PY1 or PY2. Four Pioneers transitioned to becoming an MSSP ACO and another was no longer a Medicare ACO after PY2.

Table 3 presents Pioneer ACO-level PBPM and total spending results for the first two years of the Pioneer model, arrayed by the three types of saver groups.

Table 3. Pioneer ACOs' Savings/Losses (PBPM and Total) Compared to Near Market, 2012 and 2013

Pioneer ACO	PBPM savings/losses 2012 ($)		PBPM savings/losses 2013 ($)		Total savings/losses 2012 ($)	Total savings/losses 2013 ($)
Two-year savers	**Estimate**	**95% CI**	**Estimate**	**95% CI**		
HCP-NV*	**-94.29**	**-123.55 to -65.03**	**-95.62**	**-130.00 to -61.23**	**-20,536,039**	**-16,602,467**
Michigan Pioneer	**-89.05**	**-129.45 to -48.64**	**-61.08**	**-100.90 to -21.27**	**-12,594,417**	**-11,925,825**
PrimeCare**	**-87.64**	**-123.95 to -51.34**	**-72.35**	**-102.14 to -42.56**	**-12,469,309**	**-16,823,150**
Dartmouth-Hitchcock	**-87.38**	**-110.30 to -64.46**	**-36.57**	**-58.72 to -14.42**	**-17,714,759**	**-10,344,296**
BIDCO	**-86.47**	**-109.20 to -63.75**	**-56.05**	**-79.01 to -33.09**	**-30,257,763**	**-23,064,293**
Steward	**-55.70**	**-76.22 to -35.18**	**-46.42**	**-66.47 to -26.38**	**-22,877,465**	**-24,623,753**
Sharp	**-53.37**	**-75.77 to -30.97**	**-41.50**	**-64.56 to -18.44**	**-18,059,304**	**-13,865,638**
Bellin-ThedaCare	**-48.31**	**-67.99 to -28.63**	**-44.65**	**-65.22 to -24.07**	**-11,406,090**	**-9,765,836**
Atrius	**-46.04**	**-67.55 to -24.53**	**-66.89**	**-89.34 to -44.44**	**-13,069,431**	**-23,342,169**
Trinity	**-42.72**	**-77.96 to -7.48**	**-54.61**	**-86.88 to -22.33**	**-3,346,168**	**-5,620,769**
One-year savers	**Estimate**	**95% CI**	**Estimate**	**95% CI**		
HCP-CA*	**-70.15**	**-92.28 to -48.02**	-22.99	-47.04 to 1.05	**-22,418,239**	-9,040,225

Pioneer ACO	PBPM savings/losses 2012 ($)		PBPM savings/losses 2013 ($)		Total savings/losses 2012 ($)	Total savings/losses 2013 ($)
MACIPA	**-55.82**	**-91.69 to -19.95**	-35.00	-73.97 to 3.98	**-6,453,642**	-3,663,890
Brown & Toland	**-52.54**	**-81.05 to -24.03**	-27.31	-60.00 to 5.37	**-9,809,667**	-5,301,092
Beacon	**-50.91**	**-85.41 to -16.41**	-13.18	-45.63 to 19.27	**-4,949,752**	-1,920,400
Plus!**	**-38.72**	**-65.38 to -12.06**	2.94	-21.11 to 26.99	**-7,757,451**	1,248,201
Partners	**-30.46**	**-47.72 to -13.19**	**47.27**	**29.98 to 64.57**	**-15,770,937**	**33,176,342**
Heritage	**-26.75**	**-43.71 to -9.79**	7.81	-8.71 to 24.34	**-19,410,824**	7,381,768
OSF	**-19.90**	**-39.68 to -0.13**	0.39	-19.09 to 19.87	**-5,130,674**	145,814
Monarch	**-54.20**	**-84.92 to -23.48**	**37.38**	**5.15 to 69.61**	**-9,965,127**	**8,562,494**
Allina	-12.20	-42.45 to 18.05	**-47.07**	**-79.59 to -14.54**	-1,701,179	**-6,220,021**
Non-savers	**Estimate**	**95% CI**	**Estimate**	**95% CI**		
Montefiore	-25.17	-57.58 to 7.24	6.04	-27.17 to 39.25	-6,009,635	1,609,294
Fairview	-19.41	-45.26 to 6.43	4.02	-23.9 to 31.95	-3,839,020	621,069
Univ. of Michigan*	-16.82	-42.12 to 8.49	20.68	-6.36 to 47.72	-3,901,338	5,618,318
Seton*	-15.25	-50.83 to 20.32	-3.00	-39.30 to 33.31	-1,572,002	-337,737
Presbyterian**	-14.72	-39.40 to 9.95	12.72	-15.15 to 40.6	-2,333,093	1,831,223
Park Nicollet	-9.54	-35.72 to 16.65	-18.90	-48.36 to 10.57	-1,617,816	-2,778,903
Phys.Health Partners*	-6.41	-27.91 to 15.09	15.64	-7.68 to 38.97	-1,847,113	4,224,547
Renaissance	-3.99	-26.72 to 18.73	4.81	-16.18 to 25.81	-1,092,167	1,623,238
Genesys PHO	-1.38	-31.28 to 28.52	8.45	-20.76 to 37.65	-264,307	1,523,497
Banner	5.98	-9.40 to 21.36	7.59	-9.34 to 24.52	3,020,274	4,409,181
JSA*	6.92	-22.44 to 36.27	10.96	-22.00 to 43.91	849,089	1,415,837
Franciscan	20.53	-6.10 to 47.15	25.82	-0.44 to 52.08	4,615,987	7,365,344

Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.
*Notes: *ACOs that ended participation as a Pioneer ACO as of December 31, 2013 and transitioned to being a Medicare Shared Savings Program ACO. **ACOs that ended participation as any Medicare ACO as of December 31, 2013.*
A negative number indicates savings resulting from lower spending growth for the Pioneer ACO relative to the near market comparison group. Bolded estimates indicate statistical significance at the p<0.05 level. PBPM is per beneficiary per month.

ACO Characteristics and Activities Not Clearly Related to Individual Pioneer ACO Two-Year Total Spending Results

Using the two-year spending performance as a grouping framework—*two-year savers, one-year savers, non-savers*—we arrayed features hypothesized to be key drivers of ACO spending performance and individual ACO two-year spending results. Information about these features was collected from the evaluation's primary data collection and analysis, which are ongoing activities. As such, we continue to collect and analyze information to learn more about ACOs' structures and processes. For additional information about primary data collection, see the Chapter 6. Methods section of this report. For a summary discussion of some of the evaluation's formative qualitative research, see Chapter 3. Formative Analysis of Primary Data.

As described in more detail below, no one Pioneer ACO feature we examined appeared to be independently related to Pioneer ACO spending performance in the first two years of the model. This finding is, in part, a function of the fact that these organizations were selected to participate in the Pioneer model because of their experience or capacity to offer coordinated, patient-centered care and operate in ACO-like arrangements. Thus, Pioneer ACOs displayed limited variation along some key observed structural characteristics that can be measured consistently from available qualitative data. Where there is differentiation, such as in the ACOs' relationships with hospitals, there appears to be multiple paths to achieving savings. One feature suggestive of higher performance is provider engagement—ACOs that cited the use of provider incentives or referral stream management activities appeared to be better positioned to realize lower spending. A descriptive analysis of select ACO characteristics and their relationship to each hypothesis is presented below. Analysis of results and ACOs' activities is an ongoing evaluation activity.

Extent of system integration and the level of cooperation between an ACO and hospitals or hospital systems

Relationships with hospitals may foster care coordination and cost reduction through avoided inpatient utilization and readmissions. However, avoiding unnecessary admissions may also result in reduced revenue for a hospital, which presents conflicting incentives for hospitals that have informal or even formal relationships with ACOs. Nineteen out of the 32 Pioneer ACOs have at least one hospital as a core partner in the ACO; a core partner is defined as an entity that either (a) is legally part of the ACO and part of the ACO application to CMS, and/or (b) shares in the infrastructure costs and responsibilities of the ACO. Pioneer ACOs that have hospitals as core partners, as well as those that do not have a core partner hospital, are represented among each of the three Pioneer spending groups—six of the 10 two-year savers have a hospital as a core partner; six of the 10 one-year savers have a hospital as a core partner; similarly, nine of the 12 non-saver ACOs have a hospital as a core partner. (For a summary of the evaluation's formative qualitative research on relationship across the continuum of care, see 3c. Formative Summary: Structure and Nature of ACO/Provider Relationships—Assessing the Care Continuum in this report.)

Capacity to identify, follow, and monitor beneficiaries through the continuum of care and to analyze beneficiary data from a population perspective

Medicare-covered services encompass a broad continuum of services and provider types. We continue to collect information across all of the ACOs to refine our understanding of the types of providers with which ACOs have a relationship and the nature and evolution of those relationships over time. Based on information collected from the ACOs to date, with few exceptions, all Pioneer ACOs are able to follow beneficiaries within the ACO's set of affiliated physicians and hospitals. As a result, it is difficult to appreciate any clear patterns between beneficiary monitoring and spending outcomes. There is greater diversity in the extent to which Pioneer ACOs can follow their aligned patients beyond the walls of the ACO's providers; however, the more detailed data collection needed to examine this relationship is still in progress. In addition, for those ACOs that did not exit the model, two-year spending performance did not

appear to be related to whether a Pioneer ACO's physicians had a single EHR or multiple EHRs.[14]

Incentives for engaging providers to be cost-conscious and deliver high quality care

One measure of provider engagement to be cost conscious and deliver high quality care is whether the ACO has created incentives (financial or otherwise) for ACO providers and ACO partners across the continuum of care. Based on information available from ACO site visits and quarterly assessments, most non-saver Pioneer ACOs did not provide incentives in the form of financial reward or referral stream management activities. Seven of the 10 Pioneers that had savings in one performance year indicated financial alignment or referral stream incentives for ACO providers, and all but one noted the existence of referral stream management activities, primarily with skilled nursing facilities (SNFs). Half of the 10 two-year savers indicated that financial incentives exist for ACO providers and are distributed based on criteria such as performance on quality measures and number of aligned beneficiaries. In addition, several of the two-year savers indicated that the development of preferred provider relationships is key to their ability to contain cost, with six of the 10 ACOs reporting referral stream management activities with select post-acute care providers (home health agencies, hospice providers, and SNFs) and the development of preferred provider relationships with facilities and high performing individual providers.

During focus groups held with the evaluation team at the April 2014 Pioneer ACO Spring Meeting, Pioneer ACO leaders discussed strategies and challenges related to engaging ACO participating providers and encouraging them to change practices where appropriate to achieve the ACO's goals of improving quality and reducing costs. They discussed providing compensation beyond the promise of shared savings (e.g., payment for attending training and meetings) but also noted significant barriers to engaging physicians in the ACO. Pioneers reported that shared savings are too small (or non-existent) and not immediate enough to motivate physicians—particularly PCPs—who work with other payers that provide more immediate, direct, and larger incentives than the Pioneer model.

Pioneer ACOs also discussed their challenges engaging specialists in ACO-related activities during the April focus groups. They felt that many specialists do not see a role for themselves in a model of care delivery that focuses on population health management. Moreover, they sensed that specialists believe they stand to lose more in revenue than they can gain in shared savings because specialty care is often the target of utilization management. According to one rural ACO, geographic location has presented additional difficulties, as specialists are located in urban areas near tertiary hospitals and do not see themselves as part of an ACO that is located in a remote area. Pioneers also reported barriers to obtaining data and benchmarks to share with specialists, which has made it difficult to engage specialists in a similar manner as PCPs.

[14] Pioneer ACOs that exited the model in 2014 did not have a QA5 interview about their HIT systems, so we do not have such information for those ACOs.

ACO leadership and organization culture

The 32 Pioneer ACO organizations initially selected for participation exhibited significant commitment to the Pioneer ACO model and a degree of willingness to accept risk for the spending of their aligned beneficiaries. In addition, as early adopters, Pioneer ACOs' leadership and cultures may well be considered more forward-thinking than their non-Pioneer counterparts, as they are engaged in shifting away from FFS care delivery to a more value-based approach. Almost all of the Pioneer ACOs had actively engaged leadership at the top levels of their organization, including physician and health information technology (HIT) leaders. While our assessment is impressionistic, Pioneers with consistent savings were more likely to have actively engaged HIT leadership and staff than one-year and non-saver Pioneer ACOs.

While five of the nine Pioneer ACOs that exited the model by the end of 2013 did not show savings according to the evaluation in either year compared to their near markets, two of those that exited, HealthCare Partners Nevada and PrimeCare, were among the three ACOs with the greatest PBPM savings in both 2012 and 2013. Three of these ACOs showed significant savings in 2012 but not 2013, and four that exited did not show significant savings in either year. Though it may seem that the leadership of organizations exiting the model would be less invested in accountable care, the evaluation team found that the engagement of these organizations' leadership in shifting toward value-based care delivery was not observably different from those organizations choosing to remain Pioneer ACOs moving forward. In fact, six of the nine organizations exiting the Pioneer model in the second year became participants in the Medicare Shared Savings Program, showing commitment to accountable care, just not specifically to the Pioneer ACO model.

Pressures from other purchasers for ACO-like care delivery

The majority of Pioneer ACOs reported experiencing pressure from private and public purchasers to engage in risk-based payment contracts, including establishing accountable care-like delivery models. In fact, all but six of the 32 Pioneer ACOs indicated that purchasers such as commercial payers, state payers, and employers in their markets are demanding accountable care-type models. Notably, pressure to engage in risk-based contracts from other purchasers is not related to ACO achievement of significant savings in 2012 and 2013. In fact, of the 26 Pioneer ACOs that faced pressure for accountable care-type arrangements, nine achieved significant savings in both years; another nine had savings in only one performance year, and the remaining eight ACOs showed expenditures on par with their near markets. Without more variation among Pioneer ACOs in risk-based pressure, we are not able to identify a clear relationship between the presence of risk-based contracting pressures from other purchasers and the Pioneer ACOs' achievement of savings in each performance year. Evidence does not suggest that reported pressure from other purchasers is related to evaluation two-year spending results. It may, however, be related to organizations' decisions to continue participating in the model: Pioneer ACOs that did not achieve shared savings under the CMS baseline-benchmark calculation, yet continued to participate, were more likely to operate in markets with multiple Pioneer ACOs than Pioneers that exited after PY2.

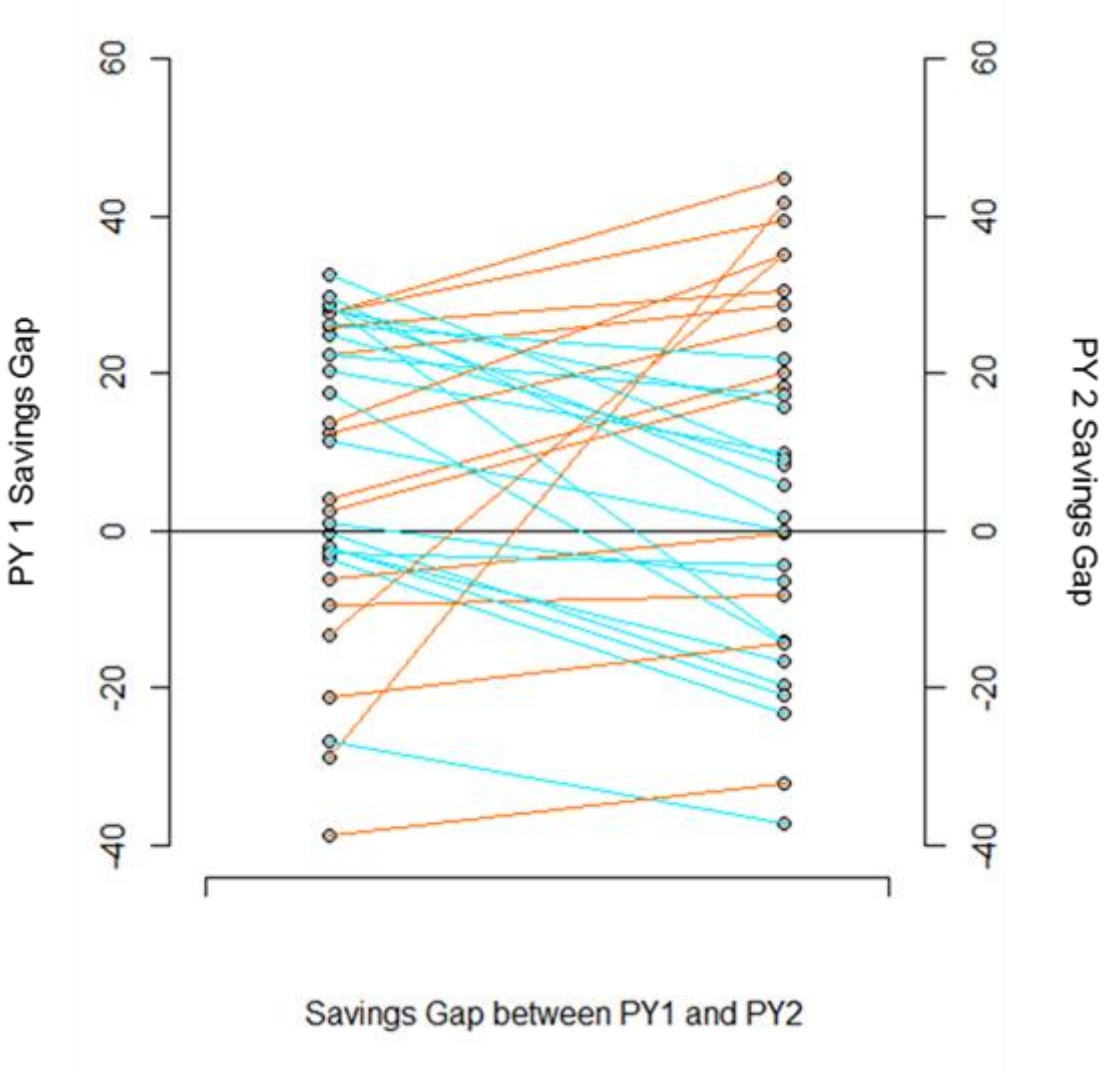
Spending Results Do Not Suggest Spillover Effects of Pioneer ACOs in Near Markets

Of interest in this evaluation is whether Pioneer ACO activities influence other stakeholders in their near markets beyond the aligned Medicare FFS population they serve. For example, as a Pioneer ACO evolves its model of care and practice patterns to meet the Pioneer model goals, market competitors may adopt some of these changes to compete with the Pioneer or the ACO's providers may influence overall culture of medical care provision of the areas in which they practice. ACO providers can serve beneficiaries not aligned with the Pioneer ACO and also work with other providers not affiliated with the ACO. This influence may result in similarly changed spending, utilization, and care quality for beneficiaries not aligned to an ACO. These potential reductions can be referred to as "market spillover" where the Pioneer has directly or indirectly impacted the care of non-aligned beneficiaries from the near market in which they receive care.

To examine evidence of possible spillover, we compared ACOs' risk-adjusted near- and far-market savings estimates for expenditures in the first two performance years of the Pioneer model against two key criteria. One criterion for observing potential spillover is when the near market savings estimates are smaller in absolute value than the far market savings estimates. Recall from earlier in this report that "savings" is actually a negative number, indicating slower spending growth among ACO-aligned beneficiaries compared to the near- or far-market comparison groups. Therefore, when we subtract far market savings from near market savings, a positive value for this savings gap indicates that this first spillover criterion has been met. Figure 3 presents a side-by-side comparison of the savings gaps in PY1 and PY2. ACOs, represented by dots on each of the vertical lines, with positive savings gaps (above the horizontal line), satisfy this first criterion in the respective performance year. In order to observe spillover over both performance years, we looked to identify ACOs with positive savings gaps in 2012 and 2013. In Figure 3 we connected the points representing the savings gaps in each of the two years. Of the 20 ACOs with positive savings gaps in PY1, three of these ACOs have negative gaps in PY2. These three Pioneers have PY1 to PY2 connecting lines that cross the horizontal (zero savings gap) line, thus 17 of the 32 Pioneer ACOs satisfy the first spillover criterion.

However, since changing patterns of care is not an instantaneous event, we also expect spillover within a market to impact expenditures over time. To capture this time element, we specified a second spillover criterion: the savings gap widens (becomes more positive) from PY1 to PY2. In Figure 3, Pioneers that experienced an increase (a movement in the positive direction) in their savings gap from PY1 to PY2 are represented with an orange line and satisfy the second criterion and those experiencing a decrease (movement in the negative direction) in their savings gap are represented with a blue line. Of the 17 ACOs that satisfy the first criterion, only eight satisfy the second spillover criterion as well. These eight ACOs are Franciscan Alliance, Montefiore ACO, Presbyterian Healthcare Services, University of Michigan, Physician Health Partners, OSF Healthcare System, Genesys PHO, and Trinity Pioneer ACO. Note that these results are descriptive; we did not determine statistical significance of any savings gap or savings gap differences.

Figure 3. Comparison of PY1 and PY2 PBPM Expenditure Savings Gaps



Notes: The savings gap in any performance year is equal to the near market savings estimate (a negative number if the ACO indeed achieved savings) minus the far market savings estimate from the statistical models described earlier in this report. Lines connect each ACO's PY1 savings (left side of the figure) with its PY2 savings gap. ACOs with positive savings gaps in each year (points above the horizontal line) and with a greater savings gap in PY2 than PY1 (lines shown in orange) are those satisfying the spillover criteria. Statistical significance not shown.

Although there is some evidence of potential spillover effects among these ACOs, in general, evidence of systemic spillover amongst Pioneers with regard to total Medicare expenditures appears weak. Only about half of Pioneers (eight of 17) satisfying the first spillover criterion also satisfy the second, while only slightly more than half of Pioneers (eight of 14) satisfying the second criterion also satisfy the first. In other words, satisfying one criterion is for the most part, uncorrelated with satisfying the other; this low degree of association between the two criteria suggests there is no systemic spillover from Pioneers to their near markets.

It is important to recognize that other market forces, not just the mere presence of the Pioneer, may be the cause of changes in healthcare spending, utilization, and quality of care among the competing entities. Factors such as state regulations, an increasing prevalence of CMS initiatives, or changes in the culture of medical care (driven by providers themselves or perhaps other stakeholders) could all impact these outcomes. Furthermore, Pioneer ACOs in their current (or even pre-Pioneer configurations) may have affected their local markets long before any Medicare ACO models launched. All these potential factors limit the degree to which changes observed in the near markets can be directly attributed to the Pioneer ACO model.

While using the far market spending estimates is a conservative approach to assessing market spillover among FFS beneficiaries, the expenditures are not adjusted for price differences between an ACO's near and far markets, so comparing Medicare payments across them could be affected by differences and changes in the hospital wage index and physician practice cost index. This reality may lead to under- or over-estimates of impacts on expenditures, depending on differences in the level of the wage indices across markets and on how the wage indices change over time between the ACO and far markets. Our preliminary price standardization analyses indicate that for a few ACOs, accounting for prices across markets may be important; for others, estimates are not sensitive to price standardization. (See "Exploratory Analysis of Methods: Effect of Preliminary Price Standardization Analysis on Far Market Spending Results" in the Methods section for additional discussion of the sensitivity of far market results to our preliminary price standardization analysis.)

Commercial Payers Report that Medicare ACOs have Increased Awareness of ACOs and Enabled New Risk-Based Commercial Contracts in Markets Where the ACOs Operate

The evaluation team interviewed three national commercial payers and two regional commercial payers to gain insights about market spillover effects of both Medicare and commercial ACOs; some of the payers interviewed have commercial ACO products that impact the Medicare ACOs and vice versa. The qualitative findings presented below are based on these payer interviews. The interviews suggest that regional market dynamics can confound the ability to discern individual market spillover effects attributable to Medicare and commercial ACOs. Thus, regional market dynamics must be considered on a case-by-case basis.

General Trends

The five commercial payers uniformly reported that the impact of Medicare and commercial ACOs on the health care market and on key stakeholder groups is complex and multidirectional. The payers indicated Medicare ACO spillover effects are largely dependent upon regional and organizational dynamics such as providers' experience managing risk and the level of provider and payer consolidation present in the marketplace. Despite ACOs' varying marketplace characteristics, the majority of payers interviewed concur that the Medicare ACOs in their respective service areas generally have increased patient and provider awareness of the accountable care delivery model.

Contracting and Pricing Changes

The three national payers interviewed reported that Medicare ACOs, namely Pioneer ACOs, have not only increased provider engagement in existing value-based delivery models but also enabled the formation of new, large-scale, risk-based commercial contracts. For example, one payer noted that providers currently participating in Pioneer ACOs (i.e., ACOs with downside risk) are especially open to engaging in conversations with commercial payers about considering additional value-based contracts. The payer attributed the providers' receptivity to additional value-based contracts to gaining direct risk management experience and having already invested in the required infrastructure and process redesign to operationalize participation in value-based contracts. Furthermore, the payer underscored that Medicare accountable care initiatives have fundamentally changed the payer's contracting and investment strategy as it plans to transition 50 percent of its current provider contracts to value-based contracts by 2017. This strategic shift is expected to help provider partners fund necessary investments, such as technology applications, vital to participation in value-based contracts. Another payer also highlighted the role of MSSP ACOs in helping organizations prepare to engage in risk-based commercial contracts, as the payer described MSSP ACOs being a good "training ground" for providers to gain experience in operating in an outcomes-based contract prior to engaging in more nuanced commercial risk-based contracts.

Market Structure and Market Consolidation

Payer interviews also included discussions of trends in market consolidation, referring to activities such as provider mergers (horizontal integration) and the acquisition of provider groups by hospitals and/or health systems (vertical integration). Two payers indicated that they did not believe consolidation in their market is ACO-driven; rather, consolidation is driven by a broader health care system-level evolution toward value-based care and individual provider focus on achieving efficiencies. One national payer noted that vertical integration of regional providers was particularly pronounced, but the driving force behind that trend was difficult to isolate. Additionally, payers said that existing and emerging CMMI initiatives such as the Health Care Innovation Awards, State Innovation Model initiative, and the Bundled Payments for Care Improvement model are likely to also have an impact on regional market dynamics.

Provider-Driven Quality and Care Coordination Impact on Non-Medicare FFS Patient Populations

Two national payers and one regional payer suggested that the presence of Medicare ACOs has acted as a catalyst for improving quality metrics in their respective markets. One large national payer in particular reported positive effects of Medicare ACOs' approach to quality improvement on the care delivered to its commercial ACO members. The commercial payer basing the commercial ACO's quality performance metrics on the Medicare ACO quality metrics largely drove these effects. Nevertheless, while the commercial payer mirrored some aspects of the Medicare ACO model to generate high-quality patient outcomes and coordinate care, it also used its ability to implement unique benefit designs and financial incentives to encourage patients to obtain their health care services from providers within the commercial ACO's provider network.

Doing so enabled the ACO to better manage patient care and ultimately allowed the ACO to deliver high-quality health care and achieve optimal patient outcomes.

Two payers indicated that initiatives and processes developed by Medicare and commercial ACOs in their marketplace seemed to improve care coordination across all their patient populations. One national payer reported that it is using care managers who are part of its commercial ACOs to improve patient outcomes and satisfaction scores and lower costs for its broader patient population, including its commercial, Medicare Advantage, and Medicare FFS populations. Another national payer reported that the presence of Medicare Pioneer ACOs and other national reform efforts have prompted leading providers to collaborate with one another when treating patients, resulting in improved outcomes and reduced costs. However, one national payer cautioned that the level of collaboration between physician-led and hospital-led ACOs might be less pronounced in certain regions where the two types of ACOs compete for patients.

2b. Utilization Results: Core Measures

We examined Pioneer ACOs' changes in per-beneficiary utilization of acute inpatient care, E&M services, imaging services, tests, and procedures to understand the utilization changes underlying our spending estimates. Given the large share of total spending on acute care hospital services (25 percent of total Medicare spending in 2012) and services reimbursed under the physician fee schedule (12 percent of Medicare spending in 2012),[15] demonstrating lower Medicare spending growth relative to the near market comparison group is likely driven by an ACO's ability to reduce duplicative or unnecessary inpatient stays or physician services.

Pooled Pioneer Results Generally Show Reduced Utilization Across Services in Both Performance Years

As shown in the pooled results in Table 4, beneficiaries aligned with Pioneer ACOs in the first two years of the Pioneer ACO model had, on average, significantly fewer acute inpatient stays and days while using fewer Part B services (E&M services, procedures, imaging, and tests) than expected given the trend in the near market comparison group. (Pooled Pioneer results for additional utilization and spending measures are shown in Appendix 2. Additional Spending and Utilization Results)

Table 4. Pooled Pioneer ACO Utilization Results, 2012 and 2013

Outcome	2012	95% CI	2013	95% CI
Aggregated results				
Acute inpatient stays	**-9,926**	**-11,498 to -8,354**	**-8,444**	**-10,288 to -6,600**
Acute inpatient days	**-40,799**	**-50,993 to -30,606**	**-15,314**	**-26,692 to -3,936**

[15] See Medicare Payment Advisory Commission, "Data Book: Health Care Spending and the Medicare Program," June 2014, p. 11. Available at http://www.medpac.gov/documents/publications/jun14databookentirereport.pdf?sfvrsn=1

Outcome	2012	95% CI	2013	95% CI
Primary care evaluation and management (E&M) services	**-227,500**	**-235,167 to -219,834**	**-246,145**	**-255,778 to -236,512**
Procedures	**-235,901**	**-269,542 to -202,261**	**-184,453**	**-227,791 to -141,116**
Imaging services	**-138,519**	**-151,823 to -125,215**	**-78,768**	**-95,123 to -62,413**
Tests	**-411,107**	**-451,688 to -370,527**	**-404,397**	**452,518 to -356,277**
Per beneficiary month				
Acute care inpatient stays (per 1,000 beneficiary months)	**-1.26**	**-1.46 to -1.06**	**-0.90**	**-1.10 to -0.71**
Acute care inpatient days (per 100 beneficiary months)	**-0.52**	**-0.65 to -0.39**	**-0.16**	**-0.29 to -0.04**
Primary care evaluation and management (E&M) services (per 100 beneficiary months)	**-2.90**	**-3.00 to -2.80**	**-2.63**	**-2.74 to -2.53**
Procedures (per 100 beneficiary months)	**-3.00**	**-3.43 to -2.58**	**-1.97**	**-2.44 to -1.51**
Imaging services (per 100 beneficiary months)	**-1.76**	**-1.93 to -1.59**	**-0.84**	**-1.02 to -0.67**
Tests (per 100 beneficiary months)	**-5.24**	**-5.75 to -4.72**	**-4.33**	**-4.84 to -3.81**

Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.
Notes: Total pooled beneficiary months for Pioneer ACOs was 7,851,613 in 2012 and 9,349,724 in 2013. This table pools the estimated effects over all 32 Pioneer ACOs and aligned-beneficiaries that were part of the ACO model at the beginning of the second performance year. See the Methods section for a full list of measures and definitions. Bold estimates indicate statistical significance at the p<0.05 level, though all estimates in this table are statistically significant. Results are risk adjusted using Oaxaca-Blinder reweighting method as discussed in the Methods section.

Pioneer ACOs with Savings in Both Performance Years Showed Steeper Reductions in Inpatient Stays Compared to their Near Market; Nearly All Pioneer ACOs had Significantly Lower-Than-Expected of Utilization Primary Care E&M Services

As shown in Table 5 below, the utilization results varied by Pioneer ACO. For example, in 2012, the difference in utilization of acute inpatient stays ranged by ACO from a reduction of 4.05 acute inpatient stays per 1,000 beneficiary months to an increase of 1.85 acute inpatient stays per 1,000 relative to their near markets. The number of Pioneer ACOs that showed significantly lower than expected utilization compared to their near markets varied by service. For example, only 16 Pioneer ACOs in 2012 and 12 Pioneer ACOs in 2013 had significant reductions in acute inpatient stays; in contrast, nearly all Pioneer ACOs had lower than expected utilization of E&M services compared to their near markets in both performance years. Use of other Part B services generally tracked two-year spending results.

Table 5. Pioneer ACO PBPM Spending and Utilization Differences by Spending Performance Compared to Near Markets, 2012 and 2013

	Spending 2012	Spending 2013	Inpatient Stays 2012	Inpatient Stays 2013	E&M 2012	E&M 2013	Procedures 2012	Procedures 2013	Imaging 2012	Imaging 2013	Tests 2012	Tests 2013
Two-year savers												
HCP-NV*	**−$94.29**	**−$95.62**	**−4.05**	**−3.31**	**−4.51**	**−3.51**	**−12.71**	**−7.06**	**−5.27**	**−5.68**	**−21.49**	**−25.30**
Michigan Pioneer	**−$89.05**	**−$61.08**	−2.05	−0.42	**−2.24**	**−2.03**	**−4.61**	−1.75	**−1.08**	**−2.95**	**5.73**	−1.60
PrimeCare**	**−$87.64**	**−$72.35**	−1.35	**−2.89**	−0.33	**−1.26**	**−8.60**	**−8.87**	**−2.45**	**−1.41**	**−11.94**	**−16.21**
Dartmouth-Hitchcock	**−$87.38**	**−$36.57**	**−3.04**	**−2.17**	**4.88**	**3.95**	**−3.08**	**−1.49**	**−1.47**	**−0.71**	**−3.68**	**−7.21**
BIDCO	**−$86.47**	**−$56.05**	**−4.06**	**−3.57**	**−2.52**	**−1.90**	**−5.65**	**−5.85**	**−3.43**	**−2.67**	**−7.99**	**−22.71**
Steward	**−$55.70**	**−$46.42**	**−2.18**	**−3.27**	**−1.75**	**−2.18**	**−5.71**	**−4.53**	**−2.99**	**−2.18**	**−7.58**	**−7.14**
Sharp	**−$53.37**	**−$41.50**	−0.80	−0.09	**−2.60**	**−0.93**	**−6.70**	**−5.25**	**−2.87**	**−1.91**	**−10.05**	**−8.14**
Bellin-ThedaCare	**−$48.31**	**−$44.65**	**−2.49**	**−2.71**	**−1.48**	−0.31	0.02	−0.23	**−2.70**	**−2.30**	**−20.14**	**−11.09**
Trinity	**−$42.72**	**−$54.61**	**−2.87**	**−3.10**	**−4.10**	**−9.10**	**−5.53**	**−7.01**	**−1.53**	**−3.54**	**−4.66**	**−18.47**
Atrius	**−$46.04**	**−$66.89**	**−1.64**	**−2.90**	**−4.44**	**−5.26**	**−3.82**	**−4.61**	**−2.16**	**−2.63**	−2.56	1.65
One-year savers												
HCP-CA*	**−$70.15**	−$22.99	**−1.99**	−0.43	**−4.45**	**−2.93**	**−4.77**	−1.61	**−2.56**	**−1.21**	**−13.02**	**−4.31**
MACIPA	**−$55.82**	−$35.00	**−2.72**	**−2.05**	**−1.42**	**−2.14**	−2.47	0.69	**−2.28**	**−1.43**	−0.11	-1.07
Monarch	**−$54.20**	**$37.38**	0.04	1.13	**−4.85**	**−4.18**	−2.12	**−10.76**	−0.68	0.97	0.03	**8.14**
Brown & Toland	**−$52.54**	−$27.31	**−1.02**	−0.34	**−4.50**	**−3.42**	**−5.66**	**−3.72**	**−2.77**	**−1.70**	**−7.32**	**−10.57**
Beacon	**−$50.91**	−$13.18	−0.67	−1.64	**−3.25**	**−9.02**	−0.70	**−3.59**	−0.64	−0.97	**−13.28**	**−18.88**
Plus!**	**−$38.72**	$2.94	**−1.76**	−0.16	**−3.90**	**−1.51**	−1.96	**2.75**	**−1.73**	**2.60**	**−7.15**	**18.99**
Partners	**−$30.46**	**$47.27**	**−1.59**	**1.02**	**−3.96**	**−1.99**	**−3.12**	**−4.53**	**−2.14**	0.18	−0.05	**−3.14**
Heritage	**−$26.75**	$7.81	−0.40	−0.33	**−4.86**	**−6.43**	**−2.41**	−0.87	**−2.03**	−0.53	**−13.20**	**−11.42**
OSF	**−$19.90**	$0.39	−0.39	0.16	**−0.77**	0.25	**1.69**	**2.71**	0.33	**1.42**	**−6.85**	**−8.94**
Allina	−$12.20	**−$47.07**	−0.97	**−1.88**	**−4.02**	**−3.90**	−0.52	−0.67	0.45	−0.13	**−3.26**	**−3.68**
Non-savers												

	Spend-ing 2012	Spend-ing 2013	Inpatient Stays 2012	Inpatient Stays 2013	E&M 2012	E&M 2013	Proc-edures 2012	Proc-edures 2013	Imaging 2012	Imaging 2013	Tests 2012	Tests 2013
Montefiore	−$25.17	$6.04	**−1.82**	0.89	−0.36	**−1.61**	**−7.74**	**−6.47**	−0.14	0.66	**−14.16**	**−34.32**
Fairview	−$19.41	$4.02	**−1.28**	0.68	**−5.48**	**−5.36**	0.77	−0.65	−0.89	−0.80	**−6.94**	−1.80
Univ. of Michigan*	−$16.82	$20.68	−0.85	−0.85	**−2.09**	**−1.37**	**−4.28**	−1.43	**−1.47**	−0.72	**−2.33**	**3.85**
Seton*	−$15.25	−$3.00	−0.23	−0.90	**−3.80**	**−3.58**	−2.87	−2.24	**−1.71**	−1.20	**6.77**	**15.03**
Presbyterian**	−$14.72	$12.72	−0.46	0.11	**−2.89**	**−1.15**	−0.47	**−1.97**	**−1.57**	**−1.76**	**−6.12**	**−7.35**
Park Nicollet	−$9.54	−$18.90	1.04	0.28	**−3.08**	**−2.33**	−1.09	−0.97	**−1.51**	**−1.24**	**49.29**	**57.24**
Phys. Health Partners*	−$6.41	$15.64	−0.63	0.49	**−2.37**	**−1.72**	1.79	1.50	−0.82	−0.51	1.27	**7.79**
Renaissance	−$3.99	$4.81	**−1.16**	**−1.42**	**−3.04**	**−3.00**	0.73	**4.59**	−0.43	0.34	−0.76	**−5.10**
Genesys PHO	−$1.38	$8.45	−0.05	0.10	**−3.16**	**−2.34**	**−3.54**	−1.25	**−1.66**	−1.22	**4.62**	**13.63**
Banner	$5.98	$7.59	**−0.81**	**−2.27**	**−3.31**	**−3.05**	0.04	2.11	**−1.55**	**−1.04**	**−2.55**	**3.59**
JSA*	$6.92	$10.96	**1.85**	0.41	**−1.74**	**−2.39**	−2.03	−2.60	−0.93	−0.31	**−10.09**	**4.85**
Franciscan	$20.53	$25.82	**1.40**	**1.64**	**−0.86**	0.07	−0.30	**3.60**	**1.03**	0.47	**−3.86**	**−10.80**

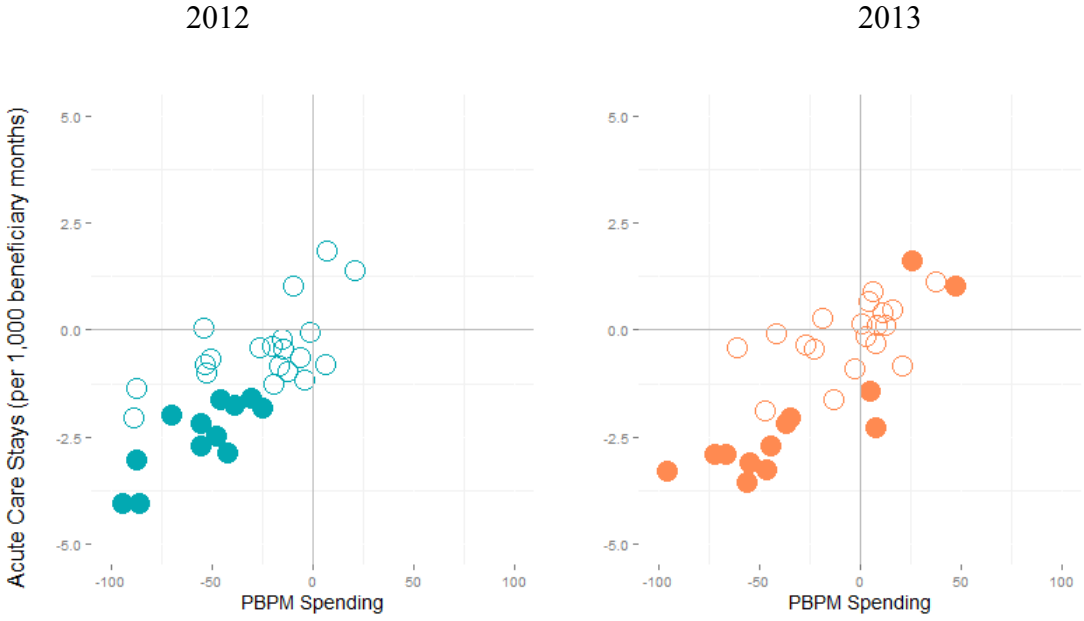
Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.
*Notes: *ACOs that ended participation as a Pioneer ACO as of December 31, 2013 and transitioned to being a Medicare Shared Savings Program ACO.**ACOs that ended participation as any Medicare ACO as of December 31, 2013.A negative number indicates savings (spending measure) or lower utilization growth from the baseline period relative to the near market. Names of the ACOs have been shortened to fit the page. Measure definitions can be found in the methods section. All utilization is measured as the unit per 100 beneficiary months, except for acute stays, which is measured as stays per 1,000 beneficiary months. Bolded estimates indicate statistical significance at the p<0.05 level. PBPM is per beneficiary per month.*

Acute Hospital Stays

As noted above, 16 ACOs had significantly fewer acute hospital stays than expected based on their near markets' experience, ranging from –0.81 (95% CI, –0.08 to –1.55) to –4.06 (95% CI, –3.06 to –5.05) per 1,000 beneficiary months in 2012. In 2013, that number fell to 12 ACOs with significantly fewer stays, ranging from –1.42 (95% CI, –0.36 to –2.47) to –3.57 (95% CI, –2.59 to –4.56) fewer stays per 1,000 beneficiary months. Three organizations had significantly more stays than expected: Franciscan Alliance (2012 and 2013), JSA Care Partners (2012), and Partners Healthcare (2013). The remaining ACOs, 14 in 2012 and 18 in 2013, had utilization changes on par with their near markets.

Reducing utilization of acute care hospital stays was correlated with savings in both performance years as shown in Figure 4. Of the 19 ACOs that had significantly lower spending per beneficiary in 2012, 12 also showed significantly fewer acute care stays than expected based on their near markets' experience. In 2013, of the 11 ACOs that had significantly lower spending per beneficiary, nine showed significant reductions in acute care stays. The 10 Pioneers in the two-year savers group were more likely than the other Pioneers to have significantly fewer acute care stays and they also showed larger differences in acute care stays relative to baseline compared to their near markets. In contrast, only two of the non-savers group ACOs (Renaissance and Banner) had significantly fewer acute care stays in both 2012 and 2013.

Figure 4. Pioneer ACOs' Differences in Acute Care Stays from Baseline (y-axis) by Differences in PBPM Spending from Baseline (x-axis) Compared to Near Markets

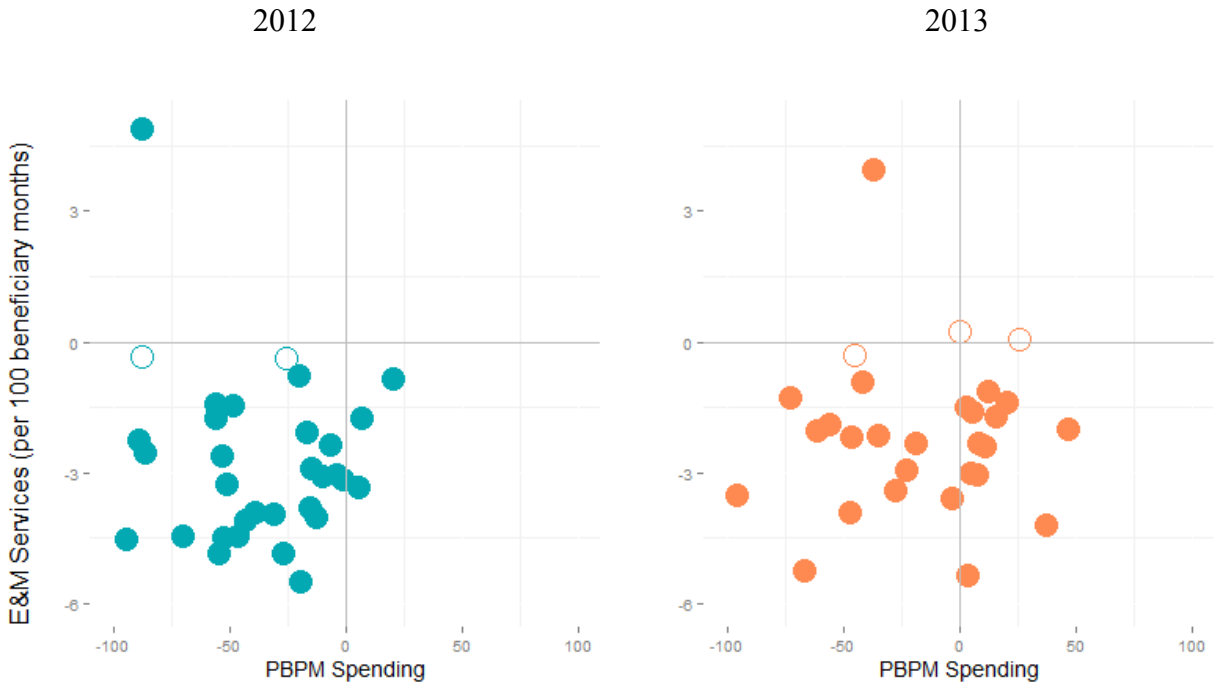


Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.
Notes: Acute care stays includes covered stays for acute care hospitals and critical access hospitals. Non-statistically significant spending results are shown with hollow circles; significant spending results are shown by solid points at the p<0.05 level. PBPM is per beneficiary per month.

Evaluation and Management (E&M) Services

As shown in Figure 5, nearly all Pioneer ACOs had significantly lower-than-expected primary care E&M services utilization in 2012 (29 ACOs) and 2013 (28 ACOs).[16] Among those Pioneer ACOs that showed significantly lower-than-expected E&M utilization compared to their near markets, the difference ranged from –0.77 (95% CI, –0.33 to –1.21) to –5.48 (95% CI, –4.93 to –6.03) fewer visits per 100 beneficiary months in 2012 and from –0.93 (95% CI, –0.48 to –1.39) to –9.1 (95% CI, –8.38 to –9.82) per 100 beneficiary months in 2013. The organizations that had E&M utilization trends on par with their near markets were not the same in 2012 and 2013. In contrast to the acute hospital stays shown in Figure 4, changes in use of E&M services generally appear less correlated with total PBPM spending results.

Figure 5. Pioneer ACOs' Differences in E&M Services from Baseline (y-axis) by Differences in PBPM Spending from Baseline Compared to Near Markets



Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.
Notes: E&M services were counted only for providers in the specialties of general medicine, family medicine, internal medicine and geriatrics. Non-statistically significant spending results are shown with hollow circles; significant spending results are shown by solid points at the p<0.05 level. PBPM is per beneficiary per month.

Only one Pioneer ACO—Dartmouth-Hitchcock—had significantly *higher-than-expected* E&M utilization in 2012 (4.88 per 100 beneficiary months, 95% CI, 4.38 to 5.37) and 2013 (3.95 per 100 beneficiary months, 95% CI, 3.56 to 4.34). In spite of a greater increase in the utilization of

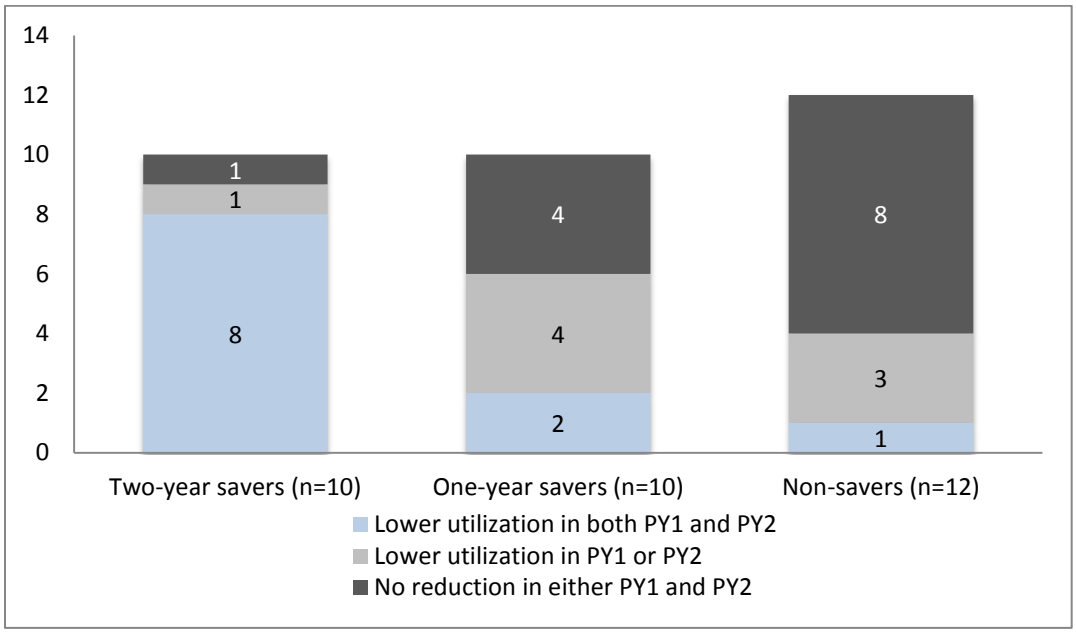
[16] E&M services were counted only for providers in the specialties of general medicine, family medicine, internal medicine, and geriatrics.

E&M services, this ACO showed savings in PBPM spending in both years, in part from significantly lower acute care stays, procedures, imaging, and tests in both years.

Other Part B Services[17]

Procedures. Procedures include a wide array of services covered under the Part B physician fee schedule, including cardiovascular, orthopedic, eye, endoscopy, oncology, and anesthesia services and procedures. As shown in Figure 6, among the two-year savers, eight of the 10 Pioneers had lower utilization of procedures in both performance years. In contrast, among the one-year savers, just two of them showed lower utilization of procedures in both years, and only one of the non-saver ACOs (Montefiore) showed significant savings in procedures in both years. In 2013, four Pioneers had significantly higher-than-expected utilization of procedures: Franciscan, OSF, Plus!, and Renaissance. These ACOs—represented in either the one-year savers or non-savers groups—also did not reduce utilization in several other core measures as noted elsewhere. (For additional scatter plots of procedures, imaging, and tests against PBPM spending results for 2012 and 2013, see Appendix 1.)

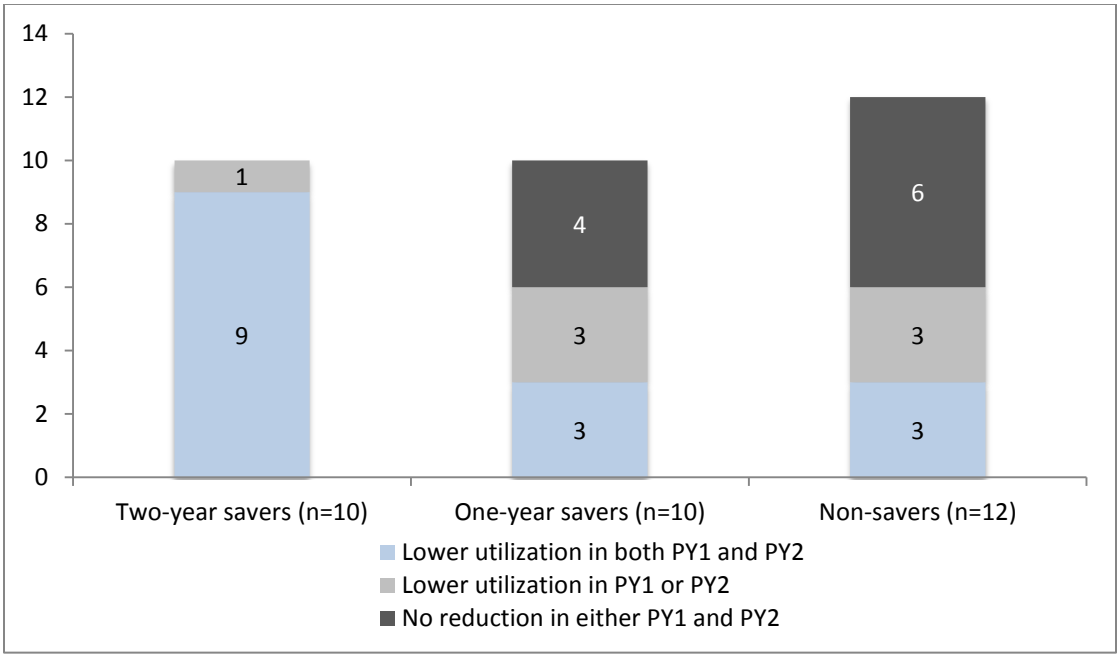
Figure 6. Count of Pioneer ACOs with Significantly Lower Utilization of Procedures in PY1 and PY2 Versus Near Market, by Savings Group



[17]These other part B services in this section are grouped by Berenson-Egger Type of Service (BETOS) codes. The coding system covers all Healthcare Common Procedure Coding System (HCPCS) codes; assigns a HCPCS code to only one BETOS code; consists of readily understood clinical categories (as opposed to statistical or financial categories); consists of categories that permit objective assignment; is stable over time; and is relatively immune to minor changes in technology or practice patterns. For a link to BETOS categories and codes see: https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/MedicareFeeforSvcPartsAB/downloads/BETOSDescCodes.pdf

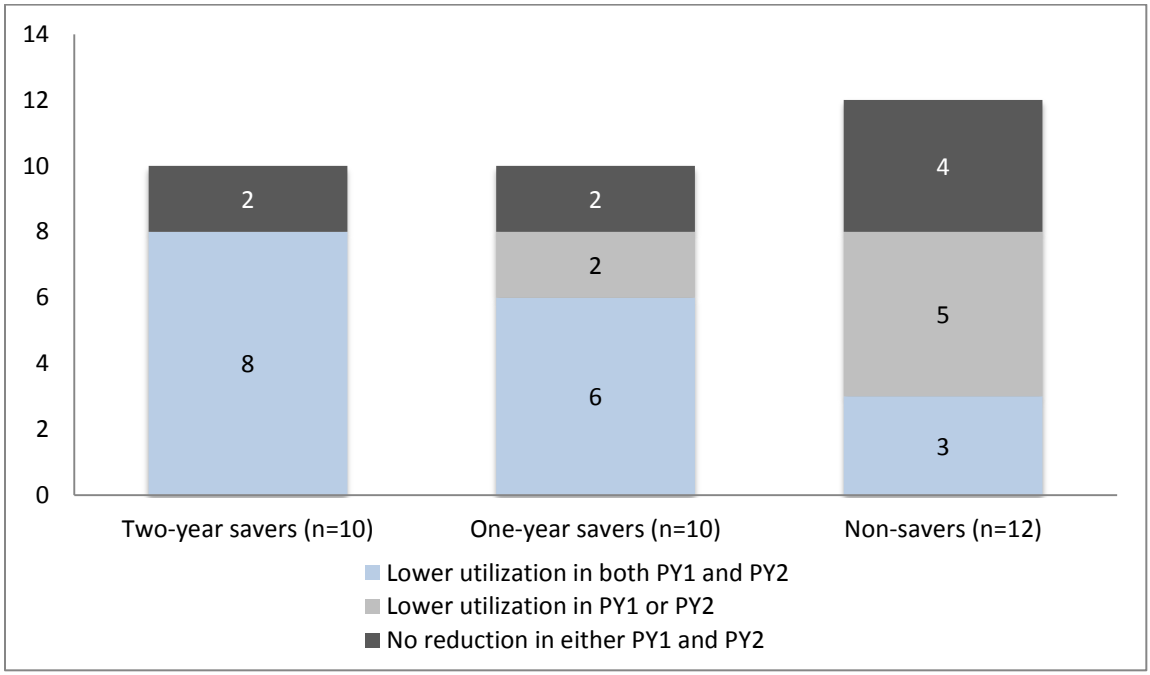
Imaging Services. Imaging services include x-rays, CAT scans, MRIs, and echography. In general, decreases in PBPM spending were accompanied by decreases in imaging in both years. Of the 10 two-year savers, nine had significantly lower imaging rates compared to their near markets across both performance years (Figure 7). In contrast, only three (Presbyterian, Park Nicollet, and Banner) of the 12 Pioneers in the non-savers group and three (Brown & Toland, HCP-CA, MACIPA) of the 10 one-year savers had significantly lower imaging utilization across both performance years. One ACO, Franciscan, had higher utilization in 2012, and two ACOs showed significantly higher imaging utilization in 2013, Plus! and OSF.

Figure 7. Count of Pioneer ACOs with Significantly Lower Utilization of Imaging in PY1 and PY2 Versus Near Market, by Savings Group



Tests. Tests span a wide range of common services from routine blood work and urinalysis to electrocardiograms, EKG monitoring and cardiac stress tests. Test utilization trends generally varied with spending results, with eight of 10 two-year saver Pioneer ACOs also having lower test use in both years (Figure 8). Six of the 10 Pioneers in the one-year savers groups had significantly lower utilization of tests in both years. In contrast, just three (Montefiore, Presbyterian, and Franciscan) of the 12 Pioneer ACOs in the non-savers group had significantly lower utilization of tests in both years. The number of Pioneers with significantly higher than expected test use from baseline compared to their near markets increased from four Pioneers (Genesys, Michigan Pioneer, Park Nicollet and Seton) in 2012 to nine Pioneers in 2013.

Figure 8. Count of Pioneer ACOs with Significantly Lower Utilization of Tests in PY1 and PY2 Versus Near Market, by Savings Group



2c. Claims-based Quality Measures

We compared Pioneer ACOs to their near markets on four claims-based quality measures:[18]

1. Hospital-wide all-cause unplanned readmissions
2. Unplanned admissions to an acute hospital during or after a SNF episode
3. Admissions to an acute hospital for ambulatory care-sensitive conditions, as defined by the Agency for Healthcare Research and Quality's Prevention Quality Indicators (PQIs)[19]
4. Post-discharge physician visits within 7, 14, and 30 days

As shown in Table 6, there was no significant reduction in 30-day acute hospital readmissions, relative to near market trend, for pooled Pioneer ACOs in either performance year.

[18] As a requirement of participation, Pioneer ACOs were also held accountable for their quality performance on a set of quality measures, which can be found here: http://innovation.cms.gov/initiatives/Pioneer-aco-model/
[19] More information available here: http://www.qualityindicators.ahrq.gov/modules/pqi_resources.aspx

Table 6. Pioneer ACO 30-Day Readmission Differences Relative to Near Market by Spending Performance, 2012 and 2013

Pioneer ACO	Readmissions 2012 (%)	Readmissions 2013 (%)
All ACOs pooled	-2.34	3.14
Two-year savers		
HCP-NV *	-1.35	-0.03
Michigan Pioneer	0.02	0.47
PrimeCare**	1.30	**-2.00**
Dartmouth-Hitchcock	-0.50	0.63
BIDCO	**-1.66**	**-1.15**
Steward	-0.76	-0.53
Sharp	-0.13	-0.57
Bellin-ThedaCare	-0.98	-0.45
Trinity	-0.74	0.90
Atrius	-0.88	-0.55
One-year savers		
HCP-CA*	-0.18	0.16
MACIPA	-0.68	**-2.18**
Monarch	1.40	0.59
Brown & Toland	-1.32	-0.61
Beacon	-0.12	-0.63
Plus!**	-0.35	-0.27
Partners	-0.82	0.55
Heritage	**-0.98**	0.26
OSF	0.05	0.68
Allina	-0.27	-0.21
Non-savers		
Montefiore	-0.29	0.92
Fairview	0.36	**1.98**
Univ. of Michigan*	0.93	0.79
Seton*	1.87	-0.96
Presbyterian**	-0.28	-0.68
Park Nicollet	0.74	1.13
Physician Health Partners*	0.83	-0.60
Renaissance	-0.02	-0.47
Genesys PHO	0.93	0.22
Banner	0.04	0.16
JSA*	1.57	-0.72
Franciscan	1.29	**2.15**

Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.
*Notes: *ACOs that ended participation as a Pioneer ACO as of December 31, 2013 and transitioned to being a Medicare Shared Savings Program ACO.**ACOs that ended participation as any Medicare ACO as of December 31, 2013. Percentages represent relative differences in hospital-wide all-cause unplanned readmissions per 1,000 admissions with respect to each ACO's corresponding near market rate. Readmissions are defined based on the CMS readmission identification algorithm (HWR) but use the same risk adjusters as the expenditure and utilization measures, rather than the risk adjusters in the official CMS HWR measure. Bolded estimates indicate statistical significance at the p<0.05 level.*

Individual Pioneer ACO results revealed no significant difference in readmissions in either 2012 or 2013 by spending performance relative to near market trend for 26 of the 32 Pioneer ACOs. Just one ACO—BIDCO—had a significant reduction in readmissions in both performance years: –1.66 percent in 2012 (95% CI, –0.51 to –2.81 percent) and –1.15 percent in 2013 (95% CI, –0.05 to –2.25 percent). Three other ACOs (PrimeCare, MACIPA, and Heritage) had significant reductions in one performance year, and two ACOs (Fairview and Franciscan) had significant increases in one performance year.

As noted earlier, most Pioneer ACOs decreased their acute hospital admission rates. It is possible that as a hospital decreases its admission rate over time, it prevents admissions among patients who had previously been more discretionary admits. After the number of admissions decreases for such patients, the patients who are left to admit may be sicker, on average, than patients in the comparison group. Since they are sicker, it may be more difficult to prevent readmissions for them. So, with most Pioneers showing no change in their readmission rates, ACOs' care transition efforts may be helping sicker patients avoid readmission.

To examine the possibility that Pioneer ACOs may be admitting higher proportions of sicker beneficiaries than providers in their near markets, we analyzed the differences in Pioneer ACOs' trends (net of trends in the ACOs' near markets) in the case mix factors used for risk adjustment over time, as well as trends for a number of CCW conditions, for all inpatient admissions. We then compared the ACOs' readmission differences to the net time trends in each factor. Correlation coefficients from these comparisons are shown in patients—has risen over time.

Table 7. On average, the Pioneers experienced a more negative trend in risk factors relative to their near market from baseline to 2012; from baseline to 2013, the trends are mixed. A negative trend indicates that fewer admissions with these risk factors are occurring in the performance years relative to the baseline years, and mostly positive but small-in-magnitude correlations with the readmission differences indicate that readmissions are following this same trend. This finding suggests that, overall, there is little evidence that the Pioneers' case mix—or mix of sicker patients—has risen over time.

Table 7. Correlation Coefficients between 30-Day Readmission Differences Estimates and Net Time Trends in Readmission Risk Factors, 2012 and 2013

Risk Factor	Pioneer Average Net Change Baseline to 2012 (%)	Correlation with Readmission Differences 2012	Pioneer Average Net Change Baseline to 2013 (%)	Correlation with Readmission Differences 2013
Age 75-84	-0.07	-0.14	**-0.86**	0.06
Age 85+	**-1.04**	0.37	**-2.28**	-0.01
Current AMI	-0.07	-0.05	0.00	0.25
Current hip fracture	0.17	0.19	0.00	-0.37
Current stroke/TIA	-0.23	0.24	0.12	0.11
Current colorectal cancer	0.05	0.10	-0.03	-0.03
Current lung cancer	-0.11	0.14	0.02	0.27
Prior 3-year AMI	**-0.27**	0.12	-0.21	0.02
Prior 3-year colorectal cancer	-0.04	0.12	-0.05	0.11
Prior 3-year hip fracture	-0.08	0.14	-0.12	-0.07
Prior 3-year lung cancer	-0.06	0.17	0.08	0.18
Prior 3-year stroke/TIA	-0.51	0.19	0.21	0.02
Medicaid dual eligible	**-1.36**	-0.06	**-0.42**	0.42
Died	**-1.30**	0.30	**-0.38**	0.03
Number of CCW chronic conditions	-0.09	0.46	0.02	0.39

Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.
Notes: Readmissions are hospital-wide all-cause unplanned readmissions (HWR) based on CMS' readmission identification algorithm but use the same risk adjusters as the expenditure and utilization measures, rather than the risk adjusters in the official CMS HWR measure. Bolded estimates indicate statistical significance at the $p<0.05$ level.

Table 8 presents pooled results for three PQI measures: COPD or older adult asthma, heart failure, and admission for any PQI condition. In addition to COPD or older adult asthma, and heart failure, PQI conditions include diabetes (short- and long-term complications, uncontrolled diabetes, and lower extremity amputations), hypertension, dehydration, bacterial pneumonia, urinary tract infection, and angina. The PQI measures were calculated as rates of PQI admissions per any hospital admission. Although these results indicated an increase in admissions for heart failure in 2012, there were significant reductions in admissions for all PQI conditions, and specifically for COPD, older adult asthma, and heart failure in 2013. In fact, compared to the estimated reduction in all admissions for Pioneers in 2013, reductions in PQIs can account for at least all of the reductions in acute inpatient stays. However, because this measure considers admissions for a PQI condition relative to all admissions, it is possible that these patients are still being admitted but not for a PQI, so the resulting change in the number of total admissions for these patients may be smaller than the reduction in PQI admissions.

Table 8. Pooled Pioneer PQI Admission Results Compared to Near Markets, 2012 and 2013

Outcome	2012	95% CI	2013	95% CI
Aggregated results (total change in PQI admissions)				
COPD or adult asthma	-677	-1,378 to 24	**-1,422**	**-2,312 to -532**
Heart failure	**872**	**431 to 1,313**	**-866**	**-1,419 to -314**
Any PQI admission	-2,057	-5,679 to 1,565	**-12,594**	**-17,630 to -7,558**
Per 1,000 admissions				
COPD or adult asthma	-5.50	-11.20 to 0.19	**-9.40**	**-15.29 to -3.52**
Heart failure	**12.81**	**6.33 to 19.30**	**-10.42**	**-17.07 to -3.77**
Any PQI admission	-4.23	-11.67 to 3.21	**-21.32**	**-29.84 to -12.79**

Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.
Notes: Total pooled beneficiaries for Pioneer ACOs were 123,068 in 2012 and 151.251 in 2013 with COPD or adult asthma; 68,013 in 2012 and 83,113 in 2013 for heart failure; and 486,667 in 2012 and 590,763 in 2013 for any PQI condition. This table pools the estimated effects over all 32 Pioneer ACOs and aligned-beneficiaries that were part of the ACO model at the beginning of the second performance year. Bold estimates indicate statistical significance at the $p<0.05$ level. Results are adjusted using Oaxaca-Blinder reweighting method as discussed in the Methods section.

Pooled Pioneer results for 2012 and 2013 for acute hospital admissions occurring during or after a SNF episode are shown in Table 9. For this measure, a SNF episode is a sequence of SNF claims (not necessarily from the same provider) with less than a 30-day break between the end ("through") date of one claim and the start ("from") date on the subsequent SNF claim for a particular beneficiary. Identifying planned versus unplanned acute hospital admissions was based on the algorithm used for the hospital-wide all-cause unplanned readmission measure. Although all of the point estimates were negative, indicating lower-than-expected readmissions compared to the near markets, none of the estimated effects were statistically significant.

Table 9. Pooled Pioneer SNF Unplanned Acute Hospital Admission Results Compared to Near Markets, 2012 and 2013

Outcome	2012	95% CI	2013	95% CI
Aggregated results (total change in SNF unplanned acute admissions)				
During or within 7 days of episode end	-87	-263 to 88	-180	-379 to 19
During or within 30 days of episode end	-113	-324 to 98	-201	-435 to 33
After and within 7 days of episode end	-107	-269 to 54	-123	-299 to 54
After and within 30 days of episode end	-133	-338 to 72	-143	-367 to 81
Per 1,000 SNF episodes				
During or within 7 days of episode end	-2.81	-8.47 to 2.85	-4.96	-10.44 to 0.51

Outcome	2012	95% CI	2013	95% CI
During or within 30 days of episode end	-3.64	-10.44 to 3.16	-5.53	-11.97 to 0.91
After and within 7 days of episode end	-3.45	-8.67 to 1.76	-3.38	-8.23 to 1.48
After and within 30 days of episode end	-4.28	-10.87 to 2.32	-3.94	-10.11 to 2.23

Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.
Notes: SNF episodes are sequences of SNF claims for a beneficiary (regardless of provider) with less than 30 days between the through date of one claim and from date of the subsequent SNF claim. Total pooled SNF episodes for Pioneer ACOs were 31,001 in 2012 and 36,302 in 2013. This table pools the estimated effects over all 32 Pioneer ACOs and aligned-beneficiaries that were part of the ACO model at the beginning of the second performance year. Results are adjusted using Oaxaca-Blinder reweighting method as discussed in the Methods section.

Table 10 presents pooled results for post-discharge physician visits at 7, 14, and 30 days following hospital discharge compared to the near market. Pioneer ACOs appeared to have increased their rates of post-discharge physician follow-up in the week immediately following discharge (by 11.31 per 1,000 beneficiaries in 2012 to 14.76 per 1,000 beneficiaries in 2013) relative to the trend in their near markets. However, the effect attenuated for longer periods following discharge and was not significant at 30 days. These results indicate that patients are not necessarily increasing their likelihood of having any visit after discharge, but instead, moving that follow-up visit closer to the discharge date.

Table 10. Pooled Pioneer Post-Discharge Physician Visits at 7, 14, and 30 Days Results Compared to Near Markets, 2012 and 2013

Outcome	2012	95% CI	2013	95% CI
Aggregated results (total change in post-discharge physician visits)				
Within 7 days	**289**	**118 to 460**	**470**	**272 to 669**
Within 14 days	3	-158 to 164	**340**	**156 to 523**
Within 30 days	-100	-231 to 30	89	-57 to 235
Per 1,000 admissions				
Within 7 days	**11.31**	**4.63 to 17.99**	**14.76**	**8.53 to 21.00**
Within 14 days	0.11	-6.18 to 6.40	**10.66**	**4.89 to 16.42**
Within 30 days	-3.92	-9.02 to 1.19	2.80	-1.80 to 7.39

Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.
Notes: Total pooled beneficiaries for Pioneer ACOs with relevant discharges were 25,570 in 2012 and 31,870 in 2013. This table pools the estimated effects over all 32 Pioneer ACOs and aligned-beneficiaries that were part of the ACO model at the beginning of the second performance year. Bold estimates indicate statistical significance at the $p<0.05$ level. Results are adjusted using Oaxaca-Blinder reweighting method as discussed in the Methods section.

2d. Patient Experience Results (CAHPS)

Patients' perceptions of the quality of care they receive, and their satisfaction with that care, has long been considered an important component of quality of health care. In 1995, the Agency for Healthcare Research and Quality (AHRQ) sponsored research in developing a standard survey instrument for measuring health plan members' perceptions of quality and satisfaction with their care. This effort has expanded to include a variety of care settings, including physician groups and hospitals.

Similarly relevant and important to the accountable care initiatives, CMS commissioned the development of a Consumer Assessment of Healthcare Providers and Systems (CAHPS) instrument specific to ACOs, building on the CAHPS for clinicians and groups instruments.[20] This section presents two sets of analyses of ACOs' patient experience using the CAHPS surveys.

The first analysis compares Pioneer and Advance Payment (AP) MSSP ACOs' performance on patient experience and satisfaction to a set of benchmark (reference) populations: Medicare FFS, Medicare Advantage (MA), and MSSP-aligned beneficiaries in 2012, the first performance year of the Pioneer and AP MSSP models. The CAHPS survey instruments for the FFS and MA populations are the same and known together as the MA & PDP CAHPS Survey. Because the ACO and the MA & PDP CAHPS instruments are not identical, comparison of these groups includes only the items that are comparable across the two surveys. We used the 2011 MA & PDP CAHPS survey to develop risk models for individual items, and our summary scores are adjusted by applying these models to the 2012 ACO and MA & PDP CAHPS surveys.

The second analysis examines Pioneer ACOs' changes in patient experience between 2012 and 2013 (the first two performance years) across all of the ACO CAHPS domains. ACO CAHPS data for 2012 were available for all 32 Pioneers and ACO CAHPS data for 2014 were available only for the 23 Pioneers that continued to operate under the model into 2014.[21]

Summary of Approach

The ACO CAHPS instrument provides data for seven of the ACO quality measures—used for computing shared savings payments—as well as several other satisfaction domains. This analysis analyzes risk-adjusted satisfaction for six of the seven ACO measures as well as for several other domains (we use the seventh, a rating of general health status, as a risk adjustment factor). Rather than conduct a detailed analysis of each individual item, following AHRQ guidance on reporting CAHPS results, we have developed a set of summary scores, composed of one or more items, to provide broader assessments of patient experience for these research questions. (See the

[20] Anhang Price, Brown, and Weinick (2012) discuss the motivation for the development of the ACO CAHPS based on the CAHPS Clinician & Group Survey (CG-CAHPS) as well as the development process itself. See http://www.reginfo.gov/public/do/DownloadDocument?documentID=450813&version=1.

[21] Beneficiaries aligned to ACOs that withdrew from the Pioneer ACO model in PY2 were not surveyed in 2013. As a result, our analyses include more ACOs for PY1 than PY2.

Methods chapter for detailed information.) This approach is consistent with the CAHPS-based ACO quality measures. We also constructed two types of standard CAHPS scores:[22]

- **Average Scores.** Each of the items analyzed have been converted, consistent with standard CAHPS reporting, to a 1-to-3 scale (for example, an item reporting as never, sometimes, usually, or always would combine never and sometimes into a single level). The average score is the average value of this scale for an ACO or benchmark population. This method does incorporate all of the information from the responses, but it also tends to compress differences between ACOs.

- **Top Box Scores.** These scores are the proportions of patients reporting the highest response level. There tends to be more variation among ACOs with this type of measure, as it focuses on performance on the highest response level. However, it does ignore information from patients reporting the lowest response level.

Our summary scores are analogous, but not identical to, the ACO quality measures. Differences between our risk-adjusted average scores are driven by differences in risk adjustment. (See the Methods chapter of this report for additional information about risk adjustment.) The top box score only captures differences in reporting of the highest response level. For scores based on items with only two response levels, the average score and the top box score are equivalent because the average score for these measures would only be based on the proportion of highest response levels. (For additional information about the domains/measures based on items with only two response levels versus those based on at least one item with three response levels, see the Methods chapter of this report.)

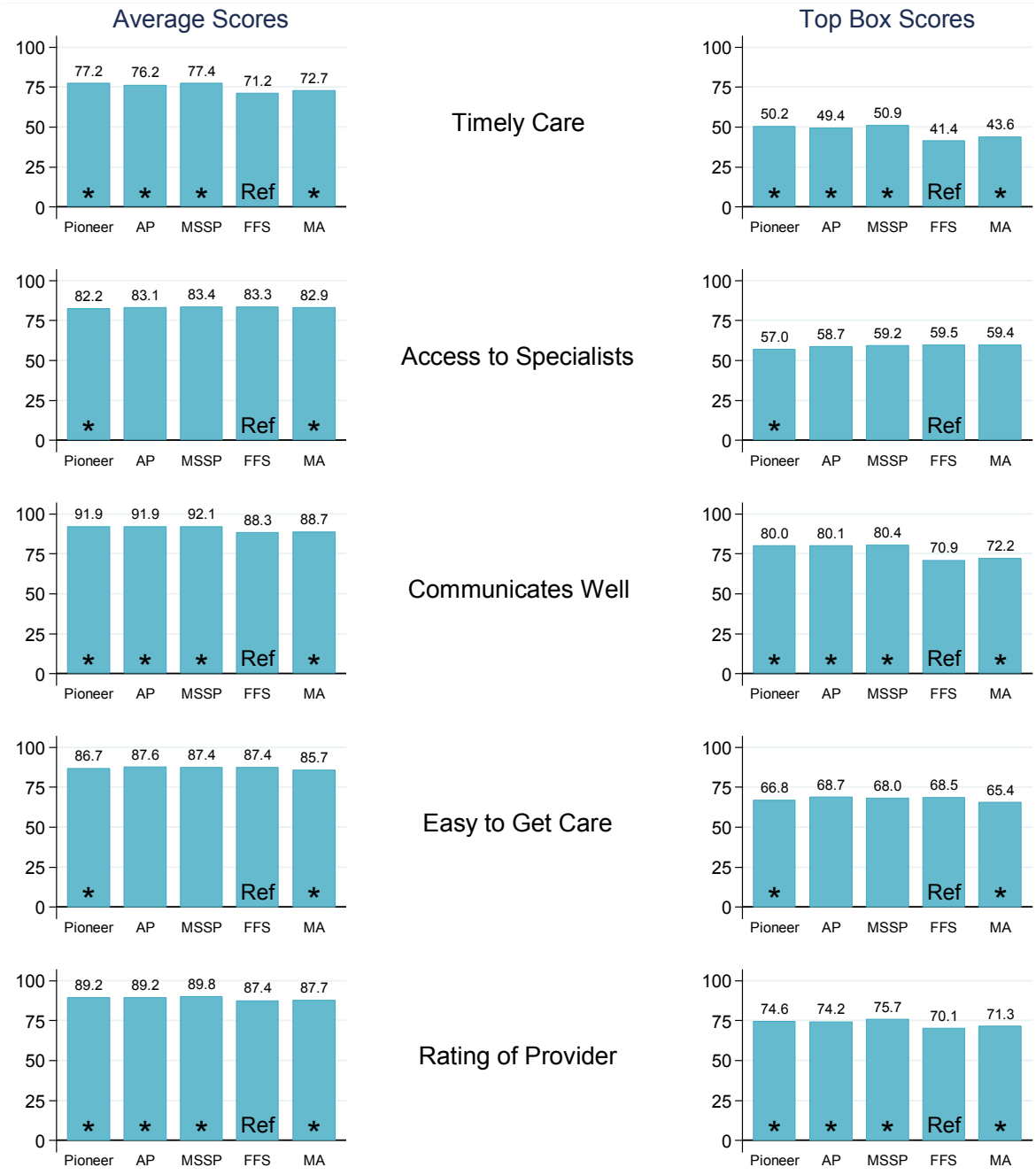
ACO Patient Satisfaction Summary Scores are Similar to Non-ACO FFS and MA Patient Scores

On average, across each domain, ACO patients report similar levels of satisfaction regardless of the type of ACO. Figure 9 presents values of the average scores (left column) and top box scores (right column) for Pioneers, AP MSSPs, and the MSSP, FFS, and MA benchmarks. Each row corresponds to a separate summary score. The top box scores reflect the proportion of patients responding to the highest response category and are generally more pronounced than average scores. Pioneer and AP MSSP ACO patients were statistically significantly more satisfied on average with the timeliness of care, appointments, and information; with how well their provider communicates; and with overall rating of provider than general FFS patients. Pioneer ACOs were rated statistically significantly lower on access to specialists and ease of getting care. The magnitudes of statistically significant effects do not appear materially significant, and any observed variation should be interpreted with caution—it is not clear, for example, whether a two- or a five-point difference on this constructed scale reflects meaningful variation. Further, it

[22] American Institutes for Research, "How to Report Results of the CAHPS Clinician & Group Survey," Princeton, NJ: Robert Wood Johnson Foundation, 2008. https://cahps.ahrq.gov/surveys-guidance/cg/cgkit/HowtoReportResultsofCGCAHPS080610FINAL.pdf

is possible that these CAHPS results are confounded, given that beneficiaries are aligned or assigned to an ACO because they receive regular care from ACO providers.

Figure 9. Average and Top-Box Scores for Five CAHPS Domains by ACO Type: Pioneer, AP MSSP, MSSP, and MA Scores Compared to FFS, 2012

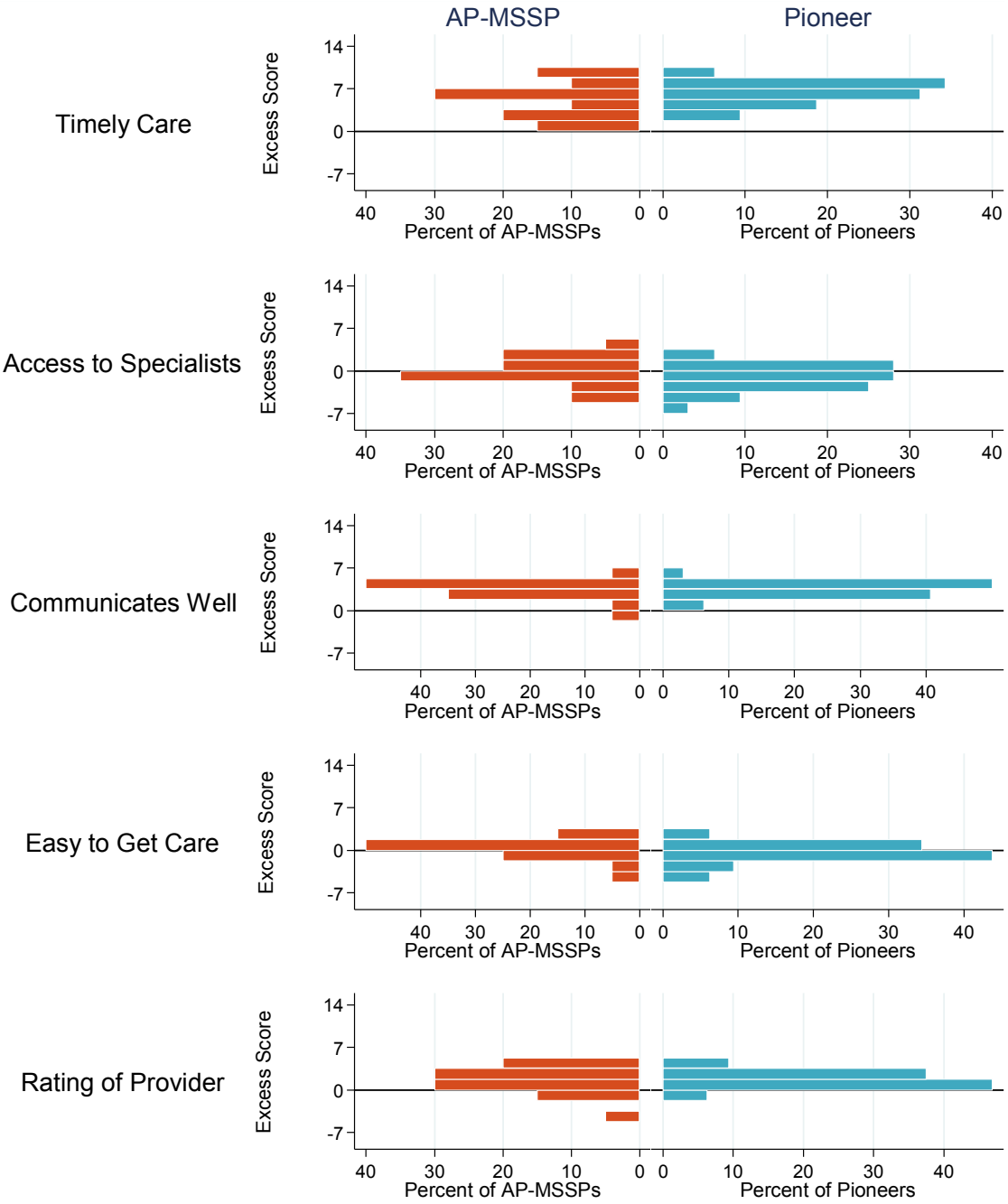


Source: Analysis of ACO, FFS, and MA CAHPS data, 2012.

Notes: Includes CAHPS scores from 32 Pioneer ACOs on questions common to all CAHPS surveys. Average scores assign 3 points for highest rating, 2 points for middle rating, and 1 point for lowest rating, scaled to a maximum of 100. Top box scores are the proportion with the highest rating, scaled to a maximum of 100. Statistically significant differences ($p<0.05$) from FFS are indicated with an asterisk (*). Standard errors for determining statistical significance computed using 200 bootstrap replications.

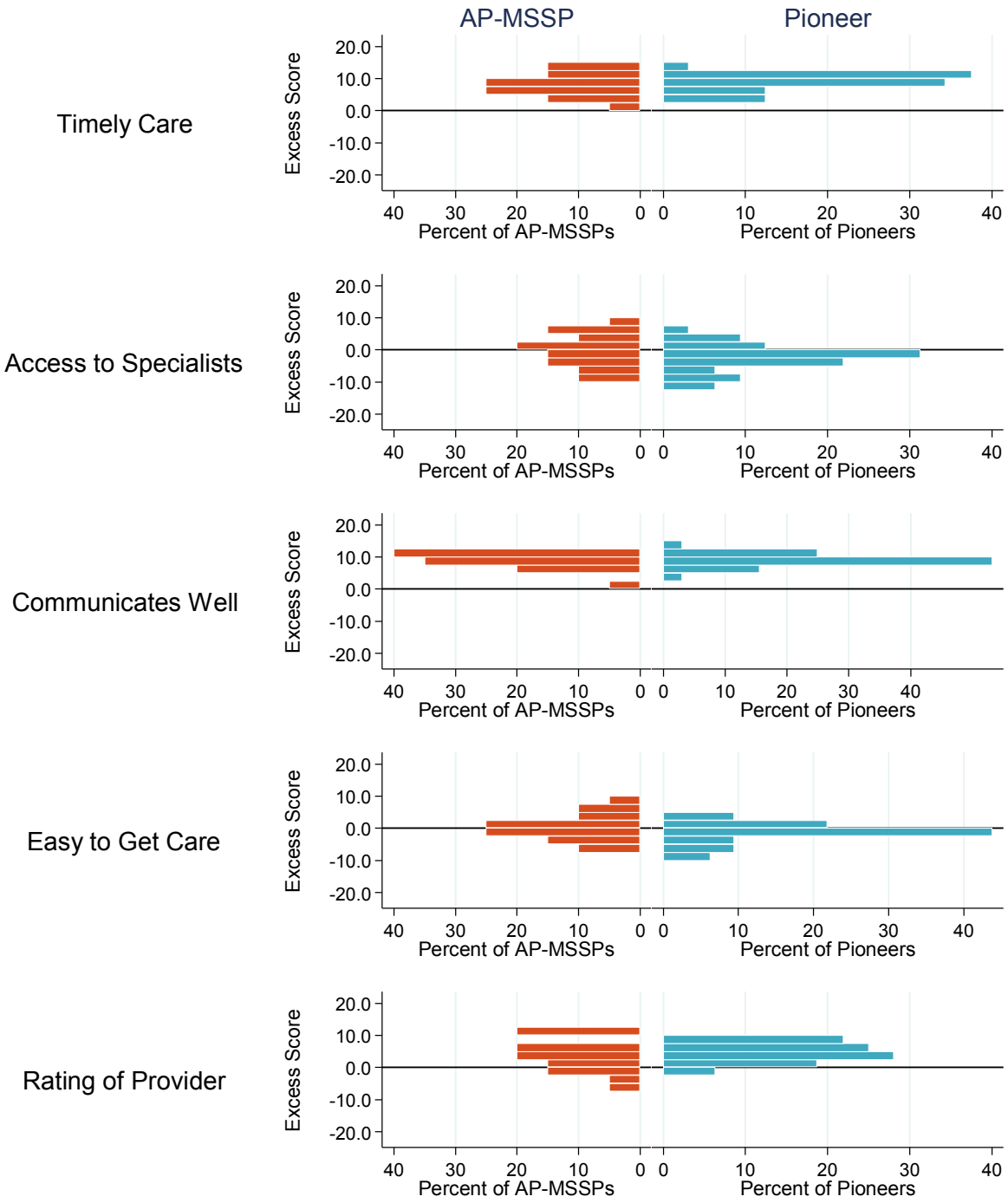
Figure 10 and Figure 11 present histograms of the "excess score"—that is, the difference of the summary score for the ACO category minus the FFS benchmark for AP MSSP and Pioneer ACOs for each summary score. These graphs illustrate the variation in the summary scores, comparing the percentage of AP MSSP and Pioneer ACOs above, at, or below the FFS benchmark. Larger bars with higher excess scores indicate that more ACOs have greater differences with respect to the FFS benchmark. AP MSSP ACOs generally have a wider variation in summary scores than Pioneers, possibly illustrating greater variation among AP MSSPs versus Pioneers. These histograms also indicate that patients aligned to AP MSSP ACOs are more likely to report greater access to specialists and a greater ease of getting needed care and treatments. Patients aligned to AP MSSP ACOs are more likely to report a higher *and* lower overall rating of their providers than Pioneer ACO-aligned patients.

Figure 10. Distribution of ACOs' Differences between Average Summary Scores and FFS Benchmarks: Pioneer versus AP MSSP ACOs, 2012



Source: Analysis of ACO CAHPS data, 2012.
Notes: Includes CAHPS scores from 32 Pioneer ACOs. For each domain, the bar graphs represent the percentage of Pioneer or AP MSSP ACOs above, at, or below, the FFS CAHPS benchmark and their magnitude of excess score levels.

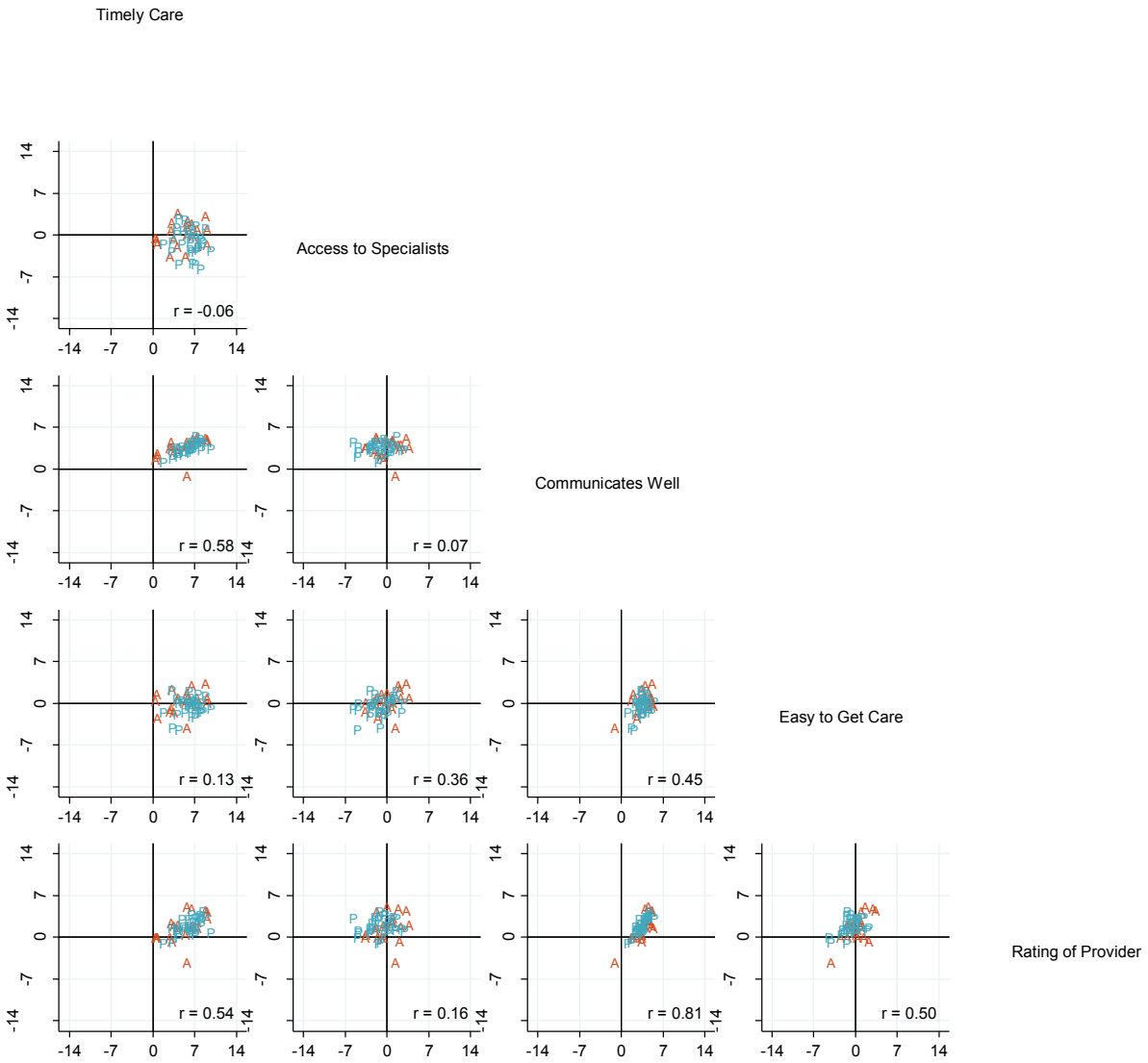
Figure 11. Distribution of ACOs' Differences between Top Box Scores and FFS Benchmarks: Pioneer versus AP MSSP ACOs, 2012



Source: Analysis of ACO CAHPS data, 2012. Notes: Includes CAHPS scores from 32 Pioneer ACOs. Blue "P"s denote a Pioneer ACO, and orange "A"s denote an AP MSSP ACO

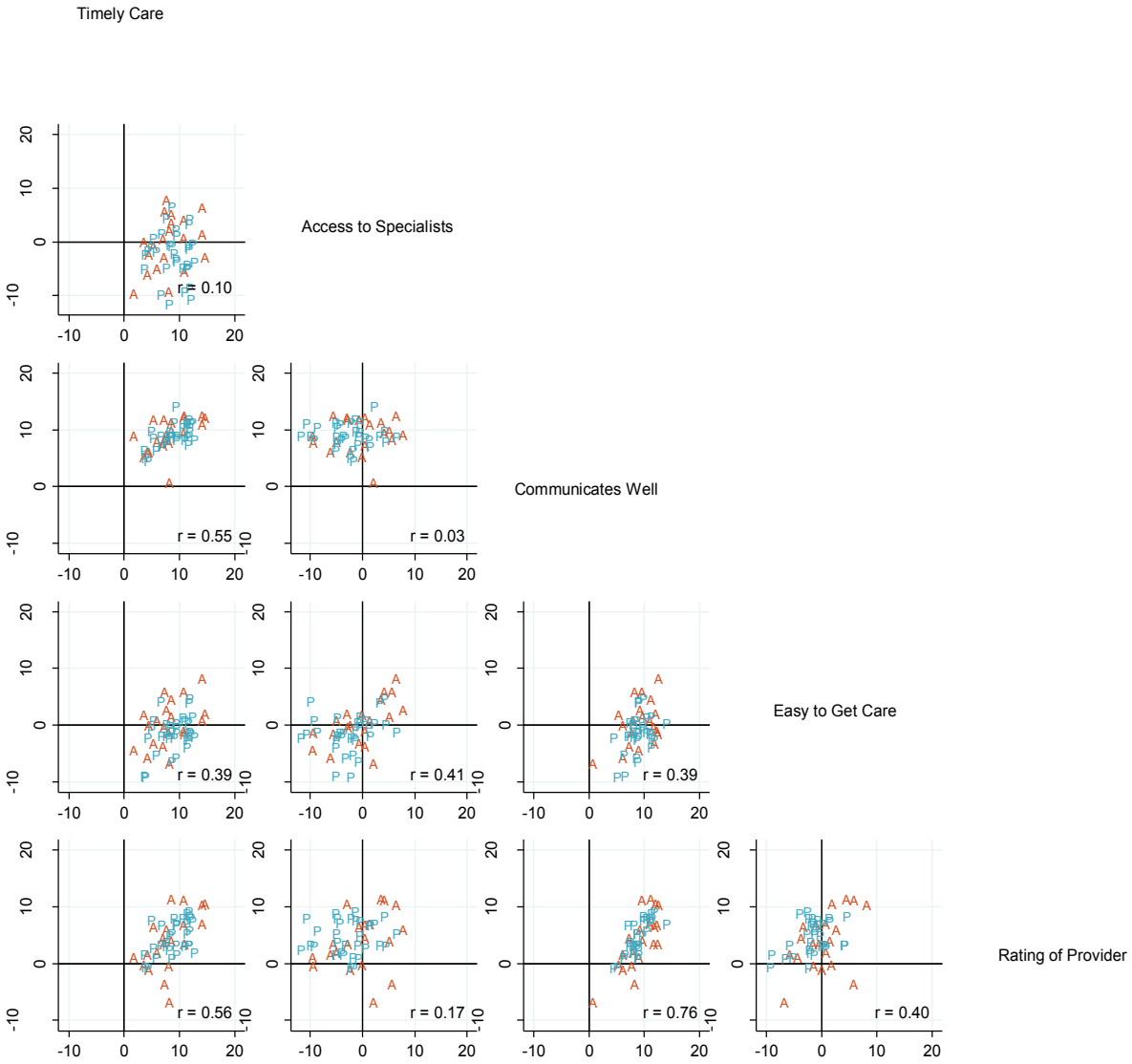
Figure 12 presents two-way scatterplots of the average summary scores, and Figure 13 presents plots for the top box scores. The summary score plotted on the horizontal axis is indicated by the short title at the top of each column, and the summary score plotted on the vertical axis is indicated by the short title to the right of each row of plots. In addition, the correlation coefficient for each pair is shown in the lower right-hand corner of each plot.

Figure 12. Pairwise Comparisons of Differences between Average Summary Scores and FFS Benchmarks: Pioneer versus AP MSSP ACOs, 2012



Source: Analysis of ACO CAHPS data, 2012.
Notes: Includes CAHPS scores from 32 Pioneer ACOs. Blue "P"s denote a Pioneer ACO, and orange "A"s denote an AP MSSP ACO.

Figure 13. Pairwise Comparisons of Differences between Top Box Summary Scores and FFS Benchmarks: Pioneer versus AP MSSP ACOs, 2012



Source: Analysis of ACO CAHPS data, 2012.
Notes: Includes CAHPS scores from 32 Pioneer ACOs. Blue "P"s denote a Pioneer ACO, and orange "A"s denote an AP MSSP ACO.

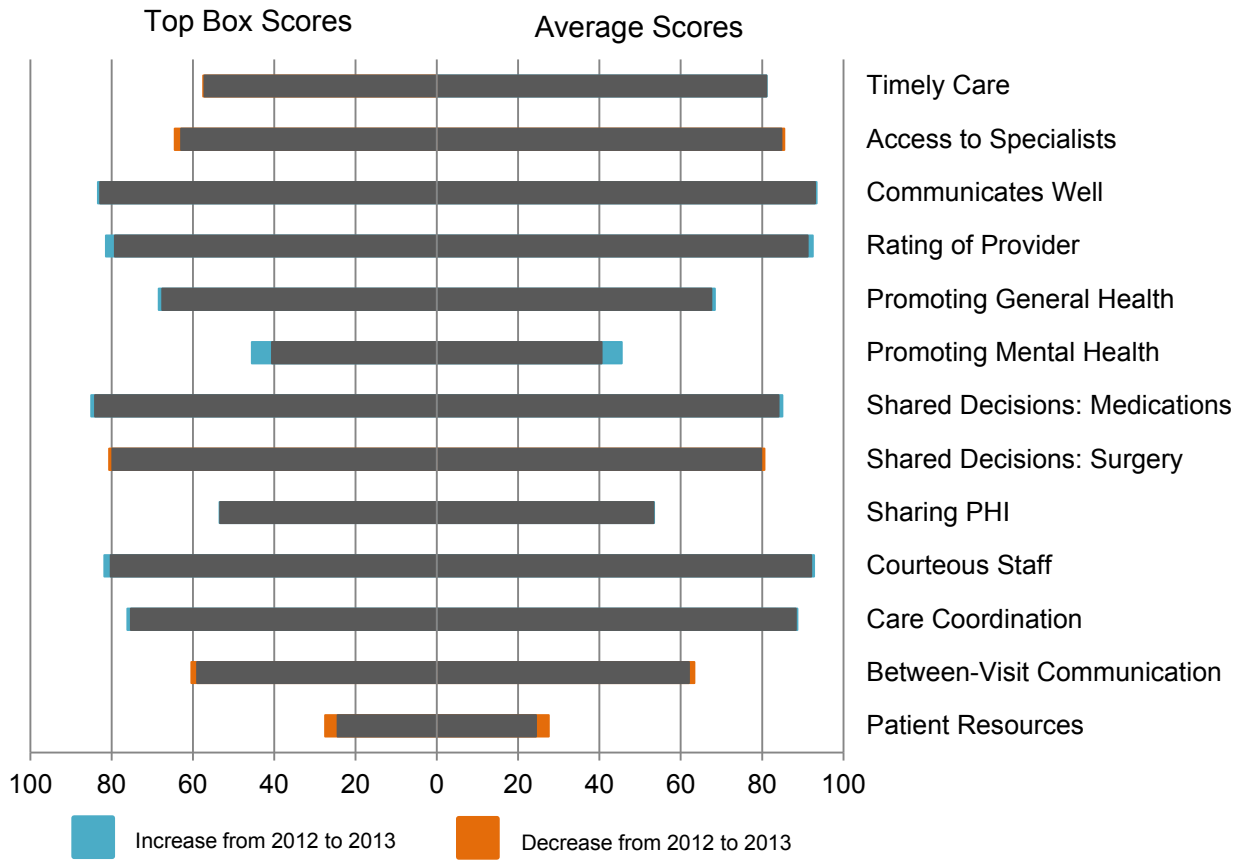
In general, there is a positive association among the summary scores, suggesting that there is an overall satisfaction factor that influences these five domains of patient experience. However, the access to specialists measure tends to have the lowest correlation coefficient compared to the other measures, suggesting that access to specialists is a different measure of experience than the other measures, which may make sense if a patient's experience is more heavily influenced by a usual provider. With respect to what influences a patient's overall rating of a provider, provider

communication is more tightly associated (higher correlation coefficient) with the overall rating than the other four summary scores.

Differences in Pioneer ACOs' Scores were Relatively Small between PY1 and PY2; Pioneer ACOs Have Similar Levels of Performance

Figure 14 summarizes the changes in top box (left side of the graph) and in average (right side of the graph) Pioneer ACO CAHPS scores from 2012 to 2013 as well as the levels of these scores. The aqua blue shading indicates that the score increased from 2012 to 2013, and the end of the bar indicates the 2013 level. The orange shading indicates that the score decreased from 2012 to 2013, and in such cases, the end of the bar indicates the 2012 level.

Figure 14. Pioneer ACOs' Changes in Top Box and Average Scores from 2012 to 2013



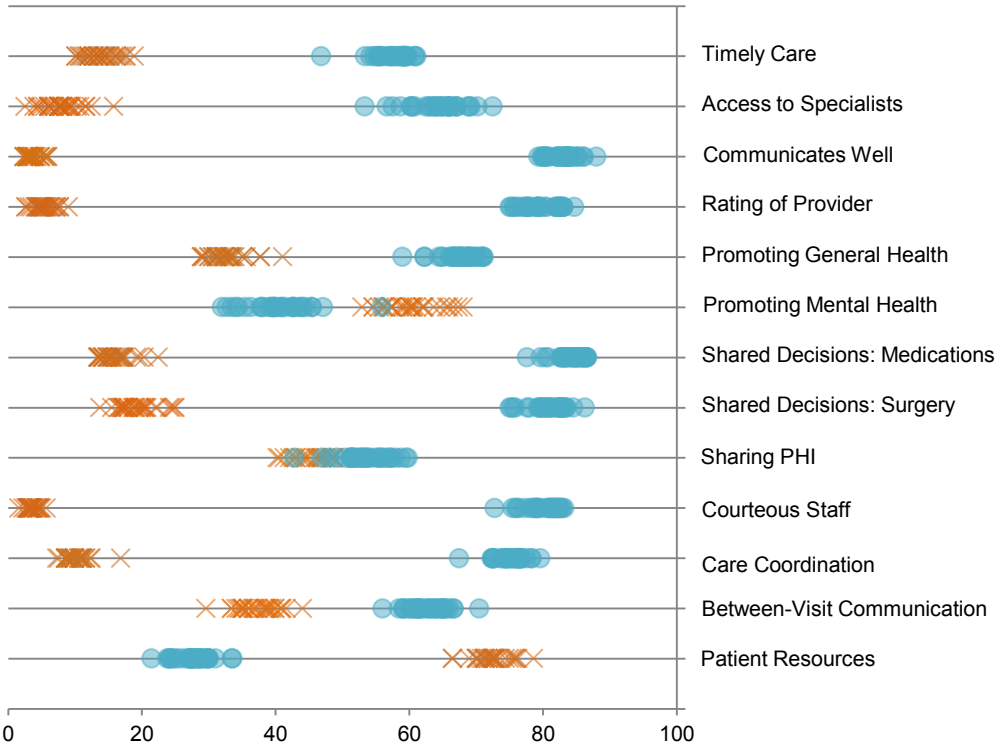
Source: Analysis of Pioneer ACO CAHPS data, 2012 and 2013.
Notes: CAHPS scores from 2012 include 32 Pioneer ACOs, while 2013 CAHPS scores contain 23 Pioneer ACOs. Aqua blue shading indicates that the score increased from 2012 to 2013, and the end of the bar indicates the 2013 level. Orange shading indicates that the score decreased from 2012 to 2013, and the end of the bar indicates the 2012 level.

The changes in average scores generally mirror the changes in top box scores, which should be expected since the top box score gives the number of responses with the highest category, which

contributes the most to the average score. Between these two years, the differences in the scores were relatively small, with some notable exceptions. There was a modest increase (from 79.2 to 81.4 percent) in the number of respondents we measure as rating their provider high (9 or 10 on a scale from 0 to 10), yielding a rise in the average score from 91.2 to 92.5. There was also a drop in the number of respondents indicating that their provider engages in activities to improve stewardship of patient resources (talking about how much prescription medications cost), from 27.5 percent in the first performance year to 24.4 percent in the second performance year. On the other hand, there was an increase in the proportion of beneficiaries rating their provider highly on mental health prevention activities (talking about depression or stress), increasing from 40.5 to 45.5 percent.

To show how beneficiaries' responses vary by Pioneer, Figure 15 presents the distributions of the risk-adjusted share of responses in the lowest category across ACOs (each ACO corresponds to an orange-colored X) and in the highest category (each ACO corresponds to an aqua blue-colored circle) in 2012. The more rightward are the aqua blue circles, the greater the proportion of responses in the highest reporting group. Analogously, the more leftward are the orange Xs, the smaller the proportion of responses in the lowest reporting group. Most ACOs have similar levels of performance, seen as the relatively compact distributions of points for each category.

Figure 15. Pioneer ACOs' Risk-Adjusted Shares of Responses in the Highest and Lowest Categories, 2012



Source: Analysis of Pioneer ACO CAHPS data, 2012.
Notes: Includes CAHPS scores from 32 Pioneer ACOs. Aqua blue circles represent each ACO's share of responses in the highest category, and orange Xs represent each ACO's share of responses in the lowest category. Responses are risk adjusted.

CHAPTER 3. FORMATIVE ANALYSIS OF PRIMARY DATA

This chapter presents initial summaries of the qualitative data collected from Pioneer, AP MSSP, and MSSP ACOs through our semi-structured quarterly assessment interviews and site visits with the ACOs.[23] Given the rapid-cycle nature of results, and the in-progress nature of this project, the summaries reflect information as it has emerged from quarterly assessment interviews and site visits. Not all ACOs were included in the initial summaries because the relevant quarterly assessment or site visit had not been conducted at the time of the initial formative analysis. Because of the semi-structured nature of the quarterly assessments and site visits and the staggered nature of the primary data collection and analysis, the level of detail across ACOs also varies. In addition to providing information about ACO activities, these formative analyses help the evaluation team understand how ACOs may be changing over time and identify areas where additional information is needed from ACOs in subsequent interviews.

3a. Formative Summary: ACO Care Management Activities

One of the tenets of the accountable care model is that "coordinated care helps ensure that patients, especially the chronically ill, get the right care at the right time, with the goal of avoiding unnecessary duplication of services and preventing medical errors."[24] The team explored how ACOs have put accountable care into practice through quarterly assessment interviews conducted with 23 Pioneer, 20 AP MSSP, and 18 MSSP ACOs between October 2013 and January 2014. Discussions focused on care management activities that ACOs identified as the most important among their care management programs and services, including identification and selection of beneficiaries for care management interventions; types of activities implemented; supporting technologies and tools; outcomes (clinical and financial); sustainability; and challenges and barriers to implementation. In these interviews, we defined care management programs and services as activities designed to assist patients and their support systems in managing medical conditions and related psychosocial problems more effectively, with the aims of improving patients' functional health status; enhancing the coordination of care; eliminating the duplication of services; and reducing the need for expensive medical services.[25] Information on care management had also been collected, though in a less focused way, through the site visits conducted through February 2014.

The information gathered to date begins to explore the relationship between care management and evaluation outcomes by looking at the subset of care management activities that could affect utilization, patient experience, and expenditures. This initial summary focuses on themes around which we have comparable and consistent information collected during the fourth quarterly

[23] The nine Pioneer ACOs that transitioned to becoming MSSPs or exited the model by December 31, 2013 are not included in this chapter's qualitative data analyses.
[24] CMS Accountable Care Organizations
[25] Definition adopted by NCQA for CMS' Special Needs Plans from Bodenheimer T, Berry-Millett R: Follow the money—controlling expenditures by improving care for patients needing costly services. *New Engl J Med* 2009; 361(16):1521-1523

assessment round and includes the organizational approach to care management, populations receiving care management, and management of care transitions.

Organizational Approach to Care Management

One working hypothesis of this evaluation is that system integration between the ACO and hospitals is important to ACO success. Here, system integration broadly refers to the coordination between hospitals and the ACO to ensure the achievement of appropriate, high quality care. From the quarterly assessments, the team observed two broad categories of organizational approaches:

- "Centralized and consistent" approaches, generally characterized as primarily conceived by ACO leadership and implemented more or less uniformly across providers in the organization

- "Diffuse and variable" models, generally characterized by more autonomy at the practice or organizational subcomponent levels of the ACO.

Table 11 presents the distribution of cohort ACOs by these two categories and by ACO type. Across the cohort, interviewers assessed most ACOs in the evaluation cohort, particularly Pioneer ACOs, as having consistent, centralized care management approaches. Approximately half of the AP MSSP ACOs are characterized in this manner, with the remaining half being typified as diffuse/variable, though many still developing their approach are working toward a consistent and centralized model.

Table 11. ACOs' Care Management Approaches

	Pioneer N=23	AP MSSP N=20	MSSP N=18
Centralized and consistent	17	10	15
Diffuse and variable	2	3	3
Progressing toward consistent	4	7	0

Interviewers noted that organizations' approaches to care management may be decentralized for different reasons, with some evolving toward functioning as a single centralized construct and others deliberately seeking to maintain autonomy for selected settings or provider practices. For example, one AP MSSP ACO's activities are decentralized because the ACO did not exist prior to participation, and until recently, did not have dedicated ACO staff focused exclusively on developing a centralized care management program. Currently, this ACO's provider practices are independently designing and delivering care management services for their patients, though the ACO is working toward fostering consistency. Alternatively, some ACOs that formed through a collaboration of distinct entities have opted to preserve certain care management activities of those component organizations instead of unifying them. One Pioneer has encouraged each component entity of the ACO to select and pilot its own care management approach so that the ACO can test whether different models—such as disease-focused versus high-risk patient focused—achieve different outcomes, which will, in turn, inform features of the ACO's future care management programs. Another Pioneer ACO that is working toward consistency owns

several hospitals and is able to leverage its historical experience providing transition management in the acute care setting, which it believes contributes to its ability to reduce costs for its ACO populations. To build on these efforts, this ACO is working to engage providers across the network in ambulatory care management, focusing on primary care delivery through the medical home model. Similarly, another example of a centralized and consistent approach is one Pioneer that has a dedicated staff that use claims data and timely hospital admission information to determine when a patient is in need of care management services and then deploy community-based care managers throughout the organization in response.

Identifying Populations for Care Management

Populations that ACOs are identifying for care management services (as shown in Table 12) and the data and methods the ACOs use to identify patients (as shown in Table 13) are in part a function of the organizations' capacities to manage and analyze data. However, even organizations with more sophisticated analytic capabilities use multiple and relatively "low tech" methods such as provider referrals and disease registries to target care management services to individuals. Patients that can be identified through analyses of trends in past utilization or disease registries are commonly targeted for care management across Pioneer, AP MSSP, and MSSP ACO types. Some organizations, primarily Pioneers and MSSPs, which tend to have more data management and analytic capacity as well as more mature health information technology (HIT) infrastructures than AP MSSP ACOs, describe using claims data to calculate risk scores or—when combined with clinical data elements—to execute complex analytics such as predictive modeling.

Because Pioneer ACOs, by definition, have some experience managing financial risk and have developed structures to support quality-related performance, the difference in identification approaches between Pioneer ACOs and AP MSSP ACOs is unsurprising. However, the difference between these two types of ACOs raises questions about whether and how quickly AP MSSPs make the decision to invest in the capacity to perform data-intensive modeling to identify patients who might benefit from care management. AP MSSP ACOs, several of which operate in small or geographically isolated communities wherein providers have known most of their patients for many years, may not believe they need such analytic capacity.

Table 12. Patient Populations the ACO Routinely Identifies for Care Management Services

	Pioneer N=23	AP MSSP N=20	MSSP N=18
Chronic condition(s)	18	16	16
Inpatient stays	16	13	14
Past patterns of high utilization	15	12	16
ED visits	11	14	14
Referred by provider	15	11	11
Predicted to have high spending	17	5	10
Past patterns of high spending	11	10	10
At-risk for hospitalization	14	5	10
In need of preventive care	7	8	5

Table 13. Approaches Employed by the ACO to Identify Beneficiaries for Care Management Services

	Pioneer N=23	AP MSSP N=20	MSSP N=18
Claims data	23	14	16
Provider identification/referral	18	12	17
Other patient level data	16	15	9
Case-by-case basis	9	12	7
Disease/patient registry	12	7	4
Patient survey/risk assessment	7	3	6
Other method(s)	12	8	7

Care Transition Management

Interviews with ACOs show that most ACOs deploy multiple interventions to help patients manage care transitions. As shown in Table 14, over half of all Pioneer, AP MSSP, and MSSP ACOs schedule post-discharge follow-up appointments with PCPs on patients' behalf, connect patients to community-based services (e.g., Meals on Wheels, medical transportation), and perform medication reconciliation after an inpatient episode of care. Based on information available at the time of this analysis, four AP MSSPs were found to perform no care transition management activities.

Table 14. Care Transition Activities

Activity	Pioneer N=23	AP MSSP N=20	MSSP N=18
Perform medication reconciliation post-discharge	14	11	13
Schedule follow-up appointment with PCP	13	12	12
Establish link to community services	14	12	11
Follow-up contact within 72 hrs. of discharge	15	11	9
Schedule follow-up appointment with specialist(s)	9	10	9
Meet in-person with patients prior to discharge	9	9	6
Monitor beneficiaries for defined period	10	5	6
Use of established transitions protocol (e.g., Eric Coleman model, Project RED)	2	4	3
None of these	0	4	0
Other activities	5	4	5

Based on quarterly assessment data and available site visit information, evaluation team members estimated each ACO's ability to know in real time or near real time when ACO-aligned beneficiaries have an inpatient admission. As shown in Table 15, most ACOs have access to admissions data from hospitals at which approximately half of their ACO beneficiaries are admitted, including 22 out of the 23 Pioneer ACOs. The evaluation team assessed that eight of 20 AP MSSP ACOs did not know in real time or near-real time when ACO beneficiaries were admitted to an inpatient facility.

Table 15. Notification to ACO of Beneficiary's Admission (in real time or near-real time) to Inpatient Facility

	Pioneer N=23	AP MSSP N=20	MSSP N=18
Yes, for at least half of aligned population admissions	22	12	13
Yes, for less than half of aligned population admissions	1	0	2
No	0	8	3

A few of the ACOs that are unable to obtain timely information for hospital admissions—or have such data for fewer than half of aligned beneficiaries admitted to inpatient settings—still manage acute care transitions for a portion of their ACO-aligned beneficiaries. Generally, these ACOs focus on beneficiaries for whom they are able to obtain timely admission and discharge data, or they may manage any transitions that they are able to learn about on an ad hoc basis. For example, if a beneficiary is already involved in some aspect of care management, the patient may alert his/her provider when discharged from an acute care facility. The remaining ACOs, all of which are AP MSSP ACOs, have no transition management activities originating from the acute care setting. These AP MSSP ACOs either have a nascent care management infrastructure with few dispersed activities or provide other types of non-transition care management services, such as home visits to beneficiaries with high utilization or spending patterns or multiple chronic conditions.

3b. Formative Summary: HIT Infrastructure and Data Capabilities

When Congress passed the American Recovery and Reinvestment Act (ARRA) of 2009 and its Health Information Technology for Economic and Clinical Health (HITECH) provisions, health reform and health information technology became inextricably linked. Information technology is regarded as a cornerstone of accountable care and a means to generate shared savings through data collection, information sharing, communication, and analytics. Such assumptions presuppose a level of IT sophistication that many ACOs in the evaluation cohort have not yet achieved. Pioneer, AP MSSP, and MSSP ACOs face a variety of information technology challenges associated with the presence of multiple EHR systems, interoperability of clinical systems (i.e., registries, clinical decision support tools, analytic software), data storage and analytics, and physician engagement.

The evaluation's fifth quarterly assessment interview focused on ACOs' HIT infrastructure and information management capabilities. The findings below reflect the information collected from 60 (23 Pioneer, 20 AP MSSP, and 17 MSSP) ACOs between February and May 2014. Interview discussions focused on: infrastructure and information/data and system use; information storage and sharing; provider experiences and interactions with each ACO's system(s); and ACO HIT goals and priorities. (For additional information about quarterly assessment interviews and site visits see the Methods section of this report.) For the purposes of quarterly assessment interviews, we specified definitions of several key terms, including:

- **HIT**: information technology infrastructure used to support clinical decision-making and business intelligence, such as EHR system(s), HIEs or other data exchanges/integration technologies, communication and messaging systems, data warehouses, and other software tools;

- **Information/data management**: electronic and paper-based tools/programs (e.g., reports, templates) used to manage patient and provider information, deliver care, and exchange relevant information within the Medicare ACO and across partners and settings;

- **"Homegrown"**: analytical tools, programs, and HIT components developed internally by an organization's computer programmers, Web developers, database analysts, quality and business intelligence analysts and others; such technologies are often uniquely tailored to the organization's specific needs;

- **"Vendor-supported"**: programs and applications licensed from and/or continuously sustained by a vendor or service provider, typically through a subscription model;

- **Commercial "off-the-shelf" software**: packaged products designed to be implemented easily by the purchasing organization and are operable with minimal customization.

Where available, findings were supplemented with information from site visits to ACOs between October 2013 and June 2014. This section is not an exhaustive description of ACO HIT infrastructure and capabilities nor is it a commentary on the appropriateness of those systems. Its

purpose is to summarize the range of system functionalities in place across ACOs as well as the capacity of those systems to effectively manage population health.

Electronic Health Record Systems

The presence of multiple EHR systems within a single organization is common across the evaluation cohort of ACOs. The majority of ACOs (42 out of 60) reported using multiple EHR systems within their provider networks. Table 16 shows the prevalence of single versus multiple EHRs across ACO types. Despite the multiplicity of EHRs within single organizations, only a handful of Pioneers (six) and a single AP MSSP cited the use of an EHR interoperability or "linkage" technology to aggregate and integrate data from their disparate EHR systems. Although such trends do not necessarily imply a lack of interoperability across ACOs, they indicate the barriers many ACOs face in becoming truly interoperable. Organizations with multiple EHRs must create more workarounds to ensure true interoperability. These processes currently elude many ACOs and create obstacles to the seamless exchange of electronic data.

Table 16. EHR Systems in Use, by ACO Type

ACOs, by Type	Single EHR System	Multiple EHR Systems
Pioneer (n=23)	7	16
AP MSSP (n=20)	7	13
MSSP (n=17)	4	13
Total= 60	**18**	**42**

Data Storage

In its Health IT Framework for Accountable Care, the Certification Commission on Health Information Technology (CCHIT) characterizes the establishment of a data warehouse that can "accept, store, normalize, and integrate data from multiple clinical, operation, financial and patient derived systems" as one of four primary requirements integral to building a strong HIT foundation.[26] Thus, for organizations building or enhancing infrastructure for population health management, data storage is vital, as is the resulting functionality allowing users to analyze current and historical data from clinical, operational, and financial sources. The cataloging and categorizing of ACO data in this arena provides insight into each organization's HIT prioritization and IT architectural development.

Despite the large quantities of data that ACOs capture, manage, and manipulate for various purposes, use of data warehouse and database technology is not prevalent across ACO types. Some ACOs use robust and scalable data warehouses; some rely on less comprehensive databases; and others lack this IT infrastructure almost entirely. Just under half of the Pioneer

[26] CCHIT (2013). A Health IT Framework for Accountable Care. Available at http://www.healthit.gov/FACAS/sites/faca/files/a_health_it_framework_for_accountable_care_0.pdf. Accessed June 27, 2014.

ACOs (12 of 23) reported storing information in a data warehouse, most of which are homegrown. The rates of reported data warehouse use are slightly lower for AP MSSP and MSSPs (about one-third for each), with homegrown technologies again predominating in both groups. Among Pioneer and MSSPs with data-storage capability, data warehouse technology is the norm, while AP MSSPs exhibit an even split between data warehouse and database technologies. This finding underscores the expected generalized differences in sophistication between ACOs types in that AP MSSPs began the model with perhaps less advanced HIT infrastructure and Pioneers and MSSPs began the model with significant aspects of their respective IT architectures in place.

Nevertheless, Pioneer ACOs appear to have varying data storage capabilities, with some using established homegrown or vendor-supported data warehouse technologies to co-locate and manipulate clinical data from EHRs, patient experience data, quality data, revenue cycle and financial data, and payer claims. On the more advanced end of the spectrum, some Pioneers reported that their warehouse integrates data from a number of disparate systems (claims, labs, pharmacy, revenue cycle, etc.). In contrast, some Pioneers are still developing their systems, which are more limited in the scope and completeness of data stored. Another still said it was in the process of procuring a vendor to develop a cloud-based warehouse solution. AP MSSPs and MSSPs also represent a similar range, although as individual cohorts, AP MSSPs and MSSPs tend to have slightly less sophisticated and longstanding systems in place than Pioneers. AP MSSPs using data storage technology range from relying on off-the-shelf database applications to maintaining more advanced warehouses (both homegrown and vendor-based). MSSPs also use a mix of databases and data warehouses, with some having made more recent purchases and others having longer-standing and, thus, more developed, IT infrastructural elements.

All ACOs recognize the importance of developing and enhancing data storage capabilities as a means to better analyze population health trends and share actionable information across the ACO. As such, ACOs without sufficient architecture emphasized the importance of investing in and growing this area of HIT, whereas ACOs with established systems in place discussed its importance and the work they continue to do to more efficiently utilize system capabilities to merge and manipulate data.

Analytic Tools and Applications

Data storage infrastructure directly affects organizational analytic capabilities: without the tools to integrate siloed and disparate data sources into a common location, data analysis becomes fragmented and labor-intensive, if not impossible. Accordingly, ACOs described a range of analytic tools and capabilities, some of which are dependent on the manner of data storage each ACO possesses. During interviews, ACOs said they leverage analytical technology for several critical means, including: (1) population health and risk analysis and disease registries, (2) claims data, (3) clinical and utilization data, and (4) quality measures reporting.

Population and risk analysis and utilization of disease registries. Slightly less than half of the ACOs reported that elements of their HIT infrastructure allow their organization to perform population analytics, identify and manage high-risk patients, or populate and manage disease registries. Among the 23 Pioneer ACOs, 12 said they use population or risk analysis technologies. Of those, four reported using either homegrown technologies or did not specify a vendor. In comparison, a smaller subset of AP MSSPs and MSSPs reported using population or risk analysis technology applications or products.

Management of claims data. Within the evaluation cohort, ACOs across the board said they use a range of technologies to store, view, and analyze CMS-provided Medicare claims data. The extent to which a given program facilitates storing, viewing, and analyzing claims data depends on the sophistication of the product selected, the individuals responsible for managing analytics, and the system's integration with other HIT tools, including the EHR. Among Pioneer ACOs, six reported using technology for claims data analysis and/or reporting. Of the three cohorts, MSSPs reported using this type of technology more frequently than the other ACO types. Still, such technology has been a focus of growth for many of the AP MSSPs. Users across ACOs said they have implemented products that range from homegrown systems to software suites from nationally known vendors and third-party products as well as capabilities realized through regional accountable care coalitions and collaboratives.

Collection and reporting of clinical and utilization data to support care management. ACOs also described a subset of data integration platforms that aggregate and manage clinical and utilization data for the purposes of supporting care management. More than half of Pioneer ACOs utilize technology in this manner, predominantly with third-party vendor products as well as a host of homegrown applications. Just over one-third of AP MSSPs said they use clinical and utilization data technology, while nine MSSPs reported using these types of products. Although such analytic tools facilitate care management practices, the absence of such technology in more than half of the ACOs interviewed does not imply that those ACOs are not conducting effective care

Meaningful Use?: Pioneer HITECH progress and HIT capabilities

The majority of Pioneer ACOs report that 50 to 75 percent of their physicians attested to meeting Meaningful Use (MU) phase 1 requirements, according to a report released by the Office of the National Coordinator in 2014.

An analysis L&M conducted to aggregate ACO progress on MU into quartiles found that just six of the 23 Pioneers had achieved attestation above the 75 percent quartile threshold. The majority of Pioneers (13) were between 50 and 75 percent attestation, while four ACOs fell between 25 and 50 percent (no Pioneers were in the lowest quartile).

Although a third of the ACOs with highest attestation are Pioneers in Minnesota, one of the five most highly attested states in the country, this state-based trend is not prevalent across other states where Pioneers are clustered. Some of the ACOs with the lowest rates of attestation are in Massachusetts—a state that ranks second only to Maine for highest attestation, according to CMS EHR Incentive Data (2014).

For some ACOs, efforts to meet MU requirements compete with the organizations' strategic plans for HIT, forcing them to prioritize. According to one Pioneer with high provider attestation, MU has become a barrier to focusing on dimensions of HIT that would better facilitate ACO care management and data-sharing activities:

"Meaningful Use Phase II has diverted us," an ACO representative said. "We were hoping to do some things for accountable care, but that's on the back burner until we get to Meaningful Use by July 2014. Once we get through that hoop, we will go back to the work that we were planning originally so that we can effectively combine data and share it with others."

management; on the contrary, many ACOs described established workarounds that have helped them effectively compensate for an inability to invest in such technology at this time. For example, ACOs across all types described maintaining care management "registries" in a spreadsheet and manually working with their lists. ACOs recognized the importance of working with clinical and utilization data to support care management, though this need manifested in both high- and low-tech approaches.

Quality measures collection. Finally, ACOs in each cohort use technology solutions to facilitate collection of data for quality-measure reporting, including the 33 CMS ACO quality measures as well as additional measures for risk-based contracts with commercial payers. Six of the 23 Pioneer ACOs described this capability, while just over one-third of AP MSSPs use a software application to compile and report on quality measures. By contrast, only three of the seventeen MSSPs reported utilizing products to collect and report quality measures and one ACO uses a homegrown system.

Data Sharing

Across ACO types, data sharing is seen as the lynchpin of integrated, coordinated care because it is a means of transferring vital information and following patients across the care continuum. Along with data storage, the CCHIT[27] highlights data sharing as a requirement for building a strong HIT foundation. Given its importance and complexity, ACOs referred to the topic of data sharing as a constant work in progress, regardless of the maturity level of their organizations' HIT infrastructures. Every ACO discussed gaps and barriers to knowledge transfer within and outside the walls of their organizations. For smaller organizations that did not have a consistent data sharing infrastructure or processes within their provider network prior to becoming an ACO, developing in-network data sharing mechanisms appears to be a central priority. More integrated and established providers that had an already established in-network data capability have naturally focused efforts more on data sharing with non-ACO providers.

Although the majority of ACOs have some manner of within-ACO data sharing in place, the ability to move information to and from providers outside the ACO varies significantly. Twenty-four of the 60 ACOs participating in quarterly assessment interviews at the time of this summary do not share data outside their provider network. Of those ACOs that share data externally, data transfer with out-of-ACO hospitals appears to be a focal point of efforts, particularly among ACOs without any hospitals in their provider networks. Several ACOs have established relationships with out-of-network SNFs and independent community health providers but is not the norm and is present only among Pioneer ACOs. Similarly, only a small number of ACOs described interoperability tools they use to follow and monitor patients outside their respective provider networks.

[27]CCHIT (2013). A Health IT Framework for Accountable Care. Available at http://www.healthit.gov/FACAS/sites/faca/files/a_health_it_framework_for_accountable_care_0.pdf. Accessed June 27, 2014.

While some ACOs expressed a desire to participate in health information exchanges (HIEs), which could facilitate better data sharing and integration across providers, at present, the majority do not participate in an HIE with external providers or institutions. Many ACOs implied that this type of data sharing, while ideal, has been relegated to a long-term strategy in favor of addressing more pressing data-sharing issues among their network providers. Some ACOs attributed the deliberate delay to the presence of multiple EHR platforms within their provider network. Other ACOs said their organizational priority is interoperability of the EHR platforms in their own networks over data sharing with providers outside their respective networks.

HIEs: A beneficial yet nascent source of data sharing

For the few ACOs operating in areas with robust regional or state-level HIEs, there are significant data-sharing benefits. One Pioneer said their 10-year history working with the state HIE has allowed it to recently establish a process for creating a series of admits/discharge/transfer (ADT) data flows. The HIE will send the ACO a daily electronic list of its patients that had inpatient and outpatient ED visits at any hospital (ACO and non-ACO facilities) in the area.

"I don't see how an ACO could manage without this capability," a representative for that ACO said.

Despite having the systems to conduct this kind of data sharing, the ACO said these processes still suffer from major glitches and are a constant work-in-progress.

"[The HIE is] having a hard time getting data out," the ACO representative said. "We still don't have a functioning ADT report from [the state HIE], even after working 12 to 18 months to get this data together."

Technology to Facilitate Communication and Care Coordination

ACOs across the evaluation cohort also use HIT for communication and care coordination purposes in patient and provider interactions. Overall, ACOs discussed an overarching need for technology that facilitates communicating cost, quality, and utilization metrics to providers. The tools used to communicate and visualize such information varied, and a handful use dashboards that integrate claims and medical data. For some ACOs, this type of tool is fully integrated into daily care delivery through single sign-on capability as a component of the organization's EHR. By contrast, other ACOs described encountering significant provider resistance to the workflow disruption associated with logging into and using a disparate program or Web portal.

Several ACOs—most of which are integrated delivery systems with an EHR from a well-known vendor—referenced one of the vendor's proprietary modules that allows providers to access information at the point of care from across the continuum, assuming they have patient consent and non-network providers use this same vendor's EHR platform. ACOs operating in the Midwest and southern California stated that because most of the large hospital systems in their respective regions are also customers of this particular vendor, they frequently exchange patient-level data at the point of care. One ACO even mentioned using this module to share data with participating ACO providers that are independent physicians operating on a different EHR vendor product.

Gaps and Challenges

Given the relative newness of ACO-related data analysis and analytical tools, interviewees highlighted a number of gaps and challenges that have proven difficult to overcome during the IT implementation and data dissemination processes. As shown in Table 17, ACO interviewees most commonly expressed challenges inherent to having disparate EHRs—and as a result, non-

standardized data—across the organization and communicating with providers outside the ACO's network. Differences in the challenges cited across ACO type likely reflect diversities in HIT emphasis, stemming from infrastructural distinctions between ACO types, in which the generally larger and more established Pioneers are less concerned with a lack of HIT resources compared to MSSPs. On the other hand, because Pioneers have largely spent more effort on non-network data exchange, this focal area is of larger import and has thus provided more frequent challenges compared to the experience of MSSPs.

Table 17. Summary of HIT Challenges, by ACO Type

ACO Type	Different EHRs/non-standardized data across ACO	Exchanging data/ communicating with providers outside network	Managing/ interpreting CMS claims	Providers' use of/ resistance to EHRs	Integrating claims data into EHRs	Quality reporting	Lack of resources for HIT
Pioneer (n=23)	10	9	3	5	2	3	1
AP MSSP (n=20)	10	5	2	3	2	3	4
MSSP (n=17)	9	4	3	4	1	1	4
Total	**29**	**18**	**8**	**12**	**5**	**7**	**9**

ACOs most frequently cited EHR vendor standardization within the ACO network as the greatest facilitating factor in sharing information with providers and communicating data across settings. Not surprisingly then, ACOs most commonly identified the lack of EHR standardization as the primary hindrance to accomplishing these goals. Such lack of seamless integration often results in provider resistance to the additional time spent logging into discrete systems to access unconnected information. Beyond EHRs, ACOs described challenges working with ACO participating providers who are at times overwhelmed with the number and complexity of decision-support tools and often resist using additional IT programs, which they do not see as providing value in the management of their patients' care—only additional cost. The prevalence of such challenges across ACOs underscores the need to build internally interoperable systems to facilitate in-network data sharing and achieve better physician buy-in.

ACOs also described technological barriers associated with sharing data and communicating with out-of-network providers. Although there are instances of ACO and non-ACO providers in the same community using EHR products from a common vendor, different installations of the EHRs often do not facilitate seamless data sharing, making them just as problematic as working across products from disparate vendors.

Technological limitations have hindered ACOs in encouraging data sharing between ACO providers and non-ACO providers. In particular, Pioneers emphasized impediments stemming from a lack of data from SNFs. Pioneers described numerous unsuccessful attempts to receive and share data with SNFs in a consistent and automated fashion, as SNFs across the country frequently lack even basic elements of the HIT infrastructures commonplace in physician practices and health systems, and many SNFs continue to use paper-based medical records. Some Pioneers attributed this trend to the general state of the nursing home industry, while others discussed a specific resistance among SNFs to engage in regular data sharing with other health care providers. One Pioneer cited problems stemming from SNFs' lack of Wi-Fi connections, which prohibited physicians from logging into the ACO's EHR system remotely during their clinical rounds in the facilities. In such instances, ACOs likely need to build IT infrastructure in conjunction with professional relationships to improve non-network data sharing.

Out-of-network data sharing is often dependent on market-level factors outside ACOs' control

Data sharing with non-network ACO providers is a challenge for every organization because it is dependent not only on the level of an individual ACO's HIT capabilities but also on market-level factors that are, in many cases, beyond the ACOs' control.

For one AP, the surrounding market's data sharing capabilities are minimal, which forces the ACO to rely on piecemeal arrangements predicated more on establishing working relationships with non-network providers than manipulation of advanced HIT.

"Part of [data sharing with non-ACO providers] has nothing to do with IT and everything to do with human personalities," a representative for the AP said.

The AP has established an arrangement with the local hospitalist groups to receive encrypted emails about its patients' discharges. Likewise, the ACO's practices have a direct data-sharing arrangement with the lab most of the ACO providers use.

"We have to continue our [ACO data sharing] growth internally [in the ACO] because the wheels are not spinning at the velocity that we would like them to on the outside [of the ACO]," the AP ACO representative said. "We don't have the luxury of time [to implement new data sharing features] so we act accordingly and create things as we need them."

3c. Formative Summary: Structure and Nature of ACO/Provider Relationships—Assessing the Care Continuum

CMS has described ACOs as "groups of doctors, hospitals, and other health care providers, who come together voluntarily to give coordinated high quality care to their Medicare patients."[28] A premise of ACOs is that they improve transitions and communication across a continuum of services that includes primary, acute, and post-acute care (PAC). Improving transitions and communication across the continuum is assumed to improve beneficiary experience and outcomes while reducing costs. To coordinate care across the care continuum, an ACO must have relationships with providers across the continuum. This section presents preliminary descriptive analysis of the structural and functional provider relationships that 80 Medicare ACOs (23 Pioneer, 35 AP MSSP, and 22 MSSP ACOs) in the evaluation cohort have in place or are developing to facilitate beneficiary transitions and communication across the care continuum.

[28] Available at http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/ACO/. Accessed July 3, 2014.

Medicare ACOs have two distinct types of relationships that enable them to coordinate care across care settings. The first, which we call *core partnerships*, are structural. Core partners are identified as part of the ACO in its application to CMS or share in the costs of the ACO. Typical core partners are a hospital and an IPA that developed an ACO together and share in its costs. The second type is *functional relationships*. These are relationships that the ACO has with providers that are not core partners. Functional relationships facilitate management of beneficiaries across settings. These relationships typically include data sharing agreements and adoption of common protocols.

Pioneers are most likely and AP MSSPs are least likely to have core partners spanning the care continuum, with regular MSSPs falling between the two. This finding is not surprising, given that Pioneers are early adopters, many of which are sponsored by large health systems, and AP MSSPs are small provider groups by definition. All types of ACOs rely on functional partnerships to increase their reach across the care continuum. Functional relationships appear to be particularly important to AP MSSPs, given that their core partnerships are very limited.

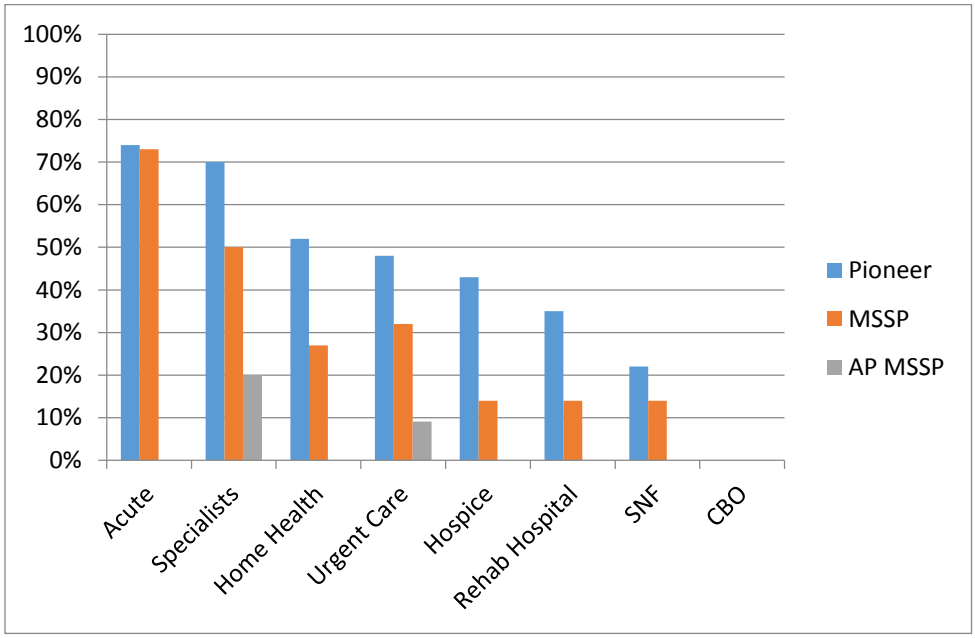
ACOs are continuously working on expanding their partnerships, which is reflected in *developing relationships*—those that are not yet functional but under development. Pioneer ACOs, most of which have existing core or functional relationships with acute care hospitals and specialists, are most likely to have developing relationships in the post-acute area. AP MSSPs are developing relationships in all areas, including acute care hospitals, specialist physicians, and post-acute care.

Pioneers are most likely, AP MSSPs least likely, to have core partners across the continuum

Figure 16 shows the presence of core partners by Medicare ACO initiative and by type of provider. Pioneers are most likely to have any type of Medicare provider as a core partner, reflecting their size and scope, and, in particular, they are most likely to have an acute care hospital and/or specialist physicians as core partners. At least some MSSPs also have core partners across all Medicare provider types but not as commonly as Pioneers. AP MSSPs stand out as significantly different from both Pioneers and MSSPs in terms of their core partners. Most AP MSSPs are composed exclusively of PCPs and therefore have no additional core partners. This reality reflects the eligibility criteria for AP MSSPs, which exclude acute care facilities from participation except for critical access hospitals and Medicare low-volume rural hospitals.[29] Community-based organizations (CBOs) are not present as core partners in any type of ACO.

[29] Advance Payment Accountable Care Organization (ACO) Model Fact Sheet. http://innovation.cms.gov/Files/fact-sheet/Advanced-Payment-ACO-Model-Fact-Sheet.pdf (Accessed 6/28/14)

Figure 16. Percentage of ACOs with Core Partners, by ACO Initiative and Type of Provider



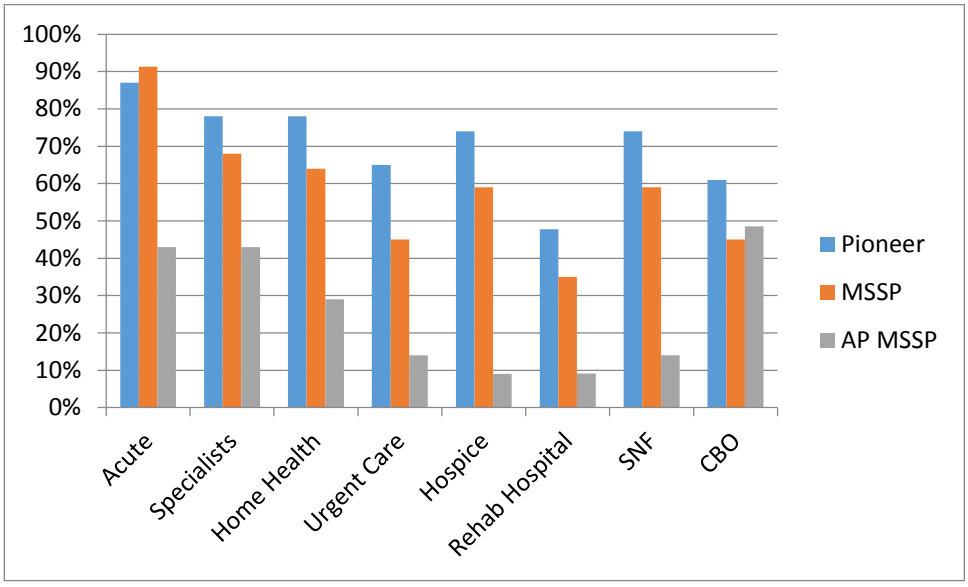
Functional relationships are important extenders of the care continuum for all types of ACOs, and particularly for AP MSSPs

ACOs often have working relationships with providers beyond their core partners. Figure 17 adds functional relationships and core partners together. When contrasted with

Figure 16, it shows that ACOs are using functional relationships to extend the care continuum beyond what can be achieved with core partners alone. This finding is particularly true for urgent care and post-acute providers (home health agencies [HHAs], SNFs, hospice), which are less likely to be included as core partners. CBOs also stand out. Although not medical providers, they often have functional relationships with ACOs, perhaps reflecting the needs of Medicaid dual-eligible beneficiaries, including those who use long-term services and supports.

AP MSSPs, which almost never have core partners beyond PCPs, do have functional relationships in all categories. For Pioneers and MSSPs, functional relationships reinforce the primary importance of acute hospitals and specialist physicians, and they reveal a significant presence of post-acute providers, including HHAs, SNFs, and hospice.

Figure 17. Percentage of ACOs with Core Partner or Functional Relationship, by ACO Initiative and Type of Provider

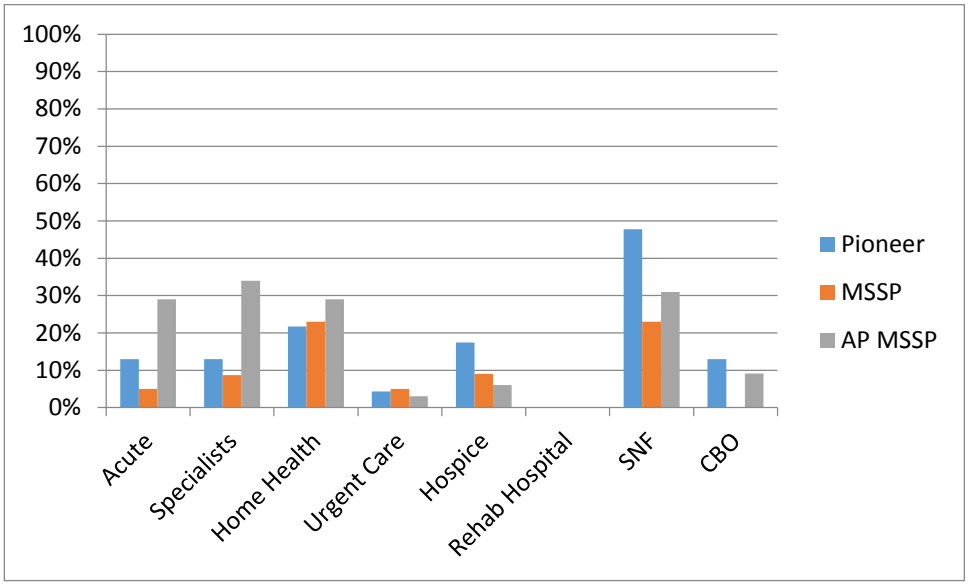


Developing relationships may reflect current initiatives

Figure 18 reflects current priorities among ACOs in developing new relationships. These are relationships that are not yet operational but in progress. Across all types of ACOs, development of post-acute relationships (SNF and HHA) is underway, though rehabilitation hospitals are an exception. Pioneers are particularly active in the SNF area, perhaps reflecting availability of the SNF three-day waiver.[30] AP MSSPs are also developing relationships with SNFs, but their activity with specialists and acute hospitals stands out. These areas are where they are not as likely as Pioneers or MSSPs to have core or functional relationships in place.

[30] Beginning in April 2014 for Pioneer ACOs choosing to participate, the SNF three-day waiver permits patients to be admitted to a post-acute care facility without at least a three-day preceding acute hospital stay.

Figure 18. Percentage of ACOs with Developing Relationships, by ACO Initiative and Type of Provider



Overall, these preliminary results suggest that all types of Medicare ACOs are working to encompass the care continuum through core partnerships and functional relationships. Relationships under development suggest an evolutionary process that continues over time. AP MSSPs are least likely to have a broad care continuum, reflecting their basis in small primary care practices, but are most active in developing relationships with acute care hospitals and specialists, two areas where a high percentage of Pioneers and MSSPs have existing core or functional relationships. Pioneers and MSSPs are similar in emphasizing acute care hospitals and specialists in their care continuums, but Pioneers stand out as most likely to have all major types of providers represented as core or functional partners. This reality may reflect the Pioneers' early adopter characteristics.

3d. Case Studies: Examples of How HIT and Provider Relationships Support Key Care Management Activities

Obtaining actionable information to deliver targeted care management services and facilitate inpatient care transitions is a function of both the relationships ACOs have with participating and non-participating providers and the capacity ACOs have to exchange health information. Presented below are some examples of how ACOs range from more HIT intensive approaches by using algorithms to identify or predict high service use or spending to less technologically dependent (i.e., "low-tech") approaches that do not require large investments in HIT or significant analytic resources. Even ACOs that rely on claims and patient data from their electronic health records do not exclusively depend on these sources of information to identify patients for care management. Similarly, ACOs that have access to real-time or near-real-time data feeds from hospitals receive this information from some, but not all, facilities from which their patients receive care.

The examples of relatively HIT-reliant ACOs below are Pioneer ACOs, and the subsequent examples of ACOs that are less HIT reliant are a mix of Pioneer and AP MSSP ACOs. These examples were identified by the evaluation team as particularly illustrative of more and less HIT-driven care management infrastructures and are not intended as a comparison of Pioneer and AP MSSP ACOs. Rather, these examples are presented to illustrate the degree to which individual organizations marshal HIT and other resources to support key care management activities.

- At the outset of the ACO model, one Pioneer ACO, an integrated delivery system (IDS), had care coordinators manually evaluate lists of patients and flag beneficiaries who accrued more than $50,000 in spending in a given period. The realization that this approach was too crude and the addition of a new IT software platform allowed the ACO to preliminarily identify candidates for care management services using risk-stratification algorithms based on seven triggers, such as number of medicines and whether expenditures exceed $50,000 to broadly categorize beneficiaries' risk of transitioning into the sickest, costliest stratum. Care managers then review the patients' medical histories to identify those who have interacted with the system recently (i.e. from chronic obstructive pulmonary disease [COPD] or congestive heart failure [CHF] flare-ups) and talk with providers to determine which candidates will benefit most from care management. Some of the more engaged physicians may ask that the care manager follow up with a specific patient directly to begin care management services. When beneficiaries are discharged from one of the ACO's acute care hospitals or are seen in the hospitals' emergency department (ED), hospital-based care managers can see, via the hospitals' HIT system, which patients are ACO-aligned beneficiaries. The ACO has agreements with a limited number of hospitals owned by organizations other than the parent IDS for the purpose of receiving data on admissions; however, the information the ACO receives from outside the parent IDS is inconsistent and at times unreliable.

- Another Pioneer, an independent practice association (IPA), invested heavily in a common health IT platform for its providers that allows for sharing of patient data, data analysis, and deriving risk scores to facilitate targeted delivery of care management services. ACO care management leadership stressed that, while HIT tools are relatively accurate in identifying many patients for care management, some patients can only be identified through talking with providers. This ACO also noted that data do not predict who will benefit from the care management interventions. Over the course of its participation in the model, this ACO has modified its approach to targeting patients for care management from focusing on the sickest, highest-risk patients to focusing on those who are not among the sickest patients but are perceived as most likely to benefit from care management programs. As a result, their care management interventions are now more focused on interacting with patients in the ambulatory setting, rather than inpatient care and transition management. They credit their achievement of earning shared savings to this ambulatory-oriented approach and their relatively small panel of ACO participating providers, all of whom use a common HIT infrastructure.

- Another IDS Pioneer ACO has evolved its care management programs from being largely disease-focused (pre-ACO) to being less disease focused and based more on risk from

relying on software and IT tools to identify patients. Beneficiaries are identified for care management programs using claims analyses and EHR data in conjunction to identify high-risk, high-cost patients. Patients are also identified by case managers and through physician referrals. At present, the ACO is implementing a software application that creates predictive analytics using data from the EHR and Medicare claims data so the ACO can prospectively identify patients who may become high risk. This ACO's efforts are focused on exchanging data with providers across the continuum of care, within and outside of the ACO's network. As such, the ACO is in the process of establishing connection to the state's HIE system so it can exchange data with providers across the state, regardless of whether they have a formal relationship with the ACO.

- A different IDS Pioneer selects beneficiaries for its care management programs using a model to analyze a variety of patient characteristics over time, such as risk score and utilization patterns. The ACO has found that this modeling approach results in more appropriate referrals to the care management program than solely relying on referrals originated by primary care providers. However, primary care providers and care managers finalize the lists of patients selected for care management that are generated by the ACO's modeling activity. While this ACO has an extensive HIT system that includes a centralized data warehouse and analytic capabilities to identify patients for care management, it has is no straightforward way for ACO providers to access information for patients admitted to hospitals or who see providers outside the ACO's network. As a solution, care managers emphasize with their patients that the patients should notify the care manager immediately if they receive care from a provider or facility other than those in the ACO's network. To encourage compliance with this request, some ACO practices offer 24-hour telephone access for patients.

Alternatively, some ACOs do not rely heavily on HIT or robust analytic resources to identify beneficiaries for care management. Rather, these organizations depend largely on physician identification of beneficiaries or they assess utilization information as it is generated when patients interact with the health system (i.e., ED encounters, presence of certain conditions, lab values that fall outside of pre-determined ranges). These ACOs tend not to use predictive analytics to prospectively identify patients or execute sophisticated analyses that rely on integrated claims and EHR data sets. In some cases, the ACO's less HIT-intensive approach is by choice; some ACOs do not perceive that investments in the IT tools and analytics packages that facilitate these activities are worth the cost. Others note that their ACOs are working toward developing more sophisticated analytic capacity and, thus, use less HIT-intensive approaches as either interim or work-around solutions. Like ACOs with more sophisticated HIT infrastructures and analytic capacity, these ACOs also struggle to identify, in a timely manner, patients who seek care outside of the ACO network, relying heavily on their organizations' relationships with providers at area hospitals and other providers in the care continuum to provide this information, albeit often inconsistently.

- An IDS-based Pioneer ACO has described difficulty integrating the disparate EHR systems of physicians that recently joined the ACO and communicating across the ACO. Among Pioneers, this ACO appears to use relatively less-HIT intensive methods for

identifying patients for care management. The ACO administrative team reviews data on a variety of patient characteristics—gaps in care, hospital or ED use, and clinical complexity—to identify beneficiaries, and subsequently provide care managers with lists of these beneficiaries for care management intervention. The ACO also relies on its providers to generate referrals for patients they believe would benefit from care management services. The opportunity to evolve its care management capabilities will in part depend on whether the ACO is able to integrate clinical, quality, and claims data to more effectively determine which beneficiaries would benefit from care management in the future.

- One AP MSSP identifies patients for care management by targeting patients with inpatient stays. ACO nurse care coordinators are posted at two of the three area hospitals responsible for admitting the largest volume of ACO patients, and nurses comb through hospital census records daily to identify all ACO-assigned patients with recent admissions. The ACO provides care transition services to any admitted ACO patient, regardless of risk status. In addition, the ACO facilitates the transition of any admitted patient—regardless of whether he or she is an ACO patient—whose primary diagnosis is myocardial infarction, congestive heart failure, chronic obstructive pulmonary disease, sickle cell anemia, a premature birth, or patients with multiple ED admissions or hospital readmissions. The ACO notes that extending transition services to non-ACO patients serves to both strengthen the very critically needed hospital relationships as well as the ACO's original mission as an organization founded to aid disadvantaged and medically underserved members of the community.

- Medicare beneficiaries assigned to another AP MSSP ACO are selected for care management based on hospital stays or ED visits from census reports from several local hospitals or because a provider or a laboratory technician has identified them as a member of a high-risk population from test results. While there is a high degree of HIT system integration within the core physician practice, the organization has experienced challenges related to integrating elements of the HIT systems of smaller practices recently purchased. In addition, the fact that the ACO uses a different EHR system from the area hospitals—all of which also differ from one another—and this difference has presented difficulties for the ACO's care coordinators working to manage patients' transitions of care. ACO care coordinators who work with ACO patients in the area hospitals must transfer information manually from one system to another. Financial constraints have limited the ACO's IT staff's ability to purchase software programs that would improve communications between the ACO's various HIT systems.

- In another AP MSSP, its independent physician practices use approximately 14 different EHR systems, none of which communicate with one another. This ACO identifies patients with inpatient stays for care management intervention. In hospitals where ACO physicians take call and round, the ACO is aware when their patients are discharged. Hospitals where ACO physicians do not have admitting privileges have been less receptive to sharing information with the ACO. In these instances, the organization has developed relationships with non-ACO hospitalists to notify the ACO when an ACO

patient is discharged. Using both methods of notification, about 50 percent of patients with inpatient discharges are identified, according to the ACO. The ACO's sole care coordinator is working to engage SNFs and HHAs in the community in discussions about care management for ACO beneficiaries. Until working relationships are developed at the ACO level, the individual ACO practices are deciding how to carry out care management at the practice level. For example, one provider focuses on making sure that patients are up-to-date on any tests or vaccinations that they may need; another practice focuses primarily on managing the patients with the greatest spending and refers them to independent specialists in the community who are known to order the fewest unnecessary tests. At the ACO level, the organization intends to focus on patients with COPD and CHF, and—to a lesser extent—diabetes, hypertension, and coronary artery disease.

ACOs' reliance on HIT infrastructure to support care management activities varies and is not necessarily related to the extent that an individual ACO has invested in technologies and tools. In some cases, the existence of technological solutions does not supersede the need to draw on the knowledge providers possess about their patients and what care management support is needed. A recurring theme, regardless of how the ACO uses HIT for care management, is that provider relationships across the care continuum, especially those with providers outside of the ACO's network of participating providers, can be limiting. Most AP MSSPs, and to a lesser though still notable extent, Pioneers struggle to develop these external relationships. Mapping back to the evaluation team's working hypotheses around drivers of ACO performance, we continue to observe that most AP MSSPs and many Pioneers are in the developing stages of their capacity to identify, follow, and monitor their aligned beneficiaries across the care continuum, with an apparently critical disconnect with hospitals that fall outside the reach of their core or functional relationships.

CHAPTER 4. LEARNING SYSTEM EVALUATION

The CMMI ACO Learning System has featured events (i.e., webinars, in-person meetings, conference calls) for ACOs since April 2012. The purpose of these events is to facilitate the transformation of participating organizations into ACOs that achieve the cost-savings and quality goals of the CMS ACO initiatives. Some events are focused on best practices in areas such as beneficiary engagement and care management. Others reflect programmatic themes, such as webinars on the benchmark methodologies used to determine cost-savings, quality measures, and quality reporting to CMS.

The first section of this chapter describes findings from an April 2014 focus group about how Pioneers are learning and evolving by the start of their third performance year. The second section describes the breadth and depth of ACO participation in Learning System events held between September 2013 and May 2014.

4a. Focus Group Findings: How ACOs Learn

On April 28, 2014, members of the evaluation team conducted focus groups with Pioneer ACO leaders who attended the Pioneer ACO spring meeting in Baltimore, Maryland. The objective was to elicit information about how Pioneers are learning and evolving by the start of their third performance year. The evaluation team conducted a similar set of focus groups a year earlier at the 2013 Pioneer ACO spring meeting in Washington, D.C., which helped inform the direction of these more recent focus groups.

Approach

The evaluation team held two simultaneous 90-minute focus group discussions with representatives from each ACO assigned randomly to one of the groups; discussions were closed-door to encourage frank conversations. One person representing each of the 22 Pioneers that registered for the meeting attended the focus groups, with 11 ACO leaders in each group. In preparation for the focus groups, we selected six topics for discussion: (1) sustaining infrastructure, (2) engaging PCPs, (3) engaging specialists, (4) managing increasing risk, (5) all payer strategies, and (6) beneficiary retention—with the expectation that two or three would be discussed during the time allotted. The topics were chosen for their relevance to ACOs based on recent site visits, quarterly assessments, and focus group results from 2013. Both groups had time to discuss topics (1), (2), and (3) listed above. Each group answered questions regarding how their organizations approached these topics and learned about new approaches or modified their approaches to these topics. The focus groups yielded two types of findings: 1) the sources of ACOs' learning across all topics discussed and 2) specific actions taken and challenges ACOs have experienced related to each of the topics. In this section, we report on findings pertaining to sources of ACOs' learning.

Moderators used a common open-ended discussion guide to prompt their respective groups. To promote consistency across sessions, we held a training for all individuals involved in the focus group administration—moderators, note takers, and logistics personnel—one week prior to the focus groups. Each group opened with introductions and a review of the ground rules. The

sessions were recorded, although we assured participants that recordings were for internal purposes only and comments would not be attributed to individuals.

Findings

Pioneers continue to rely largely on internal sources of learning: trial and error, the experiences and vision of executive and medical leaders, and parent organizations' experiences with managed care products. Pioneers are learning more than they did initially from their own data analyses now that their analytics capacity has matured. Pioneers also report having gained insights from external sources, including consultants, commercial payers, and self-insured employers but do have more experience to draw from within their organizations than most external sources. They value networking with each other to share their experiences and would like the annual meeting and other learning system activities to provide more such opportunities. Pioneers discussed looking to their learning sources in particular for ideas and evidence on interventions to achieve shared savings.

Internal Experiences and Leadership

Participants in both focus groups reported that most learning comes from internal sources, often from their own leadership teams. More specifically:

- Many Pioneers report that they learn through their own mistakes, through trial and error, and that they have found it both valuable and important to be receptive to internal critique to make adjustments and try again when an initiative is not working.

- Pioneers also reported that their executives, managers, and senior-level physicians are sources of ideas and vision. Ideas are most often generated in group settings during meetings and topic-specific committees or work groups.

- Several Pioneers said that they learn from the experiences of others working in managed care products within their parent organizations.

- One Pioneer described how its organization applied learnings from its experience participating in an earlier Medicare demonstration. One of the lessons is that return on investment (ROI) is often a long-term proposition; in the ACO's experience, realizing ROI can take more than three years.

Data Analysis

Pioneers have invested in their data analytics to identify areas for organizational improvement. Some ACOs have purchased claims management programs and/or clinical data analytic packages from vendors, while other ACOs have developed homegrown systems. ACOs said these efforts include identifying high-cost patients, developing clinical criteria based on historical analysis for the SNF three-day waiver, examining quality performance by practice and by physician, and conducting analyses to understand where the organization's ACO-aligned beneficiaries receive specialty care.

Consultants and Vendors

Pioneers reported some limited success using consultants to provide support in such areas as data integration/analysis. ACOs have found limited support from these sources, however, as most consultants and vendors have little experience working with ACOs—ACOs are more knowledgeable based on the tenure of their actual experience. One ACO said start-up consulting companies have been a good source of inspiration because they look at issues from a fresh perspective, emphasizing business process management and technology solutions and, according to the ACO, offer "thinking outside the box."

Payers and Brokers

Pioneers mentioned commercial payers and self-insured employers as good sources of strategic support for their experience with population management. One ACO said it had reached out to insurance brokers, who had shared strategies for population management found in other products. Still, at least one ACO noted that commercial payers in its area are reluctant to share ideas because of the competitive nature of the market.

Stakeholders

Pioneers reported that they often solicit stakeholders—both providers and patients—for their perspectives on various aspects of care delivery. One Pioneer reported exchanging ideas with public health nurses focused on prevention and wellness, self-management education, and care coordination. Because the public health nurses are co-located in the Pioneer's participating provider practices, physical proximity has facilitated idea sharing. A different Pioneer said it often communicates with PCPs and specialists through surveys, focus groups, and advisory committees to better understand their motivations and needs on a given topic in question. In other instances, Pioneers said patient feedback through focus groups and written complaints is a valuable source of information for process improvement efforts.

Networking

Several Pioneers discussed informal networking with other ACOs as an effective way to generate and share ideas. With the exception of the Southern New England ACO Learning Collaborative, ACOs did not mention formal learning collaboratives as sources of learning, however. One ACO expressed regret that CMS was not providing more ideas to help ACOs achieve shared savings. Another participant suggested that Pioneers should have more input into the agenda for the annual face-to-face meeting and that the ACOs specifically would benefit from more scheduled time for ACO-to-ACO interaction.

4b. Analysis of Learning System Participation Data

In this section, we analyzed participation in Mathematica-coordinated events held between September 2013 and May 2014.[31] Mathematica provided Learning System participation data from September 2013 through May 2014 to the L&M evaluation team in Microsoft Excel workbooks. We classified Learning System events by target audience (i.e., Pioneers, MSSPs, all), relying on participant e-mail addresses to determine attendees' organizational affiliations where such information was not explicitly provided.[32] We then generated summary statistics about participation in the Learning System along various dimensions and compared them with Learning System event analyses from the previous year. Attendees not affiliated with ACOs were excluded from analysis and were not reflected in attendance statistics.

This type of analysis can help identify the webinars that were most well attended and were, thus, likely to have been topic areas perceived as most useful by the participants. Participation data by itself cannot provide a comprehensive evaluation of the Learning System, however. This analysis, combined with qualitative data from ACO interviews, focus groups, and observation of events can create a richer picture of how the Learning System and other sources of learning have shaped ACO growth.

Results: Pioneer ACO Events

A total of 40 Learning System events for Pioneer ACOs were held between September 2013 and May 2014; detailed participation data were available for 31 of these events. In the previous report, we described participation in the 62 Learning System events held between April 2012 and September 2012. Thus, the time span covered in this report had fewer events over a longer period of time.

Four of the original Pioneer ACOs that became MSSP ACOs after 2013 attended several events designed for Pioneers. To be comprehensive, we included these ACOs in our analysis of Pioneer events, resulting in our examination of attendance rates for 27 Pioneer ACOs. The Pioneers that exited the model attended events in 2013 only, with the exception of a single instance in which one former Pioneer attended an event held in 2014.

By Event Topic

We classified Learning System events by topic. Counts of events by topic for the 31 Pioneer Learning System events are provided in Table 18 below.

[31] Mathematica Policy Research (Mathematica) was awarded the ACO Learning System contract in the second half of 2013.

[32] Several Pioneer ACOs employ independent firms, primarily for information technology services. Representatives from these service firms were frequently in attendance at Pioneer ACO events. We linked firm representatives to the ACOs they support and counted them as attending on behalf of their ACOs. Attendees not affiliated with any ACOs were excluded from analysis.

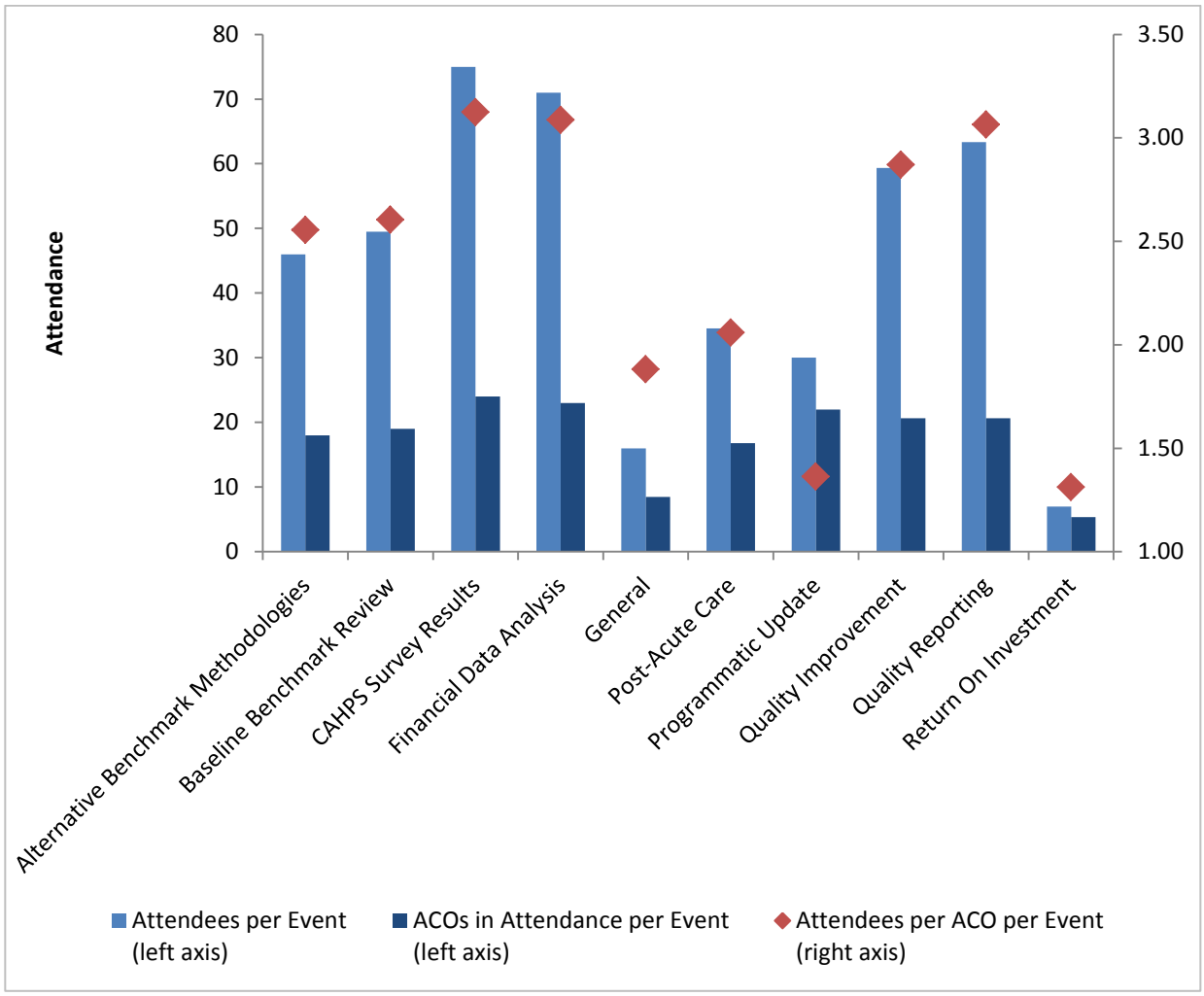
Table 18. Pioneer Learning System Events by Topic

Event Topic	Number of Events
Alternative Benchmark Methodologies	1
Baseline Benchmark Review	4
CAHPS Survey Results	1
Financial Data Analysis	1
General	2
Post-Acute Care	9
Programmatic Update	1
Quality Improvement	3
Quality Reporting	3
Return On Investment	6

The CAHPS Survey Results webinar held on September 23, 2013 had the largest attendance (75 representatives). This webinar included participants from the greatest number of ACOs (n=24), and most attendees per ACO (average of 3.13 attendees per ACO). Other popular event topics included Financial Data Analysis, Quality Reporting, and Quality Improvement.

Attendance was lowest for the Return on Investment (ROI) events held from September 2013 through February 2013. This finding was to be expected, however, as the ROI events were part of the Innovation Pod series, to which only select ACOs were engaged. ROI events were attended by, on average, 7 attendees per event on behalf of 5.3 ACOs, yielding 1.31 attendees per ACO per event. Despite some events being more popular in terms of the total number of individual participants, an average of around 20 ACOs attended most events.

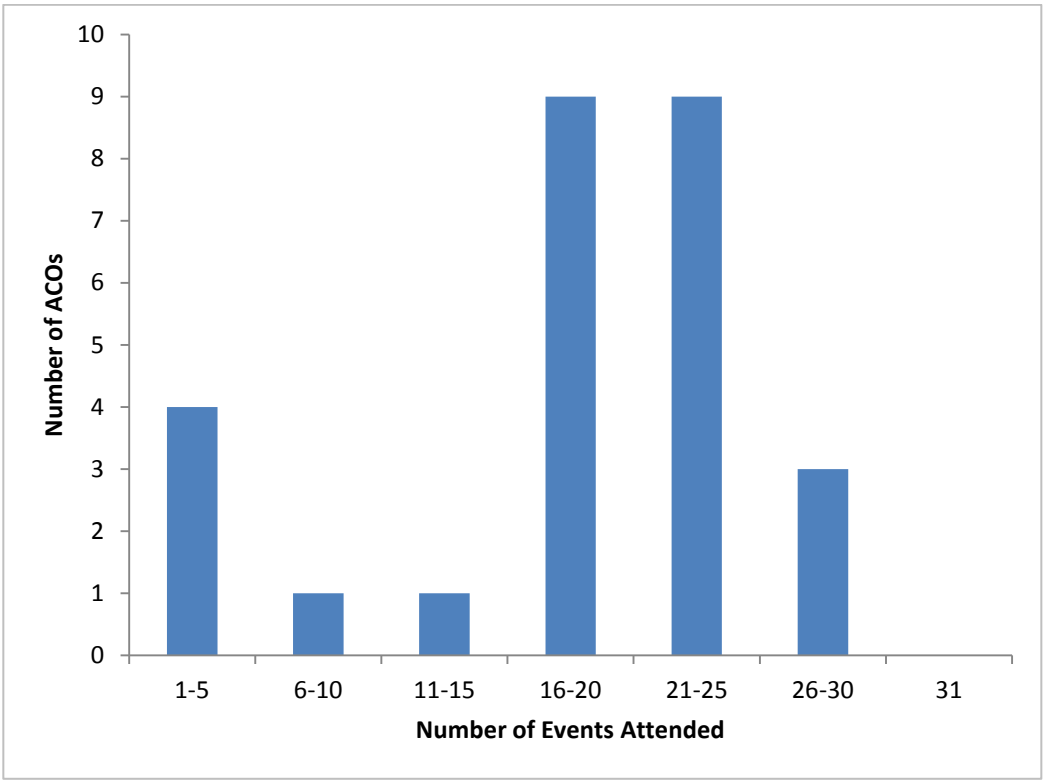
Figure 19. ACO Attendance by Event Topic



Sixty-seven percent of ACOs attended between 16 and 25 of the 31 events. Three of the four ACOs that attended five or fewer events were Pioneer ACOs that exited the model by the end of 2013.

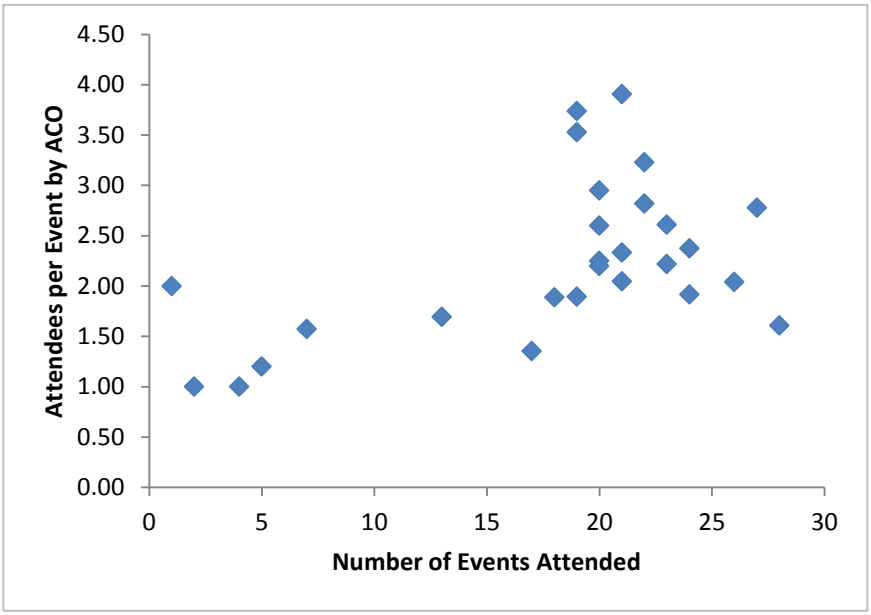
In our previous analysis of 2012 Learning System events, we found a mean of 22 Pioneers represented per event, an average of 53 total participants per event, and about 2.3 attendees per Pioneer per event. Pioneers had lower averages across all three of these dimensions in the 2013-14 events analyzed in this report: an average of 18 Pioneers attended each event, with a mean of 43 total participants per event and about 2.2 attendees per Pioneer per event. The declines are partly explained by the withdrawal of nine Pioneers at the end of 2013.

Figure 20. Frequency of Events Attended by ACOs



We explored whether there was a correlation between the average number of representatives an ACO sent to each event and the number of events attended to see if ACO engagement in the learning system was best reflected by the combination of these dimensions. In other words, do the most engaged ACOs attend the most events and send the most people? While we found a moderately positive correlation across the complete set of Pioneer ACOs (r = 0.51), the relationship disappeared once the five Pioneer ACOs that participated the least were excluded (r = 0.03). This finding was similar to the 2012 analysis that found a positive relationship overall but a negative correlation when limiting to ACOs that attended the fewest events. This result may be because ACOs that attended the fewest events go to only those events that are most relevant to their needs but send several participants instead of a lone representative.

Figure 21. ACO Attendees per Event by Number of Events Attended



By Pioneer ACO Characteristics

We analyzed participation along three dimensions of Pioneer ACO characteristics: track, size, and subtype.

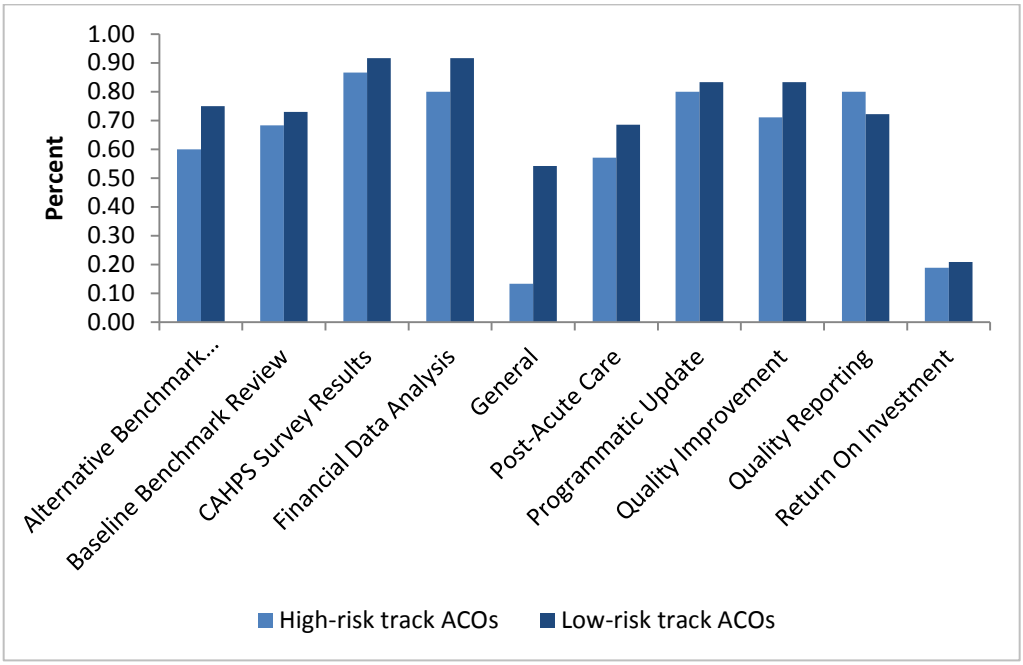
Track

We classified Pioneers as being in either the higher risk track (Alternative 1, Alternative 2) or a lower risk track (Pioneer Core, Option A, Option B), where track reflects the level of financial risk the ACO contractually chosen in the beginning of the Pioneer ACO model. We used initial track classification rather than later track classifications (Pioneers were allowed to change tracks at the end of each performance year) because we wanted the assignment to reflect Pioneers' perceived comfort and experience with the ACO model at the beginning of the model. Track assignment in later years may be more reflective of performance and changes in organizational willingness to take on risk. We evaluated whether this stratification revealed any significant differences in ACO participation, with a hypothesis that the more experienced ACOs may participate in fewer events because they have already developed expertise.

Fifteen ACOs were classified in the higher risk track, while 12 were classified in the lower risk track. We calculated the average number of ACOs in attendance by track across event topics as a percentage of ACOs in each risk track. Findings suggest that ACOs in lower risk tracks attended proportionally more events than ACOs in higher risk tracks across all event topics, although the gap was minimal in most cases. This result was not consistent with the 2012 analysis, which found that ACOs in Alternative tracks had the highest average number of participants per ACO event. This result could be because in 2012, ACOs in the higher risk track were more often

called on to present their current work as models for less experienced ACOs. Thus, they may have sent more attendees to each session to provide this mentorship.

Figure 22. Percentage of ACOs in Attendance by Risk Track and Event Topic



Size

We categorized the Pioneers as either small/medium (fewer than approximately 350 providers; n=9) or large/extra large (more than approximately 350 providers; n=18). We found that the large/extra large ACOs attended more events on average (19.6 events) than the small/medium ACOs (14.9 events). Large/extra large Pioneers also sent more attendees to events than small/medium Pioneers (2.45 per event compared to 1.84 per event, respectively). This finding is consistent with findings from the previous year's participation analysis.

Subtype

We classified the Pioneers by subtype: integrated delivery system (n=10), medical group practices with and without networks of individual practices (n=4), network of individual practices (n=7), and partnership of hospital system and medical practices (n=6). This analysis revealed that Pioneers organized as integrated delivery systems sent the greatest number of representatives to events on average (2.5). Average attendees per event among the remaining Pioneer subtypes hovered between 2.1 and 2.2, with the exception of medical group practice Pioneers, which sent an average of 1.6 attendees per Pioneer to events.

This finding contrasts with last year's analysis in which medical group practice Pioneers sent the most representatives to events on average (2.7). Networks of individual practices experienced the second largest decline, with average attendees per event falling from 2.7 to 2.1 between

performance years one and two. One possible explanation for these declines in attendance is that medical group practices and individual practice associations may have found the Learning System events held during the 2013 through 2014 period less relevant for Pioneers without hospital affiliations.

Summary

Pioneer participation in Learning System events declined from the levels observed in the events held in PY1. Although there were more events in a shorter amount of time in PY1, they were better attended in terms of the number of Pioneers represented and average representatives per Pioneer. Some of this decline can be attributed to Pioneers exiting the model during 2013. The shift from the most engaged Pioneers being high-risk tracks and medical groups to low-risk tracks and integrated delivery systems may reflect change in the relevancy of topics to different types of ACOs or changes in the way ACOs were using the Learning System as a tool to catalyze change.

Results: MSSP ACO Events

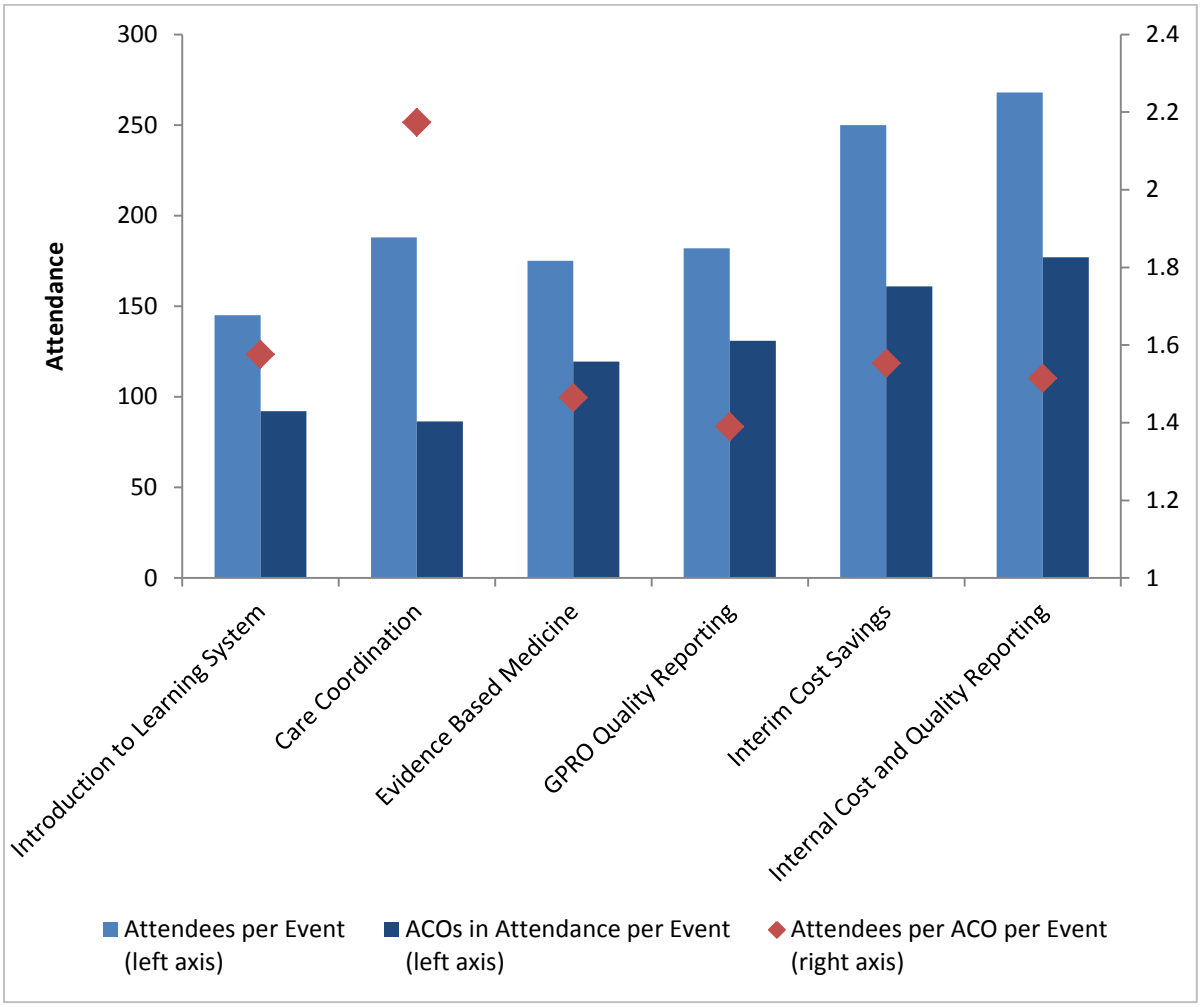
Table 19. MSSP Learning System Events by Topic

Event Topic	Number of Events
Introduction to Learning System	1
Care Coordination	2
Evidence Based Medicine	2
GPRO Quality Reporting	1
Interim Cost Savings	4
Internal Cost and Quality Reporting	1

A total of 11 Learning System events for MSSP ACOs (both AP MSSPs and MSSPs) were held between November 2013 and May 2014; detailed participation data were available for all 11 events. These represented the first set of MSSP Learning System events; thus, we are not able to contrast findings with those from a previous time period.

In January 2014, 123 new ACOs joined the 220 MSSPs already participating in the model. As a result, attendance figures were significantly higher for MSSP events held in April and May 2014 than for those held between November 2013 and January 2014. Attendance did not pick up until after January; and no MSSP events were held in February or March. The events between November 2013 and January 2014 attracted an average of 175 individuals each, while the later events drew an average of 237 individual attendees each.

Figure 23. MSSP ACO Attendance by Event Topic

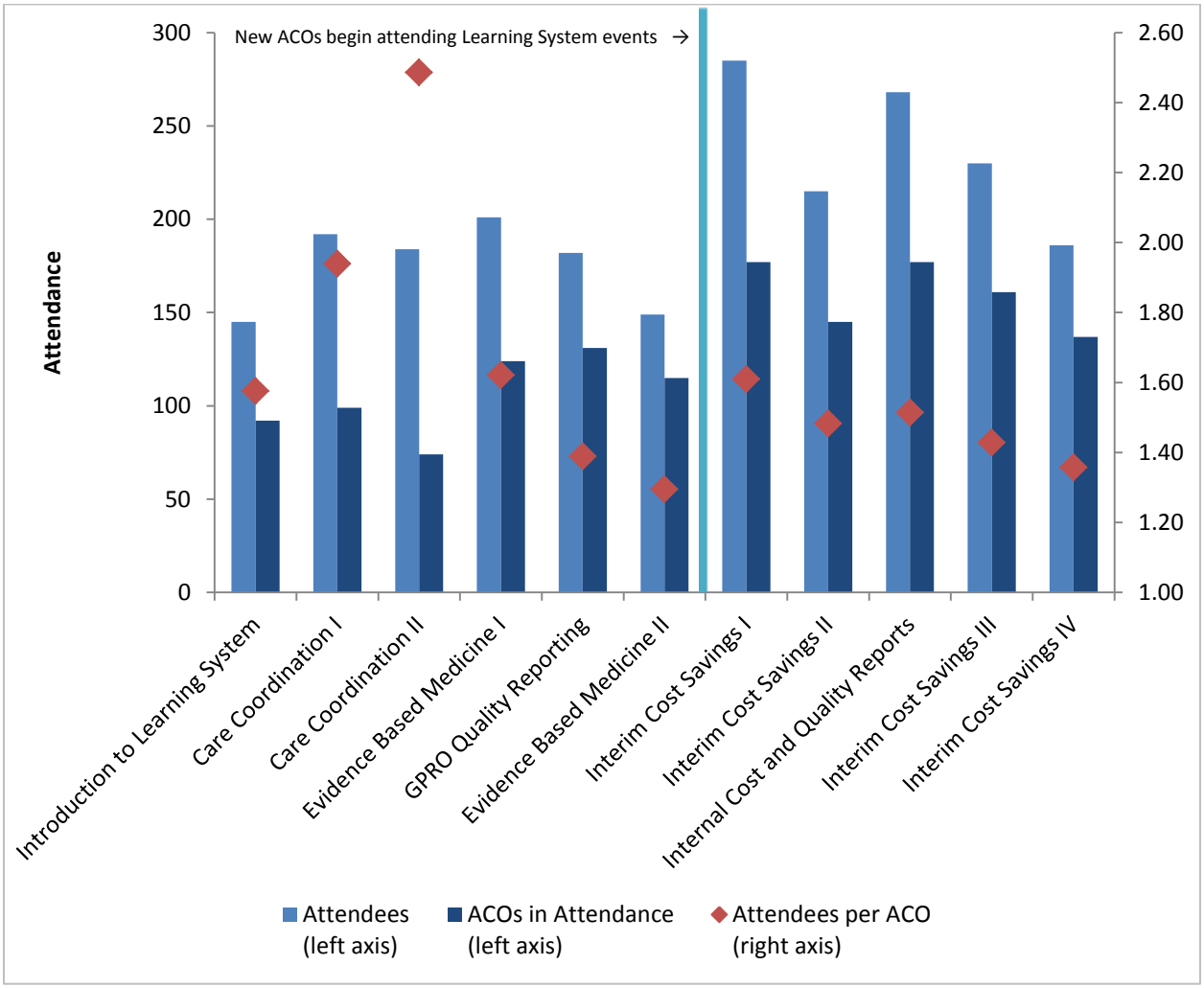


The MSSP events included an Introduction to the Learning System, two sessions on Care Coordination, two sessions on Evidence Based Medicine, four sessions on Interim Cost Savings, and one session each on Group Practice Reporting Option (GPRO) Quality Reporting and Internal Cost and Quality Reports. The Care Coordination sessions focused on alignment with community partners, effective transitions from inpatient to outpatient care, and integrating EHR systems between acute care providers and primary care providers. The Interim Cost Savings session consisted of ACO representatives in leadership positions discussing key strategies they had implemented and were planning to implement to improve quality and reduce costs. During the Internal Cost and Quality Reports webinar, representatives from one of the AP MSSP ACOs spoke about how they collected, cleaned, organized, and presented data used in cost and quality reports disseminated to affiliated providers.

The Interim Cost Savings I and the Internal Cost and Quality Reports events garnered the most interest, each drawing attendees from 177 ACOs. The Interim Cost Saving I event had 285 ACO attendees—the most of any MSSP event. The Care Coordination II event attracted the greatest

number of attendees per ACO with an average of 2.5, boosted by two ACOs that sent 16 and nine representatives, respectively.

Figure 24. ACO Attendees by MSSP Event (In Chronological Order)



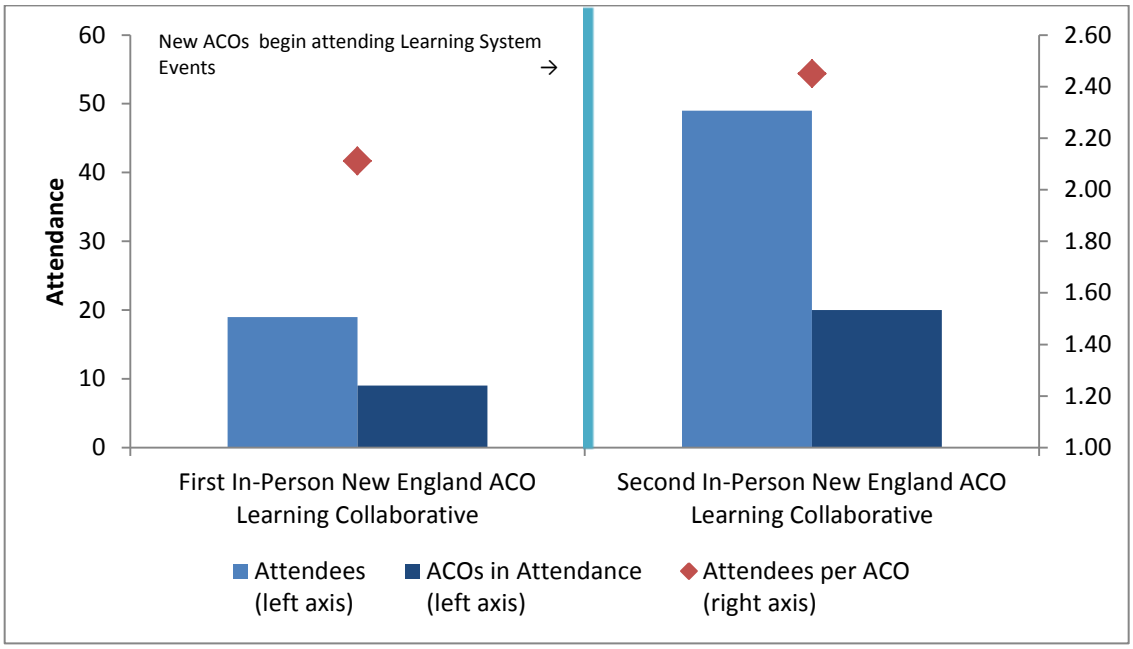
Among sessions spanning two or more events, attendance of the continuation sessions tended to dip relative to the initial session, with the exception of a small spike in attendance between the second and third Interim Cost Savings events. This change may be because some of the ACOs felt a single session was adequate to cover the topic or because, after the first session, some ACOs determined that the topic was not relevant to their needs.

Results: In-Person New England ACO Learning Collaboratives

There were two In-Person New England ACO Learning Collaboratives held in Boston, Massachusetts. All New England ACOs, regardless of which ACO model they participated in, were invited to attend the in-person events. The first one, held January 27, 2014, drew 19

attendees from nine ACOs. The second event, held May 19, 2014—after the new cohort had begun participating in Learning System events—drew 49 attendees from 20 ACOs.

Figure 25. ACO Attendees by In-Person New England ACO Learning Collaborative



There was little overlap of ACOs attending the two collaboratives: only three of the nine ACOs that attended the first also attended the second collaborative. Only one of the three ACOs that attended both events was from the Pioneer model.

Discussion

This analysis found that learning topics related to cost savings, financial data analysis, and quality results/quality reporting/quality improvement generated the most individual participants from both Pioneer and MSSP ACOs, suggesting that these topic areas are the most useful to participants, regardless of ACO type. Even as total individual participants fluctuated by topic, the average number of ACOs represented at each event was relatively constant for both Pioneers and MSSPs, with some exceptions. This result suggests that engaged ACOs may try to attend events, regardless of topic, but, for topics they are particularly interested in, they send more representatives. Another possible explanation for this trend is that some events are more interdisciplinary in nature, and for these events, ACOs encourage multiple staff with varying roles, to attend.

Proportionally, fewer MSSP ACOs sent representatives to events (fewer than 50 percent of MSSPs were represented at any one event) than Pioneer ACOs (more than 70 percent of Pioneers were typically represented at any one event), indicating that Pioneer ACOs are more engaged in the Learning System than MSSPs. There are several possible explanations for this trend. First, Pioneers have more at stake financially in the model and may want to take advantage of all

options that could improve their chances of success. Second, Pioneers are a unique group of providers with advanced delivery models and may, thus, feel the only way to learn is by discussions with one another. Indeed, this theme emerged from the focus groups held at the 2014 Pioneer Face-to-Face meeting. MSSPs, in contrast, tend to be less mature ACOs and may rely more heavily on other sources of learning. A third potential explanation is that, although the topics covered appear similar (emphasis on cost and quality concerns), the content covered or the presentation of information may differ across the two Learning Systems. For example, because the Pioneer model is more mature and the audience more intimate, there is a greater depth of information provided during sessions and more interactive discussion. A final potential explanation is that the MSSP Learning System is fairly new, and it may take time for it to draw MSSP attention. Still, a handful of Pioneer ACOs attended fewer than 10 events. These ACOs may not perceive the events as valuable or they could have had other barriers to attendance, such as time and staffing constraints.

The CMMI ACO Learning System evaluation will continue to examine ACOs' sources of and trends in learning.

CHAPTER 5. CONCLUSIONS

This report summarizes findings of this ongoing evaluation covering the first two years of the Pioneer ACO model. By the end of the second year of the model, Pioneer ACOs collectively reduced Medicare expenditures compared to their baseline and near markets' underlying expenditure trends by an average of $35.62 PBPM in 2012 and $11.18 PBPM in 2013. These reductions translate into a total savings of approximately $384 million in the first two years of the Pioneer model, with most of these savings ($279.7 million) occurring in PY1. Consistent with the spending results, utilization differences were lower in PY1 than in PY2. Estimated Medicare savings and utilization varied across the 32 Pioneers. In PY1, 19 Pioneer ACOs had significant reductions in PBPM expenditures relative to their respective near markets; in PY2, 11 Pioneers demonstrated statistically significant PBPM savings, and two Pioneer ACOs had significantly higher expenditures than expected. Ten Pioneer ACOs demonstrated statistically significant savings in both performance years, and 12 Pioneers did not have significantly different spending changes compared to their near markets in either PY1 or PY2.

Changes in utilization of a select set of key services over time provide insight into drivers of individual Pioneer ACO changes in spending. Pioneer ACOs with savings in both performance years, relative to their near markets, were more likely to show significant and larger reductions in acute inpatient stays—as well as in procedures, imaging, and tests—than Pioneers that had variable or no savings across the years. The vast majority of Pioneer ACOs exhibited reductions in the number of primary care E&M visits for beneficiaries during the first two performance years. Unlike the other utilization measures examined, we found no evidence of reduction in hospital-wide all-cause unplanned readmissions relative to near market for the Pioneer ACOs in either performance year. We also found weak evidence of systemic spillover—where Pioneer ACOs have directly or indirectly impacted the care of non-aligned Medicare beneficiaries—as a result of the Pioneer model in the first two performance years.

Descriptive examination of key ACO features did not reveal measured characteristics that appear to be related to ACOs' two-year spending results. This finding may be attributable, in part, to the somewhat limited variation in observed structural characteristics that can be measured consistently from available qualitative data across all Pioneer ACOs. For those features where we do observe variation, such as relationship with a hospital or whether ACO providers use a single EHR, it appears that they do not explain Pioneer ACOs' two-year spending results. One suggestive finding is around provider engagement, where ACOs that place more emphasis on engaging providers through incentives and referral management activities may be better positioned to achieve savings. Ongoing collection and analysis of qualitative data may provide additional insights into key operational features or may reveal that other factors, such as market characteristics, are bigger drivers of spending.

Analyses of CAHPS surveys of aligned beneficiaries from all 32 Pioneers in 2012 and the 23 Pioneers continuing into 2014 found that most ACOs have similar levels of performance in the domains we examined and do not vary appreciably relative to the larger FFS or MA patient populations, with Pioneer ACOs showing slightly higher satisfaction with timeliness of care and provider communication. It may also be too early in the model to see distinct differences in

patient experience among ACOs. There appears to be little relationship between evaluation savings estimates and significantly high or low CAHPS scores.

Finally, information about how Pioneer ACOs are learning as they progress through the Pioneer ACO model revealed that internal resources continue to dominate Pioneer ACO approaches to learning, including trial and error; experience of executives and leadership staff in the ACO; and experience from parent organizations' managed care products. Some Pioneers cited the use of external consultants, and many expressed the value in networking with other Pioneers and learning activities that help facilitate this interaction.

CHAPTER 6. METHODS

This chapter explains the methods and approaches to quantitative and qualitative data collection and analyses that underlie the results presented in this report.

6a. Spending and Utilization Analysis

Data Sources and Analytic File Construction

Medicare claims and enrollment data used to perform quantitative analyses were obtained from the CMS Chronic Conditions Warehouse (CCW) (Table 20). The CCW stores claims-level data in several SAS and Oracle files. Claims-level data that may be accessed through the CCW include the Research Identifiable Files (RIF), which contain final action fee-for-service claims for institutional and non-institutional providers. Enrollment data, such as the Master Beneficiary Summary Files, include one record per beneficiary. Hierarchical Condition Category (HCC) scores housed in the CCW were used in risk adjustment sensitivity analyses.[33]

ACO-specific data made available from the CMS contained identifying information for participating providers and aligned or assigned beneficiaries and their corresponding ACOs. These data were uploaded to the CCW, and file contents included beneficiary and ACO identifiers as well as information on whether a beneficiary was no longer aligned with an ACO.

Table 20. Source Files and Relevant Variables

File	Data/Variable and Purpose
MBSF_AB (2008 – 2012)	Demographic characteristics, date of death, eligibility for Part A and B, enrollment in Medicare managed care
MBSF Chronic Conditions File (2008 – 2012)	Presence of selected chronic conditions
Research Identifiable Files (August 13, 2014 update)	Expenditures and utilization, by service; presence of secondary payer
Pioneer Quarterly Provider Participant List (January 7, 2014)	Identify Pioneer participating physicians
Pioneer Alignment List, PY1-PY3 (obtained March 3, 2013 and April 15, 2014)	Identify Pioneer aligned beneficiaries for performance years
Pioneer Quarterly Exclusion Reports (April 15, 2014)	Identify Pioneer beneficiaries who lost alignment during each quarter, for all performance years
MSSP 2012 Starters (extracted from MDD, May 9, 2014 update)	Identify MSSP assigned beneficiaries for the performance years.
MSSP 2013 Starter Lists (August 25, 2014)	Identify beneficiaries assigned to AP MSSP and MSSP ACOs with a January 1, 2013 start date.

[33] Pope G.C., Kautter J., Ellis R.P. et al. Risk adjustment of Medicare capitation payments using the CMS-HCC model. Health Care Financing Review. 25(4):2004, 119-41.

Analytic files were constructed to include populations of FFS Medicare beneficiaries aligned to Pioneer ACOs and their comparison groups. Beneficiaries aligned to a Pioneer ACO during the performance years were compared against (1) a population of beneficiaries who would have been aligned to each ACO's 2012 providers in the baseline period of 2010 and 2011 and (2) comparable baseline- and performance-period populations of alignment-eligible beneficiaries not attributed to a Medicare ACO.

Identification of Baseline Populations

Since Medicare ACOs did not exist prior to 2012, baseline beneficiaries were aligned to Pioneer ACOs by simulating the alignment algorithm using PY1 ACO providers. Thus, the baseline population represents patients who were treated by providers who would participate in a Pioneer ACO the first performance year.

Identification of the Alignment-Eligible Population[34]

A beneficiary was eligible for alignment to a Pioneer ACO or for inclusion in a comparison group during the baseline period according to the same alignment criteria used in the performance years. Beneficiaries were determined to be eligible for alignment in a baseline year if they met the following criteria during the alignment period:

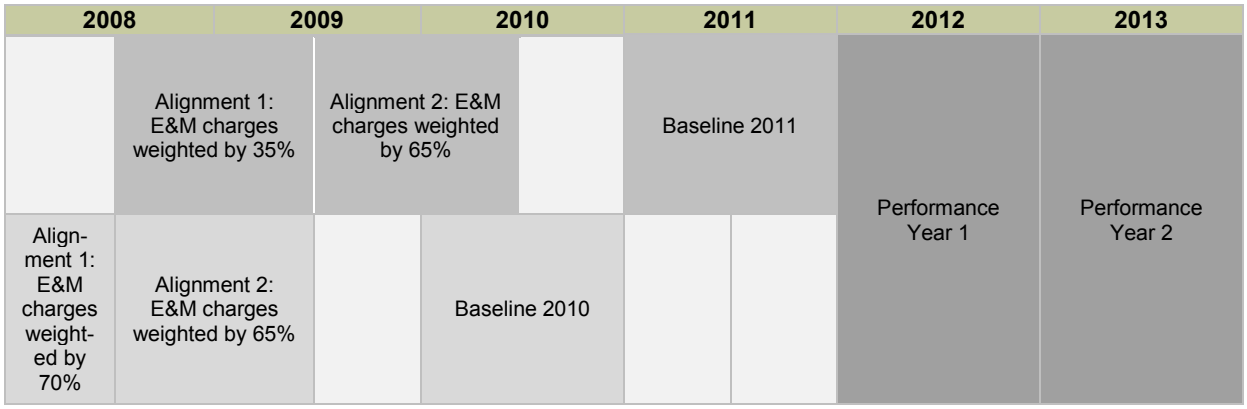
- Part A and Part B coverage;
- No months in which Medicare was the secondary payer;
- No months in which beneficiary was enrolled in a Medicare Advantage plan
- No months of residence outside the U.S. or U.S. territories; and
- Alive as of January 1 of baseline year.

Alignment of Baseline Beneficiaries to a Pioneer ACO

Pioneer ACO beneficiary alignment in the baseline years was simulated separately for two, instead of three, alignment years according to a modified version of the financial methodology because National Provider Identifiers (NPIs) were not reliably in use before 2008 (Figure 26). Alignment to a specific ACO during the baseline period was determined using eligibility criteria for two staggered alignment years running from July to June. For baseline year 2010, the alignment period was identified as the 1.5-year period between January 2008 and June 2009. For baseline year 2011, the alignment period was the 2-year period between July 2008 and June 2010.

[34] The approach for identifying alignment-eligible beneficiaries and assigning beneficiaries to an ACO was adapted from the financial methodology: Pioneer Alignment and Financial Reconciliation Methods, Version 9.1, March 26, 2014 (http://innovation.cms.gov/files/x/pioneeracobmarkmethodology.pdf).

Figure 26. Baseline and Alignment Periods for Pioneer ACOs



As in the performance years, beneficiaries were aligned to a particular Pioneer ACO in a baseline year if, during that year's alignment period, they received a plurality of weighted allowed charges from primary care services (Qualifying Evaluation and Management [QEM] services) delivered by primary care or non-primary care providers participating in that Pioneer ACO in 2012.[35] A crosswalk containing Tax Identification Numbers (TINs) and NPIs associated with each ACO was used to align beneficiaries to specific ACOs based on the provider identifier contained in individual claims records.

A conditional two-stage alignment algorithm was employed. If 10 percent or more of a beneficiary's QEM allowed charges were associated with primary care providers, alignment was based on allowed charges for QEM services rendered by primary care providers. If fewer than 10 percent of QEM allowed charges were associated with primary care providers, then alignment was based on QEM allowed charges associated with non-primary care providers.

For baseline 2011, allowed charges for alignment year 1 were weighted 35 percent. For baseline 2010, alignment year 1 charges were weighted 70 percent, which is equivalent to doubling the weighted value of 35 percent because the year was truncated by six months. For both baseline years, alignment year 2 charges were weighted 65 percent.

Analyzing Beneficiaries

The alignment eligibility and alignment algorithm was run for each baseline year as it is for each performance year so that beneficiaries were alive and aligned to an ACO at the start of each year. Beneficiaries were included in the baseline year up to the month of death or exclusion from any alignment eligibility criteria, except in the case of the geographic exclusion, which eliminated a beneficiary from the full baseline year.

[35] Primary care specialties are general medicine, family medicine, internal medicine, geriatric medicine, nurse practitioner, or physician assistant. Non-primary care specialties are nephrology, hematology/oncology, medical oncology, surgical oncology, radiation oncology, gynecological oncology, rheumatology, endocrinology, pulmonology, neurology, neuropsychiatry, or cardiology.

Alignment-eligible beneficiaries who were not attributed to a Medicare ACO were similarly followed each baseline and performance year if they were part of a comparison group.

Identification of Comparison Group Populations

The comparison groups consist of beneficiaries selected based on eligibility and geographic location. We defined near and far market comparison groups during the baseline and performance years for each ACO using two geographic areas:

- **Near market: FFS Medicare beneficiaries in a Pioneer ACO service area who are not aligned to a participating provider in a Pioneer or MSSP ACO.** For each ACO, we define the ACO's service area (market) as the counties where the ACO's participating providers in the first performance year were located and all contiguous counties. This comparison group comprises FFS Medicare beneficiaries who are alignment-eligible and reside within the near market area but not attributed a Medicare ACO.

- **Far market: FFS Medicare beneficiaries in markets not served by a Pioneer or MSSP ACO who do not receive care from an ACO.** This comparison group includes markets that are characteristically similar and usually geographically close to, but distinct from, the Pioneer near markets with regard to both providers and beneficiaries. This comparison group comprises FFS Medicare beneficiaries who are alignment-eligible and reside within the far market area but not attributed to a Medicare ACO.

Defining Comparison Groups from Pioneer ACO Service Areas—Near Markets

To identify the ACO market area from which the near market group of comparison beneficiaries is drawn, we identified the counties where the ACO participating providers in the first performance year were located. Pioneer ACO providers are from lists of NPI numbers generated by the ACO. Using ZIP Codes of the provider addresses mapped to FIPS (county) codes, we circumscribed the market for each intervention ACO to include all counties with all participating providers (primary care providers and specialists) as well as all contiguous counties.

Defining the comparison group to include beneficiaries from Pioneer ACO market areas provides a point of comparison representing what might have occurred if Pioneer-aligned ACO beneficiaries had not received care from providers participating in the ACO model. A fundamental strength of this comparison group specification is that the local market characteristics are the same as the Pioneer-aligned ACO beneficiaries, including availability of different types of care (e.g., post-acute care, hospice care), provider characteristics, and the provider environment.

A notable limitation of this comparison group specification is that there are likely spillover effects in markets where Pioneer ACOs are located, as the presence of an ACO may influence changes in cost and utilization patterns for comparison group beneficiaries. Spillover would not only imply that non-ACO beneficiaries may receive some care from ACO providers but also that non-ACO providers may adopt or engender practices similar to ACO providers as the concentration of ACO providers and practice groups in the market grows.

The near market specification also raises concerns about potential selection bias of beneficiaries to ACOs, which could originate either from how patients select their providers or how providers refer patients. Concerns about spillover effects and selection bias substantiate the need to incorporate multiple comparison groups in the evaluation.

Defining Comparison Groups from Non-Pioneer ACO Service Areas—Far Markets

To provide a complementary perspective and mitigate the selection bias and spillover concerns introduced by the ACO service area comparison group, we also specify comparison groups that include beneficiaries who reside outside of Pioneer ACO service areas but are located in markets geographically similar to, yet distinct from, such ACOs. If Pioneer ACOs do not operate in the market, it is reasonable to accept that there will not be spillover in the outcomes of the comparison group. This "far-market" approach is conceptually appealing in that ACO-related spillover should not reach markets that are distinct from markets where ACOs are located.

Unlike the ACO near market, there is not a population of providers affiliated with a hypothetical ACO-like comparison entity that may be used to define the far market comparison group in a straightforward manner. Therefore, we used a previously defined market—core-based statistical areas (CBSA) or hospital referral regions (HRR)—to define the far market comparison group. Use of a previously defined area as a market is appealing, as the market by definition aggregates areas based on individuals' market-related behaviors. For instance, CBSA areas are defined by the Office of Management and Budget[36] as socially and economically interdependent areas geographically circumscribed by commuting times to the core geographic area; and HRRs represent regional health care markets for FFS Medicare patients' medical care that often require the services of a major referral center, as defined by the Dartmouth Atlas of Health Care.[37] We examined how well both CBSAs and HRRs capture the beneficiaries aligned with Pioneer ACOs before selecting a far market comparison group for each ACO.

- **CBSA.** If CBSAs are used as markets for potential comparison areas for ACOs, then they should also describe the market for the ACOs reasonably well. To identify whether CBSAs performed well as markets for Pioneer ACOs, we assessed the highest percentage of ACO-aligned beneficiaries captured by a CBSA-defined market for each Pioneer ACO. We found that the CBSA capturing the plurality of aligned beneficiaries encompassed at least 89 percent of aligned beneficiaries for 20 of the 32 Pioneer ACOs. However, the CBSA boundaries captured fewer than 75 percent of beneficiaries for 10 of the 32 Pioneer ACOs, and less than 50 percent for six of the Pioneers.

  A less troublesome but present issue is that CBSAs do not capture non-metropolitan areas. Non-CBSA areas exist and aligned beneficiaries live in these areas. On average, 4.2 percent of 2012 Pioneer ACO-aligned beneficiaries have addresses that do not match to a CBSA.

[36] http://www.whitehouse.gov/omb/inforeg_statpolicy
[37] http://www.dartmouthatlas.org

- **HRR.** HRRs cover the entire geographic area of the U.S. but can span great distances that may obscure valuable distinctions in communities that are associated with how individuals seek care across the range of health care settings. Examining the coverage of beneficiaries afforded by the HRR definition of a market, we found that the HRR definition of market captures at least 89 percent of aligned-beneficiary addresses for 15 of the 32 Pioneer ACOs. However, like CBSAs, HRRs do not consistently capture more than 75 percent of ACO-aligned beneficiary addresses for 12 of the 32 Pioneer ACOs.

- **CBSA or HRR**. The CBSA capturing a larger percentage of aligned beneficiaries displays the larger percentage beneficiaries for 13 of the 32 Pioneer ACOs, outperforming the HRR by more than 25 percentage points in 6 of the 32 market comparisons. The HRR market definition captures more beneficiaries than the CBSA for the remaining 19 Pioneer ACOs, outperforming the CBSA by 38 percentage points twice. Using the CBSA or HRR captures more than 50 percent of aligned beneficiaries for 31 of the 32 Pioneer ACOs, more than 80 percent for 26 of the 32, and more than 90 percent for 21 of the 32 Pioneer ACOs.

Although neither the CBSA nor the HRR market definition performed exclusively well for each ACO, at least one of the market definitions tended to adequately describe the Pioneer ACO markets in each scenario, as there is more than 80 percent beneficiary coverage for 26 of 32 ACOs. Thus, we used both CBSAs and HRRs as potential comparison markets.

With CBSAs or HRRs identified as the Pioneer's market, we used either definition to populate the pool of potential far markets. Noting that the more populated market definition was commonly the more complete market of beneficiaries for Pioneer ACOs, we looked to identify CBSA and HRR area definitions with significant geographic overlap and to exclude the less populated alternative. Specifically, we identified for each CBSA (or HRR) when at least 67 percent of the market's ZIP Codes were shared with an HRR (or CBSA) and removed the CBSA (or HRR) if the alternative market had a higher population in 2010. We further excluded any potential comparison markets that contained Medicare ACOs in 2012 or more than 5 percent of FFS beneficiaries aligned with a Pioneer ACO in 2012.

Although beneficiaries from far-market comparison groups were selected from separate markets, the close geographic proximity of the market groups remains a desired characteristic, as they are likely to have more comparable baseline beneficiary characteristics. To select markets located near the ACO's market for comparison, we selected markets most similar along a vector of market characteristics within the same U.S. Census division:

1. Natural logarithm of population (2010);
2. Unemployment rate (2010);
3. Herfindahl-Hirschman Index (HHI) of hospital charges (2011);
4. Median household (HH) income (2010);
5. Age-, sex-, and race-adjusted Medicare spending per beneficiary (2009);
6. Percent of the population of white race (2010); and
7. Medicare managed care penetration rate (2011).

Comparison markets were chosen as the "nearest neighbors" to each Pioneer ACO market, nearest defined as the closest market in terms of Euclidean distance (i.e., straight line distance between two points) over the seven dimensions and without a Pioneer or MSSP ACO (Table 21). All measures were standardized to a mean of zero and standard deviation of one at the Census division level prior to matching.

One ACO market, the New York CBSA, failed to provide a match that was satisfactory to the evaluation team at the Census division level. New York was subsequently matched at the national level to Chicago CBSA. With two MSSP ACOs, Chicago also violates the restriction that the comparison markets not include any ACOs. However, the benefits of using a more appropriate match as a comparison market outweighs the limitations of being in a different Census division and the potential spillover from two MSSP ACOs in this case.

The far-market comparison group specification introduces fewer concerns with selection bias, though potential differences in provider practice patterns, beneficiary characteristics, or prices between ACO and non-ACO markets may affect cost and utilization patterns. However, our analytic approach is expected to limit the extent to which these discrepancies affect our estimates of the effects of Pioneer ACOs.

Table 21. Pioneer ACO Near and Far Markets

Near Market City	Near Market State	Number of Pioneer ACOs	Far Market City	Far Market State	Type
Appleton	WI	1	Wausau	WI	HRR
Bangor	ME	1	Pittsfield	MA	CBSA
Boston	MA	5	Worcester	MA	HRR
Des Moines	IA	1	Sioux Falls	SD	HRR
Detroit	MI	1	Cleveland	OH	CBSA
Indianapolis	IN	1	Rockford	IL	HRR
Los Angeles	CA	2	San Jose	CA	CBSA
Manchester	NH	1	Norwich	CT	CBSA
Minneapolis	MN	3	Omaha	NE	HRR
New York	NY	1	Chicago	IL	CBSA
Peoria	IL	1	Urbana	IL	HRR
Philadelphia	PA	1	Camden	NJ	HRR
Phoenix	AZ	1	Ogden	UT	CBSA
San Diego	CA	1	Portland	OR	HRR
San Francisco	CA	1	Santa Cruz	CA	HRR

Analytic Approach

The evaluation employed a quasi-experimental design to examine changes in Medicare spending and other outcomes for Pioneer ACO-aligned beneficiaries relative to changes of the near market and far market comparison populations to obtain the estimated average treatment effect of being aligned with a Pioneer ACO.

To estimate the treatment effect, we used a difference-in-differences design, which represents the treatment effect after subtracting the baseline effect from the effects of the comparison group and its baseline. A strength of the difference-in-differences design is that, following assumptions of the model, it controls for time-consistent unobserved differences between the treatment and comparison groups. However, providers and beneficiaries associated with an ACO are changing over time; as such, a potential concern is that there is time-varying selection on observed characteristics occurring as the model develops. To address this concern, we used the Oaxaca-Blinder reweighting technique to ensure that our comparison beneficiaries are similar to our treatment beneficiaries in observed characteristics in each observed year.[38]

The observed characteristics represent the covariates used for risk adjustment in multivariate models. The risk adjustment controls for a number of beneficiary-level characteristics, including indicator variables for: age categories (less than 64 years, 65-74 years, 75-84 years, and 85+ years); sex; race/ethnicity (White, Black, Hispanic, Asian/Pacific Islander, other); whether the beneficiary was dually eligible for Medicare and Medicaid; whether the beneficiary died in the year of interest; had end stage renal disease; whether the beneficiary had a hip fracture, colorectal cancer, stroke, AMI, or lung cancer in the year of interest (five variables); and whether the beneficiary had a hip fracture, colorectal cancer, stroke, AMI, or lung cancer in any of the three years prior to the year of interest (five variables).

The variables used for adjusting risk were chosen to control for characteristics related to health care expenditures and utilization but were not likely to be affected by the Pioneer model (i.e. endogenous to the intervention). For example, while demographic characteristics are related to mean health expenditures and they may be part of selection into the treatment group, demographic characteristics will not change as a result of participation in the Pioneer model. Other characteristics, including chronic conditions, may change as a result of participation in the Pioneer model.

Reweighting the observed characteristics using the Oaxaca-Blinder method adjusts, or reweights, a comparison population so that it mimics the treated population in observed characteristics and thereby removes potential biases from selection on observed characteristics that are changing over time. It has a propensity score interpretation under the assumption of "common support."[39] Moreover, the estimator is a consistent estimator of the treatment effect if the true model for the mean outcome *or* the model for the propensity score is a linear function of the covariates.

In our analyses, we first reweighted the Pioneer ACOs to their comparison populations using the Oaxaca-Blinder method. Then, we identified differences in the changes of the conditional mean of the outcome of interest from the baseline time period across the two groups to obtain the estimated average treatment effect on the Pioneer ACO population.

[38] Blinder, A.S. Wage discrimination: reduced form and structural estimates. Journal of Human Resources. 1973. 8;436-55.
Oaxaca, R. Male-female wage differentials in urban labor markets. International Economic Review. 1973. 14;693-709.
[39] Dinardo, J. Propensity score reweighting and changes in wage distributions. NBER Working Paper. 2002.
Kline, P. Oaxaca-Blinder as a reweighting estimator. The American Economic Review. 2011.

Conditioning on observed characteristics allows us to control for time-varying differences between the treatment and comparison groups. Examining differences in changes of the outcome variables between the two groups allows for the estimator to control for time-varying changes that are common to all beneficiaries (e.g., shared expenditure changes across the health systems) as well as time-consistent differences between the treatment and control populations.

Notable assumptions of this approach that are necessary to identify the treatment effect include: (1) observing and controlling for the selection-relevant, time-varying characteristics and (2) the conditional means would have followed parallel paths in the absence of the Pioneer model. Reweighed estimates using the Oaxaca-Blinder method creates a counterfactual that answers the question, *"What would be the average expenditures of the comparison group if the distribution of observable characteristics was the same as the treatment population?"* Comparing these conditional means leads to an estimate of the average treatment effect on the treated (ATT). To do so, we estimated the following regression separately for the comparison populations for each Pioneer ACO-comparison market pair:

$$_{i,t} = X'_{i,t}\beta_t + \varepsilon_i \qquad (1)$$

where $y_{i,t}$ is the outcome of interest for beneficiary i in period t; and X is a 1 x k vector of beneficiary-level characteristics. From this estimation, we obtain $\hat{\beta}_{t,k}^{comp}$ for each of the k covariates which we use with Pioneer ACO beneficiary observations to predict outcomes for the treatment population. The average of the predictions provides the counterfactual expected outcome given the distribution of characteristics observed in the treatment (ACO) group. Specifically, the estimated ATT for performance year one, 2012, is calculated as:

$$\widehat{Effect} = Actual - \widehat{Counterfacutal}$$

$$= \Delta\bar{Y}_i^{T=1} - \widehat{\Delta Y}_i^{T=0}$$

$$= [\bar{Y}_{2012}^T - \bar{Y}_{PRE}^T] - \left[\left[\bar{\hat{Y}}_{2012}^T | X^T, T=0\right] - \left[\bar{\hat{Y}}_{PRE}^T | X^T, T=0\right]\right]$$

$$= [\bar{Y}_{2012}^T - \bar{Y}_{PRE}^T] - \left[\frac{1}{N_{2012}^T} 1' X_{2012}^{T\prime} \hat{\beta}_{2012}^{T=0} - \frac{1}{N_{2010}^T + N_{2011}^T} \sum \left(1' X_{2010}^{T\prime} \hat{\beta}_{2010}^{T=0} + 1' X_{2011}^{T\prime} \hat{\beta}_{2011}^{T=0}\right)\right],$$

where T indicates treatment status, N is the number of beneficiaries, indicates the mean of the outcome $\hat{\beta}_t^{T=0}$ are estimated by OLS regressions using the comparison beneficiaries, 1 is an N x 1 vector of ones, and X is a k x N matrix of observed characteristics.

The ATT for performance year two, 2013, is calculated in a similar fashion to information from 2012—comparing 2013 to the average during the pre-implementation period. We re-estimated the effects using 400 bootstrapped samples to obtain estimates of the standard errors.

The estimator is used to estimate the ATT for mean total Medicare expenditures per beneficiary per eligible month and also utilization of several types of services discussed in the report and

report appendix. Annual spending was capped at approximately the top 1 percent of the distribution conditional on the year and beneficiary's ESRD status.[40]

In addition to estimating the ATT separately for each ACO-comparison pair, we also estimated the pooled ATT for the ACOs using similar regression methods. For pooled analyses, comparison groups were weighted proportionally to the size of their matched ACO population.

Why the Evaluation Did Not Use Propensity Scores

The Oaxaca-Blinder method was used instead of propensity scores to reweight the treatment and comparison populations. Propensity scores are often used in evaluations to balance the likelihood that intervention and comparison populations receive a particular treatment, controlling for their observable characteristics, which, in turn, impact their outcomes. Propensity scores, however, are not well suited for the Pioneer ACO evaluation.

The populations in the Pioneer ACO evaluation are the ACO-aligned Medicare beneficiaries and their comparators—a geographically bound near market of all otherwise eligible Medicare beneficiaries and a geographically bound far market of otherwise eligible Medicare beneficiaries. The treatment in this case is whether a beneficiary is aligned to an ACO.

Modeling the propensity for a beneficiary to be aligned to an ACO is problematic because the beneficiary is a step removed from the decision that determines whether he or she is in the treatment group. The beneficiary is first indirectly assigned to a provider based on visit patterns and then is part of an ACO if the provider chose to participate in the ACO. In other words, beneficiaries do not explicitly select in to an ACO; they are passively aligned to an ACO based on which providers they happened to visit. Ideally, the propensity of the provider to join an ACO would be modeled, but then the model would become overly complex since the provider is a step removed from beneficiary outcomes.

The second reason it is problematic to model the propensity that a beneficiary is aligned to an ACO is that the comparison groups include all otherwise alignment-eligible beneficiaries within a market, rather than a matched sample of beneficiaries. After matching the treatment group to a comparison group based on beneficiaries' observable characteristics and modeling the propensity to receive the treatment, propensity scores are used in a regression model to minimize the effect of any residual differences between the groups on outcomes. In the Pioneer ACO evaluation, a sample of beneficiaries is not selected to be in each comparison group. Instead, each comparison group includes the full population of beneficiaries in a market who would otherwise be eligible to be aligned to an ACO if the provider they were aligned to participated in an ACO in the market.

The lack of ACOs in the far markets is a third problematic reason for using propensity scores. It is fundamentally problematic to model the propensity of being aligned to an ACO in a far market

[40] For the baseline years, annual expenditures were capped at $134,644 and $422,089 for non-ESRD and ESRD beneficiaries, respectively. For 2012, annual expenditures were capped at $135,359 (non-ESRD) and $414,767 (ESRD). Annual 2013 expenditures were similarly capped at $143,238 (non-ESRD) and $426,159 (ESRD).

because there are no ACOs in the far markets. The far market comparison groups were selected based on market-level factors so that they are similar to their respective near markets but did not contain a Medicare ACO at the start of the Pioneer ACO model. In this way, the far market comparison group is well positioned to detect any ACO spillover effects in the near market comparison group.

Given these conceptual limitations of propensity scores with the Pioneer ACO evaluation, the Oaxaca-Blinder method was used to control for any observable differences, and hopefully any systemic difference, between the treatment and comparison groups. Oaxaca-Blinder simply reweights the average treatment effect on the treated based on the distributions of the observable characteristics in the treatment and comparison groups. It is related to propensity scores insofar as it adjusts for residual differences on observable characteristics but can be done in a single model, as opposed to a two-step propensity score model containing a reweighting step and a regression step.

Alternative Risk-Adjustment Methods

The risk adjustment methods used in the evaluation were subject to several considerations. In addition to being affected by the intervention, information derived from claims data may be subject to differences in coding practices across ACOs.[41,42] Provider coding procedures, such as more complete or thorough coding practices, can lead to chronic conditions identified more frequently through claims-based algorithms used by the CCW. Moreover, when beneficiaries receive a greater number of services, including preventive services, providers have more opportunities to add diagnoses to claims and trigger chronic conditions identified by the CCW algorithm. The endogenous nature of chronic conditions can also affect other claims-derived measures of risk such as the HCC score.

In addition to health-related conditions, we controlled explicitly for mortality as a risk-adjuster. Beneficiaries in our data have significantly higher average costs in their last year of life, as expected. As such, significant changes in the proportions of the populations who die in a given year can influence the population mean expenditure level.

The mortality rate of the ACO population was determined during the baseline period—that is, the baseline information for the ACO population was determined from the population of beneficiaries who would have been aligned with the ACO had the ACO existed prior to the first performance year. Our difference-in-differences estimator for the treatment effect of the ACO model compares changes in the difference of the outcome of interest between the treatment and comparison group. The difference from which we examine the change is calculated as a mean over the baseline period (2010 and 2011). Furthermore, the difference is conditioned on the set of observed characteristics—risk adjusters—which can vary over time and may confound our

[41] Song Y., Skinner J., Bynum J., Sutherland J., Wennberg J.E., Fisher E.S. Regional variations in diagnostic practices. *N Engl J Med*. 2010;363(1):45–53.
[42] Colla C. H., Wennberg D. E., Meara E., Skinner J. S., Gottlieb D., Lewis V. A., Snyder C. M., & Fisher, E. S. (2012). Spending differences associated with the Medicare physician group practice demonstration. *JAMA*, 308(10), 1015-1023.

estimated change in the difference. Specifically, there are several important implications for the decision of whether to include mortality within the year of observation as a covariate in the model:

1. Without including mortality as a covariate in the model, the difference-in-differences design controls for differences in both the rate of mortality and associated end-of-life costs between the treatment and control populations that existed prior to the ACO model.
2. With or without including mortality as a covariate, the difference-in-differences estimator identifies changes in the difference in end-of-life expenditures associated with mortality.
3. Without including mortality as a covariate, we assume that any changes in the difference in either the rate of mortality or end-of-life costs is an effect of the ACO model.

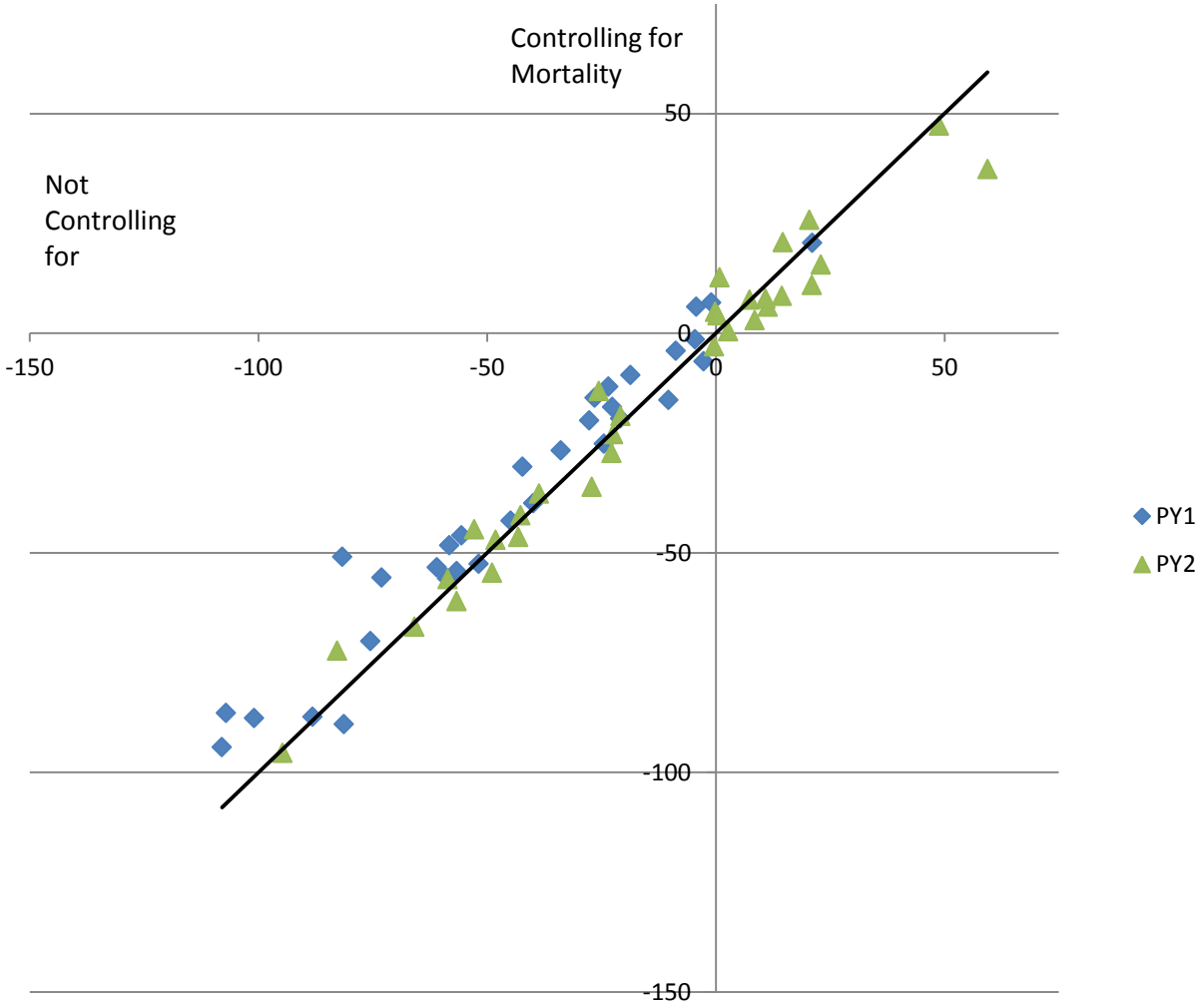
The first two implications of the design are advantages of the evaluation. The first implies that we are not concerned with unobserved time-invariant factors generating a difference in outcomes for the treatment and control populations. The second notes that, although unexplained differences in the end-of-life costs exist between these two groups, changes in this difference will be captured in our estimated effect. The third states the assumption on which the decision to include, or not include, mortality as a risk-adjuster: changes in mortality rates during the performance years result from changes in care delivery by the ACOs. In this sense, mortality is endogenous to the treatment effect we are trying to measure.

Generally, we exclude from our risk-adjustment covariates that are the result to the ACOs' behaviors, as they are endogenous. In this sense, changes in mortality may be an inappropriate risk-adjuster because they could be considered part of the treatment effect that we are attempting to estimate. If ACOs are altering the mortality rate of the aligned beneficiary populations through systematic changes in care delivery, then we wish to allow this effect to enter the treatment effect through its change in average expenditures. However, if changes in mortality are spurious or from selection of the aligned beneficiary population (i.e. providers are simply caring for and aligning healthier populations) then we would wish to exclude changes in the difference in mortality rates from affecting our estimates of the treatment effect.

Figure 27 shows differences in the estimated treatment effects on expenditures per beneficiary month for PY1 and PY2, using the near-market comparison population in models that control for mortality (y-axis) and do not control for mortality (x-axis) as a risk adjuster.[43] For reference, we also present the 45-degree line. The points of Figure 27 show that the addition of mortality as a covariate tends to move the estimates toward zero (reduce the magnitude of savings or losses). Forty-nine of the 64 point estimates indicate savings prior to controlling for mortality. For 35 of the 49 savers, the addition of the mortality adjustment reduced the estimated savings of the ACO. Similarly, 10 of the 15 ACOs whose point estimates suggested losses experienced a reduction in the estimated loss. On average, the point estimate increased (fewer savings, greater losses) by $2.96, across the 32 Pioneer ACOs, after controlling for mortality. However, because movement was toward zero, the average absolute change is of interest and equals a $6.48 shift after controlling for mortality.

[43] Savings are shown as negative estimated effects.

Figure 27. Scatterplot of Savings/Loss Estimates with and without Mortality as a Covariate (Near Market Comparison Group)



The size of changes in estimated effects after controlling for mortality indicates the importance of this issue. However, the qualitative findings change very little with or without using mortality as a risk-adjuster. Of the 64 estimated effects, over the two performance years, only two ACOs have a point estimate from the near-market analysis that changes signs. These two ACOs moved from statistically insignificant savings to statistically insignificant losses. And, importantly, statistical significance was not changed from the inclusion or exclusion of mortality as a covariate for any ACO—that is, all statistically significant or insignificant findings remained after including mortality as a covariate.

Decisions around the use of the conditions used as health-related control variables were subject to several sensitivity tests. We compared our preferred risk-adjustment method against the following five models, all of which retained the beneficiary enrollment and mortality variables:

- Exclude all condition (current- and prior three-year) indicators
- Exclude all prior three-year condition indicators (retain the current-year condition indicators)
- Exclude all condition (current- and prior three-year) indicators, but include the concurrent (current-year) HCC risk score
- Exclude all condition (current- and prior three-year) indicators, but include the 31 current-year Elixhauser condition indicators[44]
- Keep all condition indicators, and add the concurrent HCC risk score and also the 31 current-year Elixhauser condition indicators

We used 2011 claims for beneficiaries aligned with at least one Pioneer or Pioneer comparison group to construct the expenditure and readmissions outcomes. We then compared the distributions of predicted and actual outcomes as well as the degree of agreement (intraclass correlation) of the three models. Note that the specific methods vary by measure because of the different distribution of outcome values (e.g., non-negative and continuous for expenditures, binary for readmissions). We also created observed-versus-expected ratios for each ACO for each model to assess how sensitive our results might be to the choice of risk adjustment model.

There is little evidence that changing risk adjustment to rely on HCC scores or Elixhauser scores would improve model performance. However, using all conditions, in addition to the current five CCW conditions, may improve model performance. The tradeoff is between a model with more conditions that could be subject to upcoding versus a more parsimonious model that would not capture all conditions but better reflect true prevalence of disease. Exploring the potential for gaming condition coding—a concern that heavily influenced our selection of the five low-variation CCW conditions in the current model—of the Elixhauser conditions may be considered in future reports.

Regarding the information incorporated in the various risk adjustors, it seems that although there is a positive association among the predicted values, as would be expected, there is also a fair amount of information encoded in each that is not encoded in the others. Table 22 presents the correlation coefficients among predicted values under each model for Pioneer ACO-aligned beneficiaries. These coefficients are all approximately between 0.7 and 0.8; the relatively high correlations of the predicted values is driven in part by having demographic and death indicators in common across the models. In addition, the individual intraclass correlation coefficient among all Pioneer ACO-aligned beneficiaries between the current, HCC, and Elixhauser models is 0.779.

[44] Charlson M.E., Pompei P., Ales K.L., et al. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. Journal of Chronic Disease. 40;1987:373–83.

Table 22. Correlation Coefficient Matrix of Predicted PBPM Expenditures

Model	Without Prior Conditions	Current Model	HCC Score	Elixhauser	All Adjustors
Without Prior Conditions	1.000	0.995	0.761	0.710	0.792
Current Model	0.995	1.000	0.766	0.710	0.796
HCC Score	0.761	0.766	1.000	0.705	0.800
Elixhauser	0.710	0.710	0.705	1.000	0.925
All Adjustors	0.792	0.796	0.800	0.925	1.000

Spending and Utilization Measures

This report presents several key measures of Medicare spending and utilization for performance years one and two:

- Total Medicare payments: total Medicare payments for all claims, excluding Part D.
- Acute care inpatient stays: inpatient hospitalization stays in acute care and critical access hospitals.
- Procedures, imaging, and tests: Berenson-Egger Type of Service (BETOS) code categories.[45]
- Primary care evaluation and management (E&M) services: limited to a subset of E&M services from providers in the specialties of general medicine, family medicine, internal medicine and geriatrics.

We also present select categories of Medicare expenditures and utilization, pooled for all Pioneer ACOs in each performance year and for individual Pioneer ACOs: Part B (physician services, ambulatory surgical center, anesthesia, E&M, imaging payments, test payments, other procedure payments, and Part B Drug payments), all Medicare-covered inpatient hospitals (acute care hospitals, long-term care hospital, inpatient rehabilitation facilities, inpatient psychiatric facilities, children's hospitals, and cancer hospitals), skilled nursing facilities, home health care, hospice, hospital outpatient departments, and durable medical equipment.

The evaluation used actual Medicare payments to estimate spending effects. Medicare payment amounts reflect Medicare program expenditures and the money that CMS is saving—or losing—with the Pioneer ACO model. These payments include differences in wages across areas of the

[45] The BETOS coding system was developed primarily for analyzing the growth in Medicare expenditures. The coding system covers all Healthcare Common Procedure Coding System (HCPCS) codes; assigns a HCPCS code to only one BETOS code; consists of readily understood clinical categories (as opposed to statistical or financial categories); consists of categories that permit objective assignment; is stable over time; and is relatively immune to minor changes in technology or practice patterns.

country as well as indirect medical education (IME) and disproportionate share hospital (DSH) payments, though not beneficiary copayments or payments from other insurance carriers. Because CMS payments reflect these Medicare payment system adjustments, they are not an accurate proxy for changes in utilization that may or may not be occurring in ACOs.

Price standardization is commonly performed to level the wage differences and other the payment adjustments when comparing the spending of providers in different markets. Price standardization would be necessary if the evaluation's goal were to compare the spending performance of ACOs against each other. However, the goal in spending analyses is to determine whether CMS saves money through the Pioneer ACO model. Given that spending estimates include the payment adjustments that are part of the Medicare payment system, any direct comparisons of ACOs' results from this analysis should be based on utilization.

Methodology Differences between Current Report and Report Submitted October 2013

The methods used to estimate spending in the preliminary PY1 Oaxaca-Blinder analyses reported in October 2013 differed from the methods used in this current analysis. As a result of these changes, results for PY1 reported herein differ from the preliminary PY1 results reported in October 2013. Specific differences are:

- **Data sources.** Claims used in the preliminary PY1 method were drawn from annual MBSF instead of the monthly RIF files used for the current analysis.

- **Population.** The preliminary PY1 method included one baseline year (CY 2011), compared to the two currently used (2010 and 2011), and only beneficiaries who were alive and aligned or alignment eligible as of January 1, 2012, the start of the Pioneer model. The current methodology keeps aligned beneficiaries in the population up until the month (or year for geographic exclusions) of the baseline or performance year in which an exclusion criterion is met, rather than excluding them for the entire period.

- **Estimating savings/losses.** The preliminary PY1 results did not include dual eligibility for Medicaid as a control variable. The preliminary results did include mortality in the performance years, like the current model. However, the data for the preliminary results did not include decedents during the baseline period. Because the data for the preliminary results did not include decedents in the baseline period, the estimator was not able to distinguish between differences in costs from the implementation of the Pioneer model and differences in end-of-life costs between the Pioneer and comparison populations, which may have existed prior to the performance period. As a result, any differences in end-of-life costs for decedents were included in our estimated preliminary PY1 savings/losses for a Pioneer. The updated data set includes decedents in both the baseline and performance periods. With these updated data, we are now able to observe and exclude from the estimated savings/losses any differences in end-of-life costs between the populations that existed prior to the performance period and include any changes in end-of-life costs that occur after the Pioneer model was implemented. Also, the previous results measured differences in the rate of growth (percentage growth) for the Pioneer

ACOs and comparison populations, whereas the current methodology measures differences in the nominal dollar change in average expenditures.

Limitations

Finally, we note the following limitations of the spending and utilization analyses:

- The difference-in-differences approach rests on the assumption that outcomes for the treatment and comparison groups would change following parallel trends in the absence of ACO implementation. This assumption must hold for any ACO-comparison combinations and outcomes under consideration.

- While controlling for some observed time-varying characteristics and unobserved time-consistent differences, the set of time-varying characteristics used to control for selection is limited since most claims data are potentially impacted by ACO participation. Thus, any time-varying characteristics that are correlated with both ACO participation and outcomes are included in our estimate of the treatment effect.

- We did not control for differences in Medicare prices among providers. As such, any changes in the differences in prices across services received by the ACO and far market comparison populations are not controlled in the analyses. Since systemic spillover in the Pioneer model has not been detected through the second performance year, the near market comparisons appear sufficient, so comparisons to the far market matter insofar as they are used in place of near market estimates. A separate far-market sensitivity analysis (discussed below) was conducted to provide an outer-bound estimate of the effect of prices on the spending results.

- Standard errors of the estimates were estimated using bootstrapped samples, rather than computed analytically, and are subject to sampling variation.

Exploratory Analysis of Methods: Effect of Provider and Beneficiary Turnover on Evaluation Spending Results

The providers affiliated with Pioneer ACOs may change between performance years—ACOs may expand or contract their participating provider list and providers may decide to discontinue participation in the ACO. Indeed, as some Pioneer ACO leaders noted in focus groups at the April 2014 Pioneer ACO Spring Meeting, some Pioneers said that they see expansion of the ACO provider network as the key to their organizations' ability to control utilization through provider engagement and exercise greater leverage in negotiations with payers as a result. Because beneficiaries are aligned to the ACO based on a plurality of E&M services from ACO-participating providers, changes in ACO provider composition can impact which beneficiaries are aligned to the ACO in a given year. The majority of beneficiaries are aligned with primary

care providers.[46] Table 23 shows the number of these providers affiliated with ACOs in 2012; the number of providers lost through attrition after 2012; the number of newly affiliated providers in 2013; the percent of continuously affiliated providers from 2012 to 2013; and the percent of beneficiaries aligned with an ACO in 2013 who were also aligned in 2012.

Table 23. Pioneer ACO Provider and Beneficiary Turnover, 2012 to 2013

Pioneer ACO	2012 Provider Count (N)	2012 to 2013 Provider Losses (N)	2012 to 2013 Physician Additions (N)	2013 Provider Count (N)	Percent of 2013 Providers Affiliated in 2012 (%)	Percent of 2013 Beneficiaries Aligned in 2012 (%)
Two-year savers						
Michigan Pioneer	193	58	91	226	60	48
Dartmouth-Hitchcock	703	74	347	976	64	53
BIDCO	1,682	335	262	1,609	84	62
Steward	1,444	166	516	1,794	71	52
Sharp	884	77	128	935	86	69
Bellin-ThedaCare	1,219	253	103	1,069	90	79
Trinity	67	7	24	84	71	56
Atrius	1,312	440	534	1,406	62	65
One-year savers						
MACIPA	492	179	41	354	88	77
Monarch	265	22	96	339	72	57
Brown & Toland	191	18	20	193	90	70
Beacon	260	84	138	314	56	47
Partners	492	66	132	558	76	59
Heritage	1,075	153	945	1,867	49	46
OSF	427	65	405	767	47	53
Allina	190	19	69	240	71	70
Non-savers						
Montefiore	2,969	931	411	2,449	83	54
Fairview	364	66	48	346	86	74
Park Nicollet	1,323	562	62	823	92	80
Renaissance	190	25	40	205	80	62
Genesys	294	12	102	384	73	77
Banner	929	151	596	1,374	57	61
Franciscan	680	123	222	779	72	52

[46] Restricted to the 23 ACOs continuing to participate in the Pioneer ACO model by the end of 2013. "Primary care providers" is defined as providers through which ACO beneficiary alignment was performed and can be physicians in general medicine, family medicine, internal medicine, or geriatric medicine or nurse practitioners or physician assistants according to specialty codes taken from Tables A-3 and A-4 in *Pioneer ACO Alignment and Financial Reconciliation Methods* (http://innovation.cms.gov/files/x/pioneeracobmarkmethodology.pdf).

Notes: Excludes the nine ACOs that exited the Pioneer model as of December 31, 2013. "Losses" include 2012 providers no longer with the ACO during 2013. "Additions" include providers added to the ACO in 2013. "Alignment-defining" shows the proportion of providers through which beneficiaries were aligned in 2013 who were also present in the 2012 panel.

Between performance year one (2012) and performance year two (2013), the proportion of providers through which beneficiaries were aligned changed substantially for some Pioneers. The proportion of 2013 participating providers who participated with the same ACO in 2012 ranged from 0.47 to 0.92, with an average of 0.73. The range among ACOs shows that the provider list defining beneficiary alignment in PY2 consisted of more new ACO providers for some ACOs but was relatively the same for others.

Because baseline spending and utilization estimates for this evaluation are determined using beneficiaries aligned with PY1 providers, changes in providers—and consequently, aligned beneficiaries—in PY2 could affect the evaluation spending and utilization results. We have begun to examine the relationship between provider and beneficiary changes and their effects on evaluation spending results in 2012 and 2013, as well as the difference between those spending estimates in 2012 and 2013. In preliminary analyses, correlations indicate that while more stable Pioneer ACOs (measured as the share of continuously aligned beneficiaries and providers) have, on average, greater savings (fewer losses), these results were not statistically significant. This finding suggests that a more stable aligned population of beneficiaries may be related to improved expenditure performance for an ACO.

Exploratory Analysis of Methods: Effect of Preliminary Price Standardization Analysis on Far Market Spending Results

In our far market analyses, difference-in-differences estimates of Medicare payments would be affected if the differences in prices that Medicare pays—the expenditures noted—between an ACO and its comparison group vary over time. Our far market analyses may under- or overestimate the impact of ACOs on expenditures, depending on changes in the differences in the level of the hospital wage index and the Geographic Adjustment Factor (GAF) between ACOs and far market comparisons over time. In this section, we use data on hospital wage indices, GAFs, and per beneficiary per month (PBPM) Medicare expenditures to assess the potential impact of geographic variation in prices on our estimates of ACO savings. We reproduce the far market difference-in-differences analyses on total expenditures after standardizing the Medicare payment amounts using the methodology described below. Payments for inpatient, outpatient, and skilled nursing facilities (SNF) were standardized using adjusted hospital wage indexes assigned to each ACO and far market's core-based statistical area (CBSA) in the year that the expenditures were incurred. Payments for Part B physician office services were similarly standardized using the GAFs.

We show that for a few ACOs, accounting for variation in prices across markets may be important; for others, estimates are not sensitive to whether or not prices are standardized. However, there were a number of limitations on performing complete price standardizations across the markets, and we believe the results should be viewed as an upper-bound estimate of the impacts of price standardization across markets because many hospitals were reclassified to

a higher wage index (37.6 percent nationally in 2012),[47] which was not taken into account in these analyses because the wage index was estimated at a market level. As a result, the actual, hospital-level wage index for both ACO and far market providers may differ considerably from the CBSA-level wage index used in these analyses.

Approach

For each ACO and far market comparison area, we calculated an adjusted wage index that reflects the labor share of costs and the proportion of costs that are affected by the wage index. CMS calculates a wage index value for each CBSA, as well as a statewide rural wage index. The hospital wage index is used to adjust inpatient, outpatient, and SNF payments. A separate Geographic Practice Cost Index (GPCI) is used to adjust physician payments. The following methodology was used to calculate the adjusted wage index:

- ***Assign hospital wage index for ACO and far market areas***: We obtained information from the CMS website on the hospital wage index for each ACO and far market comparison area in fiscal years 2010-2013.[48] Based on the approach used by the Dartmouth Atlas, we used a simplified methodology for assigning the hospital wage index:

  - We assigned ACOs to a single CBSA based on their primary geographic location and did not attempt to assign the hospital wage index at the provider or beneficiary level. This approach is a potentially important limitation given that ACOs can have aligned patients from more than one CBSA.

  - We did not consider any reclassification to a higher wage index that may be applicable for individual providers.[49] This decision may be an important limitation given that, as of fiscal year 2012, over one-third of hospitals (37.6 percent) nationwide had a reclassification to a higher wage index.

- ***Determine labor share of total costs***: In the hospital PPS, the base payment rate is divided into a labor-related and non-labor share. The labor-related share is adjusted by the wage index applicable to the area where the hospital is located. For inpatient hospital payments, the labor-related share of costs is 68 percent if the wage index is > 1.0 and 62 percent otherwise.[50] For outpatient hospital payments the labor related share was 60

[47] Acumen, 2010 "Revision of Medicare Wage Index, Final Report, Part II" (http://www.acumenllc.com/reports/cms/Medicare_Wage_Index_Part_2.pdf)

[48] Fiscal Year 2010 indexes were effective only as of April 1, 2010 through September 30, 2010 due to the Affordable Care Act. See http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/Wage-Index-Files.html

[49] An important feature of the hospital wage index is that hospitals can apply for reclassification to a higher wage index area that is in close geographic proximity if they pay wages comparable to those paid by hospitals in that CBSA.

[50] Note that, in 2015, the labor-related share of costs will increase to 69.6% for areas with a wage index > 1.

percent, for SNF payments, 68.38 percent. For each time period and market, we applied the appropriate labor-related share. We did not adjust other types of services (home health, DME, hospice).

- ***Calculate adjusted wage index***: We calculated an adjusted wage index that reflects the impact that the wage index has on Medicare payment amounts. It applies the wage index to the portion of labor share of inpatient, outpatient, and SNF costs, while not applying it to the non-labor share of these costs or to physician costs. The adjusted wage index was calculated as follows:

$$(Non\ Labor\ Share) + (Labor\ Share \times ((\%\ of\ inpatient, outpatient, or\ SNF\ costs) \times wage\ index))$$

The adjusted wage index was calculated separately for each ACO and far market comparison area for each time period. It has less variation than the actual wage index, reflecting the fact that only a portion of Medicare payments are affected by it.

We also obtained information from the CMS website on the GAF for each ACO and far market comparison area in fiscal years 2010-2013.[51] The GAF was used to adjust physician expenditures only. The GAF is calculated using the GPCI assigned to each CBSA using the following formula:

$$GAF_L = \left(GPCI_{PW,L} \times 0.48266\right) + \left(GPCI_{PE,L} \times 0.47439\right) + \left(GPCI_{MP,L} \times 0.04295\right)$$

The weights in this equation reflect the relative contribution of relative value units (RVUs) nationally, as applied to a locality's physician work (PW,L), practice expense (PE,L), and malpractice (MP,L) GPCI components.[52]

Once the adjusted wage indexes and GAF were obtained, we standardized the annual, and resulting PBPM, expenditures used for the far market analyses in the main body of the report. One limitation of this approach is that we price standardized annual expenditures on the basis of calendar years (i.e., January 1 to December 31 of a given year) using indexes applied by CMS to Medicare payments according to fiscal years (i.e., October 1 through September 30 of the given year). Matching the fiscal year indices to calendar year expenditures would require re-building the analytic data sets.

Our objective was to perform the far market impact analyses for the *total* PBPM expenditure measure, using price-standardized data. To do so, we needed to adjust components of total beneficiary-level expenditures with the following steps:

[51] See http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/Wage-Index-Files.html
[52] MaCurdy, Thomas, Shafrin, Jason, DeLeire, Thomas, DeVaro, Jed, Bounds, Mallory, Pham, David, Chia, Arthur. (2012) Geographic Adjustment of Medicare Payments to Physicians: Evaluation of IOM Recommendations. Unpublished Manuscript. Acumen LLC. Burlingame, CA.

1. Subtract inpatient, outpatient, SNF, and physician expenditures from each beneficiary's average monthly total expenditures, leaving a "total residual expenditures" amount.
2. Multiply inpatient, outpatient, SNF, and physician expenditures by the ratios shown in Table 24. Note that these ratios transform far market expenditures only (i.e., ratios = 1.0 for ACO expenditures). Fundamentally, the ratios were constructed to: (1) eliminate the effect of the far market-specific adjusted wage index on the payments observed in the claims data—assuming that adjusted wage index was used by CMS in adjusting costs claimed by the far market providers to determine the actual payments we observed; and (2) "re-apply" the ACO-specific wage index to those claimed costs. Therefore, the transformed far market expenditures are, theoretically, what they would have been had they been incurred in the ACO market.
3. Calculate the new price-standardized values for total annual expenditures by summing the "total residual expenditures" (see Step 1) and the transformed values for annual inpatient, outpatient, SNF, and physician expenditures.

Table 24. Wage Index and GAF Ratios for Types of Expenditures for Beneficiaries in an ACO and its Far-Market Comparator

Type	Market	Ratio
Inpatient	Far	$= \frac{[(1 - Hosp.Labor\ Share) + (Hosp.Labor\ Share) * WageIndex]^{ACO}}{[(1 - Hosp.Labor\ Share) + (Hosp.Labor\ Share) * WageIndex]^{Far}}$
	ACO	= 1.0
Outpatient	Far	$= \frac{[(0.4) + (0.6) * WageIndex]^{ACO}}{[(0.4) + (0.6) * WageIndex]^{Far}}$
	ACO	= 1.0
SNF	Far	$= \frac{[(0.3162) + (0.6838) * WageIndex]^{ACO}}{[(0.3162) + (0.6838) * WageIndex]^{Far}}$
	ACO	= 1.0
Physician	Far	$= GAF^{ACO} / GAF^{Far}$
	ACO	= 1.0

With the new price standardized values for total annual expenditures, we recalculated our far market difference-in-differences estimates using the same approach described in the body of this report.

Results

There were 19 of 32 ACOs for which the adjusted inpatient, outpatient, SNF, and GAF ratios wage indices were more than 5 percent different between the ACO and its far market comparison area across the baseline and performance years (2010-2013). The inpatient, outpatient, SNF, and GAF ratios ranged from a minimum of 0.79 to a maximum of 1.19, across all years consistently. The largest differences were observed for the following ACOs:

- For the three ACOs in the Lost Angeles, CA area (*Heritage California*, *Monarch Healthcare*, and *Healthcare Partners Medical Group*), the adjusted inpatient wage index was 0.79-0.80 for the far market comparison area (San Jose, CA) across the four years (the outpatient, SNF, and GAF ratio were similarly low).

- The only ACO with an adjusted wage index more than 10 percent higher than its far market comparison was *Montefiore*, for which the adjusted inpatient wage index was 1.16-1.18 in its far market comparison area across the four years (the outpatient, SNF, and GAF ratio were similarly high).

Consistent differences are less of a concern in the difference-in-differences estimator than *changes* in the wage index ratio during the time periods in the study.[53] We highlight the ACOs that had the largest changes by focusing on the inpatient wage index ratio:

- *Beacon Health* (Bangor, ME area) experienced the largest such change. The difference in the adjusted inpatient wage index between Bangor, ME and its far market comparison (Pittsfield, MA) decreased by 0.122 points over four years (0.954 in 2010 to 0.831 in 2013). The wage index was lower in Bangor in 2010, and the difference grew larger in subsequent years because of a large change in the value of the adjusted wage index for Pittsfield, MA.

- The five ACOs in the Boston, MA area (*Atrius Health*, *MACIPA*, *Partners Healthcare*, *Beth Israel Deaconess*, and *Steward Health Care*) had a 0.066 point decrease in the difference in the adjusted inpatient wage index between their market and the far market comparison (1.066 in 2010 to 1.00 in 2013 because, in 2012, the far market [Worcester, MA] started having the same wage index value as Boston, i.e., all ratios = 1.0). Previously, the wage index was higher in Boston.

- *Trinity Health* (Des Moines, IA) also had a 0.066 point decrease in the difference in the adjusted inpatient wage index between their market and the far market comparison, Sioux Falls, SD (1.032 in 2010 to 0.965 in 2013). In 2010, the wage index was higher in Des Moines compared to Sioux Falls, but the relationship reversed in 2011-2013.

- *Dartmouth Hitchcock* (Manchester, NH) had a 0.064 increase in the difference in the adjusted inpatient wage index between their market and the far market comparison, Norwich, CT (0.897 in 2010 to 0.961 in 2013). While the wage index in Manchester remained lower than in Norwich, the difference diminished between 2010 and 2013.

We define an impact (reduction or increase) on estimated savings as a change in statistical significance (at the 5 percent level) or a change in the direction of the impact (Table 25). The results show that standardization reduced savings estimates for six of the 32 ACOs in 2012,

[53] This type of year-to-year volatility is one of the criticisms of the hospital wage index. For example, see http://www.acumenllc.com/reports/cms/MWI_Report_5_1_09.pdf

although for two ACOs, the magnitude of the impact was relatively small. Standardization reduced savings estimates for eight of the 32 ACOs and increased savings estimates for four ACOs in 2013. We highlight some of the notable impact on ACOs:

- Price standardization reduced 2012 or 2013 savings estimates for all of the Boston, MA ACOs as well as the *Beacon Health*, and *Trinity Health.* These ACOs were noted above as having large decreases in their far market wage and GAF ratios over the 2010-2013 period compared to the rest of the ACOs. On the other hand, price standardization increased savings estimates for *Dartmouth-Hitchcock*, the ACO noted as having a relatively large increase in its far market wage and GAF ratios over the four-year period.

- *Beacon Health* showed the greatest impact on its estimated savings from price standardization. In 2012, their price standardized estimates showed a $40 PBPM loss compared to an estimated $79 PBPM savings using non-standardized data, a $119 fluctuation in the point estimate. In 2013, their price standardized estimates showed a statistically significant $85 PBPM loss compared to zero savings or losses using non-standardized estimates. This difference in estimates appears to be driven by the fact that they had the largest swing in their wage and GAF ratios between 2010 and 2013, as noted above.

- Standardization increases the savings estimates for Montefiore in 2012 (from $53 to $62 PBPM). While standardization had only a minimal impact on savings estimates for 2013, their results are no longer statistically significant at the 5 percent level. Similarly, while standardization had only a minimal impact on savings estimates for *Presbyterian Healthcare Services*, its results are no longer statistically significant in 2012.

Discussion

Analysis of changes over time in the hospital wage index and GPCI for ACOs and their far markets indicates that failure to standardize prices has a non-trivial impact on our results for some ACOs. This result can be explained both by differences in the level of the hospital wage index across markets and differences in the rate of change in the index over time. That said, limitations in our methodology for standardizing prices across markets and time could lead to spurious results for some ACOs, possibly less reliable than results using non-standardized prices.

These limitations include the inability to adjust for differences in the hospital wage index at the hospital level unless we build our measures of costs from the "ground up" (i.e., based on DRGs), an approach that would be painstaking for a sensitivity analysis. The main limitation with using the CBSA-level wage index is that, nationally, a substantive proportion of hospitals have been reclassified to higher wage index values, meaning that a price standardization approach based on the wage index for a CBSA may over-correct for differences related to the wage index since hospitals in lower wage index CBSAs are presumably more likely to be reclassified.

Another limitation of the standardization approach used in this sensitivity analysis is that it implicitly assumes that all ACO beneficiaries are from the same CBSA, an assumption that we know is not accurate for every ACO. A better approach would be to use a weighted wage index

that reflects each ACOs mix of patients across CBSAs, using the baseline period data that we examined as part of developing the far market comparison groups.

While use of standardized prices is conceptually appealing, limitations in our ability to accurately standardize them are of concern. Particularly, we are concerned that any price-standardized Medicare payment amounts that we calculated do not reflect actual Medicare payment amounts. We use actual payments in our far market cost analyses, but for the evaluation of future performance years, we will conduct further analyses of how changes in the wage index may have contributed to our findings for specific markets where the value of the wage index is considerably different for the ACO and its far market or where there is volatility in the wage index.

Table 25. Estimated Total PBPM Savings/Losses for Pioneer ACOs Using Non-price Standardized Versus Price Standardized Expenditures: Difference-in-Differences Analyses Using Far Market Comparators

	2012 Estimated Savings/Loss						2013 Estimated Savings/Loss					
	No Price Standardization			With Price Standardization			No Price Standardization			With Price Standardization		
Pioneer Name	**PBPM**	**s.e.**	**t-stat**	**PBPM**	**s.e.**	**t-stat**	**PBPM**	**s.e.**	**t-stat**	**PBPM**	**s.e.**	**t-stat**
Bellin-ThedaCare	**-44.57**	**14.36**	**-3.10**	**-60.03**	**14.27**	**-4.21**	-21.41	15.73	-1.36	**-35.71**	**15.63**	**-2.28**
Phys. Health Partners*	**-28.74**	**11.20**	**-2.57**	**-28.51**	**11.30**	**-2.52**	-12.97	12.75	-1.02	-16.49	12.86	-1.28
University of Michigan*	**-42.79**	**14.43**	**-2.97**	**-38.03**	**14.66**	**-2.59**	-9.69	15.69	-0.62	-0.34	15.93	-0.02
Renaissance	5.62	11.87	0.47	7.14	11.83	0.60	13.12	12.11	1.08	5.80	12.07	0.48
Genesys PHO	-5.45	16.18	-0.34	-16.02	16.39	-0.98	-11.54	16.98	-0.68	-24.09	17.18	-1.40
Monarch Healthcare	**-82.34**	**16.88**	**-4.88**	**-74.82**	**16.43**	**-4.55**	21.80	17.95	1.21	**39.70**	**17.44**	**2.28**
Allina Health	-11.87	14.70	-0.81	-3.55	14.85	-0.24	-27.50	17.23	-1.60	-26.20	17.41	-1.50
Brown & Toland	**-70.12**	**26.23**	**-2.67**	**-51.31**	**25.44**	**-2.02**	-13.00	28.90	-0.45	5.43	27.89	0.19
Montefiore ACO	**-52.72**	**17.60**	**-3.00**	**-61.95**	**17.70**	**-3.50**	**-33.22**	**16.30**	**-2.04**	-31.09	16.42	-1.89
Sharp Healthcare System	**-47.10**	**12.17**	**-3.87**	**-55.90**	**12.28**	**-4.55**	**-41.12**	**12.97**	**-3.17**	**-52.83**	**13.10**	**-4.03**
Michigan Pioneer ACO	**-60.12**	**29.43**	**-2.04**	-50.73	29.92	-1.70	**-102.72**	**31.57**	**-3.25**	**-81.00**	**32.01**	**-2.53**
Banner Health Network	4.99	12.41	0.40	4.46	12.76	0.35	14.12	13.29	1.06	-2.78	13.83	0.20
MACIPA	**-76.05**	**21.33**	**-3.57**	-29.58	21.37	-1.38	**-44.80**	**22.13**	**-2.02**	1.67	22.20	0.08
OSF Healthcare System	**-32.26**	**11.99**	**-2.69**	**-29.34**	**11.78**	**-2.49**	**-25.73**	**12.03**	**-2.14**	-15.97	11.78	-1.35
Fairview Health Systems	-17.06	11.74	-1.45	-10.14	11.81	-0.86	20.63	14.96	1.38	21.75	15.10	1.44
Franciscan Alliance	-7.14	13.55	-0.53	-9.70	13.49	-0.72	-18.86	12.65	-1.49	**-36.05**	**12.63**	**-2.85**
Partners Healthcare	**-55.44**	**12.20**	**-4.55**	-14.74	12.31	-1.20	**38.94**	**12.36**	**3.15**	**79.64**	**12.48**	**6.38**
BIDCO	**-114.93**	**14.85**	**-7.74**	**-68.13**	**15.01**	**-4.54**	**-61.72**	**15.56**	**-3.97**	-14.92	15.68	0.95
Beacon, LLC	**-79.72**	**22.28**	**-3.58**	**40.64**	**20.62**	**1.97**	0.95	23.02	0.04	**85.25**	**21.89**	**3.89**
Trinity Pioneer ACO, LC	**-45.29**	**17.55**	**-2.58**	-33.01	17.53	-1.88	**-72.79**	**17.54**	**-4.15**	**-53.35**	**17.49**	**-3.05**

	2012 Estimated Savings/Loss						2013 Estimated Savings/Loss					
	No Price Standardization			With Price Standardization			No Price Standardization			With Price Standardization		
Pioneer Name	**PBPM**	**s.e.**	**t-stat**	**PBPM**	**s.e.**	**t-stat**	**PBPM**	**s.e.**	**t-stat**	**PBPM**	**s.e.**	**t-stat**
Atrius Health	**-78.50**	**15.42**	**-5.09**	**-34.31**	**15.51**	**-2.21**	**-75.86**	**15.51**	**-4.89**	**-31.67**	**15.63**	**-2.03**
Park Nicollet Health	-7.39	12.24	-0.60	0.36	12.36	0.03	1.96	15.05	0.13	2.74	15.15	0.18
Seton Health Alliance*	6.02	19.19	0.31	1.77	19.30	0.09	11.33	20.86	0.54	-2.37	20.99	-0.11
Steward	**-85.39**	**13.94**	**-6.12**	**-36.74**	**14.06**	**-2.61**	**-48.06**	**14.09**	**-3.41**	0.60	14.25	0.04
HCP-CA*	**-96.32**	**13.57**	**-7.10**	**-90.83**	**13.05**	**-6.96**	**-44.80**	**14.31**	**-3.13**	**-30.96**	**13.68**	**-2.26**
HCP-NV*	**-80.97**	**16.64**	**-4.87**	**-70.40**	**16.89**	**-4.17**	**-130.70**	**19.36**	**-6.75**	**-135.30**	**19.79**	**-6.84**
JSA Medical Group*	-4.58	17.29	-0.26	-8.37	17.35	-0.48	10.95	18.65	0.59	-2.10	18.77	-0.11
PrimeCare**	**-84.73**	**18.76**	**-4.52**	**-66.89**	**18.57**	**-3.60**	**-67.94**	**19.24**	**-3.53**	**-59.19**	**19.08**	**-3.10**
Presbyterian**	**-28.46**	**14.39**	**-1.98**	-23.43	14.16	-1.65	-22.38	15.56	-1.44	-29.50	15.43	-1.91
Plus! **	-11.80	14.24	-0.83	-27.39	14.28	-1.92	**40.15**	**12.44**	**3.23**	15.37	12.49	1.23
Dartmouth Hitchcock ACO	**-48.69**	**15.60**	**-3.12**	**-63.57**	**15.15**	**-4.19**	-4.34	16.14	-0.27	**-37.99**	**15.79**	**-2.41**
Heritage California ACO	**-48.98**	**12.10**	**-4.05**	**-37.17**	**11.06**	**-3.36**	-9.48	12.25	-0.77	9.20	11.13	0.83

*Notes: *ACOs that ended participation as a Pioneer ACO as of December 31, 2013 and transitioned to being a Medicare Shared Savings Program ACO.**ACOs that ended participation as any Medicare ACO as of December 31, 2013. A negative number indicates savings from the baseline period relative to the far market. Names of the ACOs have been shortened to fit the page. Bolded estimates indicate statistical significance at the p<0.05 level. PBPM is per beneficiary per month. S.E. is standard error.*

6b. CAHPS Analysis

The data sources for the analysis of patient experience and quality data are the CAHPS surveys fielded for computing seven CMS ACO quality measures (ACO CAHPS) for 2012 and 2013 and also for computing MA & PDP CAHPS and FFS benchmarks for 2012. The ACO CAHPS data set contained no fields that could be used to match to CMS claims data.

Table 26 identifies within domains for each ACO CAHPS item, the MA & PDP CAHPS item that is identical, or nearly identical, to the summary measures provided to the ACO annually. Composite measures using the first seven ACO CAHPS domains are also ACO quality measures. ACO CAHPS item numbers and text reference the Final National Implementation Survey that was fielded in 2012,[54] and the MA & PDP CAHPS item numbers and text reference the 2012 Medicare Advantage Prescription Drug Survey.[55] Items found only in the MA-PDP CAHPS are not included in this table.

Table 26. Mapping of ACO CAHPS Items to MA and PDP CAHPS Items per Domain

ACO Item #	ACO Item Text	MA & PDP Item #	MA & PDP Item Text
Getting Timely Care, Appointments and Information			
6	In the last 6 months, when you phoned this provider's office to get an appointment for care you needed right away, how often did you get an appointment as soon as you needed?	4	In the last 6 months, when you needed care right away, how often did you get care as soon as you thought you needed?
8	In the last 6 months, when you made an appointment for a check-up or routine care with this provider, how often did you get an appointment as soon as you needed?	6	In the last 6 months, not counting the times you needed care right away, how often did you get an appointment for your health care at a doctor's office or clinic as soon as you thought you needed?
10	In the last 6 months, when you phoned this provider's office during regular office hours, how often did you get an answer to your medical question that same day?		
12	In the last 6 months, when you phoned this provider's office after regular office hours, how often did you get an answer to your medical question as soon as you needed?	10	In the last 6 months, when you phoned a doctor's office or clinic after regular office hours, how often did you get an answer to your medical question as soon as you needed?
15	Wait time includes time spent in the waiting room and exam room. In the last 6 months, how often did you see this provider within 15 minutes of your appointment time?	8	Wait time includes time spent in the waiting room and exam room. In the last 6 months. How often did you see the person you came to see within 15 minutes of your appointment time?

[54] See https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharedsavingsprogram/Downloads/Final-National-Implementation-Survey-nf.pdf.

[55] See http://www.ma-pdpcahps.org/Documents/MA-PD%20English%20CATI%20SCRIPT%2012-19-2011.pdf.

ACO Item #	ACO Item Text	MA & PDP Item #	MA & PDP Item Text
How Well Providers Communicate			
16	In the last 6 months, how often did this provider explain things in a way that was easy to understand?	17	In the last 6 months, how often did your personal doctor explain things in a way that was easy to understand?
17	In the last 6 months, how often did this provider listen carefully to you?	18	In the last 6 months, how often did your personal doctor listen carefully to you?
19	In the last 6 months, how often did this provider give you easy to understand information about these health questions or concerns?		
20	In the last 6 months, how often did this provider seem to know the important information about your medical history?		
22	In the last 6 months, how often did this provider show respect for what you had to say?	19	In the last 6 months, how often did your personal doctor show respect for what you had to say?
23	In the last 6 months, how often did this provider spend enough time with you?	20	In the last 6 months, how often did your personal doctor spend enough time with you?
Patient's Rating of Provider			
41	Using any number from 0 to 10, where 0 is the worst provider possible and 10 is the best provider possible, what number would you use to rate this provider?	21	Using any number from 0 to 10, where 0 is the worst personal doctor possible and 10 is the best personal doctor possible, what number would you use to rate your personal doctor?
Access to Specialists			
46	In the last 6 months, how often was it easy to get appointments with specialists?	34	In the last 6 months, how often was it easy to get appointments with specialists?
47	In the last 6 months, how often did the specialist you saw most seem to know the important information about your medical history?		
Health Promotion and Education			
General Health Promotion and Education			
49	Your health care team includes all the doctors, nurses and other people you see for health care. In the last 6 months, did you and anyone on your health care team talk about specific things you could do to prevent illness?		
50	In the last 6 months, did you and anyone on your health care team talk about a healthy diet and healthy eating habits?		
51	In the last 6 months, did you and anyone on your health care team talk about the exercise or physical activity you get?		
52	In the last 6 months, did anyone on your health care team talk with you about specific goals for your health?		

ACO Item #	ACO Item Text	MA & PDP Item #	MA & PDP Item Text
Mental Health Promotion and Education			
57	In the last 6 months, did anyone on your health care team ask you if there was a period of time when you felt sad, empty, or depressed?		
58	In the last 6 months, did you and anyone on your health care team talk about things in your life that worry you or cause you stress?		
Shared Decision-Making			
Making Decisions about Medications			
27	Did you and this provider talk about the reasons you might want to take a medicine?		
28	Did you and this provider talk about the reasons you might not want to take a medicine?		
29	When you and this provider talked about starting or stopping a prescription medicine, did this provider ask what you thought was best for you?		
Making Decisions about Surgery			
36	Did you and this provider talk about the reasons you might want to have the surgery or procedure?		
37	Did you and this provider talk about the reasons you might not want to have the surgery or procedure?		
38	When you and this provider talked about having surgery or a procedure, did this provider ask what you thought was best for you?		
Sharing Your Health Information			
39	In the last 6 months, did you and this provider talk about how much of your personal health information you wanted shared with your family or friends?		
40	In the last 6 months, did this provider respect your wishes about how much of your personal health information to share with your family or friends?		
Health Status and Functional Status			
Self-rated Health			
59	In general, how would you rate your overall health?	71	In general, how would you rate your overall health?
Self-rated Mental Health			
60	In general, how would you rate your overall mental or emotional health?	72	In general, how would you rate your overall mental health?
Cognitive Functioning			
75	Because of a physical, mental, or emotional condition, do you have serious difficulty concentrating, remembering, or making decisions?		

ACO Item #	ACO Item Text	MA & PDP Item #	MA & PDP Item Text
Beneficiaries without a Chronic Condition			
62	Is this a condition or problem that has lasted for at least 3 months?	74	Is this a condition or problem that has lasted for at least 3 months?
64	Is this medicine to treat a condition that has lasted for at least 3 months?	76	Is this [medicine] to treat a condition that has lasted for at least 3 months?
Beneficiaries' Functional Status			
65	During the last 4 weeks, how much did your physical health interfere with your normal social activities with family, friends, neighbors or groups?		
66	During the last 4 weeks, how much of the time did your physical health interfere with your social activities (like visiting with friends, relatives, etc.)?		
76	Do you have serious difficulty walking or climbing stairs?		
77	Do you have difficulty dressing or bathing?		
78	Because of a physical, mental, or emotional condition, do you have difficulty doing errands alone such as visiting a doctor's office or shopping?		
Courteous and Helpful Office Staff			
42	In the last 6 months, how often were clerks and receptionists at this provider's office as helpful as you thought they should be?		
43	In the last 6 months, how often did clerks and receptionists at this provider's office treat you with courtesy and respect?		
Care Coordination			
21	When you visited this provider in the last 6 months, how often did he or she have your medical records?		
25	In the last 6 months, when this provider ordered a blood test, x-ray, or other test for you, how often did someone from this provider's office follow up to give you those results?	24	In the last 6 months, when your personal doctor ordered a blood test, x-ray or other test for you, how often did someone from your personal doctor's office follow up to give you those results?
55	In the last 6 months, how often did you and anyone on your health care team talk about all the prescription medicines you were taking?		
Between Visit Communication			
14	In the last 6 months, did this provider's office contact you to remind you to make an appointment for tests or treatment?		
31	In the last 6 months, how often did this provider give you easy to understand instructions about how to take your medicines?		

ACO Item #	ACO Item Text	MA & PDP Item #	MA & PDP Item Text
33	Was the written information this provider gave you easy to understand?		
34	In the last 6 months, did this provider suggest ways to help you remember to take your medicines?		
Stewardship of Patient Resources			
56	In the last 6 months, did you and anyone on your health care team talk about how much your prescription medicines cost?		
Items Not Specified as CAHPS Domains			
Ease of Getting Care (Not Included in the 2013 ACO CAHPS)			
53	In the last 6 months, how often was it easy to get the care, tests or treatment you thought you needed?	39	In the last 6 months, how often was it easy to get the care, tests or treatment you thought you needed through your health plan?
Other Items			
3	How long have you been going to this provider?		
4	In the last 6 months, how many times did you visit this provider to get care for yourself?	16	In the last 6 months, how many times did you visit your personal doctor to get care for yourself?
48	How many specialists have you seen in the last 6 months?	35	How many specialists have you seen in the last 6 months?
73	Are you deaf or do you have serious difficulty hearing?		
74	Are you blind or do you have serious difficulty seeing, even when wearing glasses?		
Demographics			
67	What is your age?	83	What is your age?
68	Are you male or female?	84	Are you male or female?
69	What is the highest grade or level of school that you have completed?	85	What is the highest grade or level of school that you have completed?
70	How well do you speak English?		
72	What is the language you speak at home?		
79	Are you of Hispanic, Latino, or Spanish origin?	86	Are you of Hispanic or Latino origin or descent?
81	What is your race? Mark one or more.	87	What is your race? Please mark one or more.
82	Did someone help you complete this survey?	88	Did someone help you complete this survey?
83	How did that person help you? Mark one or more.	89	How did that person help you? Mark one or more.

We then separated the domains and subdomains of items from Table 26 into measures for comparing ACOs and their comparison groups, comparing Pioneer ACOs in PY1 and PY2, and risk adjustment. Table 27 shows which domain or subdomain was included in different analyses and which was used for risk adjustment.

Table 27. Use of CAHPS Domains and Sub-domains in ACO CAHPS Analysis

Domain/Subdomain	Baseline versus Comparison	Pioneer ACO PY2 vs. PY1	Risk Adjustment
Timely Care	Y	Y	
Access to Specialists	Y	Y	
Communicates Well	Y	Y	
Rating of Provider	Y	Y	
Sharing PHI		Y	
Promoting General Health		Y	
Promoting Mental Health		Y	
Shared Decisions: Medications		Y	
Shared Decisions: Surgery		Y	
Sharing PHI		Y	
Health/Functional Status: Self-Rated Health			Y
Health/Functional Status: Self-Rated Mental Health			Y
Health/Functional Status: Cognitive Function			Y
Health/Functional Status: Non-Chronic Conditions			Y
Health/Functional Status: Functional Status			Y
Courteous Staff		Y	
Care Coordination		Y	
Between-Visit Communication		Y	
Patient Resources		Y	
Ease of Getting Care	Y		
Other Items			Y
Demographics			Y

Notes: Non-CAHPS items used as risk adjustment include urban/rural location of beneficiary, median household income in the ACO's market, number of ACOs in the market, average Medicare Parts A and B payments in the market, and the size of the ACO's aligned population. These variables are only used in the Pioneer ACO PY1 vs. PY2 comparison.

Analytic Approach

Summary scores constructed from multiple items are item-weighted composites where the denominator is based on the number of respondents (incorporating information from screening questions) so that items with more responses are weighted more heavily than those with fewer responses. This is a standard approach for creating a CAHPS summary score.[56]

Because the underlying data are surveys, each respondent represents some number of sample frame beneficiaries, and the resulting weights differ from respondent to respondent. We

[56] American Institutes for Research, "How to Report Results of the CAHPS Clinician & Group Survey", Princeton, NJ: Robert Wood Johnson Foundation, 2008. https://cahps.ahrq.gov/surveys-guidance/cg/cgkit/HowtoReportResultsofCGCAHPS080610FINAL.pdf

constructed a beneficiary weight in the ACO CAHPS data set equal to the inverse of the ratio of the number of respondents for the ACO to the total 2012 aligned population.[57] Scores for each item are risk-adjusted individually at the beneficiary level, and the composite risk-adjusted measure is equal to a response-weighted average of the constituent items. Items with more than two response levels were converted to trichotomous indicators, where a value of 1 represents never or sometimes; a value of 2 represents usually; and a value of 3 represents always (Table 28).

We also constructed two types of standard CAHPS scores:[58]

- **Average scores.** Each of the items analyzed have been converted, consistent with standard CAHPS reporting, to a 1-3 scale (for example, an item reporting as never, sometimes, usually, or always would combine never and sometimes into a single level). The average score is the average value of this scale for an ACO or benchmark population. This method does incorporate all of the information from the responses, but it also tends to compress differences between ACOs.

- **Top box scores.** These scores are the proportions of patients reporting the highest response level. There tends to be more variation among ACOs with this type of measure, as it focuses on performance on the highest response level. However, it does ignore information from patients reporting the lowest response level. The top box score only captures differences in reporting of the highest response level. For scores based on items with only two response levels, the average score and the top box score are equivalent because the average score for these measures would only be based on the proportion of highest response levels.

Table 28. Items Based on Two- versus Three-Level Response Items

Measures with Only Two-Level Responses	Measures with At Least One Three-Level Response
Promoting General Health*	**Timely Care***
Promoting Mental Health*	**Access to Specialists***
Shared Decisions: Medications*	**Communicates Well***
Shared Decisions: Surgery*	**Rating of Provider***
Sharing PHI*	Courteous Staff
Patient Resources	Care Coordination
	Between-Visit Communication

Notes: Domains with an asterisk are associated with the indicated ACO quality measure. Some measures include multiple domains.

[57] In the absence of other information, we are assuming an equal probability of selection.
[58] American Institutes for Research, "How to Report Results of the CAHPS Clinician & Group Survey", Princeton, NJ: Robert Wood Johnson Foundation, 2008. https://cahps.ahrq.gov/surveys-guidance/cg/cgkit/HowtoReportResultsofCGCAHPS080610FINAL.pdf

Risk Adjustment

The risk adjustment method that we employed in this report used the beneficiary- and market-level factors listed below.

- Age
- Gender
- Education
- Race/ethnicity
- Use of a proxy to read, write, or respond to the survey
- Self-reported general and mental health
- Self-reported presence of chronic conditions
- Self-reported functional impairments
- ACO size (number of aligned beneficiaries)
- ACO location (percent of population in its market area residing in urban counties)
- Medicare advantage penetration in its market area
- Market area household income
- Average Medicare payments in its market area

Because of the trichotomous nature of many of the individual items, for risk adjustment we estimated a stereotype logistic model of the probabilities of each response level conditional on the risk adjustment factors. A stereotype logistic model is a constrained version of a multinomial logistic model that encodes the ordinal nature of the responses but allows for more flexible effects on the response from the risk adjustment factors than exist in an ordinal logistic model.[59] For the top box measures and items with only two response levels, we estimated ordinary logistic models for risk adjusting these items.

6c. Primary Data

The team interviewed all ACOs in the primary data collection cohort on a quarterly basis. The topics and timing of the quarterly assessments, as well as the entry and exit of ACOs into the

[59] Anderson, J. A. "Regression and ordered categorical variables (with discussion)." Journal of the Royal Statistical Society, Series B 46 (1984): 1–30.

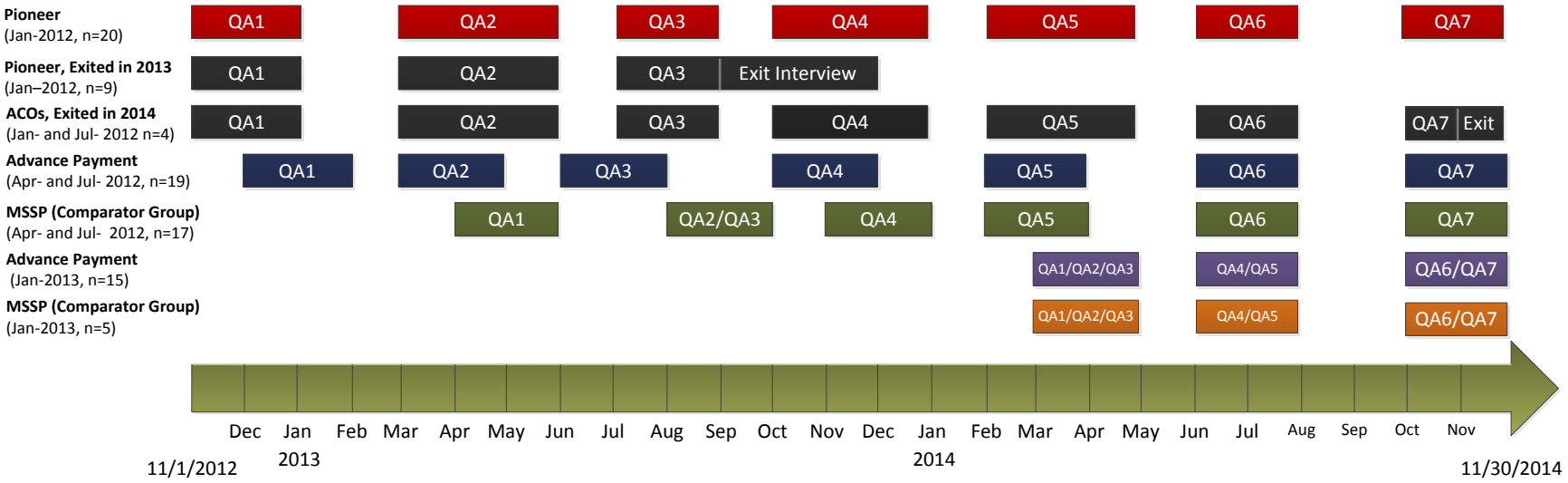
cohort, from the beginning of the evaluation to date is shown in Figure 28. Quarterly assessment interviews provide the team with continuous, topic-focused assessments of how the intervention and comparison group ACOs are performing and evolving throughout the duration of the performance period. The interview protocols were organized into modules of questions that address each domain of the project's conceptual framework. We discontinued quarterly assessment interviews after the third quarterly assessment with the nine Pioneer ACOs that exited the model; our final interview with these organizations was an exit interview conducted between July and December 2013. As a result, we have limited information about these organizations.

Quarterly assessments strike a balance between collecting core details on ACOs, while also offering flexibility to shape the discussions around topics pertinent to specific ACOs at various points in time. A two-person team, comprising a senior-level lead interviewer and a note taker who captures transcript-style notes, conducted each interview. Interview notes were uploaded to a web-based qualitative and mixed method research software platform (Dedoose) and coded to organize details from the notes and facilitate analyses of interview findings. Data were extracted from interview notes and analyzed using codes and other internal querying capabilities.

The team has also conducted ACO site visits with all ACOs in the primary data collection cohort. This cohort includes all Pioneer ACOs; however, the nine organizations that exited the model by December 31, 2013 did not have site visits. Site visits began in October 2013 and continued through August 2014. In collaboration with each ACO, the evaluation team developed the agenda of topics to be covered in advance of the site visit. This approach balances the need to tailor the questions and topic areas for each ACO while also yielding comparable information to inform the evaluation. During the one- to two-day site visits, the team collected qualitative data from interviews conducted with members of the executive leadership team, providers and clinical staff, and directors of technical and operational areas involved in the ACO, affording evaluators the opportunity to better understand the factors affecting an ACO's ability to deliver quality care and contain cost and strategies for navigating challenges and capitalizing on successes. As appropriate, we also conducted focus groups with ACO participating providers or ACO-aligned beneficiaries to gather additional detail directly from those who provided and received health services as part of the ACO. Interviews conducted during the site visits and focus groups yield rich details about organizations that might not otherwise be captured through surveys, and are not obtainable through claims or review of programmatic and other administrative data and documents.

Findings based on semi-structured quarterly assessment interviews and site visits have limitations. Not all ACOs were asked or responded to precisely the same set of questions. The quarterly assessments and site visits are deliberately structured to strike a balance between collecting a core set of factual details on ACOs and offering flexibility to shape the discussions around topics pertinent to specific ACOs at various points in time. Information collected during the course of quarterly assessment interviews is based on the opinions, knowledge, and experiences of the interviewees.

Figure 28. ACO Quarterly Assessment Interviews, 2012 through 2014



QA1	History, Leadership and Governance
QA2	Provider Network
QA3	Marketplace and Environment
QA4	Population Health - Care Management
QA5	Health IT and Information/Data Management
QA6	Strategy, Finance, and Sustainability
QA7	Care Continuum

**Date listed under each ACO type refers to the dates the organizations began participation as a Medicare ACO.*
**"N" refers to the number of ACOs in each ACO type within the qualitative evaluation cohort as of 7/15/14. There is a total of 80 ACOs in qualitative evaluation cohort. "QA" is quarterly assessment.*
**The nine Pioneer ACOs that elected to withdraw from the Pioneer ACO model in mid-2013 did not have a QA4 interview; instead, these ACOs received an exit interview. The interviews occurred between July - November 2013. Two of the exit interviews occurred in conjunction with a QA3 interview. At CMMI's request, one exit interview occurred in lieu of a QA3 interview. The L&M evaluation team did not conduct any further interviews with the nine Pioneers after their respective exit interviews. The three Pioneer ACOs that elected to withdraw from the Pioneer ACO model in mid-2014 will have QA6 interviews and the same holds true for the AP MSSP ACO terminated by CMS during the same period.*
**During 2014, four ACOs exited. These ACOs received an exit interview in conjunction with a QA7 interview.*
**One MSSP (2012) was removed from the qualitative cohort because it had served as a qualitative comparison to a Pioneer that exited in 2013.*

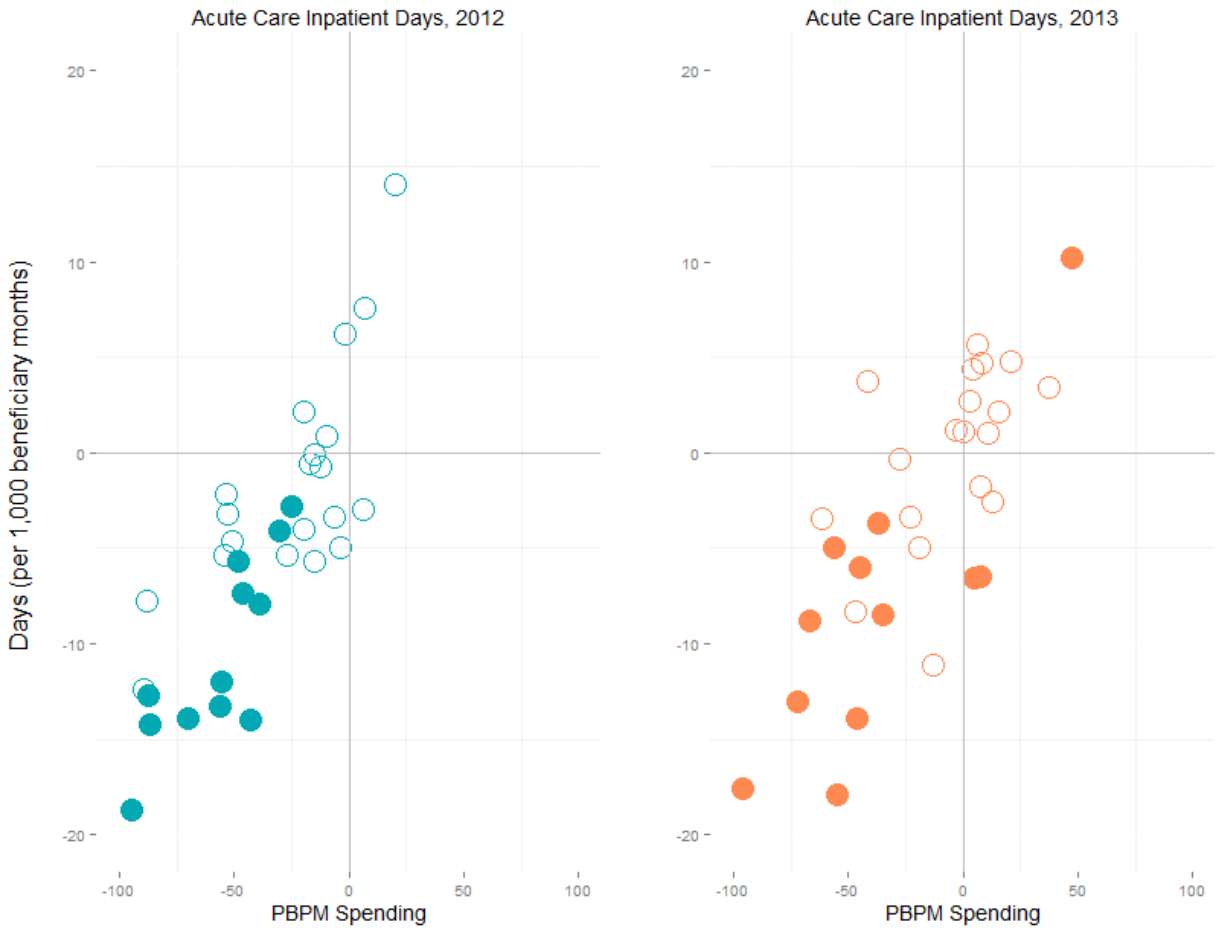
APPENDIX 1. ADDITIONAL UTILIZATION AND SPENDING RESULTS SCATTERPLOTS

The following figures present scatterplots of additional utilization metrics against per beneficiary per month spending results. The scatterplots show that utilization for several BETOS procedures, imaging, and tests, as well as acute care inpatient days and stays, generally varied directly with per beneficiary per month spending.

Figure 29. Pioneer ACOs' Differences in Procedures, Imaging, and Tests from Baseline by Differences in PBPM Spending from Baseline Compared to Near Markets, 2012 and 2013

Note: Each point on scatterplot represents a single Pioneer ACO compared against its near market comparison group. Non-statistically significant spending results are shown with hollow circles; significant spending results are shown by solid circles. PBPM is per beneficiary per month.

Figure 30. Pioneer ACOs' Differences in Acute Inpatient Days from Baseline by Differences in PBPM Spending from Baseline Compared to Near Markets, 2012 and 2013



Note: Each point on scatterplot represents a single Pioneer ACO compared against its near market comparison group. Non-statistically significant spending results are shown with hollow circles; significant spending results are shown by solid circles. PBPM is per beneficiary per month.

APPENDIX 2. ADDITIONAL SPENDING AND UTILIZATION RESULTS

Table 29. Additional Pooled Pioneer Spending Results by Select Settings, Difference-in-differences Estimates Compared to Near Markets, 2012 and 2013

Outcome (per beneficiary month)	2012	95% CI	2013	95% CI
All Inpatient Hospital	**-$14.40**	**-$17.31 to -$11.49**	**-$6.46**	**-$9.26 to -$3.66**
Part B	**-$8.29**	**-$9.32 to -$7.27**	**-$2.69**	**-$3.84 to -$1.54**
Hospital Outpatient	**-$5.82**	**-$6.76 to -$4.88**	-$0.22	-$1.21 to $0.78
SNF	**-$2.18**	**-$3.34 to -$1.03**	-$0.83	-$2.07 to $0.42
Home Health	**-$1.06**	**-$1.59 to -$0.54**	$0.46	-$0.13 to $1.04
Hospice	**-$1.34**	**-$2.11 to -$0.58**	$0.14	-$0.69 to $0.97
DME	**-$1.22**	**-$1.43 to -$1.00**	**-$0.92**	**-$1.13 to -$0.71**

Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.
Notes: Total pooled beneficiary months for Pioneer ACOs was 7,851,613 in 2012 and 9,349,724 in 2013. This table pools the estimated effects over all 32 Pioneer ACOs and aligned beneficiaries that were part of the ACO model at the beginning of the second performance year. Bold estimates indicate statistical significance at the p<0.05 level; all measures were statistically significant in 2012 and all but hospital outpatient, SNF, Home Health, and Hospice were statistically significant in 2013. Results are risk adjusted using Oaxaca-Blinder reweighting method as discussed in the Methods section.

Table 30. Additional Pooled Pioneer Utilization Results by Select Settings, Difference-in-differences Estimates Compared to Near Markets, 2012 and 2013

Outcome (per 100 beneficiary months)	2012	95% CI	2013	95% CI
Outpatient emergency room visits	**-0.18**	**-0.21 to -0.15**	**-0.12**	**-0.16 to -0.09**
Observation stays	-0.002	-0.01 to 0.007	**0.04**	**0.03 to 0.05**
Inpatient emergency room visits	**-0.07**	**-0.08 to -0.05**	**-0.06**	**-0.07 to -0.04**
Inpatient rehabilitation facility, long-term care days	**-0.17**	**-0.25 to -0.08**	**-0.11**	**-0.20 to -0.03**
Skilled nursing facility days	**-0.40**	**-0.70 to -0.13**	-0.17	-0.46 to 0.12
Home health visits	**-0.97**	**-1.40 to -0.60**	-0.15	-0.62 to 0.32
Hospice days	**-0.87**	**-1.33 to -0.40**	0.06	-0.46 to 0.57

Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.
Notes: Total pooled beneficiary months for Pioneer ACOs was 7,851,613 in 2012 and 9,349,724 in 2013. This table pools the estimated effects over all Pioneer ACOs and aligned-beneficiaries that were part of the ACO model at the beginning of the second performance year. See the Methods section for a full list of measures and definitions. Bold estimates indicate statistical significance at the p<0.05 level. All but observation stays were statistically significant in 2012, and all but SNF, Home Health and Hospice were significant in 2013. Results are adjusted using Oaxaca-Blinder reweighting method as discussed in the Methods section.

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