Evaluation of CMMI Accountable Care Organization Initiatives
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Advance Payment ACO Final Report

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RESULTS AT A GLANCE

The Advance Payment (AP) Accountable Care Organization (ACO) Model provided 36 small, physician-based Medicare Shared Savings Program (MSSP) ACOs with up-front payments to invest in resources to improve care delivery. These advance payment funds were intended to be recouped against shared savings payments according to the Centers for Medicare & Medicaid Services (CMS) financial benchmarking methodology. The AP model ran from 2012 to 2015. AP ACOs comprised 15 to 20 percent of all MSSP ACOs that launched in 2012 or 2013. CMS contracted with L&M Policy Research and its partners to conduct an evaluation of the AP model, which focused on answering the following key questions:

- What were the quality, spending, and utilization levels of beneficiaries assigned to AP ACOs relative to similar fee-for-service (FFS) beneficiaries not attributed to a Medicare ACO?
- What were some of the factors explaining AP ACO performance according to the evaluation?
- Were AP ACOs able to repay their advance payment funds within their three-year participation agreement period and how many renewed their participation agreement?

To answer these questions, the evaluation's methodology necessarily contrasts with the financial benchmarking methodology for calculating MSSP ACO shared savings. The evaluation assigned beneficiaries to AP ACOs according to the MSSP assignment algorithm and compared their spending to the spending of FFS Medicare beneficiaries who were assignment-eligible but not aligned with or assigned to any Medicare ACO in the AP ACOs' markets. To evaluate the impact of the AP model, the evaluation used a difference-in-differences framework to measure outcomes—quality, Medicare program spending, and utilization—for the period 2012 to 2014. Results were produced for partial year 2012 for ACOs that started in April or July 2012 and for calendar years 2013 and 2014. Since this approach to measuring outcomes differs from the financial benchmarking methodology, the evaluation's findings differ from the MSSP quality and financial results. Specifically, the evaluation found among all AP ACOs:

- **Quality Results:** Quality results using several claims-based measures were largely not statistically distinguishable from comparison beneficiaries over the three years.
- **Total Spending Results:** AP ACOs had non-statistically significant lower-than-expected total spending in 2012 and 2013 and statistically significant higher-than-expected total spending in 2014 of $20.80 per beneficiary per month.
- **Setting-Specific Spending Results:**
  - For acute inpatient care, AP ACOs had significantly lower-than-expected spending in 2012 and 2013 and significantly higher-than-expected spending in 2014.
  - AP ACOs had higher-than-expected spending on physician services in all years. Many AP ACOs reported engaging in activities that could potentially promote the use of physician services in efforts to address wellness, care gaps, post-discharge quality, and to promote continued beneficiary assignment to the ACO.

  - AP ACOs showed significantly lower-than-expected spending on home health in all years, largely driven by two or three AP ACOs in high home health utilization markets in each year.

- In an exploratory analysis of ACO, aggregate beneficiary, and market factors associated with outcomes, no clear pattern emerged in the relationship with spending and utilization. ACOs using claims or EHR data to identify patients for care management tended to have lower-than-expected spending, but other care management variables were not associated with spending results.

Two-thirds of AP ACOs continued to participate as either the same or a new MSSP ACO in 2016 after the AP Model ended. Of the approximately $68 million in advance payment funds distributed to the AP ACOs, $30 million had yet to be recouped against shared savings by the end of the three-year participation agreement period. Seventeen of the original 36 AP ACOs fully paid back their advance payment funds, and 6 more ACOs that continued to participate could still have about $14 million in advance payment funds recouped based on their shared savings performance during the second participation agreement period.

Although AP ACOs may need a longer timeframe to generate lowered spending and improved quality as a result of their advance payment investments, the AP ACO model enabled physician practices to invest in resources to coordinate care, analyze patient data, become more aware of costs and utilization, and enhance communication within the practice and with providers outside of the ACO.

EXECUTIVE SUMMARY

Through the Advance Payment Accountable Care Organization (AP ACO) Model, the Centers for Medicare & Medicaid Services (CMS) furnished 36 selected physician-based organizations participating in the Medicare Shared Savings Program (MSSP) with up-front and ongoing monthly payments for 24 months. These payments totaled $67.8 million to invest in staff and infrastructure for delivering better-coordinated and higher quality care to their assigned Medicare patients.[1] Advance payment funding was intended to help overcome financial barriers more acutely faced by small physician-based organizations interested in forming an ACO.

For each performance year, advance payments were recouped against any shared savings an ACO accrued according its benchmarked spending level. The prospect of shared savings provides a financial incentive for ACO participation, and the financial performance of AP ACOs has been previously reported for 2013, 2014, and 2015. This evaluation report examines how the care received by fee-for-service (FFS) Medicare beneficiaries assigned to AP ACOs compares to non-ACO FFS Medicare beneficiaries in the AP ACOs' markets in 2012, 2013, and 2014. Findings under this evaluation differ from the financial performance results because they have different methods owing to different purposes. These differences mainly stem from differences in (1) comparison populations (national versus local), (2) approaches in trending methods (projected target spending level for ACO-assigned beneficiaries versus concurrent spending among similar non-ACO beneficiaries), (3) risk-adjustment methods, (4) determination of assigned beneficiary populations, and (5) different time allowed for claims run-out. This evaluation report describes features of AP ACOs, presents their quality and spending results for 2012 through 2014 relative to their local markets, shares perceptions of physicians in AP ACOs, and explores ACO, beneficiary, and market characteristics associated with spending and utilization results. It also discusses whether AP ACOs continued in MSSP once the AP ACO Model ended. The evaluation does not compare the performance of AP ACOs to non-AP MSSP ACOs.

As a subset of MSSP ACOs, the 36 AP ACOs comprised 15 to 20 percent of all MSSP ACOs that launched in 2012 or 2013. The leadership and physicians composing AP ACOs generally viewed advance payment funds as an essential means for practice transformation. AP ACOs were located in a broad array of geographic areas, including large urban markets and smaller, more rural markets. The majority had no more than 8,000 beneficiaries assigned in any performance year. However, these ACOs were not static organizations over time and experienced some churn in assigned beneficiaries over the evaluation period.

To evaluate the impact of the AP model, the evaluation team employed a difference-in-differences (DID) framework to evaluate key outcomes of the AP model relative to their markets. The DID framework compares the growth rate in Medicare beneficiary outcomes—quality, Medicare program spending for covered services, and utilization—for AP ACO-assigned beneficiaries relative to FFS Medicare beneficiaries in the AP ACO's market who were not aligned with or assigned to any Medicare ACO.

[1] Of the 36 AP ACOs, five started the AP model in April 2012, 15 in July 2012, and 16 in January 2013. Three had exited the AP model by the end of 2015.

To address questions of whether AP ACOs experienced improved quality outcomes for assigned beneficiaries during their participation in the AP model relative to similar beneficiaries in their markets not assigned to ACOs over the same time period, we examined several quality measures derived from claims. Overall, we found that Medicare beneficiaries assigned to AP ACOs experienced statistically indistinguishable quality of care compared to their non-ACO-assigned fee-for-service counterparts. Across individual AP ACO quality measures, the primary observable pattern is the absence of consistent results across measures and performance years. Few AP ACOs showed statistically significant improvements or declines relative to their comparison groups.

We also examined the effect of AP ACOs on Medicare program spending for all AP ACO-assigned beneficiaries in 2012, 2013, and 2014. We found:

- **Total spending:** The difference in Medicare spending for beneficiaries assigned to AP ACOs from their baseline relative to their comparison group was not statistically distinguishable for 20 AP ACOs that started in 2012. Similarly, in 2013, no statistically significant changes in Medicare spending were detectable for all 36 AP ACOs. In 2014, AP ACOs had statistically significant higher-than-expected spending growth of $20.80 per beneficiary per month (PBPM), translating into an estimated $70.80 million more in spending than would have been spent in the absence of the model in 2014. (See Table 1.)

Table 1. Estimated Difference-in-Differences Effects on AP ACOs' Total Medicare Spending, 2012 to 2014

	2012	2013	2014
Total PBPM DID ($)			
Point estimate	−$7.50	−$2.00	$20.80*
95% CI lower	−$18.50	−$8.70	$14.60
95% CI upper	$3.50	$4.60	$27.10
Total annual DID ($)			
Point estimate	−$7,617,605	−$6,563,499	$70,846,110*
95% CI lower	−$18,825,043	−$27,834,325	$49,608,700
95% CI upper	$3,589,834	$14,707,328	$92,083,520

Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.
Notes: DID=difference-in-differences, PBPM=per beneficiary per month, CI=confidence interval. There were 20 ACOs in 2012, 36 in 2013, and 35 in 2014. Negative numbers indicate lower AP ACO spending growth from the baseline relative to the comparison market. Results for 2012 are for the period beginning with the start of the AP model (either April or July) through the end of 2012 for the 2012 starters. Results for 2013 and 2014 include 2012 and 2013 starters and cover each calendar year. All point estimates noted with an asterisk are statistically significant at the p<0.05 level. Results adjusted for demographic and health-related characteristics using the Oaxaca-Blinder reweighting method, as discussed in the Methods section.

- **Results by service:** AP ACOs had significantly lower-than-expected spending growth in acute inpatient services relative to their comparison markets in both 2012 and 2013, but by 2014, they had significantly higher-than-expected spending. For physician services, AP ACOs had significantly higher-than-expected spending growth relative to their comparison

markets in all three years. AP leadership reported investing in activities to address gaps in primary care delivery and ensure that their ACO beneficiaries received preventive services; physicians in AP ACOs also reported being engaged in practice transformation activities. This greater focus on care management, quality requirements, and preventive care may have accounted for the relative rise in utilization of physician services. AP ACOs had significantly higher-than-expected spending on SNF services in 2012 and 2013 and significantly lower-than-expected spending in 2014 relative to their comparison markets; they had significantly lower-than-expected home health spending in all three years.

- **Results by AP ACO:** Among individual AP ACOs, we found variation in spending results over time, with no AP ACO showing significantly lower PBPM spending growth relative to its comparison market in every year and just one ACO with significantly higher growth compared to its comparison market in every year. We also found a trend toward more ACOs with significantly higher spending growth compared to their markets over the course of the model. Two of the 20 AP ACOs that started in 2012 had significantly higher spending growth. In 2013, 4 of 36 AP ACOs had significantly higher spending growth. By 2014, 11 AP ACOs had significantly higher spending growth relative to their comparison markets and just 2 had significantly lower spending growth. In all three years, the majority of AP ACOs had spending results that were not statistically different from zero, as shown by the bars that intersect the x-axis in Figure 1. Each set of bars shows PBPM total spending results for each year an ACO participated in the model (2012 starters have three bars and 2013 starters have two bars).

Figure 1. PBPM Total Spending Difference-in-Differences Estimates for AP ACOs, 2012 to 2014

Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.
Notes: Bars represent 95% confidence intervals around the point estimate for each ACO; bars that do not intersect the x-axis indicate statistically significant point estimates. There were 20 ACOs in 2012, 36 in 2013, and 35 in 2014. Results for 2012 are for the period beginning with the start of the AP model (either April or July) through the end of 2012 for the 2012 starters. Results for

2013 and 2014 include 2012 and 2013 starters and cover each calendar year. Negative numbers indicate lower AP ACO spending growth from the baseline relative to the comparison market. Results adjusted for demographic and health-related characteristics using the Oaxaca-Blinder reweighting method, as discussed in the Methods section.

We explored potential drivers of ACO spending results using a regression approach to measure the associations between the DID estimates from the evaluation and a set of ACO, aggregate beneficiary, and market characteristics. In this exploratory analysis, we found that ACOs that analyzed Medicare claims data or used an EHR to identify patients for care management tended to have lower spending growth relative to their comparison markets, but other care management variables did not appear to be associated with spending results. ACOs located in states with at least one Medicaid initiative were associated with lower spending growth, though those located in markets with more CMS initiatives appeared to be associated with higher growth relative to their comparison markets. We did not find statistically significant associations between spending and utilization findings and ACOs located in areas where other MSSP ACOs were present. ACOs with a higher prevalence of older patients and patients with certain chronic conditions tended to have larger increases or smaller decreases in spending growth relative to their comparison group.

Transforming multiple physician-led practices into a cohesive entity to improve quality and reduce Medicare spending growth is a process that may take longer than the evaluation period. Many participating organizations had little or no experience working with and analyzing claims data and incorporating population-level data into their care planning or management; some were also newly formed organizations with no history working as a single entity. However, AP ACOs and their participating physicians demonstrated commitment to the ACO model, and this commitment appears to have extended beyond the AP performance period—two-thirds of AP ACOs either renewed participation as an MSSP ACO or continued to participate as a new MSSP ACO in 2016. Among the original 36 AP ACOs, 17 had fully repaid $38 million in advance payments by the end of their first participation agreement period. Of the roughly $30 million in outstanding advance payments, $14 million could still be recouped by CMS from 6 ACOs that renewed their participation agreements.

INTRODUCTION

Sections 3021 and 3022 of the Affordable Care Act (ACA) established Accountable Care Organization (ACO) initiatives, which offer financial incentives for providers to cooperate and share accountability in delivering better coordinated, higher quality, and more efficient care. One such initiative is the focus of this evaluation report: the Advance Payment (AP) ACO Model of the Medicare Shared Savings Program (MSSP). The AP ACO Model was sponsored by the Centers for Medicare & Medicaid Services (CMS) Center for Medicare and Medicaid Innovation (CMMI) and ran from 2012 to 2015.[2] It provided AP ACOs with up-front payments to invest in resources to improve care delivery. This funding was intended to help overcome financial barriers that may be particularly acute for small, physician-based organizations transitioning to ACOs. Providers participating in AP ACOs continue to receive Medicare's fee-for-service (FFS) payments and AP ACOs may share in savings if they achieve quality benchmarks and spending below a benchmark established by CMS for a population of assigned beneficiaries in a given year.[3]

To be eligible to participate in the AP ACO Model, applicants had to apply and be selected to participate in MSSP and also apply and be accepted to the AP model. Because they must meet MSSP requirements, AP ACOs had to have at least 5,000 assigned beneficiaries. In addition, the AP model was open only to MSSP ACOs that (1) do not have any inpatient facilities and have less than $50 million in total annual revenue or (2) ACOs in which the only inpatient facilities are critical access hospitals and/or low-volume rural hospitals and have less than $80 million in total annual revenue.[4] ACOs co-owned by a health plan or insurer were not eligible for the AP model regardless of whether they met any of the other criteria. CMS selected 36 organizations to participate in the model: five started the AP model in April 2012, 15 in July 2012, and 16 in January 2013.

AP ACOs received three types of payments from CMS: (1) an up-front, lump-sum payment of $250,000; (2) an up-front, variable payment of $36 multiplied by the number of its historically assigned beneficiaries; and (3) a monthly payment of $8 per the number of historically assigned beneficiaries for 24 months. Beyond the two types of up-front payments, the monthly payments were made until mid-2014 for 2012 starters and end of calendar year 2014 for 2013 starters. ACOs could choose to spend these funds on personnel, information technology, and other CMS-approved resources that may help improve care coordination, improve the quality of care, and deliver care more efficiently. AP ACOs' use of these funds had to comply with spend plans they developed and submitted to CMS.

For each performance year, CMS calculated the financial performance of each ACO by comparing expenditures for its assigned beneficiaries to performance year-specific benchmarks, which are established based on a growth projection using the three years of Medicare spending (Parts A and B) preceding the first participation agreement period. ACOs were also held accountable for their

[2] The evaluation covers the period 2012 to 2014. We report results for partial year 2012 (for ACOs that started in April or July 2012) and calendar years 2013 and 2014. CMS calculated and reported financial and quality performance results as PY1 (2012 and 2013), PY2 (CY2014), and PY3 (CY 2015). Those financial results appear in the Appendix of this report in Table 24.

[3] See https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharedsavingsprogram/Downloads/Shared-Savings-Losses-Assignment-Spec.pdf

[4] See http://innovation.cms.gov/Files/fact-sheet/Advanced-Payment-ACO-Model-Fact-Sheet.pdf.

performance on 33 quality measures, which can affect their amount of shared savings in the model. If the performance-year expenditures were less than the benchmark, and the results were outside an established minimum savings rate, then the MSSP would have generated shared savings. Alternatively, if the performance year expenditures were greater than the benchmark, and the results were outside an established minimum loss rate, then the MSSP would have generated shared losses.[5] Because AP ACOs were part of MSSP, each organization had the option to participate under one of two tracks: an upside-only track that entails the ACO sharing savings only with CMS for the agreement term or an upside and downside track that entails sharing savings and losses with CMS for the agreement term. All but one AP ACO participated under the upside-only risk arrangement, meaning that nearly all AP ACOs were not at financial risk for losses if they exceeded benchmark spending for their assigned beneficiaries.

A total of about $68 million in advance payments were distributed to AP ACOs. CMS's provision of advance payment funds and most AP ACOs choice to share only in upside risk meant that AP ACOs were largely insulated from financial losses. AP ACOs were only required to pay back advance payments if they earned enough shared savings to offset advance payments during their three-year agreement period, which ended in December 2015. If an AP ACO did not earn shared savings under the model, CMS only pursued repayment if the ACO terminated its agreement before the term had ended or continued beyond the initial three-year participation agreement period as an MSSP and achieved shared savings.[6]

Shared savings results show how ACOs performed relative to their benchmarks. However, to understand whether AP ACOs yielded improvements in Medicare spending and quality relative to what would have been spent in the absence of the AP model and to identify the characteristics related to these outcomes, CMS contracted with L&M Policy Research and its research partners, Abt Associates, Avalere Health, Social and Scientific Systems, and Truven Health Analytics to evaluate the AP ACO Model. The evaluation team also examined how ACOs invested their advance payments as well as their patterns of repayment and MSSP participation agreement renewal. Financial and evaluation results differ because their methods and purposes are not the same.[7]

The treatment (or intervention) under investigation in this evaluation comes in the form of two incentives: 1) the advance payment funds paid to each AP ACO and 2) the financial incentive of shared savings (or in the case of one AP ACO, shared savings or losses) against a set expenditure benchmark, while maintaining quality. There was no prescribed set of activities that the AP ACOs were required to implement, and the responses to the AP model incentives differed across the ACOs. AP ACOs generally invested in resources to implement or improve care management,

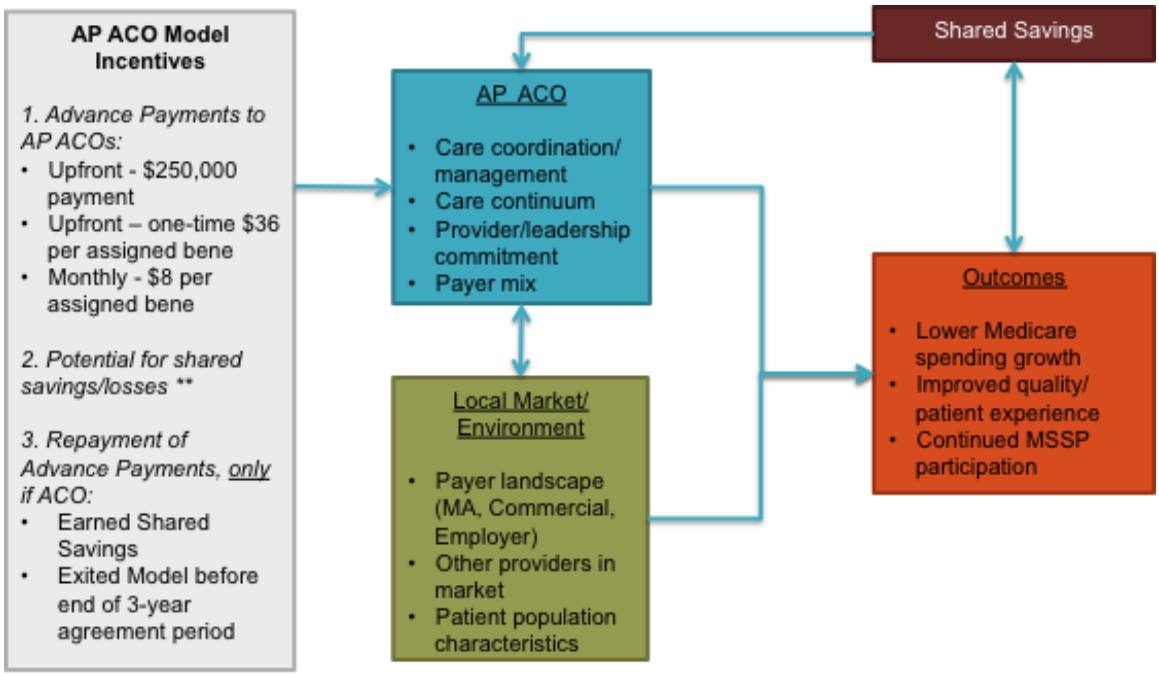
[5] See https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharedsavingsprogram/Downloads/ACO_Methodology_Factsheet_ICN907405.pdf

[6] CMS Advance Payment ACO Model Innovation Agreement; Section 1115A(b) of the Social Security Act.

[7] Financial savings and losses under the model's payment formula are calculated with the goal of establishing an incentive to reduce spending compared to a benchmark determined by CMS, and ACOs may meet thresholds to earn shared savings payments. Findings under this evaluation differ from the savings and loss calculations for purposes of payment, both at an aggregate level and for individual Pioneer ACOs because of differences in (1) comparison populations (national versus local), (2) approaches in trending methods (projected target spending level for ACO-assigned beneficiaries versus concurrent spending among similar non-ACO beneficiaries), (3) risk-adjustment methods, (4) determination of assigned beneficiary populations, and (5) different time allowed for claims run-out.

though this investment took many forms. Figure 2 illustrates the conceptual pathway from AP model incentives to outcomes of interest via ACO- and market-level drivers.

Figure 2. AP ACO Conceptual Model of Intervention Pathway to Outcomes



** Only one AP ACO agreed to take risk (share in losses).

To assess the effect of the AP ACO treatment, this evaluation employed a mixed-methods design, in which the research team used both quantitative and qualitative information to study the AP model from a baseline period (before the AP ACO formed) through a two- or three-year performance period (depending on when the AP ACO started) and compared spending, utilization, and quality of care outcomes of AP ACO-assigned beneficiaries to a comparison group of beneficiaries who received care in the same market but were not otherwise attributed to any Medicare ACO.[8] Thus, the evaluation's analysis of AP ACO performance was not compared against other non-AP MSSP ACOs. To understand what AP ACOs were doing in response to their incentives, and thus provide context for the treatment effect estimates, the research team gathered extensive primary data from the AP ACOs through surveys, site visits, and regular telephone-based key informant interviews.

To estimate the AP ACO treatment effect, we used a difference-in-differences (DID) framework, which compares the growth rate from the pre-treatment baseline period in per-beneficiary-per-month (PBPM) Medicare outcomes for AP ACO-assigned beneficiaries relative to FFS Medicare beneficiaries who were eligible for assignment but not aligned with or assigned to a Medicare

[8] In this report, results for 2012 are for the period beginning with the start of the AP model (either April or July) through the end of calendar year 2012. Results for 2013 and 2014 are for their respective calendar years, 2013 and 2014. This time period corresponds to the first two performance years of the model (2012-2013 and 2014).

ACO in the AP ACO's market. The DID approach accounts for time-consistent differences between the beneficiaries assigned to the AP ACO and their non-ACO FFS comparison counterparts; it also accounts for changes occurring over time that impact both the assigned and comparison beneficiaries. Furthermore, we controlled for any time-varying differences in observed characteristics that may arise from selection bias between the groups through the Oaxaca-Blinder method of reweighting the treatment effect outcomes.[9] As such, this framework compares changes in ACO outcomes to expected changes in outcomes in the absence of the AP model. Where the evaluation found an AP ACO had higher spending growth from the baseline to the performance year than its comparison market, we describe the evaluation's spending result in this report as "higher than expected." Where an AP ACO has lower spending growth from the baseline to the performance year than the comparison, we describe the evaluation's spending results as "lower than expected."

This report contains evaluation results for years 2012 through 2014 of the AP model. First, we describe the AP ACOs, their motivations, and how they spent their advance payment funds. We then present results of the DID analysis of quality, spending, and utilization results. Next, we present results of an exploratory analysis of ACO, market, and patient characteristics associated with the spending results. Finally, we discuss the AP ACOs' participation after the model ended in 2015.

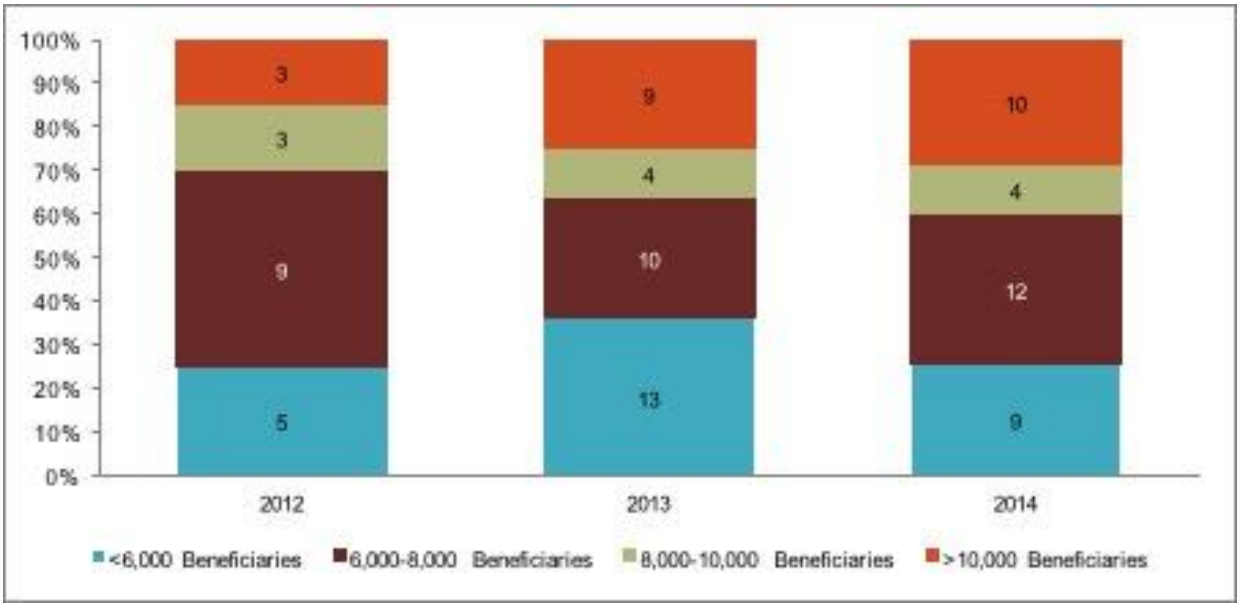
[9] Further details available in the Methods section.

WHO WERE THE AP ACOS AND HOW DID THEY SPEND ADVANCE PAYMENT FUNDS?

AP ACOs comprised 15 to 20 percent of all MSSP ACOs that formed in 2012 or 2013. They were small, physician-based organizations located across a wide range of geographic areas, including larger urban areas and smaller, more rural, areas. Although they all demonstrated the need for capital to qualify for the AP model, existing capabilities and provider relationships varied across the 36 AP ACOs and informed how they decided to allocate their advance payments. For example, while some ACOs reported in interviews that they had a common electronic health record (EHR) already in place among the ACO providers, most (approximately 70 percent) reportedly had different EHR platforms that were not interoperable. According to the evaluation's physician survey, most physicians in AP ACOs had been practicing medicine for upwards of 20 years and were delivering care in practices with fewer than five physicians in volume-based compensation arrangements. Some physicians who formed AP ACOs had prior experience working together but about half of AP ACOs were formed to participate in the MSSP ACO initiative. Given the heterogeneity in their markets, infrastructure, and experience practicing together prior to becoming an ACO, the AP ACOs effectively reflected 36 separate laboratories to study how they responded to the AP model's incentives.

Collectively, the number of unique beneficiaries assigned to AP ACOs increased slightly over the study period from 272,551 in 36 AP ACOs in 2013 to 288,278 in 35 ACOs in 2014. Individual AP ACOs ranged in size from about 4,000 to 13,000 beneficiaries, with the majority of AP ACOs having no more than 8,000 beneficiaries assigned in any performance year, as shown in Figure 3.

Figure 3. Distribution of ACOs by Number of Assigned Beneficiaries, 2012 to 2014



Source: L&M analysis of Medicare claims for beneficiaries meeting AP ACO assignment criteria.
Note: There were 20 ACOs in 2012, 36 in 2013, and 35 in 2014.

As shown above, AP ACOs were not static in size over the evaluation period—changes in the number of beneficiaries assigned to each ACO and changes in which beneficiaries are assigned

can occur for several reasons, including changes in beneficiary utilization of services that result in assignment, changes in the primary care physicians billing under tax identification numbers (TINs) in an ACO, or changes in the caseload of primary care physicians in the ACO. At the median, AP ACOs that started in 2012 had a 7 percent reduction in the number of beneficiaries between 2012 and 2013, as shown in Table 2. Between 2013 and 2014, the median AP ACO increased the number of assigned beneficiaries by 7 percent, with changes in size ranging from a 33 percent decrease to an increase of 120 percent. Changes for each ACO are shown in the Appendix; some examples include:

- RGV ACO Health Providers started in 2012 with 6,090 assigned beneficiaries and dipped to 5,557 assigned beneficiaries in 2013 before increasing in size to 7,742 beneficiaries in 2014. This ACO reported adding six new practices in 2014, and with this expansion increased its number of assigned beneficiaries by 39 percent; 72 percent of beneficiaries assigned in 2013 were assigned again in 2014, while just 55 percent of the beneficiaries assigned in 2014 were also assigned in 2013.
- Maryland ACO of the Eastern Shore, started in 2012 with 5,886 assigned beneficiaries, had somewhat fewer assigned beneficiaries in 2013, and then had a large increase in 2014, when it more than doubled in size to 12,147 assigned beneficiaries—the largest increase of any AP ACO. This ACO noted early on that is was interested in adding new providers and reported churn in the specific ACO-affiliated practices as well as the number of ACO-participating practices from year to year. As a result of the large increase in the number of beneficiaries between 2013 and 2014, just 21 percent of assigned beneficiaries in 2014 had been assigned in 2013.

As discussed in the Methods section, because of variation in an ACO's composition between performance years, separate baseline periods were created for each performance year to more adequately frame baselines to the evolving ACO organizations.

Table 2. Distribution of Change in AP ACO Assigned Beneficiaries, 2012 to 2014

	Change 2012 to 2013	Change 2013 to 2014	Share assigned in 2012 also assigned in 2013	Share assigned in 2013 also assigned in 2014	Share assigned in 2013 also assigned in 2012	Share assigned in 2014 also assigned in 2013
Minimum	-36%	-33%	61%	33%	76%	21%
25th percentile	-9%	-4%	79%	63%	83%	68%
Median	-7%	7%	86%	72%	86%	74%
75th percentile	-6%	18%	88%	78%	89%	80%
Maximum	-1%	120%	92%	83%	92%	87%

Source: L&M analysis of claims for beneficiaries meeting AP ACO assignment criteria.
Note: There were 20 ACOs in 2012, 36 in 2013, and 35 in 2014. Changes from 2012 to 2013 include 2012 starters only.

Many AP ACOs were motivated to become ACOs to maintain independence and saw advance payment funds as essential to evolving their practices

In our interviews with AP ACOs, ACO leadership commonly discussed two primary rationales for participating in the AP model. First, several AP ACOs said they were motivated to achieve the three-part aim of lower costs, higher quality, and better health for patients and discussed ACOs as a pathway to implementing changes in their care delivery practices. ACO leadership described how implementing such changes offered a way to gain experience in and ultimately transition to more value-based contracting, which many of them expected to become more prevalent in the future. This theme was consistent with results from our physician survey, where 65 percent of AP physicians reported being directly part of the decision to participate in the AP ACO Model, and the most frequent reason cited by AP physicians as "very important" in the decision to participate was "interest in delivering higher quality, lower cost care." Of physicians who reported being directly part of the decision to participate in their ACO, 82 percent of AP physicians cited this factor, compared to 71 and 64 percent of physicians participating in Pioneer and MSSP ACOs, respectively. AP physicians were also more likely to support the ACO model and see it as an effective mechanism for improving care delivery. Specifically, more than 60 percent of AP-participating physicians agreed or strongly agreed that an ACO-type model is effective in providing high-quality and cost-effective care to patients, compared to approximately half of physicians participating in a Pioneer or MSSP ACO. Physicians in the AP model were also more likely than Pioneer and MSSP physicians to believe that their practice is compatible with a value-based payment environment and that their goals are aligned with their ACO.

The second reason AP ACO leadership cited as a rationale for participating in the AP model was that hospitals in their markets were buying physician practices. They viewed the ACO as a way to maintain independence in an increasingly consolidated environment, while also motivating the practices to evolve to provide better care at lower cost. In the same vein, approximately half of AP physicians involved in the decision to participate in their ACO indicated that the "need to remain competitive in [their] local market" was "very important" in their participation decision, a greater percentage than for either MSSP or Pioneer physicians.

At the time of their MSSP applications, these organizations recognized that becoming a successful ACO would require significant investment. Several AP ACOs noted that the advance payment funds were essential to the success of their ACO, reinforcing the importance of the advance payments to stimulating and sustaining participation as a Medicare ACO. For example, one ACO said, "I feel that it probably would have cost each one of us, as providers, an investment of about $100,000 to get the infrastructure going. And let me tell you, it takes a lot, first of all, to try to get doctors to work together…so, I think that without the advanced payment program, we may not have [an MSSP]." Another noted that, "Without the advanced payment, the ACO would not have happened." Still another AP ACO that invested in hiring care coordinators to embed within physician practices noted that the ACO could not have been established without the AP funds. The importance of investments in care management support is reinforced by the perspectives of participating physicians: almost three-quarters of those participating in AP ACOs cited "support for care coordination" as "very important" in their decision to participate in an ACO.

AP ACOs allocated the majority of advance payment funding to ACO personnel and benefit costs

Collectively, the AP ACOs received $67.8 million in advance payments from CMS. Based on an analysis of each AP ACO's final expense report (fourth quarter of 2015), they spent $64.4 million of the funds received. Twenty-four of the 36 AP ACOs had spent the full amount of their AP funds. Of the remaining 12, 6 had spent at least 90 percent of their funds. Seventeen of the 36 AP MSSPs had repaid their advance payments in full by the end of 2015, while 16 AP ACOs had not repaid their advance payments of $29.9 million.[10]

The AP ACO Model Innovation Agreement required each participating ACO to expend advance payment funds in accordance with their CMS-approved spend plan. AP ACOs were required to submit a quarterly expense report documenting, on a cash basis, how the organization spent its advance payment funds by major category: personnel and benefits, information technology, operating expenses, and medical care/clinical process improvement.[11] Across all ACOs combined, most AP funds were used to support the salary and benefit costs of ACO personnel—either staff or contracted labor. Such staffing included: care management staff, office support staff, and ACO leadership (e.g., chief operations officers). Spending on staffing also included paying providers to take on ACO roles, such as ACO medical director. Approximately one third of the ACOs that invested in administration did so through hiring a management company.

In addition to staffing, some AP ACOs invested in information technology with the goals of building analytic capability, enabling communication across providers, and creating tools to support care management. AP ACOs reported some growing pains with respect to IT acquisition and implementation. In interviews, some AP ACOs noted that they were not able to leverage their IT investments to meet their intended goals. Some organizations reported that "off the shelf" products with the capabilities that their small organizations needed were not available at a reasonable price. For example, one AP ACO noted,

> *"At the time the ACO started in July of 2012, the market for ACO enterprise solutions was geared toward large organizations and not geared at all toward physician-run, geographically diverse areas like ours. We literally could not afford anything on the market that we wanted at the time. But over the last two and a half years, the market has adapted … there are a lot of IT platforms that are very good. Had one of those been available at the beginning of the ACO, we would have snatched it up immediately."*

Some organizations were unable to benefit from their investments in IT systems until well into the participation period, if ever, suggesting that adopting new systems for many AP ACOs was a process that may take a long time. Inadequate IT was sometimes cited as a barrier to making other practice changes that depended on improved population data. For example, one ACO said that it needed its IT to be in place before beginning to manage patient care. This organization's first IT vendor could not successfully provide the data needed to identify patients for care management,

[10] Three additional AP ACOs discontinued in the model before the end of their initial participation agreement period.
[11] Because of overlap in the definition of some of the expense report categories, AP ACOs may have reported the same expenditure in different expense categories, limiting comparability of the information from expense reports across ACOs.

and thus the organization had to wait until a second vendor was secured and in place before being able to begin developing a care management strategy in mid-2014. Another ACO also struggled to develop a working IT infrastructure and ultimately regretted spending as much as it did on IT. Leadership stated that their clinicians generally knew which patients needed care management, and they believed that the ACO could have better spent its limited advance payment funds on hiring additional staff to provide care management and coordination support rather than on IT to identify patients for care management.

Over the course of the AP model, the 36 AP ACOs invested their advance payments in resources—largely staff—to stand up their nascent ACOs and manage the care of their assigned populations. The next section of this report discusses spending and quality outcomes from a baseline period compared to what likely would have happened in the AP ACOs' markets from 2012 through 2014 if AP ACOs had not formed.

AP ACO QUALITY AND SPENDING PERFORMANCE

The evaluation results presented in this section show how much higher or lower than expected Medicare quality, spending, and utilization was for assigned beneficiaries as a result of the AP ACO Model. We consider quality, spending, and utilization effects together because all are important to assess the extent to which the AP model helps achieve the three-part aim. Overall, we found that AP ACOs did not have success in lowering spending growth, and consequently utilization, from the baseline period compared to their markets and that, while they demonstrated some positive trends in quality, the results were largely not statistically significant. The remainder of this section discusses these results in detail.[12] This section also presents findings from an exploratory analysis of ACO, aggregate beneficiary, and market characteristics associated with AP ACOs' spending according to the evaluation.

AP ACOs' quality results were not statistically distinguishable from comparison beneficiaries

To address questions of whether AP ACOs improved quality outcomes for their assigned beneficiaries during their participation in the AP model, we examined 11 quality measures derived from claims for each AP ACO.[13] These claims-based quality measures have two advantages: (1) they allow us to perform a DID analysis so we have a market comparison group for the AP ACOs and (2) they provide insights into the impact AP ACOs had on quality through care coordination activities and transitions between health care settings/facilities—both of which are key tenets of providing accountable care and are aimed at delivering appropriate ambulatory care and avoiding more costly acute care. Some of the measures shown in Figure 4 are likely more readily affected by the activities of the ACOs, while those in Figure 5 are more readily affected by hospital care. To the extent that ACOs cannot influence hospital utilization since they are only allowed to have formal relationships with small hospitals in the AP model, they may be less likely to be able to affect hospital-based quality measures. At the same time, AP ACOs are still accountable for the total spending of their assigned beneficiaries and can cultivate informal relationships with hospitals to help ensure that their beneficiaries receive high-quality care. The claims-based quality measures used in the evaluation, their brief descriptions, and whether each measure is included in the ACO quality measure set that AP ACOs must report are shown in Table 3. (See Table 14 for more detail.) Our analyses of all claims-based quality measures used the same difference-in-differences approach as the spending and utilization analyses.

[12] For the quality analysis, a negative difference-in-differences estimate denotes improved performance for an ACO in a performance year versus its comparison group's performance for all measures except follow-up physician visit measures. For the spending and utilization analyses, a negative difference-in-differences estimate indicates lower-than-expected spending or utilization.

[13] We also examined the core set of 33 quality measures identified in the ACO final rule ("GPRO measures") for 16 AP ACOs with data for 2012 through 2014. We do not have DID results for these measures because we have no comparable data for the market comparison groups used in the analyses. These measures and the results from an analysis of variables associated with the GPRO measures are in Appendix 2.

Table 3. Claims-based Quality Measures

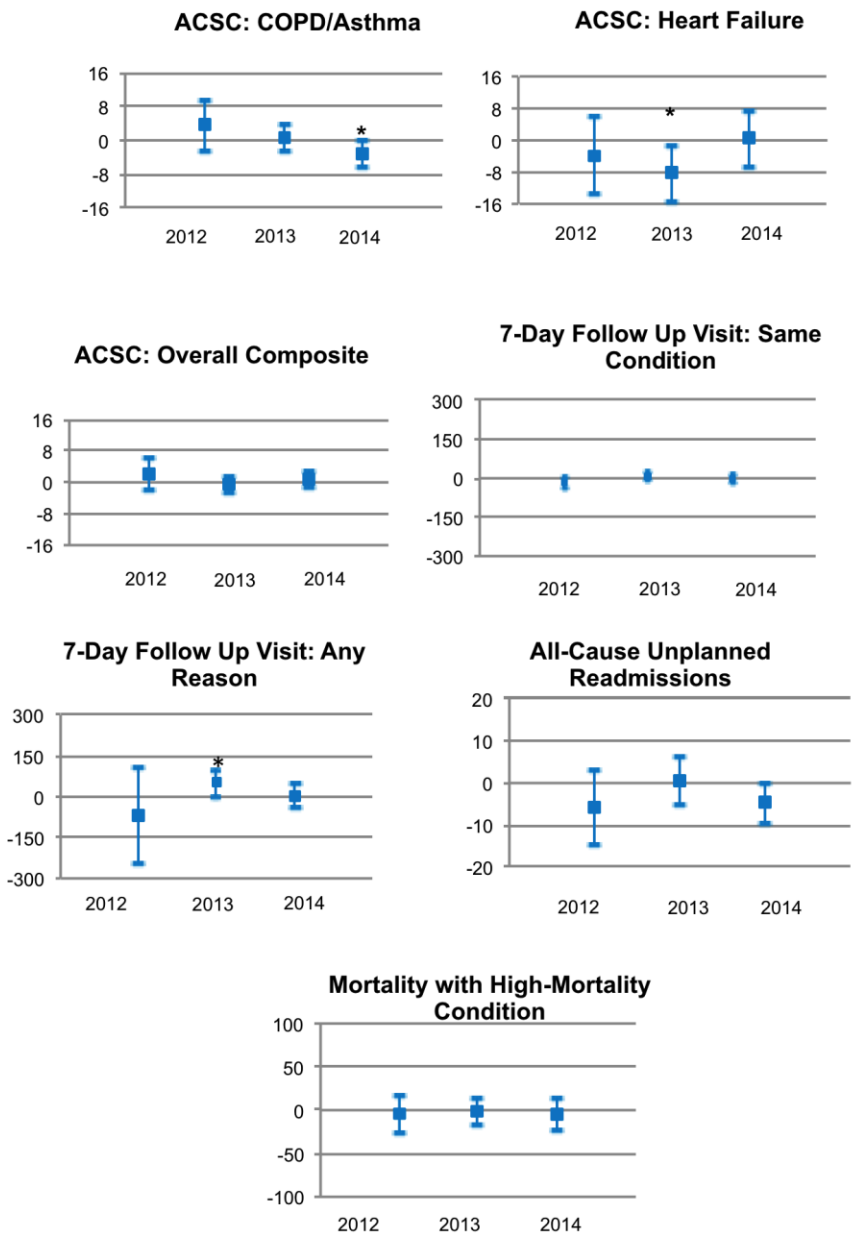
Measure	Brief Description
Ambulatory Care Measures	
Ambulatory care-sensitive conditions: COPD/Adult asthma (PQI05)*	Avoidable admissions due to COPD or adult asthma
Ambulatory care-sensitive conditions: Heart failure (PQI08)*	Avoidable admissions due to heart failure
Ambulatory care-sensitive conditions: Overall composite (PQI90)	Avoidable admissions due to one of a selected set of conditions
Follow up physician visit within 7 days of discharge, same condition	Patients with one or more physician visits within 7 days of discharge divided by hospitalizations at non-federal short-stay hospitals, excluding cancer, primary psychiatric, and rehabilitation conditions for the same diagnosis
Follow up physician visit within 7 days of discharge, any reason	Patients with one or more physician visits within 7 days of discharge divided by hospitalizations at non-federal short-stay hospitals, excluding cancer, primary psychiatric, and rehabilitation conditions for any reason
Hospital-wide all-cause unplanned readmissions*	Unplanned readmission: hospital-wide all-cause, unplanned readmission rate (HWR NQMC:009564)
Mortality rate among beneficiaries with high-mortality conditions	Mortality overall among beneficiaries with at least one inpatient hospitalization with one or more high-mortality chronic conditions diagnoses in the past two years and with one inpatient hospitalization in the current year, with the final discharge containing a primary diagnosis of a high-mortality chronic condition among nine Iezzoni conditions
Hospital-based Measures	
Admissions for low-intensity Diagnosis Related Groups	Beneficiaries admitted as inpatients for certain low-intensity DRGs divided by all hospitalizations at non-Federal short-stay hospitals, excluding cancer, primary psychiatric, and rehabilitation conditions of ACO beneficiaries
Hospital-acquired conditions among beneficiaries with hospital stays	Average days per hospital acquired condition (HAC) for each year adjusted for the volume of total acute discharges and are reported assuming 10,000 annual discharges
In-hospital mortality rate for high-mortality beneficiaries who died	Among those who died with high-mortality conditions, mortality rate of people who died in hospital
In-ICU mortality rate for high-mortality beneficiaries who died	Among those who died with high-mortality conditions, mortality rate of people who died in ICU

*Notes: PQI=Prevention Quality Indicator, COPD=chronic obstructive pulmonary disease, ICU=intensive care unit. *Also included in 2012–2014 ACO quality measure set.*

Figure 4 presents the average values and 95 percent confidence intervals for the estimated DID effects for seven ambulatory care quality measures and Figure 5 does so for four hospital-based

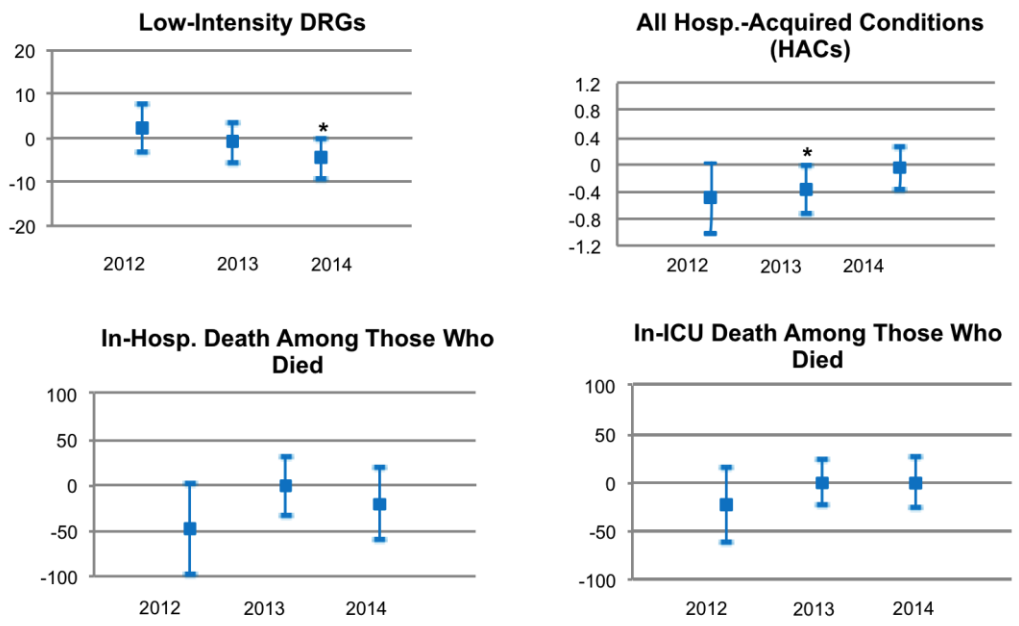
measures with data for 2012 through 2014. A negative DID estimate for these measures denotes improved performance for an ACO versus its baseline compared to the comparison group's performance, with the exception of the seven-day follow-up physician visits after acute hospital discharge, for which a positive DID estimate denotes improved performance (i.e., more visits within seven days of discharge implies higher quality care). As seen in Figure 4 and Figure 5 AP, ACOs largely performed on par with their markets across the measures and years. While there may be emerging improvements in quality for some of the measures, the evidence is inconclusive. The trend in admissions for COPD/asthma and low-intensity DRGs is directionally toward better quality, though only statistically significant in 2014, for example.

Figure 4. Estimated Difference-in-Differences Effects on the AP ACOs' Ambulatory Care Quality Measures, 2012 to 2014



Notes: ACSC=ambulatory care-sensitive condition, COPD=chronic obstructive pulmonary disease. Admissions for Selected Ambulatory Care-Sensitive Conditions (AHRQ Prevention Quality Indicators) and Mortality for Patients with High-Mortality Conditions are per 1,000 Beneficiary Years for Relevant Beneficiaries; Readmissions are per 1,000 Acute Hospital Discharges; Post-Discharge Follow Up Physician Visits For Any and for Same Diagnosis as Hospital Stay are per 1,000 Acute Hospital Discharges. Results for 2012 are for the period beginning with the start of the AP model (either April or July) through the end of 2012 for the 2012 starters. Results for 2013 and 2014 include 2012 and 2013 starters and cover each calendar year. All point estimates noted with an asterisk are statistically significant at the $p<0.05$ level. Results adjusted for demographic and health-related characteristics using the Oaxaca-Blinder reweighting method, as discussed in the Methods section.

Figure 5. Estimated Difference-in-Differences Effects on the AP ACOs' Hospital-based Quality Measures, 2012 to 2014



Notes: DRG=diagnosis related group, ICU=intensive care unit. Low-Intensity DRGs, and Hospital-Acquired Conditions are per 1,000 Acute Hospital Discharges. Results for 2012 are for the period beginning with the start of the AP model (either April or July) through the end of 2012 for the 2012 starters. Results for 2013 and 2014 include 2012 and 2013 starters and cover each calendar year. All point estimates noted with an asterisk are statistically significant at the p<0.05 level. Results adjusted for demographic and health-related characteristics using the Oaxaca-Blinder reweighting method, as discussed in the Methods.

Table 4 displays the percentages of AP ACOs in each year that had higher performance in quality measures relative to their comparison groups, regardless of statistical significance. Even if individual years' DID estimates are not statistically significant, a consistent sign (positive or negative) of the DID estimate identifies whether there may be an emerging trend toward improvements in performance for AP ACOs. For heart failure ambulatory care-sensitive conditions (ACSC) admissions, overall composite ACSC admissions, unplanned readmissions, and rate of hospital-acquired conditions (HACs), a majority of ACOs in each year experienced higher quality relative to their market comparisons. The rate of HACs was the only measure with an overall DID result indicating improvement over time relative to the comparison group as well as a majority of the individual ACO estimates in each of the performance years. Although the estimates for individual years were not statistically significant, these trends suggest that AP ACOs could be experiencing some measurable improvement in the rate of HACs. Because the mechanism through which the AP ACOs could be influencing HACs remains unclear, this measure is less likely to be sensitive to an AP ACO's activities.

Table 4. Share of AP ACOs with Difference-in-Differences Results Showing Improvement in Each Quality Measure, 2012 to 2014

Measure	2012	2013	2014

Ambulatory care-sensitive conditions: COPD/adult asthma (PQI05)	40%	56%	57%
Ambulatory care-sensitive conditions: Heart failure (PQI08)	60%	67%	51%
Ambulatory care-sensitive conditions: Overall composite (PQI90)	53%	51%	51%
Follow up physician visit within 7 days of discharge, same condition	45%	44%	43%
Follow up physician visit within 7 days of discharge, any reason	45%	61%	51%
Hospital-wide all-cause unplanned readmissions	65%	64%	66%
Mortality rate among beneficiaries with high-mortality conditions	50%	50%	49%
Admissions for low-intensity Diagnosis Related Groups	35%	53%	57%
Hospital-acquired conditions among beneficiaries with hospital stays	53%	66%	65%
In-hospital mortality rate for high-mortality beneficiaries who died	77%	53%	47%
In-ICU mortality rate for high-mortality beneficiaries who died	53%	50%	47%

Notes: PQI=Prevention Quality Indicator, COPD=chronic obstructive pulmonary disease, ICU=intensive care unit.

Across individual AP ACO's quality measures, the primary observable pattern is the absence of consistent results across measures and years. Few AP ACOs showed statistically significant improvements or declines relative to their comparison groups. (See Table 20 and Table 21 in the Appendix.) Only two AP ACOs had consistently statistically significant results (two or more years) on more than one measure, but it is difficult to explain these results.

Overall, the major observation among the individual-level AP ACO quality results is the lack of a pattern across ACOs. It may be premature to observe improvements in quality because the care coordination and care management activities that may improve performance on many of these measures are nascent in most AP ACOs, and limited relationships with hospitals can impact whether and when an AP ACO is aware that an assigned beneficiary has been hospitalized. The estimates also have a high level of uncertainty; given the low numbers of beneficiaries assigned to each ACO, any small but true positive effects are difficult to show conclusively.

AP ACOs had non-statistically significant lower-than-expected spending in 2012 and 2013 and statistically significant higher-than-expected spending in 2014

Medicare spending for beneficiaries assigned to AP ACOs was an estimated $7.50 PBPM lower than it would have been in the absence of the AP model for the 20 AP ACOs that started in 2012. In 2013, spending from the model was an estimated $2.00 PBPM lower for all 36 AP ACOs than it would have been in the absence of the model. However, neither of these estimates was statistically significant. By 2014, AP ACOs collectively generated higher-than-expected spending of $20.80 PBPM. (See Table 5.) This increase translates into an estimated $70.80 million more in 2014 than would have been spent in the absence of the model.

Table 5. Estimated Difference-in-Differences Effects on AP ACOs' Total Medicare Spending, 2012 to 2014

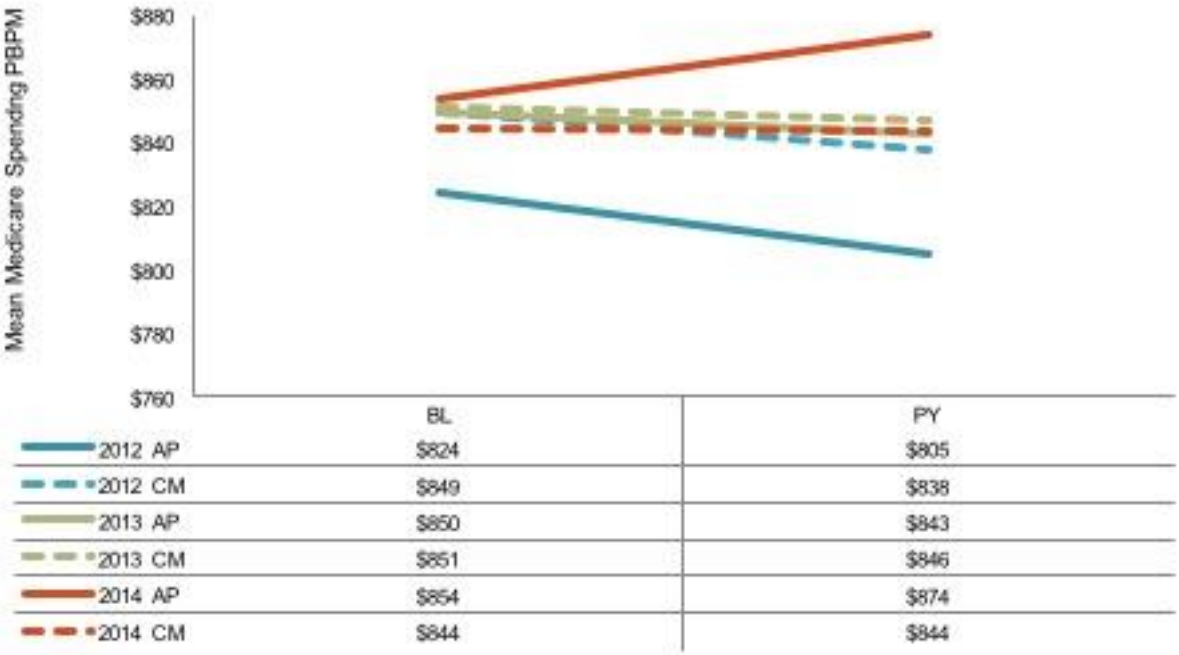
	2012	2013	2014
Total PBPM DID ($)			
Point estimate	−$7.50	−$2.00	$20.80*
95% CI lower	−$18.50	−$8.70	$14.60

	2012	2013	2014
95% CI upper	$3.50	$4.60	$27.10
Total annual DID ($)			
Point estimate	−$7,617,605	−$6,563,499	$70,846,110*
95% CI lower	−$18,825,043	−$27,834,325	$49,608,700
95% CI upper	$3,589,834	$14,707,328	$92,083,520

Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.
Notes: DID=difference-in-differences, PBPM=per beneficiary per month, CI=confidence interval. Results represent spending levels of all AP ACOs analyzed each year net of underlying baseline and comparison market trends. There were 20 ACOs in 2012, 36 in 2013, and 35 in 2014. Results for 2012 are for the period beginning with the start of the AP model (either April or July) through the end of 2012 for the 2012 starters. Results for 2013 and 2014 include 2012 and 2013 starters and cover each calendar year. Negative numbers indicate lower AP ACO spending growth. All point estimates noted with an asterisk are statistically significant at the p<0.05 level. Results adjusted for demographic and health-related characteristics using the Oaxaca-Blinder reweighting method, as discussed in the Methods section.

Figure 6 shows total PBPM spending results as the conditional mean total PBPM spending for beneficiaries in AP ACOs and the conditional mean total PBPM spending for beneficiaries in comparison markets in the performance years and the baseline periods. It shows that spending for beneficiaries in the ACOs' comparison markets was essentially flat all three years while spending for the 20 ACOs that started in 2012 declined from $824 to $805 PBPM, declined to a lesser extent from about $850 to $843 PBPM for the 36 ACOs analyzed in 2013, and increased from about $854 to $874 PBPM for the 35 ACOs analyzed in 2014.

Figure 6. Total Medicare PBPM Mean Spending for AP ACOs and their Comparison Markets in Baseline and Performance Years, 2012 to 2014



Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.
Notes: CM=comparison market, BL=baseline, and PY=performance year. Lines represent each performance year's mean spending trajectory from the average of its two baseline years to its performance year for beneficiaries in all AP ACOs (solid lines) and beneficiaries in their comparison markets (dashed lines). There were 20 ACOs in 2012, 36 in 2013, and 35 in 2014. Results for 2012 are for the period beginning with the start of the AP model (either April or July) through the end of 2012 for the 2012 starters. Results for 2013 and 2014 include 2012 and 2013 starters and cover each calendar year. Results adjusted for demographic and health-related characteristics using the Oaxaca-Blinder reweighting method, as discussed in the Methods section.

As more medically complex and vulnerable beneficiaries may benefit more from ACO care coordination and management activities, the team also explored total spending for Medicaid dual-eligible or high-Hierarchical Condition Category (HCC) beneficiaries assigned to AP ACOs. For the sickest beneficiaries in the top 25 percent of HCC scores by ACO,[14] DID estimates showed higher ACO spending growth from baseline relative to the comparison group in 2012 and 2014 and lower spending growth from baseline in 2013. For dual-eligible beneficiaries, we found higher ACO spending growth from baseline in all three years relative to the comparison group.

Spending by Setting

Decomposing the pooled AP ACOs' spending results by setting reveals both differences by and within types of spending over time.[15] (See Pooled AP results in row 1 of Table 6.) For example, AP ACOs had significantly lower-than-expected acute inpatient spending in 2012 and 2013, but

[14] To identify high-HCC beneficiaries, we used HCCs based on diagnoses in the year immediately prior to the performance year of interest because we wanted to identify the highest projected spenders for the following year.

[15] Pooled results are based on spending for all beneficiaries in AP ACOs versus comparison markets.

in 2014 acute inpatient spending was higher than expected. The reverse pattern was seen with SNF, where AP ACOs had significantly higher-than-expected spending in 2012 and 2013 but significantly lower-than-expected spending in 2014. For physician services spending, AP ACOs had significantly higher-than-expected spending in all three years, while they had significantly lower-than-expected home health spending in all three years. Results for other spending settings are shown in Table 22 in the Appendix. The contribution of each type of spending to lower or higher ACO relative spending growth in each year is shown in Figure 7, which captures how acute inpatient, physician services, and outpatient/ambulatory surgery center spending contributed to total higher spending growth relative to comparison markets across all AP ACOs by 2014. The remainder of this section explores results for settings of spending and discusses general trends across ACOs and, where notable, individual AP ACOs that influenced spending among all AP ACOs.

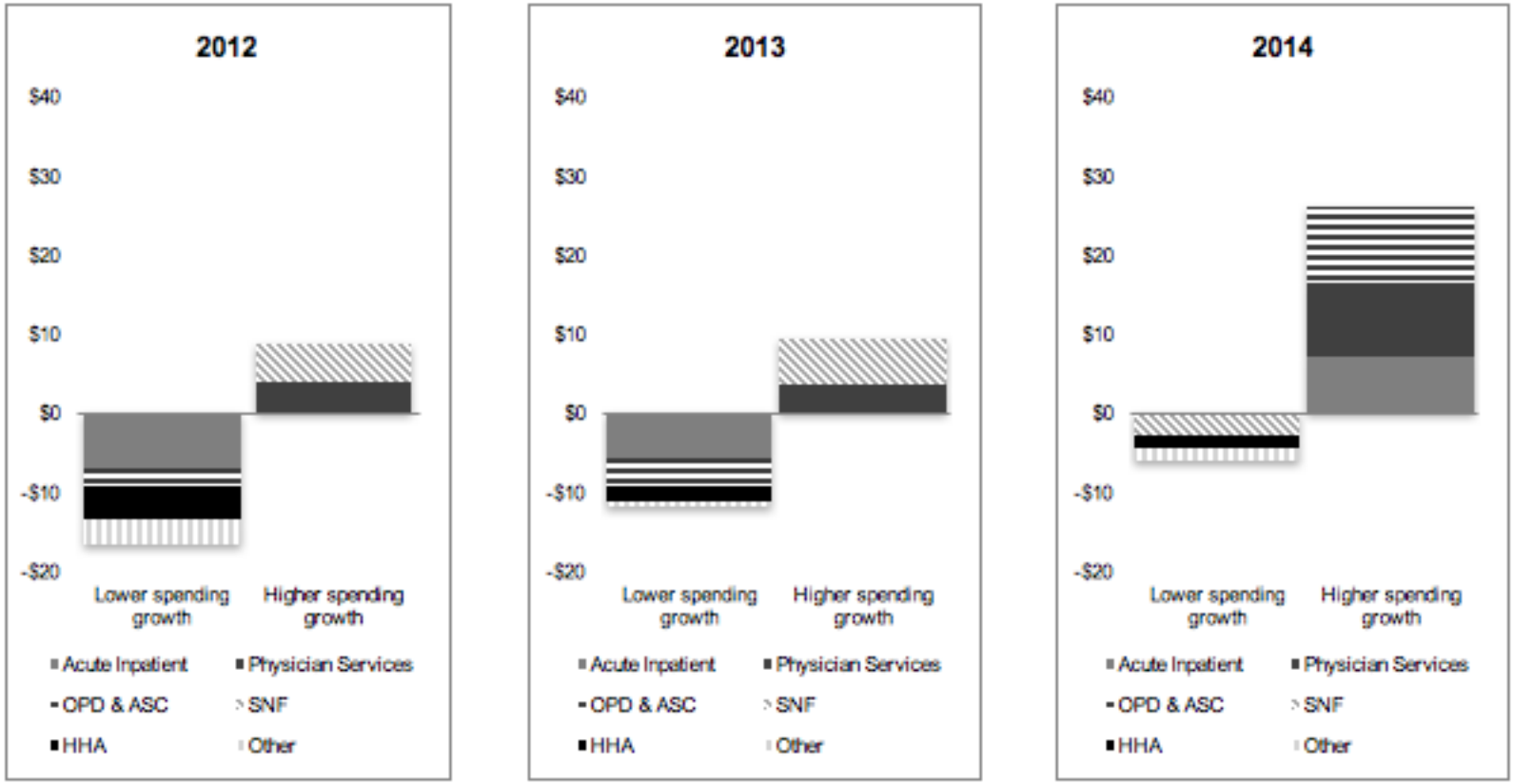
Table 6. Estimated Difference-in-Differences Effects on AP ACOs' PBPM Spending, 2012 to 2014

	Acute Inpatient (in $PBPM)			Physician Services (in $PBPM)			Home Health (in $PBPM)			Skilled Nursing Facility (in $PBPM)		
	2012	2013	2014	2012	2013	2014	2012	2013	2014	2012	2013	2014
Pooled AP	**-6.9***	**-5.8***	**7.3***	**3.8***	**3.7***	**9.1***	**-4.2***	**-1.9***	**-1.7***	**5.0***	**5.8***	**-2.8***
Accountable Care Partners	4.6	-7.0	2.2	7.9	-7.0	4.6	-4.4	-0.5	-10.7*	-11.4*	-8.8*	-0.6
ACO Health Partners	NA	2.9	6.0	NA	3.4	5.1	NA	4.9*	10.1*	NA	34.8*	-4.5
Am. Hlth. Alliance	NA	-12.6	-18.0*	NA	4.9	1.6	NA	-6.2*	-3.0	NA	-7.8	-14.6*
Am. Hlth. Network of OH Care	NA	19.3	17.3	NA	4.1	-2.7	NA	6.2*	11.0*	NA	6.3	8.7
Bay Area Florida Phys. Trust	NA	-20.7*	-13.4	NA	8.0	4.0	NA	-4.5	-6.0	NA	-4.4	-2.8
Coastal Carolina Quality Care	-11.2	-27.2*	-4.6	7.0	16.6*	31.4*	1.3	2.3	2.1	-4.7	-5.5	-13.5*
Coastal Medical	-57.7*	-32.7*	-12.0	-3.9	-0.6	8.0*	-1.1	0.2	3.5	-22.8*	-16.0*	-25.9*
Cumberland	-15.1	-5.9	-7.3	-5.3	-6.4	4.0	-11.9*	-7.0*	-4.7	14.9*	10.5*	-12.4*
Fort Smith	NA	2.3	14.7	NA	6.4	2.2	NA	-0.5	-1.2	NA	13.2*	10.2*
Golden Life Healthcare	85.7*	92.4*	33.1*	8.0	14.0*	6.4	7.5*	8.9*	3.1	114.9*	210.9*	-3.1
Harbor Medical Associates	-8.0	-10.6	38.6*	-1.9	-5.0	17.1*	4.3	2.6	6.5*	7.6	18.9*	17.3*
Integrated ACO	NA	-2.7	11.3	NA	2.1	3.9	NA	-2.6	0.1	NA	-19.8*	-16.0*
Jackson Purchase Med. Assoc.	-19.1	-27.0*	-14.5	-2.3	-3.9	7.0	-2.6	-0.8	-0.6	-12.4	-12.3	-11.1
KCMPA-ACO	NA	-16.0*	-6.5	NA	2.4	5.3	NA	0.4	0.8	NA	-2.6	-1.7
Lower Shore ACO	NA	-47.4*	-25.8	NA	1.0	-0.3	NA	0.4	1.2	NA	-15.5*	-7.6
Maryland ACOs of East. Shore	-4.2	-8.7	31.4*	12.9	7.4	10.8*	3.2	1.3	2.2	-8.0	-0.9	7.1*
Maryland ACOs of West. MD	-15.6	-38.7*	33.1	-4.9	-5.0	5.7	-1.7	-4.1*	0.2	-1.8	-8.6	6.4
Medical Mall	-22.7	-25.4	12.5	17.3*	8.8	19.7*	-52.9*	-39.3*	-39.0*	-10.2	-10.5	-4.9
MPS ACO Physicians	17.9	-29.0	40.6*	15.0*	5.4	19.5*	2.1	-2.0	2.7	23.1*	22.0*	22.5*
National ACO	NA	-15.9	25.8	NA	-11.2	0.2	NA	-0.1	-4.9	NA	7.6	28.6*
Nature Coast ACO	NA	25.0*	26.3*	NA	10.2	20.8*	NA	-1.1	1.4	NA	4.3	-1.5

	Acute Inpatient (in $PBPM)			Physician Services (in $PBPM)			Home Health (in $PBPM)			Skilled Nursing Facility (in $PBPM)		
NOMS ACO, LLC	NA	-5.8	13.8	NA	-3.5	22.0*	NA	1.3	1.7	NA	-7.6	4.2
North Country ACO	-10.1	25.2*	32.4*	2.6	1.4	7.8*	-4.6*	0.0	1.4	-7.0	-7.4	15.8
Owensboro ACO	NA	-19.3	-14.5	NA	3.3	7.5	NA	-1.2	2.2	NA	-19.5*	-19.4*
Physicians ACO	-15.2	-12.8	-3.6	5.8	14.7*	21.9*	-5.6	19.6*	11.7*	-10.4	-6.6	-26.7*
Physicians Collaborative Trust	NA	-1.8	9.2	NA	5.8	10.9*	NA	-2.9	-0.1	NA	-0.3	-2.9
Primary Partners	-24.6*	-1.3	15.9	-16.7*	-10.8	3.1	-6.0*	-7.3*	-11.5*	4.2	1.7	10.8*
Primary Partners ACIP LLC	NA	9.8	7.1	NA	-6.3	-2.8	NA	5.9	2.5	NA	5.3	-5.3
PriMed, LLC	-43.8*	-21.7*	0.0	21.2*	18.6*	0.0	-0.7	-3.9	0.0	-7.9	1.1	0.0
Quality Independent Physicians	39.5*	21.9*	6.8	11.8*	11.8*	15.0*	-0.1	-3.6	-0.4	29.6*	17.3*	6.9
Reliance Healthcare Network	-10.7	-11.5	-13.1	6.9	5.9	6.0	29.2*	10.1*	-17.1*	4.2	-1.8	0.0
RGV ACO Health Providers	-17.7	0.0	18.6	5.2	1.4	2.2	-37.1*	-44.7*	-27.9*	-7.2	-11.3*	-8.8*
Rio Grande Valley Hlth. Alliance	NA	-4.5	4.2	NA	8.6*	2.7	NA	-28.6*	-53.3*	NA	-12.3*	-16.7*
SERPA-ACO, LLC	NA	-1.6	10.1	NA	-0.9	5.2	NA	-3.1*	-3.8*	NA	4.9	-8.5
St. Thomas Medical Group	-11.8	-18.1	-25.4*	-14.6*	-0.2	27.5*	8.9*	8.6*	7.1	-5.0	-0.9	-6.5
Texoma	6.0	7.0	18.6	8.1	11.2	17.1*	-9.2	5.2	-0.5	-11.3	-3.1	4.9

Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.
Notes: Pooled results are based on spending for all beneficiaries in AP ACOs versus comparison markets. AP ACOs are in alphabetical order, and some names have been abbreviated. Cells with NA are for AP ACOs that started in 2013 and thus do not have results for 2012. Negative numbers indicate lower AP ACO spending growth from the baseline relative to the comparison market. Results for 2012 are for the period beginning with the start of the AP model through the end of 2012. Results for 2013 and 2014 include 2012 and 2013 starters and cover each calendar year. All point estimates noted with an asterisk are significant at the $p<0.05$ level. Results adjusted for demographic and health-related characteristics using the Oaxaca-Blinder reweighting method, as discussed in the Methods section.

Figure 7. Estimated Difference-in-Differences Effects on AP ACOs' Pooled PBPM Spending by Setting, 2012–2014



Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.
Notes: OPD=outpatient department, ASC=ambulatory surgery center, HHA=home health agency, SNF=skilled nursing facility. Other includes durable medical equipment, hospice, long-term care hospital, inpatient rehabilitation facility, and inpatient psychiatric facility. Pooled results are based on spending for all beneficiaries in AP ACOs versus comparison markets. There were 20 ACOs in 2012, 36 in 2013, and 35 in 2014. Negative numbers indicate lower AP ACO spending growth from the baseline relative to the comparison market. Results for 2012 are for the period beginning with the start of the AP model (either April or July) through the end of 2012 for the 2012 starters. Results for 2013 and 2014 include 2012 and 2013 starters and cover each calendar year. Results adjusted for demographic and health-related characteristics using the Oaxaca-Blinder reweighting method, as discussed in the Methods section.

Acute Inpatient Spending

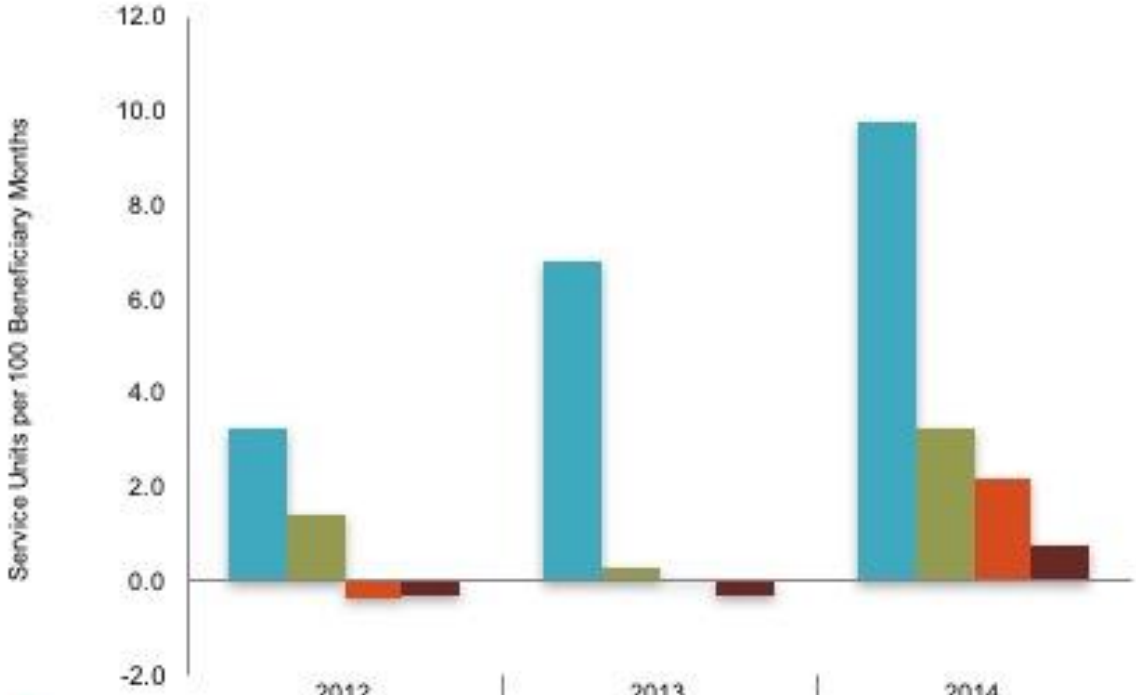
Acute inpatient spending includes Medicare covered stays in acute care inpatient facilities and critical access hospitals. As shown in the first row of Table 6, AP ACOs collectively had significantly lower-than-expected acute inpatient spending in 2012 and 2013 and significantly higher-than-expected acute inpatient spending in 2014, reflecting the overall spending pooled across AP ACOs.

AP ACOs' relationships with hospitals can be complex and complicated for these small physician practices to navigate. In interviews with ACO leadership, several AP ACOs reported that their lack of market power over and desire to remain independent from hospitals was part of their motivation for becoming an ACO. Nevertheless, some AP ACOs reported having or developing relationships with area hospitals that enabled them to exchange information about admissions and discharges or send care managers to meet with patients to manage transition home or to post-acute care. However, several AP ACOs also discussed the conflict between trying to reduce overall expenditures while maintaining cooperative relationships with area hospitals, which may consider the ACO as a threat to their bottom lines because they may reduce inpatient or outpatient utilization. This challenge can be especially acute where there is a single or dominant hospital in the market and the ACO is concerned about damaging the relationship. For example, one ACO felt that hospitals in its area viewed the ACO as trying to take away the hospitals' revenue. Another ACO noted that a major challenge was introducing what might be perceived as managed care concepts (e.g., measuring and managing quality, utilization, and costs) into a market whose providers had been stable and financially successful in a FFS payment environment. According to that ACO, there was no natural market impetus for change, and the single hospital that sees 90 percent of the ACO's patients was not open to coordinating care. The ACO said it had to be careful not to be perceived as threatening to the hospital and other providers with which it worked given the close-knit and small medical community in its area. These dynamics made managing care across settings difficult.

Physician Services

In 2012, AP ACO physician services' spending growth was estimated to be $3.8 PBPM higher than expected and $3.7 PBPM higher than expected in 2013. However, by 2014, physician services' spending growth was estimated to be over $9 PBPM more than it would have been in the absence of the model. Examining the underlying utilization changes for select categories of physician services, we see that relative to their baseline and comparison populations, beneficiaries assigned to AP ACOs had increased utilization in imaging, office evaluation and management (E&M) visits, procedures, and tests by 2014, as shown in Figure 8.

Figure 8. Estimated Difference-in-Differences Effects on AP ACOs' Physician Services Utilization per 100 Beneficiary Months, 2012 to 2014



	2012	2013	2014
Tests	3.2	6.8	9.8
Procedures	1.4	0.3	3.3
Office E&M	-0.4	0.0	2.2
Imaging	-0.3	-0.3	0.8

Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.
Notes: E&M=evaluation and management. Negative numbers indicate lower AP ACO utilization growth from the baseline relative to comparison markets. Results for 2012 are for the period beginning with the start of the AP model (either April or July) through the end of 2012 for the 2012 starters. Results for 2013 and 2014 include 2012 and 2013 starters and cover each calendar year. Tests, procedures, and imaging measures are Berenson-Egger Type of Service (BETOS) code categories. Point estimates for tests in all three years, for procedures in 2012 and 2013, for office E&M in 2014, and for imaging in 2013 and 2014 were significant at the $p<0.05$ level. Results adjusted for demographic and health-related characteristics using the Oaxaca-Blinder reweighting method, as discussed in the Methods section.

These findings showing an uptick in the utilization of physician services are consistent with information collected from interviews with AP ACOs. Many ACOs described that they were engaging in activities to improve primary care delivery that could potentially promote the use of physician services through investments in staff and infrastructure. Some AP ACOs reported increasing patient outreach to encourage visits with primary care physicians (PCPs) as part of their care management strategy. For example, one AP ACO set a target for their physicians to see 95 percent of ACO patients during the year; this ACO also set a target of annual wellness visits for 60 percent of ACO patients and post-discharge visits within 14 days for 50 percent of ACO patients. Two AP ACOs said they contacted patients who were at risk of not being assigned to the ACO to schedule appointments so they would remain assigned.

Some AP ACOs discussed efforts to increase access to primary care through expanded office hours or nurse hotlines to direct patients to next-day appointments with physicians. For example, one AP ACO reported making changes to its scheduling to leave a few empty appointments each morning for patients who need next-day care. Similarly, another AP ACO noted that since becoming an ACO, it has worked to increase access to care for all ACO-assigned beneficiaries. This ACO's leadership indicated that it gave the "red carpet treatment" to assigned beneficiaries so that they can have same-day appointments. This same ACO noted that more coordinated care leads to an increased caseload and identification of more medical issues within their population. To meet these new needs, the ACO expanded access by offering home visits by mid-level providers and administering intravenous medications in providers' offices. Another ACO hired a nurse practitioner (NP) to see ACO patients after hours as well as patients unable to get an appointment with their PCP within seven days after hospital discharge. However, according to ACO leadership, physicians affiliated with the ACO perceived this expanded access as an attempt to "steal" their patients, so the ACO stopped offering the NP's services.

Several AP ACOs also discussed identifying "gaps in care" as part of their care management and quality strategy. They described working to bring patients into the office to address those gaps, some of which were related to Medicare's quality reporting requirements for participation in the AP ACO Model. Many AP ACOs reported in interviews that they were focused on meeting the quality reporting requirements and achieving measure-specific benchmarks for domains that include preventive care and care for at-risk populations. One such example is an ACO that built flags into the EHR to remind physicians to fulfill missing ACO quality metrics (e.g., administer a flu shot if it is indicated) and had front office staff routinely call patients who needed follow-up appointments to fill these identified gaps. This kind of EHR modification and investment in staff to focus on filling gaps in care could result in an increase in utilization if beneficiaries receive more office visits, diagnostic tests, imaging, or other physician services.

Home Health Spending

Home health is the only service where AP ACOs collectively showed significantly lower-than-expected spending in 2012, 2013, and 2014. However, most individual ACOs did not show significantly lower-than-expected spending. Rather, two or three AP ACOs each year drove the lower collective home health spending growth among all AP ACOs, as shown in Table 6. Based on interviews with ACO leadership, two of these ACOs reported that reducing home health overutilization in their markets was a key strategy for their ACOs. Both of these ACOs' markets included counties with some of the highest rates of beneficiary home health use in the country in 2012, 2013, or 2014.[16]

- One AP ACO noted that its physicians evaluated all patients receiving home health services to ensure they met CMS requirements for receiving home health care. For patients who needed extra help that does not rise to the level of services provided by home health, care

[16] Medicare Payment Advisory Commission March Report 2014, http://medpac.gov/documents/reports/mar14_ch09.pdf?sfvrsn=0, page 224. Medicare Payment Advisory Commission March Report 2015, http://medpac.gov/documents/reports/chapter-9-home-health-care-services-(march-2015-report).pdf?sfvrsn=0, page 225. Medicare Payment Advisory Commission March Report 2016, http://medpac.gov/documents/reports/chapter-8-home-health-care-services-(march-2016-report).pdf?sfvrsn=0, page 223

coordinators visited the home to provide auxiliary care. The ACO reported that care coordination helped with management of home health use because home health nurses were often performing tasks that the care coordinator could complete or train patients or caregivers to do. As a result, the ACO was able to use home health only for the patients who clearly needed the service.

- Another AP ACO said that its board adopted the goal of reducing home health utilization to move closer to the national average. The ACO's care managers targeted people with high home health use for home visits and found beneficiaries who did not seem to need the service, some of whom did not know how they came to have the service. Using claims data from CMS, the ACO identified providers outside its ACO who were ordering home health for the ACO's beneficiaries and sent those providers letters pointing out their high use rate and asked them to coordinate with the PCP. The ACO believes that the letter sent a message that someone is monitoring home health utilization, and it may have had an effect on physicians outside the ACO who were ordering unnecessary care, leading to reduced utilization of home health.

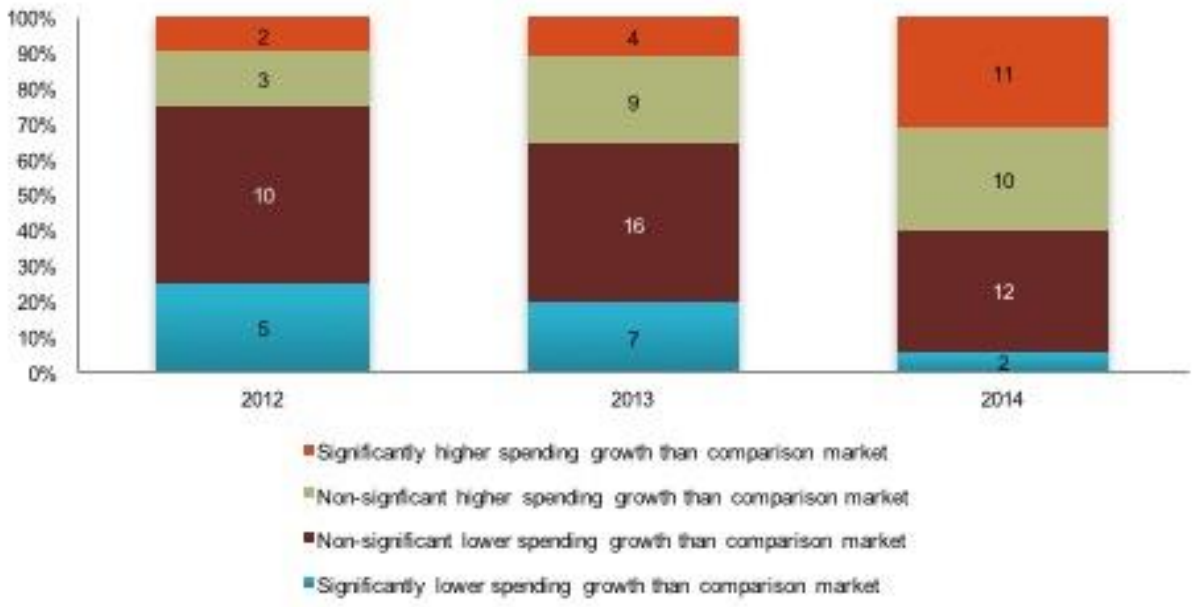
Skilled Nursing Facility Spending

After significantly higher-than-expected SNF spending in 2012 and 2013, AP ACOs collectively had lower-than-expected SNF spending growth in 2014, as shown in Table 6. One AP ACO in particular, Golden Life, had the greatest growth in SNF spending relative to its comparison group among all AP ACOs in 2012 and 2013. This spending growth was the result of increased utilization of SNF services among Golden Life's assigned beneficiaries compared to its market beneficiaries. Golden Life's higher spending relative to its comparison group abated in 2014, and the pooled SNF spending across ACOs was a statistically significant $2.8 PBPM less spending relative to comparison groups. What is driving this increased utilization between baseline and performance years for Golden Life is not clear. The ACO noted that some patients were assigned to the ACO by virtue of receiving evaluation and management services from some of their physicians who are SNF medical directors during their SNF stay. However, given the evaluation design, this would affect the results if those physicians treated a different patient population in the baseline period. To examine this possibility, we looked at Golden Life's beneficiary turnover between the baseline and performance years. We found higher than average turnover for Golden Life between the performance years and their respective baselines, suggesting that Golden Life physicians may have been treating a different population in the baseline periods, but this evidence is not conclusive.

Total Spending by AP ACO

Examining the total spending results for each AP ACO shows variance across ACOs and over time. No AP ACO had significantly lower-than-expected PBPM spending in all years (2012, 2013, and 2014 for 2012 starters or 2013 and 2014 for 2013 starters) and one ACO, QIP, had significantly higher-than-expected spending in all years. As shown in Figure 9, the share of AP ACOs with lower spending growth from baseline decreased over the course of the model so that only two ACOs had significantly lower spending growth in 2014.

Figure 9. Count of AP ACOs by PBPM Total Spending Results, 2012 to 2014



Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.
Notes: PBPM=per beneficiary per month. There were 20 ACOs in 2012, 36 in 2013, and 35 in 2014. Results for 2012 are for the period beginning with the start of the AP model (either April or July) through the end of 2012. Results for 2013 and 2014 include 2012 and 2013 starters and cover each calendar year. Results adjusted for demographic and health-related characteristics using the Oaxaca-Blinder reweighting method, as discussed in the Methods section.

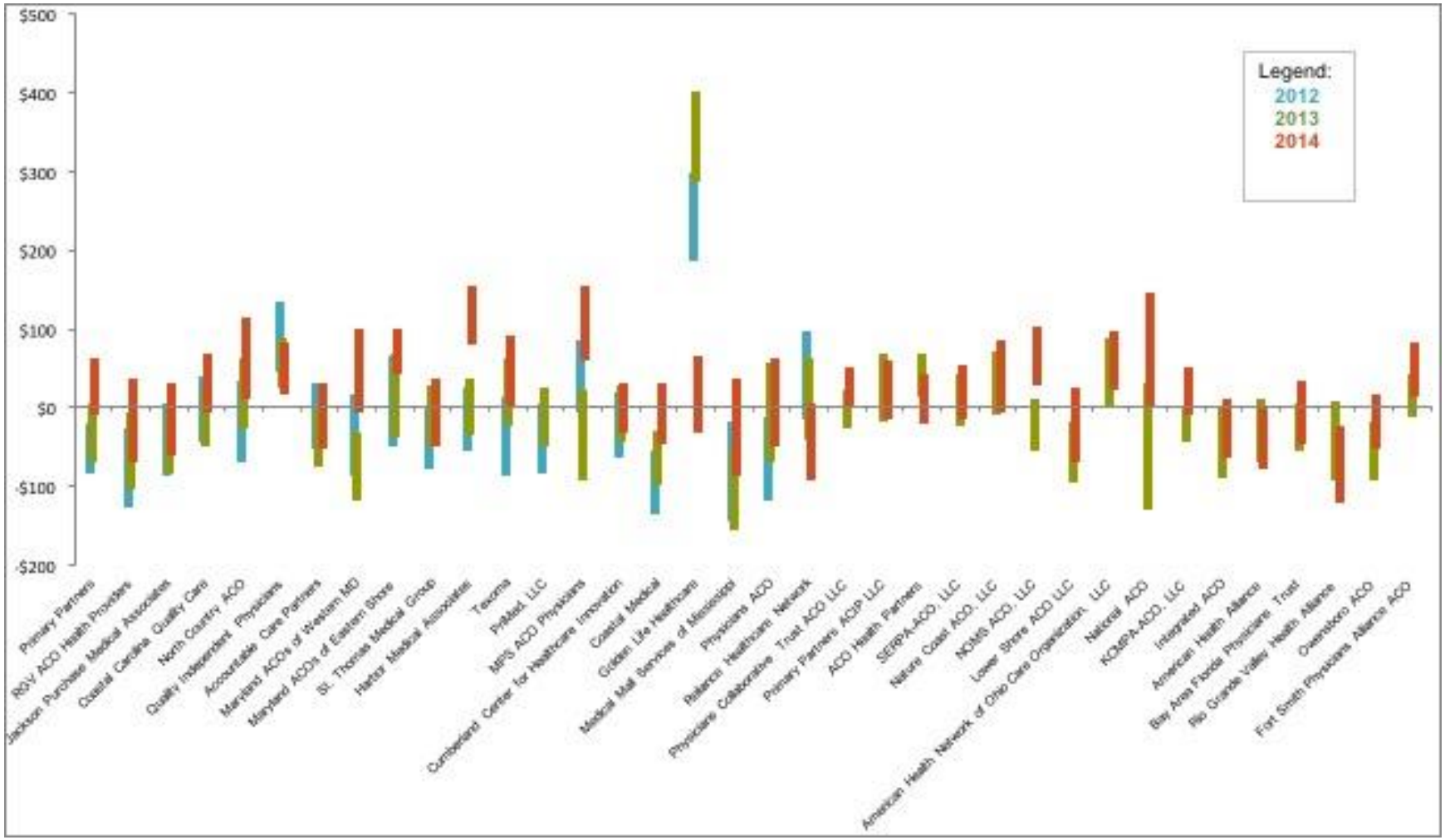
As with the quality measures, the point estimates of PBPM spending for individual ACOs vary over time for each ACO and are imprecise. Figure 10 summarizes this variation and imprecision, plotting the confidence intervals for each point estimate of PBPM total spending for each year by AP ACO. (Where the 95 percent confidence interval does not cross zero, the DID estimate is considered statistically significant.) In general, results in 2012 and 2013 for most AP ACOs are not statistically significant; for 2012 starters, the bars with the 2012 and 2013 results overlap more than with 2014, which shows consistency in those two periods. In 2014, most ACOs show a shift toward higher spending growth from baseline relative to their comparison group. Compared to the other AP ACOs, one ACO, Golden Life, had much greater PBPM spending growth from baseline relative to its comparison market in 2012 and 2013. This ACO's influence on the total pooled spending results in 2012 and 2013 can be seen in Figure 11.

Figure 11 shows each AP ACO's contribution to pooled annual total spending results (PBPM spending growth relative to the comparison population times beneficiary months) for each year. Each segment of the bars is an AP ACO. The purpose of the figure is to show the number of AP ACOs that contributed to pooled total higher or lower spending growth each year and the magnitude of those contributions. Decomposing pooled total spending, Golden Life's influence on the results in 2012 and 2013 is meaningful, contributing a high proportion of greater-than-expected spending and offsetting a number of ACOs contributing lower-than-expected spending in these years. By 2014, however, this AP ACO was no longer driving pooled total spending. As the figure shows, 21 of 35 AP ACOs had higher-than-expected expenditures by 2014. The combined

magnitude of this higher growth relative to their comparison markets exceeded the lower spending growth by the remaining AP ACOs that year, resulting overall in greater spending growth for 2014.

The next section explores associations between ACO, aggregate beneficiary, and market characteristics and the ACO-level spending outcomes.

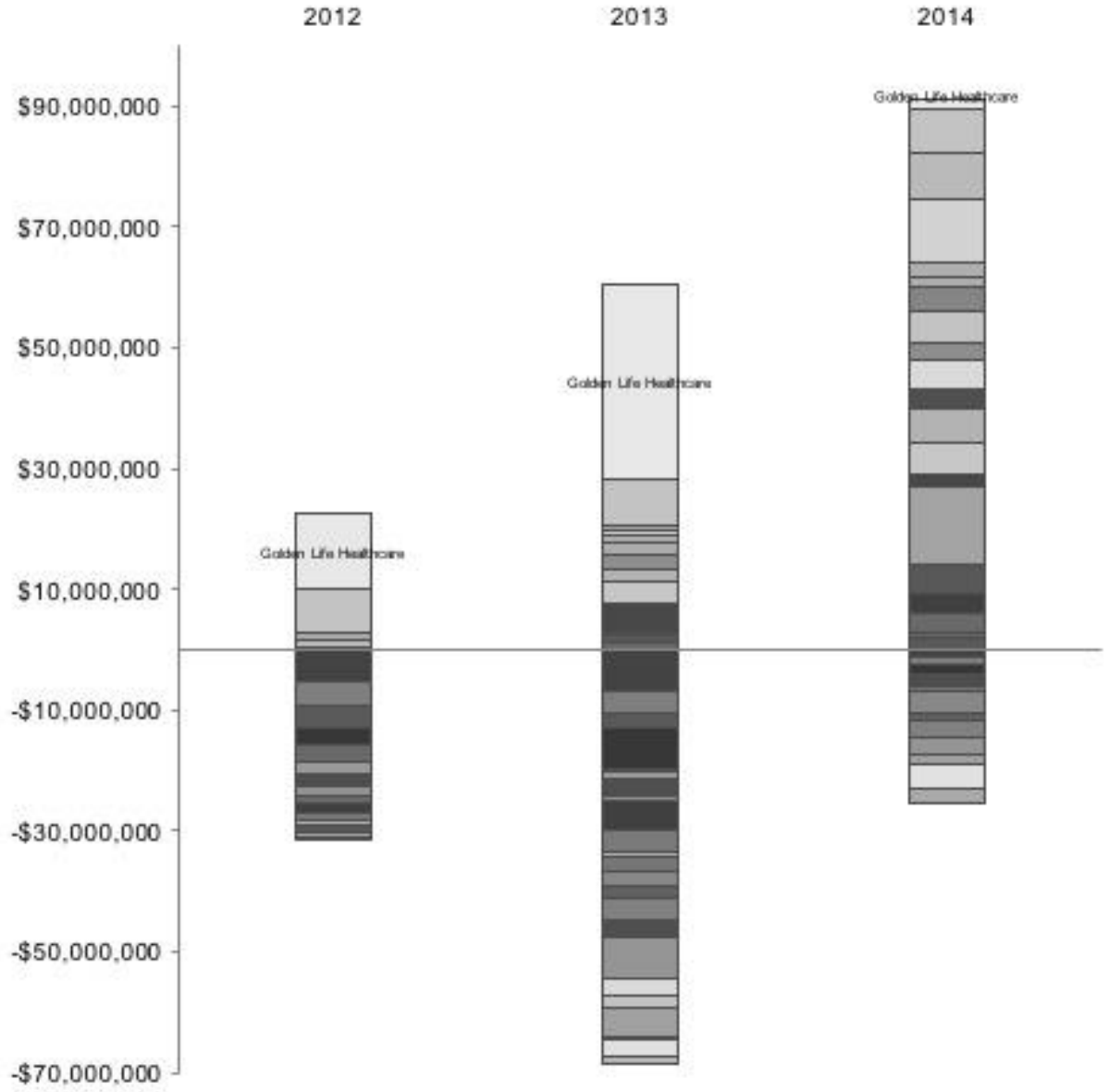
Figure 10. PBPM Total Spending Difference-in-Differences Estimates for AP ACOs, 2012 to 2014



Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.

Notes: Bars represent 95% confidence intervals around the point estimate for each ACO; bars that do not intersect the x-axis indicate statistically significant point estimates. There were 20 ACOs in 2012, 36 in 2013, and 35 in 2014. Results for 2012 are for the period beginning with the start of the AP model (either April or July) through the end of 2012 for the 2012 starters. Results for 2013 and 2014 include 2012 and 2013 starters and cover each calendar year. Negative numbers indicate savings. Results adjusted for demographic and health-related characteristics using the Oaxaca-Blinder reweighting method, as discussed in the Methods section.

Figure 11. Contribution of APs ACOs to Pooled Total Spending, 2012 to 2014



Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.
Notes: Pooled results are based on spending for all beneficiaries in AP ACOs versus comparison markets. Individual ACOs' total spending is stacked, with each segment shade representing the same ACO across years. ACOs with higher spending growth from baseline relative to comparison market are above zero, and those with lower spending growth from baseline relative to comparison market are below zero. Golden Life Healthcare was an ACO with a disproportionate amount of spending in 2012 and 2013 but not in 2014. There were 20 ACOs analyzed in 2012, 36 in 2013, and 35 in 2014. Results for 2012 are for the period beginning with the start of the AP model (either April or July) through the end of 2012 for the 2012 starters. Results for 2013 and 2014 include 2012 and 2013 starters and cover each calendar year. Results adjusted for demographic and health-related characteristics using the Oaxaca-Blinder reweighting method, as discussed in the Methods section.

In exploratory analysis of factors associated with spending and utilization, ACOs that use EHR and claims data to identify patients for care management tended to have lower-than-expected spending

As shown above, the spending estimates for ACOs vary across ACOs and performance years. To better understand which factors may underlie spending outcomes, we implemented a second stage regression approach to explore the association between measures of ACO, aggregate beneficiary, and market characteristics and evaluation spending and utilization results. Although we are not able to determine causality, examining the patterns of association is useful for assessing the extent to which ACO activities, versus attributes of the patient population and the markets, may be contributing to ACO performance.

Second stage regression is typically used to examine impacts across multiple studies (in our case, multiple AP ACO effects across years). The second stage regression approach uses the ACO-level DID estimates from each performance year as the dependent variables and available ACO, market, and aggregate beneficiary characteristics as explanatory variables.[17] (See the Methods section for more detailed description of the methodology used to estimate these associations.) Because each observation in the second stage regression represents an ACO-level DID result for each of the 36 ACOs over the two or three years they were in the model, only 91 observations are available.[18] Estimated relationships in this analysis indicate associations and cannot be interpreted as causal.

Because of the limited sample size, we restricted the explanatory variables to a small set of factors hypothesized to be drivers of ACO spending and specific variables of interest to CMS, such as other MSSP ACOs in the market. This list of explanatory variables was also limited by the data that were available for all the ACOs; given the semi-structured interview protocols and the wide variety and combination of ACO activities, our interviews with the ACOs yielded varying levels of detail about any particular topic, limiting how much comparable information we had across all ACOs. As a result, the variables on care management do not capture all facets of care management, including how often certain activities occur. In addition, several of the ACO variables and some of the market-level variables are for a single point in time, while the outcome variables are for two or three years, depending on the ACO's start date. While this analysis offers the opportunity to examine possible relationships more empirically at the model level, this analysis should be considered exploratory and results presented should be considered in light of these limitations. The explanatory variables tested were:

- **ACO variables.** The ACO team's analyses of primary data collected from the ACOs during interviews yielded six indicator variables related to ACO activities and infrastructure; for example, the presence of care management and presence of single or multiple EHRs. (See the Methods section for additional detail on primary data collection and analysis.) These variables were available for 34 of the 36 AP ACOs.[19] We also

[17] The DID estimates for each of the spending and utilization measures used in the broader evaluation serve as the dependent variables in separate regressions.

[18] There were 20 AP ACOs that started in 2012, each potentially participating for three performance years and 16 AP ACOs that started in 2013, each participating for two performance years. One of the 2012 AP ACOs dropped out before 2014, resulting in 91 ACO-year observations. We clustered at the ACO level to account for repeated observations over the three years.

[19] These data were not collected for two ACOs that the evaluation was not able to interview.

examined the impact of breadth of care continuum, the ratio of baseline year Medicare expenditures to baseline mean HCC score for assigned beneficiaries, and ACO capacity on APs' results.

- **Beneficiary variables**. Since we are limited in the number of explanatory variables we can test with adequate power, we included a subset of demographic and health characteristics, including age categories and the presence of certain chronic conditions. These are the same demographic characteristics used in risk adjusting the DID estimates but aggregated to the ACO level. Beneficiary variables are constructed to be the share of an ACO's assigned beneficiaries with the characteristic. We initially included the percent of assigned beneficiaries with each ACO who were female, but found this variable to be highly collinear with other variables and dropped it in the final specification.

- **Market variables.** Market variables were available from Dartmouth Atlas Hospital Referral Region or Core-Based Statistical Area and were based on 2013 information. We also included a set of market variables that may be related to ACO performance, including socioeconomic score (SES),[20] other CMS initiatives, AHRQ safety composite score, hip/knee replacement composite score, and Medicare Advantage (MA) penetration rate. We included the hospital wage index to control for the varying cost of labor over time in the ACOs' markets. This index serves to standardize each estimate, and uses the Boston wage index as a base indicator. This index is only included in regressions using dependent variables that are expenditures.

Table 7 shows the regression results for select dependent variables. Each column represents a separate regression with explanatory variables listed in the rows and dependent variables listed in the columns. In general, dependent variables shown were selected for being robust to alternative specifications. For example, total spending results tended to remain robust regardless of the specification of the second stage covariates. One exception to this robustness requirement is physician expenditures; although it is included in the table, we found the physician expenditure DID result to be sensitive to specifications of second stage covariates. For presentation purposes, we provide the direction of the estimated coefficients for estimates that are statistically significant at the 5 percent level. For the expenditure dependent variables, cells with minus signs indicate less spending and cells with plus signs represent more spending, as the dependent variables are the DID estimates. For example, ACOs using claims and EHR for care management purposes are associated with lower estimated total spending growth relative to their comparison markets than ACOs not using these data sources for care management. For the utilization variables, minus signs are associated with decreases in use of the service and plus signs are associated with increases in service use relative to the comparison group.

[20] SES is the average percent of unemployed, adult poverty, and non-white populations in the ACOs' market. The data source is the Area Health Resource File for 2013.

Table 7. Second Stage Regression Results for Selected Spending and Utilization Measures

	Definitions	Total Spending	Acute Inpatient Spending	Physician Services Spending	SNF Spending	Home Health Spending	Physician Office E&M Use	Procedures Use	Tests Use	Imaging Use
ACO VARIABLES										
Use claims/ EHR	AP uses claims or EHR data to identify patients for care management (Neither claims nor EHR; Claims only; EHR only; Claims & EHR)	—	—		—					
Timely notice	AP routinely receives timely notification from hospitals of inpatient admissions/discharges (Yes/No)				+			+		
Visit inpatient	Visiting ACO patients during an inpatient stay is part of care management program (Yes/No)					—				—
Breadth of care	Number of different provider types associated with the ACO (self reported)			+			—			+
Spending per HCC ($/HCC)	Divided the baseline year per-beneficiary spending by the mean HCC score for assigned beneficiaries during the baseline years. HCC score is a function of chronic conditions, gender, and institutional status while being a proxy for relative illness. A higher value may indicate that an ACO has a greater potential/capacity to decrease assigned patients' costs.						+			
Beneficiaries per PCP	Calculated by dividing the total number of assigned beneficiaries by the total number of participating PCPs.		—		—				—	
BENEFICIARY VARIABLES										
Age < 65	Percent of assigned beneficiaries in age category (omitted category is 65-74)		+			—				
Age 75-84	Percent of assigned beneficiaries in age category (omitted category is 65-74)					—				
Age > 84	Percent of assigned beneficiaries in age category (omitted category is 65-74)	+			+		—		—	
Stroke	Percent of assigned beneficiaries with presence of stroke					+				
MARKET VARIABLES										
Socioeconomic score	Average percent of unemployed, adult poverty, and non-white populations in the ACOs' market. ACOs in markets with high scores may have more challenges managing their patient population.							+		

	Definitions	Total Spending	Acute Inpatient Spending	Physician Services Spending	SNF Spending	Home Health Spending		Physician Office E&M Use	Procedures Use	Tests Use	Imaging Use
CMS initiatives	Indicator for markets that contain participants in more than one of the following, as reported by CMS: the Multi-Payer Advanced Primary Care Demonstration, Independence at Home Models, Comprehensive Primary Care Initiative, Federally Qualified Health Center Demonstration, Partnership for Patients	+	+			+					
Medicaid initiatives	Indicator for whether any Medicaid initiatives were present in the state of the ACO, including: Medicaid patient-centered medical homes, health homes, Medicaid-specific ACOs, Medicaid dual eligible demonstrations, and Medicaid delivery reform programs.	—	—		—	—					
Hip knee composite	Based on the 30-day hip/knee complications score. Averaged the score for hospitals in ACO market, weighted by number of cases. A higher score indicates worse quality.					+					
MA penetration rate	Constructed as the percent of Medicare beneficiaries enrolled in MA in 2013. Markets with more MA experience may have the resources/tools to support population health and ACO efforts.				—						

Notes: E&M=evaluation and management, EHR=electronic health record, HCC=hierarchical condition category, MA=Medicare Advantage. Cells with plus (+) or minus (—) show the direction of coefficients that were significant at the 5 percent level. Negative values are associated with lower-than-expected spending or utilization; positive values are associated with higher-than-expected spending or utilization. To determine the count of primary care physicians (PCPs), we used an NPI list for the AP ACOs provided by CMS and cross-referenced NPIs with the National Plan and Provider Enumeration (NPPES) database. We classified PCPs as those whose primary Medicare specialty taxonomy code corresponded to physician/internal medicine, physician/family practice, or physician/geriatric medicine (specialty codes 8, 11, and 38). (See the Methods section for additional detail on primary data collection and analysis.)

Overall, no clear pattern emerged in the relationship between spending and utilization outcomes and ACO variables. ACOs using claims or an EHR to identify patients for care management tended to have lower-than-expected spending. However, other care management variables such as timely notice of inpatient admission and whether the care management program included inpatient visits were not associated with spending results. Other relationships observed include:

- ACOs with higher aggregate rates of older patients and patients with certain chronic conditions tended to have higher rates of spending growth relative to the comparison group. This finding also suggests that ACOs with a high prevalence of these types of patients may have a harder time lowering spending. Note that these factors are accounted for at the individual level in the DID estimates; thus, even with risk adjusting these patient attributes, ACOs with higher percentages of these types of patients were still associated with higher spending.
- Associations found between public payer payment initiatives and outcomes were mixed and do not have a straightforward interpretation. AP ACOs located in markets with more than one CMS initiative appeared to be associated with higher spending growth relative to their comparison markets. It may be the case that spillover effects in markets with multiple payment initiatives make it more difficult to show lower-than-expected spending compared to that market. However, we did not find statistically significant associations between the impact findings and ACOs locating in areas where other MSSP ACOs were present, and ACOs located in states with at least one Medicaid initiative were associated with lower spending growth relative to their comparison groups.
- There was some evidence that ACOs located in markets with high MA penetration rates tended to have more savings for SNF expenditures. These ACOs may have more experience with post-acute care management and functioning as an ACO.

Most AP ACOs continued as Medicare ACOs after the AP ACO Model ended

To encourage the formation of ACOs, AP ACOs were given advance payments without having to assume downside financial risk. Advance payment funds were recouped against shared savings as long as the ACO completed the full three-year initial agreement period ending in December 2015, and any remaining funds would continue to be recouped if the ACO renewed participation in MSSP.[21] The AP model had little attrition of ACOs during the three-year participation agreement period.[22] AP ACOs had to decide in 2015, with only the first two years of financial performance results (2012-2013 [PY1] and 2014 [PY2]), whether to continue as MSSP ACOs and whether to assume downside financial risk (Table 24 in the Appendix shows CMS's financial results and shared savings payments for the three performance years of the AP ACO Model).

By the end of their first participation agreement period, AP ACOs still active as MSSP ACOs renewed their participation agreements in 2016 at a higher rate than non-AP MSSP ACOs (55 percent versus 36 percent), according to CMS. Specifically, 18 of the original 36 AP ACOs

[21] See https://innovation.cms.gov/files/x/advance-payment-model-aco-solicitation-doc.pdf

[22] One AP ACO, PriMed, exited the AP model by the end of 2014 because it joined another MSSP ACO, making it ineligible to continue participation in the AP model. By the end of 2015, Fort Smith and Medical Mall were no longer participating in the AP model.

officially continued as MSSP ACOs in 2016.[23] Four additional AP ACOs began a new MSSP contract but with the same executive(s), in the same state, or with a similar provider list as a former AP ACO. Executives and providers from two additional AP ACOs joined MSSP ACOs that began their initial agreement periods in 2014 or 2015. Twelve organizations decided to no longer participate in MSSP. (See Table 8.)

According to CMS, 17 AP ACOs (47 percent) had fully repaid their advance payments by the end of 2015. Of the roughly $30 million in outstanding advance payments, $14 million could still be recouped by CMS from ACOs that renewed their agreements. The remainder cannot be recouped from ACOs that either did not renew their agreements or became a new MSSP ACO while retaining some leadership or providers from the original ACO.

Table 8. Which AP ACOs Continued as MSSP ACOs?

Name	ACO Status	Chose Higher Risk Track?	Outstanding Advance Payments at End of 2015
April 2012 Starters			
Coastal Carolina Quality Care	MSSP	No	$3,083,992
Jackson Purchase Medical Associates	Some of ACO is new MSSP and AIM: much overlap of providers	No	$0
North Country ACO	No longer ACO	---	$1,714,876
Primary Partners	No longer ACO	---	$0
RGV ACO Health Providers	MSSP	Yes	$0
July 2012 Starters			
Accountable Care Partners	Some of ACO is new MSSP: much overlap with executive leader, providers, and service area	No	$1,619,368
Coastal Medical	MSSP	No	$0
Cumberland Center for Healthcare Innovation	MSSP	No	$0
Golden Life Healthcare	Some of ACO is new MSSP and AIM: key executives and some providers from AP are part of both MSSP and AIM	No	$1,918,504
Harbor Medical Associates	No longer ACO	---	$2,125,984
Maryland ACO of Eastern Shore	No longer ACO	---	$1,559,176
Maryland ACO of Western MD	No longer ACO	---	$1,513,576
Medical Mall Services of Mississippi[2]	No longer ACO	---	---
MPS ACO Physicians	No longer ACO	---	$1,737,700
Physicians ACO	MSSP	No	$0

[23] See https://data.cms.gov/ACO/2016-Medicare-Shared-Savings-Program-Organizations/5kdu-cnmy

Name	ACO Status	Chose Higher Risk Track?	Outstanding Advance Payments at End of 2015
PriMed[1]	Some of ACO is new MSSP; key executives from AP are part of MSSP leadership	No	---
Quality Independent Physicians	MSSP	No	$0
Reliance Health Network	No longer ACO	---	$0
St. Thomas Medical Group	No longer ACO	---	$386,547
Texoma	MSSP	No	$1,758,448
January 2013 Starters			
ACO Health Partners	MSSP	No	$0
American Health Alliance	MSSP	No	$0
American Health Network of Ohio Care Organization	MSSP	No	$0
Bay Area Florida Physicians Trust	MSSP	No	$0
Fort Smith Physicians Alliance ACO[2]	No longer ACO	---	---
Integrated ACO	MSSP	No	$0
KCMPA-ACO	MSSP	No	$2,394,520
Lower Shore ACO	No longer ACO	---	$2,031,640
National ACO	MSSP	No	$0
Nature Coast ACO	Some of ACO is new MSSP: much overlap with executive leader, providers, and service area	No	$0
NOMS ACO	MSSP	No	$1,737,160
Owensboro ACO	Some of ACO is new MSSP: key leaders from AP are part of MSSP leadership	No	$1,639,600
Physicians Collaborative Trust ACO	MSSP	No	$2,666,140
Primary Partners ACIP	No longer ACO	---	$0
Rio Grande Valley Health Alliance	MSSP	Yes	$0
SERPA-ACO	MSSP	No	$2,106,340

Sources: Data are from CMS documentation, including: List of renewing 2016 MSSPs: https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharedsavingsprogram/Downloads/2016-Shared-Savings-Program-Renewal-ACOs.pdf. List of new 2016 MSSPs: https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharedsavingsprogram/Downloads/2016-Shared-Savings-Program-Initial-ACOs.pdf. List of 2015 ACOs: https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharedsavingsprogram/Downloads/MSSP-ACOs-2015-Starters.pdf. List of 2014 Medicare ACOs: https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharedsavingsprogram/Downloads/2014-ACO-Contacts-Directory.pdf. List of 2013 MSSPs: https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharedsavingsprogram/Downloads/2013-ACO-Contacts-Directory.pdf. List of all current (2016) MSSPs: https://data.cms.gov/ACO/2016-Medicare-Shared-Savings-Program-Organizations/5kdu-cnmy. Publicly available CMS documentation was supplemented with other CMS program documentation provided to the evaluation team. CMS documentation was also supplemented with Internet searches of ACO websites and ACO press releases. AIM denotes ACO Investment Model.
Notes: [1]ACO only participated in PY1. [2]ACO only participated in PY1 and PY2.

The AP ACOs that achieved shared savings in PY1 and PY2 under CMS's payment formula were more likely to continue as MSSP ACOs once their initial participation agreement ended. Of the 15 AP ACOs that earned shared savings in PY1 or PY2, 12 continued as MSSP ACOs and 3 did not (80 percent); of the 21 that did not earn shared savings, 12 continued as MSSP ACOs and 9 did not (57 percent) (see Table 9). The continuation of a higher proportion of APs with shared savings may be related, in part, to the payment incentives facing ACOs. According to the terms of the AP ACO participation agreement with CMS, advance payments that AP ACOs received are repaid out of any shared savings for as long as the ACO is participating in MSSP. Should the ACO enter a second agreement period, continuing as an MSSP ACO after the conclusion of the AP model, CMS would continue to recoup the balance on advance payments. Organizations that failed to earn shared savings while participating in the AP model may not want to have to pay back the advance payments out of future shared savings. AP ACOs that achieved shared savings while participating in the AP model may also have been more confident in their ability to be successful as MSSP ACOs and thus been more inclined to continue. However, with two exceptions, the AP ACOs that continued as MSSP ACOs did not choose to take on financial risk for losses, regardless of their success as AP ACOs.[24]

Table 9. AP ACOs that Continued to MSSP by Shared Savings Status

	Earned Shared Savings in PY1 and PY2	Did Not Earn Shared Savings In PY1 and PY2
Number that continued in MSSP (2016)	12	12
Number that did not continue in MSSP	3	9
Total	15	21
Percent continued in MSSP	80%	57%

AP ACOs' perceptions of trends in their markets may also have influenced whether AP ACOs chose to continue as MSSP ACOs. Among AP ACOs that discussed their continued commitment to value-based care, the most common theme that emerged was a perceived shift toward value-based payment and a desire not to be left behind as this shift occurs. However, ACOs were also influenced by the dearth of value-based contracting in their markets. For example, one ACO that did not renew its MSSP contract said that the ACO is not very committed to the concept of value-based contracting as a whole, primarily because it perceives that its market is not. A representative of this ACO noted, "I think the group is open to [taking on managed care contracts] and better positioned to do that now than in the past. It depends on the market and penetration." This representative noted that there has not been a lot of MA penetration in the market but felt that the providers are better positioned to handle it when it enters their market. For another ACO, a

[24] RGV ACO Health Providers was the only AP ACO to assume financial risk under Track 2 during its first participation agreement period. It and Rio Grande Valley Health Alliance transitioned to Track 3 upon renewal of their participation agreements. Under the May 2015 final rule, CMS introduced Track 3 to MSSP as a new risk track option. Key features of Track 3 include prospective beneficiary assignment (rather than preliminary prospective assignment with retrospective reconciliation, as under Tracks 1 and 2); a higher sharing rate (up to 75 percent based on quality performance compared to 60 percent under Track 2); and waiver of the 3-day SNF rule for prospectively assigned beneficiaries. Source: https://www.cms.gov/Newsroom/MediaReleaseDatabase/Fact-sheets/2015-Fact-sheets-items/2015-06-04.html

representative noted that it had invested in transitioning to population-based risk management and changed the way it manages care but continues to operate in a largely FFS payment environment. This ACO's leadership was concerned about the disparity between its shifting approach to care management and the lagging evolution of its payment environment, where commercial ACO-like contracting has not materialized. These examples illustrate the potential difficulty of Medicare alone sustaining ACOs in markets where value-based contracting with other payers is absent.

SUMMARY AND DISCUSSION

This evaluation of the AP ACO Model addressed whether the model, which provided advance payments to ACOs and the possibility of sharing in savings, resulted in improved quality outcomes for beneficiaries, lower Medicare spending relative to what would have been spent if those AP ACOs had not formed, and continued participation as an MSSP ACO. By comparing quality, spending, and utilization trends of beneficiaries assigned to AP ACOs with similar beneficiaries in ACOs' markets, the evaluation examined whether AP ACOs were delivering care better than what would be expected to FFS beneficiaries who were not subject to accountable care. This approach differs from the AP ACOs' financial as well as quality performance as part of their participation agreement and used in calculations of shared savings against their respective benchmarks as a financial incentive to participate.

The AP model attracted 36 small, physician-based organizations that volunteered to accept advance payment funds from CMS to invest in infrastructure and redesigned care processes to improve care for their assigned beneficiaries. Eighteen of those ACOs continued as the same organization and 6 more continued as other MSSP ACOs after the AP model ended. Seventeen of the 36 AP ACOs participating for the duration of their first agreement period repaid their advance payments in full by the end of 2015, while 16 AP ACOs had not repaid $29.9 million in advance payments, only $14 million of which could still be recouped by CMS from ACOs renewing their participation agreement as the same MSSP ACO.

Our evaluation of the AP model did not find that AP ACOs had lower spending growth from the pre-model period relative to their comparison markets during the three-year performance period; quality results were largely not statistically distinguishable from comparison beneficiaries. Importantly, these results compare AP ACO spending and quality performance against similar FFS beneficiaries not attributed to a Medicare ACO, rather than to those assigned to non-AP MSSP ACOs.

With respect to spending results, AP ACOs collectively had non-statistically significant lower-than-expected spending of $7.50 PBPM in 2012 (20 ACOs) and $2.00 PBPM in 2013 (36 ACOs). In 2014, they had significantly higher-than-expected spending of $20.80 PBPM (35 ACOs). The 2014 result was driven by relatively higher ACO spending growth in physician services, inpatient acute care, and outpatient/ambulatory surgery center spending. AP ACOs showed lower home health spending growth in all three years, driven by a few ACOs in markets with initially high home health spending.

Individual AP ACOs' evaluation spending results relative to the evaluation comparison groups varied over time, with no individual AP ACO showing significantly lower-than-expected PBPM Medicare spending in all three years, and only one ACO showing significantly higher-than-expected spending over the same period. Of the 20 AP ACOs that started in 2012, just 2 had significantly higher-than-expected spending in that year. In 2013, 4 of 36 AP ACOs had significantly higher-than-expected spending. By 2014, 11 of 35 AP ACOs had significantly higher-than-expected spending and just 2 had significantly lower-than-expected spending. In all three years, the majority of AP ACOs had estimated spending changes from baseline that were not significantly different from the spending changes in their comparison markets.

In our exploration of the relationship between ACO, aggregate beneficiary, and market characteristics with the evaluation spending and utilization results, we found no clear pattern in the relationship between spending and utilization performance and ACO care management variables. While ACOs using claims or an EHR to identify patients for care management tended to have lower-than-expected spending, other care management variables such as timely notice of inpatient admission and whether the care management program included inpatient visits did not appear to be associated with spending. ACOs with a higher prevalence of older patients and patients with certain chronic conditions tended to have higher rates of spending growth relative to their comparison groups. This finding also suggests that ACOs with many of these types of patients may have a harder time lowering spending. Relationships between presence in the markets of public payer payment initiatives and outcomes were difficult to interpret: ACOs located in markets with at least one Medicaid initiative were associated with less spending, though those located in markets with more CMS initiatives appeared to be associated with higher spending growth relative to the comparison group.

These results from years 2012, 2013, and 2014 of the AP model show that for participating organizations, measurable, consistent reductions in Medicare spending and improvements in quality relative to their market comparison populations had yet to emerge by 2014. Quality results were largely not statistically significant, but may show some favorable trends. Spending results show increased spending relative to ACOs' comparison groups in 2014, with some of this increase driven by higher utilization of physician services among ACO-assigned beneficiaries. Qualitative evidence supports the possibility that AP ACOs were engaged in some practice transformation activities—improved patient outreach, attention to quality metrics and preventive service provision, and increased access—that could promote utilization of physician services among AP ACO-assigned beneficiaries relative to comparison group beneficiaries in their markets. These types of investments may result in improved quality or lower spending growth that takes longer than the evaluation period to materialize. AP ACOs' ability to reduce inpatient acute care spending, at least in the near term, may be hampered somewhat by their lack of leverage over local hospitals and the early stage of development of their population management activities.

Transforming groups of small, physician-led practices, particularly those with demonstrated need for capital to invest in population management, may take longer than the model period allows to observe changes in quality and spending results for several reasons. On the one hand, AP funding gave these organizations an opportunity to experiment with investing in resources and personnel around accountable care activities, without the risk of bearing all of the costs of standing up the ACO or in taking on downside financial risk. CMS's provision of advance payment funds and the option to share only in upside financial risk meant that AP ACOs were largely insulated from the risk of losses from their performance relative to CMS's baseline-benchmark calculation. On the other hand, requiring these new ACOs to take on financial risk at the outset, when CMS was establishing the model and ACOs were newly implementing their care management programs and investing in staff and other resources to manage care for their assigned beneficiaries, could have been too much risk to entice participation altogether and may have failed to promote ACOs in markets with little such ACO activity. Providers may also need stronger incentives to reduce overutilization while maintaining quality than they faced under the AP model. If they operate in a predominantly FFS market environment, they may continue to face incentives to increase the volume of services delivered.

Although AP ACOs did not achieve overall reductions in Medicare spending growth relative to their markets or consistent improvements in quality during the evaluation period, evidence from interviews and a physician survey suggests that the advance payment funding had an effect on participants' investments in resources to coordinate care, analyze patient data, improve quality measures, and enhance communication within the practice and with providers outside of the ACO. Some of these investments, such as HIT systems and developing relationships with providers outside of the ACO, may be more sustainable than others, such as care management or executive staff whose positions were funded with advance payments. For example, an ACO that reported funding its care management program, including hiring care managers to assist with home visits, medication reconciliation, and development/facilitation of care plans, did so almost entirely with advance payment money. The ACO had misgivings about whether physicians would provide the funds needed to continue the program in the event the ACO generates no shared savings. In contrast, a few AP ACOs noted that some IT investments such as prompts built into their EHRs, data sharing and connectivity, and data collection and reporting are sustainable.

Some ACOs reported that a positive legacy of the AP model is that providers better understand total cost of care and have undergone a change in mindset around utilization. A representative from one AP ACO said, "I think the data is very powerful. It is. Until you had that, many doctors had no idea what anything costs, what home health costs . . . no idea. So waking up to recognize that has been very helpful." According to our survey of AP ACO physicians, two-thirds said that being part of the ACO has made them more aware of controlling treatment costs and that participation has influenced how they care for their ACO and non-ACO patients. This evidence suggests that spending and utilization data, are likely a key part of spurring physicians' behavior change by showing them how existing practice patterns—their own and those of others across the care continuum—affect spending and utilization for their ACO-assigned beneficiaries.

The commitment of the organizations that volunteered to participate in the AP model has extended beyond the AP performance period—two-thirds of AP ACOs continue to participate as Medicare ACOs with renewed participation agreements or from forming new MSSP ACOs with some of the same leadership or providers participating in AP ACOs and thus can apply lessons learned from the AP model. However, the majority of AP ACOs that have continued as Medicare ACOs have not taken on downside financial risk, perhaps in part because many of them are not fully confident that they could sustain the investments they made to operate as an ACO. CMS is currently testing the ACO Investment Model (AIM), which also offers pre-paid shared savings and builds on the experience with the AP ACO Model. AIM is testing the use of pre-paid shared savings to encourage new ACOs to form in rural and underserved areas while encouraging MSSP ACOs to transition to payment arrangements with greater financial risk.

METHODS

The evaluation relies on a mixed-methods data collection and analytic approach. Secondary data analyses included extensive Medicare claims analysis for beneficiaries assigned to AP ACOs and their specified comparison groups and analysis of quality of care measures. Primary data collection and analyses included site visits and quarterly telephone assessments with each of the AP ACOs informed the basis of case studies of the AP ACO Model, as did a survey of participating physicians. Detail on the specific data sources and methods are provided here for the study's quantitative and qualitative components, respectively.

The evaluation's methodology differs from the financial methodology used to calculate shared savings because these calculations have different purposes.[25] The financial approach starts with an ACO's historical spending and forecasts a target spending level based on national spending growth rates, with some adjustments, and then compares the ACO's spending by the end of the year against that target. The evaluation's approach does not compare against national spending growth rates but instead against trends in spending of the otherwise assignment-eligible beneficiaries in an ACO's local market because they best approximate what would have happened to the spending levels of the beneficiaries in the ACO had the ACO never existed. Local markets are also apt for the evaluation because price differences across different markets are not a concern.

Quantitative Methods

We employed a quasi-experimental design to examine changes in outcomes across the treatment (AP ACO-assigned beneficiaries) and comparison groups (FFS beneficiaries residing in an ACO's market who were eligible for assignment but not aligned with or assigned to a Pioneer or MSSP ACO) to obtain the estimated average treatment effect for the population assigned to an AP ACO. To estimate the average treatment effect, we compared pre- to post-implementation changes in mean outcomes (spending, utilization, and quality) across the two groups. The difference-in-differences estimator allows us to control for time-varying changes that occur during the implementation of the ACO that are common to all beneficiaries (i.e., shared expenditure changes across the health systems) as well as to control for baseline spending level differences between treatment and comparison populations.[26] Lower spending in difference-in-differences results

[25] In addition to their differences in methodology, the financial performance calculations and evaluation performance calculations rely on different data sources for beneficiary assignment—Integrated Data Repository (IDR) for financial performance and Chronic Conditions Warehouse (CCW) for evaluation performance. Different data sources are used for two main reasons. First, CMS uses the IDR to assign beneficiaries to calculate financial performance because it provides timely access to claims and enrollment data. The CCW contains final action claims and settled enrollment updates for calculating evaluation performance. Thus, both data sources have varying degrees of claims run-out and enrollment updates owing to differences in the timing of data pulls. Second, the evaluation must assign beneficiaries to the ACOs' Tax Identification Numbers (TINs) in the evaluation's baseline years and create comparison groups using the same assignment eligibility criteria. If the evaluation used two different data sources, it would mean that the programmatic list of assigned beneficiaries would unavoidably result in an imbalance between ACO-assigned beneficiaries and the evaluation's assigned beneficiaries in its baseline years as well as the comparison group of beneficiaries who met the criteria for assignment but were not assigned to an SSP ACO.

[26] The difference-in-differences estimator rests on an assumption of parallel trends between the AP ACOs and comparison groups in the absence of the treatment. As a test for this, we examined mean spending trends in the baselines and found that a satisfactory number of the AP ACOs showed similar spending trends to their comparison groups. (See Table 25 and Table 26 in Appendix.)

indicates that the beneficiaries assigned to an ACO had decreases in spending that exceeded the rate of decrease in the comparison group or that those beneficiaries had increases in spending that were below the rate of increase in the comparison group or that they had decreases in spending while spending in the comparison group increased.

We used the Oaxaca-Blinder reweighting technique to condition the comparison group mean outcomes on the same distribution of observed covariate characteristics as the ACO population. Comparing the ACO outcomes to the reweighted comparison outcomes allowed us to obtain the estimated average treatment effect on the treated (ATT) and control for time-varying observed differences between the ACO and comparison populations. The first performance year began in 2012 or 2013, depending on when the ACO was formed. The baseline period consisted of the two years prior to the first performance year: 2010 and 2011 for the AP ACOs that started in 2012 and 2011 and 2012 for AP ACOs that started in January 2013. Because of variation in an ACO's participating providers (or TINs for purposes of the assignment algorithm)—and, hence, their assigned beneficiaries—between performance years, separate baseline periods were created for each performance year to more adequately frame baselines to the evolving ACO organizations.

Defining Time Periods: Baseline, Performance Year, and Assignment

Table 10 provides a summary of the time periods covered by the performance years and their corresponding baseline years. Because of staggered ACO start dates in 2012, with the first cohort of AP ACOs starting in April 2012 and a second cohort entering in July 2012, the first performance year (PY1) was defined to include a portion of CY2012 and all of CY2013. PY2 corresponded to CY2014. ACOs that launched on April 1, 2012 or July 1, 2012 had baseline periods that incorporated the full calendar years of 2010 and 2011; ACOs that launched on January 1, 2013 had a baseline period of 2011 and 2012. The AP ACO Model used retrospective beneficiary assignment at the end of 12-month periods beginning April or July of 2012 or January of 2013 and 2014 to determine assignment. Following this approach, for our purposes, the relevant assignment periods for the baseline and for the performance years (the time periods for which the assignment algorithm described below was implemented) corresponded to similar 12 months periods over calendar years, except for AP ACOs that started in 2012, which ran for 12 months from April or July 2012 through March or June 2013.

Table 10. Overview of the Evaluation's Relevant Time Periods for Beneficiary Assignment

Performance and Baseline Years	ACO Start Date(s)	Months for Performance	Months for Assignment	Beneficiary Assignment Determined by
PY1 Baseline Year 1	April 1, 2012	Jan. 2010 - Dec. 2010	Jan. 2010 - Dec. 2010	PY1 Providers
	July 1, 2012	Jan. 2010 - Dec. 2010	Jan. 2010 - Dec. 2010	
	Jan. 1, 2013	Jan. 2011 - Dec. 2011	Jan. 2011 - Dec. 2011	
PY1 Baseline Year 2	April 1, 2012	Jan. 2011 - Dec. 2011	Jan. 2011 - Dec. 2011	PY1 Providers
	July 1, 2012	Jan. 2011 - Dec. 2011	Jan. 2011 - Dec. 2011	

Performance and Baseline Years	ACO Start Date(s)	Months for Performance	Months for Assignment	Beneficiary Assignment Determined by
	Jan. 1, 2013	Jan. 2012 - Dec. 2012	Jan. 2012 - Dec. 2012	
PY1[1]	April 1, 2012	(1) April 2012 - Dec. 2012 (2) Jan. 2013 - Dec. 2013	(1) April 2012 - March 2013 (2) Jan. 2013 - Dec. 2013	PY1 Providers
	July 1, 2012	(1) July 2012 - Dec. 2012 (2) Jan. 2013 - Dec. 2013	(1) July 2012 - June 2013 (2) Jan. 2013 - Dec. 2013	
	Jan. 1, 2013	Jan. 2013 - Dec. 2013	Jan. 2013 - Dec. 2013	
PY2 Baseline Year 1	April 1, 2012	Jan. 2010 - Dec. 2010	Jan. 2010 - Dec. 2010	PY2 Providers
	July 1, 2012	Jan. 2010 - Dec. 2010	Jan. 2010 - Dec. 2010	
	Jan. 1, 2013	Jan. 2011 - Dec. 2011	Jan. 2011 - Dec. 2011	
PY2 Baseline Year 2	April 1, 2012	Jan. 2011 - Dec. 2011	Jan. 2011 - Dec. 2011	PY2 Providers
	July 1, 2012	Jan. 2011 - Dec. 2011	Jan. 2011 - Dec. 2011	
	Jan. 1, 2013	Jan. 2012 - Dec. 2012	Jan. 2012 - Dec. 2012	
PY2	April 1, 2012	Jan. 2014 - Dec. 2014	Jan. 2014 - Dec. 2014	PY2 Providers
	July 1, 2012	Jan. 2014 - Dec. 2014	Jan. 2014 - Dec. 2014	
	Jan. 1, 2013	Jan. 2014 - Dec. 2014	Jan. 2014 - Dec. 2014	

Notes: [1]PY1 for the evaluation uses a different time period for assigning beneficiaries to ACOs and measuring their performance in contrast to the financial performance calculations, which combined the partial 2012 calendar year for 2012 MSSP starters with 2013 to create a first performance year spanning 2012-2013.

Identifying Assignment-Eligible Beneficiary Population

The first step in creating the study population is to identify all beneficiaries who are eligible for assignment to an ACO. The population of assignment-eligible ACO and comparison beneficiaries was drawn from the universe of beneficiaries listed Master Beneficiary Summary File (MBSF) for each relevant year and restricted to beneficiaries with claims for at least one qualified evaluation & management (QEM) service during each year of assignment; in addition, to be eligible for assignment, the beneficiary had to meet the following CMS-established program criteria for assignment:[27]

- Alive as of January 1 of calendar year
- One or more months of Part A and Part B coverage

[27] Medicare Shared Savings Program, Shared Savings and Losses and Assignment Methodology Specifications, Version 2, April 2013. https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharedsavingsprogram/Downloads/Shared-Savings-Losses-Assignment-Spec-v2.pdf

- No months where covered by only Part A or Part B
- No months in which beneficiary was enrolled in a Medicare Advantage plan
- No months of residence outside the U.S. or U.S. territories

Criteria were the same for the baseline and performance years.

Defining the Treatment Population

Beneficiary Assignment for Performance Years

For the performance years, the treatment group was defined as all beneficiaries assigned to an AP ACO according to the assignment algorithm technical specifications.[28] The algorithm identifies, within the assignment-eligible beneficiary population, beneficiaries who received at least one QEM service during the relevant time period from an ACO-participating primary care physician and assigns the beneficiary to the ACO with more allowed qualified primary care service charges from ACO-related tax identification numbers (TINs) than any other ACO or any non-ACO TIN during the 12-month assignment year (April or July of 2012 to March or June of 2013 for the 2012 performance months, CY2013, or CY2014).[29]

If a beneficiary received no QEM services from a primary care physician, assignment was made to qualified participating specialties.[30] In these cases, we assigned beneficiaries with QEM charges not from primary care physicians to the ACO if they received at least one QEM from a physician with a non-primary care specialty at the ACO and had more allowed QEM charges from ACO TINs than any other ACO or non-ACO TIN.

[28] Using the assignment technical specifications, we developed an algorithm to determine baseline period and performance year beneficiary populations. Lists of assigned beneficiaries used to measure financial performance in the performance years were available to the evaluation team to validate against the beneficiaries it assigned to ACOs using the assignment algorithm. To test the performance of the evaluation algorithm, we compared the beneficiaries in the CMS and L&M performance year populations and ascertained match rates. Overall, we were able to achieve a successful match rate of 86 percent to 94 percent across performance years. Where some beneficiaries were assigned to an ACO to measure financial performance but the evaluation did not and those beneficiaries were in the comparison group, they would have biased the results toward the null.

[29] If a tie occurs when calculating total charges by provider (non-ACO TIN) and by ACO (all TINs in an ACO), the provider with the most recent service takes precedence for that step of the assignment algorithm. If a tie still remains, then assignment is random.

[30] PCPs as those whose primary Medicare Specialty taxonomy code corresponded to Physician/Internal Medicine, Physician/Family Practice, and Physician/Geriatric Medicine (specialty codes 8, 11, and 38). We included FQHCs, RHCs, Method II CAHs, and Electing Teaching Amendment (ETA) hospitals in the assignment algorithm. Any physician NPI in attestation by FQHC/RHC/CAH/ETA is considered a primary care physician regardless of specialty code. Because claims from these facilities are found in outpatient RIFs, no provider specialty code is available, therefore, the billing NPI is considered a PCP specialty for these claims. This may affect how beneficiaries with claims from any of these providers are assigned in prior steps. We used CCNs to identify FQHCs/RHCs/CAHs/ETAs. ACO participating FQHC/RHC/CAH/ETA services are defined by services on the outpatient file and are considered qualified primary care services if the claims include a HCPCS or revenue center code that meets the definition of primary care service. Providers with both a primary care and non-PCP specialty codes on claims during the period were reassigned as non-PCPs.

Beneficiary Assignment for Baseline Years

For the baseline periods, the treatment group is intended to represent beneficiaries *who would have been assigned* to the ACO had the ACO existed in the baseline period with the same set of participating providers. Following the approach used to define the treatment group for the performance years, within the beneficiary population identified as being assignment-eligible, we identified beneficiaries who received at least one QEM service during the relevant time period from a TIN participating in the ACO during the performance year *corresponding to the baseline year of interest*. In other words, for the baseline period, the list of ACO-affiliated providers in the performance year was applied to services received in the baseline *as if the ACO had been in operation in those years*. We then assigned beneficiaries to an ACO if the beneficiary had more allowed QEM charges from ACO TINs than any other ACO or non-ACO TIN. Similarly, we assigned beneficiaries with QEM charges not from primary care physicians to the ACO if they received at least one QEM from a physician with a non-primary specialty at the ACO and had more allowed QEM charges from ACO TINs than any other ACO or non-ACO TIN.

We employed this approach to create a different baseline group for each performance year based on the cohort of participating ACO providers during that performance year. For the 2012 starters, the baseline years were 2010 and 2011; for the 2013 starters, the baseline years were 2011 and 2012.

Defining the Comparison Group

We defined comparison groups of beneficiaries in geographic areas, or markets, where each AP ACO operates. These comparison groups are intended to represent our best estimate of how the ACO populations' outcomes would change in the absence of the ACO formation.

Defining Comparison Markets

We defined an ACO's market as all counties where the ACO drew at least 1 percent of its assigned population in a given baseline or performance year to reflect the geographic distribution of assigned beneficiaries. We then weighted the comparison beneficiary population to proportionately represent the counties where assigned beneficiaries resided.

Defining the Comparison Group of Beneficiaries for the Baseline and Performance Years

Identifying beneficiaries for inclusion in the comparison group begins with the assignment-eligible population, as defined above. All beneficiaries aligned with or assigned to Medicare's Pioneer, MSSP, or AP ACOs, according to the evaluation's alignment or assignment of beneficiaries to ACOs, were removed from the file. We then restricted the comparison group of beneficiaries in the corresponding baseline or performance year to beneficiaries who resided within an ACO's market, according to county of residence in the MBSF.

Data Sources and Measures

In this section, we describe the evaluation team's acquisition and use of secondary data.

Secondary Data Acquisition and Security Plans

The evaluation team prepared and submitted to CMS a request for data as well as a Data Use Agreement (DUA). Any data received electronically via managed file transfer (MFT) is copied to a secure drive at the SSS data center in Ashburn, Virginia. This center uses a combination of physical and virtual components to provide faster response times to requests for resources, efficient maintenance and application upgrade, as well as security standards and guidelines established to support Federal Information Security Management Act (FISMA), Health Insurance Portability and Accountability Act (HIPAA), and 21 CFR Part 11 compliance requirements. Access to the data is limited to those who have been authorized, and is enforced by dual-factor authentication and other security measures in the FISMA level-2 center. By the date of retention as identified in the DUA, all physical and electronic copies of the data files will be securely destroyed.

Secondary Data Sources

Data used for the quantitative component of the evaluation and for building the analytic files were gathered primarily from the CMS Chronic Conditions Warehouse (CCW) Data Enclave, a secure environment where Medicare administrative files are housed. The CCW stores claims-level as well as summary data in several SAS and Oracle files; both types of data were accessed for the evaluation's analyses.

The team created a master database, which housed information on beneficiary demographic characteristics (i.e. age, gender, Medicare status, location, date of death); identification of the ACO to which the beneficiary has been assigned; whether the beneficiary is a member of the comparison group; and clinical characteristics (i.e. HCC risk score, presence of selected chronic conditions). Annual spending and utilization of institutional and non-institutional services are also available in the master database.

<u>Data Obtained from the CCW</u>

- Claims-level data accessed through the CCW included the Research Identifiable Files (RIF), which contain fee-for-service claims for institutional and non-institutional providers. Updated monthly until considered final at 12 months, RIFs contain: (1) beneficiary identifiers, (2) providers of service identifiers, (3) diagnosis codes, (4) procedure codes, and (5) payment amount. RIFs are organized by type of claim and include records on Inpatient, Outpatient, Physician/Supplier, Skilled Nursing Facility, Home Health, Hospice, and Durable Medical Equipment cost and use.

  The RIFs served as the primary source of data for constructing estimates of Medicare utilization and expenditures.

- Summary data were from the MBSF, which includes several files that provide information on beneficiary characteristics and enrollment, presence of selected chronic conditions, and annual summary (aggregated) utilization and expenditure estimates that have been constructed from institutional and non-institutional claims records. The MBSF files used in these analyses consist of:

  - MBSF Base A/B/D. The Base A/B/D file, which contains beneficiary enrollment data, was used to characterize beneficiaries by demographic characteristics (i.e., age, gender, race, rural/urban location) and Medicare status (i.e., reason for entitlement, receipt of low income subsidy).

  - MBSF Chronic Conditions. Data from the Chronic Conditions file provided information to ascertain the prevalence of selected chronic conditions in the population, including acute myocardial infarction, atrial fibrillation, chronic kidney disease, chronic obstructive pulmonary disease, depression, diabetes, heart failure, hip/pelvic fracture, rheumatoid/osteoarthritis, stroke, and selected types of cancer.

- ACO Participating Provider Lists. There were two lists of participating providers for each of the AP ACOs—one for 2012-2013 (PY1) and a second for 2014 (PY2). The lists include all participating TINs and CCNs.

Data Obtained from Other Sources

- Hierarchical Condition Codes (HCC) Scores. HCC scores for newly eligible, community-dwelling, and institutionalized beneficiaries are computed by CMS using diagnostic information contained in physician and hospital claims and used to risk-adjust Medicare Advantage capitation payments. Contained in an Oracle database housed in the CCW, HCC scores were downloaded for use in analyses requiring risk adjustment.
- Group Practice Reporting Option (GPRO). This data source is a set of process and outcome quality measures submitted through the Group Practice Reporting Option (GPRO) system. We grouped the 17 individual measures into four coherent composites (care coordination, diabetes, cardiovascular disease, and preventive care).

Table 11 summarizes the content of files obtained through the CCW.

Table 11. Data Sources and Uses

File (Years)	Data/Variable and Purpose
MBSF_AB (2010 – 2014)	Demographic characteristics, date of death, eligibility for Part A and B, enrollment in Medicare managed care
MBSF Chronic Condition File (2010 – 2014)	Presence of selected chronic conditions
HCC File (2008–2011)	HCC score for beneficiaries for risk adjustment
Research Identifiable files (2010 – 2014)	Expenditures and utilization, by service; presence of secondary payer
AP Updated Participant Lists (June 2014 and March 2015)	Identify AP-participating physicians (for turnover analysis)

Evaluation Metrics: Spending, Utilization, and Quality

The evaluation team developed a list of expenditure, utilization, and risk-adjusted quality measures. These are presented below, along with detailed specifications in Table 12, Table 13, and Table 14, respectively.

Table 12. Spending Variable Specifications

Measure	Description
Total spending	Total Medicare Payments (excludes Part D, includes Per Diem Payment for Acute & OIP)
Acute inpatient	Acute Medicare Payment + Acute Per Diem Payment **Acute Medicare Payment** is the sum of the Medicare claim payment amounts (claim payment amount from each claim) in the acute inpatient setting for a given year. **Acute Per Diem Payment** is the sum of the entire pass through per diem payment amounts (Claim pass through per diem amount from each claim) in the acute inpatient setting for a given year. Medicare payments are designed to include certain "pass-through" expenses such as capital-related costs, direct medical education costs, kidney acquisition costs for hospitals that are renal transplant centers, and bad debts. This variable is the sum of all the daily payments for pass-through expenses. It is not included in the Medicare Payment amount (Acute Medicare Payment). To determine the total Medicare payments for acute hospitalizations for the beneficiary, this field should be added to the total Medicare payment amount for acute hospitalizations.
Physician services	Anesthesia + E&M + imaging + procedures + physician visits (E&M in office setting) + tests + part B drugs **Anesthesia** is the total Medicare payments for part B anesthesia services for a given year. Anesthesia claims are a subset of the claims, and a subset of procedures in the Part B Carrier data file. Anesthesia claims are defined as those with a line BETOS code where the first 2 digits = “P0” and the units for the carrier line='2'. **E&M** is the total Medicare payments for the part B evaluation and management services for a given year. E & M claims are a subset of the claims in the Part B Carrier and DME data files, and a subset of physician claims. The E & M claims are defined as those with a line BETOS code where the first digit ='M', but is not M1A or M1B, which are categorized as physician office care in this file. **Imaging** is the total Medicare payments for imaging services for a given year. Claims for imaging procedures are a subset of the claims, and a subset of procedures in the Part B Carrier and DME data files. These imaging claims are defined as those with a line BETOS code (BETOS_CD) where the first digit =I (except for 'I1E', or 'I1F' – which are considered Part B drugs). **Procedures** is the total Medicare payments for services considered part B other procedures (i.e., not anesthesia or dialysis) for a given year. Claims for other procedures are a subset of the claims, and a subset of procedures in the Part B Carrier data file. These other procedure claims are defined as those with a line BETOS code where the first 2 digits are ('P1','P2','P3','P4','P5','P6','P7', or 'P8').

Measure	Description
	Physician visits (E&M in office setting) is the total Medicare payments for the part B physician office services for a given year. Physician office claims are a subset of the claims in the Part B Carrier and DME data files, and a subset of physician evaluation and management claims (note that E&M are tabulated separately in this data file). The physician visit claims are defined as those with a line BETOS code where the first three digits =M1A or M1B (the remainder of physician services which occur in different settings appear in E & M) **Tests** is the total Medicare payments for part B tests for a given year. Claims for tests are a subset of the claims in the Part B Carrier data file. These claims are defined as those with a line BETOS code where the first digit =T. **Part B drugs** is the total Medicare payments for Part B drugs for a given year. Part B drug claims are a subset of the claims in the Part B Carrier and DME data files. The Part B drug claims are identified by BETOS codes with values of 'D1G','O1D','O1E','O1G','I1E', or 'I1F'.
Hospital outpatient + ambulatory surgery centers	Hospital outpatient + Ambulatory surgery center **Hospital outpatient** is the total Medicare payments in the hospital outpatient setting for a given year. Calculated as the sum of CLM_PMT_AMT for all HOP claims where the CLM_PMT_AMT >= 0. **Ambulatory surgery center** is the total Medicare payments in the part B ambulatory surgery center (ASC) setting for a given year. ASC claims are a subset of the claims in the Part B Carrier data file. The ASC claims are identified by the claim lines where the HCFA type service code = 'F'. The total ASC Medicare Payments are calculated as the sum of NCH payment amount where the processing indicator code was ('A','R', or 'S').
SNF	This variable is the total Medicare payments in the skilled nursing facility (SNF) setting for a given year. The total Medicare payments for SNF are calculated as the sum of non-negative claim payment amounts for all SNF claims.
Home health	This variable is the total Medicare payments in the home health (HH) setting for a given year. Calculated as the sum of non-negative claim payment amounts for all HH claims.
Other hospital (IRF, LTAC, IPF)	Other inpatient payments + Other inpatient per diem payments **Other inpatient payments** is the sum of the Medicare claim payment amounts in the other inpatient settings for a given year. **Other inpatient per diem payments** is the sum of all the pass through per diem payment amounts in the other inpatient setting for a given year. Medicare payments are designed to include certain "pass-through" expenses such as capital-related costs, direct medical education costs, kidney acquisition costs for hospitals that are renal transplant centers, and bad debts. This variable is the sum of all the daily payments for pass-through expenses. It is not included in the other inpatient Medicare payment amount. Other inpatient claims are a subset of the claims in the IP data file consisting of data from IP settings such as long-term care hospitals, inpatient psychiatric facilities, inpatient rehabilitation facilities, and other types of IP facilities such as children's hospitals or cancer centers.
DME	This variable is the total Medicare payments for part B durable medical equipment (DME) for a given year. Claims for DME are a subset of the claims in the Part B

Measure	Description
	Carrier and DME data files. These claims are defined as those with a line BETOS code where the first three digits are ('D1A','D1B','D1C','D1D','D1E', or 'D1F').
Hospice	This variable is the total Medicare payments in the hospice setting for a given year. The total Medicare payments are calculated as the sum of non-negative claim payment amounts for all hospice claims.

Table 13. Utilization Variable Specifications

Measure	Description
Physician office E&M	Physician office E&M is the count of events in the Part B physician office services (PHYS) for a given year. An event is defined as each line item that contains the relevant service. Physician office claims are a subset of the claims in the Part B Carrier and DME data files, and a subset of physician evaluation and management claims (note that E&M are tabulated separately in this data file). The PHYS claims are defined as those with a line BETOS code where the first three digits =M1A or M1B (the remainder of physician services which occur in different settings appear in E&M).
BETOS imaging	This variable is the count of events for imaging services (IMG) for a given year. An event is defined as each line item that contains the relevant service. Claims for imaging procedures are a subset of the claims, and a subset of procedures in the Part B Carrier and DME data files. These imaging claims are defined as those with a line BETOS code where the first digit =I (except for 'I1E', or 'I1F' – which are considered Part B drugs).
BETOS procedures	This variable is the count of events for Part B other procedures for a given year. An event is defined as each line item that contains the relevant service. Claims for other procedures are a subset of the claims in the Part B Carrier data file. These other procedure claims are defined as those with a line BETOS code where the first 2 digits are ('P1','P2','P3','P4','P5','P6','P7', or 'P8').
BETOS tests	This variable is the count of events in for Part B tests for a given year. An event is defined as each line item that contains the relevant service. Claims for tests are a subset of the claims in the Part B Carrier data file. These claims are defined as those with a line BETOS code where the first digit =T.

Note: Procedures, imaging and tests measures are Berenson-Egger Type of Service (BETOS) code categories. 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.

Table 14. Risk-Adjusted Quality Measure Specifications

Measure	Description
Overutilization of costly services	Beneficiaries age 65 or older receiving one or more surgical procedures that have generated concern regarding potential overutilization. Selected procedures from the Healthcare Effectiveness Data and Information Set (HEDIS) Frequency of Selected Procedures measure. Specifically included are the procedures in the FSP-3 table for Medicare plan reporting: bariatric weight loss surgery, CABG, PCI, cardiac catheterization, carotid endarterectomy, cholecystectomy (open), cholecystectomy (laparoscopic), back surgery, hysterectomy (abdominal), hysterectomy (vaginal), prostatectomy, total hip replacement, total knee replacement, mastectomy, and lumpectomy (specific codes subject to copyright).
Appropriate and efficient setting of care, Ambulatory Surgical Center (ASC) conditions	Beneficiaries admitted as inpatients for an ASC-covered procedure, divided by beneficiaries receiving one or more surgical procedures relatively likely to be performed on ambulatory basis. See HCPCS codes on the ASC payment list (see Addendum Table AA in, for example, http://cms.gov/Medicare/Medicare-Fee-for-Service-Payment/ASCPayment/ASC-Regulations-and-Notices-Items/CMS-1589-FC.html?DLPage=1&DLSort=2&DLSortDir=descending) with payment indicators A2, G2, J8, L6, P2, P3, or R2 [surgical procedures, and new technology intraocular lens; excludes drugs, procedures integral to a surgical procedure, and other packaged services in the ASC payment system] on physician claims with line performed date within an inpatient stay)
Appropriate and efficient setting of care, low-intensity DRGs	Beneficiaries admitted as inpatients for certain low-intensity DRGs divided by hospitalizations at non-Federal short-stay hospitals, excluding for cancer, primary psychiatric, and rehabilitation conditions of ACO beneficiaries. The relevant low-intensity DRGs cover the following diagnoses: disequilibrium, respiratory infections & inflammations, chronic obstructive pulmonary disease, simple pneumonia & pleurisy, bronchitis & asthma, percutaneous cardiovascular procedure with non-drug-eluting stent, circulatory disorders except AMI with cardiac catheterization, syncope & collapse, chest pain, gastrointestinal hemorrhage, esophagitis, gastrointestinal & miscellaneous digest disorders, cellulitis, kidney & urinary tract infections, and signs & symptoms without major complications and comorbid conditions.
Hospital-wide all cause 30-day readmissions	For patients age 65 or older, unplanned readmissions within 30 days of discharge divided by hospitalizations at non-Federal short-stay hospitals, excluding for cancer, primary psychiatric, and rehabilitation conditions (http://www.qualitymeasures.ahrq.gov/content.aspx?id=46502).

Measure	Description
7-day inpatient post-discharge physician visit	Patients with one or more physician visits within 7 days of discharge divided by hospitalizations at non-federal short-stay hospitals, excluding for cancer, primary psychiatric, and rehabilitation conditions. The conceptual basis of this measure is consistent with HEDIS follow up after hospitalization measure, which also includes a 7-day window for physician follow-up. This measure is also consistent with the required elements to bill Transition Care Management CPT code 99496. There has been research on the use of 7-day follow-up period for physician visits following a hospitalization for heart failure to reduce hospital readmissions (see http://jama.jamanetwork.com/article.aspx?articleid=185798). And lastly, Mathematica has an implementation & monitoring contract for the Community-Based Care Transitions Program, and among other measures, includes 7- and 30-day post-discharge physician follow-up rates (http://www.mathematica-mpr.com/our-publications-and-findings/projects/community-based-care-transitions).
Ambulatory care-sensitive conditions (ACSCs): AHRQ Prevention Quality Indicator (PQI) Overall Composite	Admissions for one of the following conditions: diabetes with short-term complications, diabetes with long-term complications, uncontrolled diabetes without complications, diabetes with lower-extremity amputation, chronic obstructive pulmonary disease, asthma, hypertension, heart failure, angina without a cardiac procedure, dehydration, bacterial pneumonia, or urinary tract infection, divided by population 18 years and older in metropolitan area or county (http://www.qualityindicators.ahrq.gov/Downloads/Modules/PQI/V43/Composite_User_Technical_Specification_PQI_4.3.pdf).
ACSCs: AHRQ PQI admissions for heart failure (ACO #10)	Admissions with a principal diagnosis of heart failure per 100,000 population, ages 18 years and older/discharges, for patients ages 18 years and older, with a principal ICD-9-CM diagnosis code for heart failure (http://www.qualityindicators.ahrq.gov/Downloads/Modules/PQI/V45/TechSpecs/PQI%2008%20Heart%20Failure%20Admission%20Rate.pdf).
ACSCs: AHRQ PQI admission for COPD (ACO #9)	Admissions with a principal diagnosis of chronic obstructive pulmonary disease (COPD) or asthma per 100,000 population, ages 40 years and older divided by the population 40 years and older in metropolitan area or county (http://www.qualityindicators.ahrq.gov/Downloads/Modules/PQI/V45/TechSpecs/PQI%2005%20COPD%20or%20Asthma%20in%20Older%20Adults%20Admission%20Rate.pdf).
Risk-adjusted in-hospital all-cause mortality for patients with high-mortality conditions	Number of in-hospital deaths among beneficiaries with high-mortality conditions divided by the number of all deaths among beneficiaries with high-mortality conditions
Risk-adjusted in-ICU all-cause mortality for patients with high-mortality conditions	Number of in-hospital deaths where the terminal discharge had one or more ICU days among beneficiaries with high-mortality conditions divided by the number of all deaths among beneficiaries with high-mortality conditions

Notes: Data are from Medicare claims and obtained from the Research Identifiable Files accessed through the Chronic Conditions Warehouse.

Payments versus Prices

The evaluation used CMS payments for its spending results. Payments include differences in wages across areas of the country as well as indirect medical education (IME) and disproportionate

share hospital (DSH) payments, though not beneficiary copayments or payments from other insurance carriers. Since CMS payments contain the artifacts of the payment system, they are not an accurate proxy for changes in utilization that may or may not be occurring in ACOs. CMS payments do, however, reflect expenditures of the Medicare program itself. The goal in spending analyses is to determine whether CMS saved money through the AP model, and analyses of utilization patterns show how ACOs might be saving the Medicare program money.

The evaluation isolated ACOs' spending against their market trends with difference-in-differences analyses. Comparisons against beneficiaries in an ACO's market thus assume that the price of services is equal.

Expenditure Caps

Because extreme values for Medicare expenditures can unduly influence and examination of mean expenditures, the evaluation capped annual expenditures at the 99th percentile separately for non-end-stage renal disease (ESRD) and ESRD beneficiaries with the values used in the financial benchmark methodology. See

Table 15 for the value of the caps.

In addition, we examined the share of beneficiaries in the treatment and comparison groups that are low or high utilizers, as defined by low and high expenditures, to assess the extent to which those means are sensitive to outlier values.[31] We found similarities in the shares of beneficiaries in the treatment and control groups who were low or high utilizers; the magnitude of their spending was also similar. (See Table 27 through

[31] Low utilizer beneficiaries were defined as those with non-zero expenditures of $25 or less per month. High utilizer beneficiaries were defined as those beneficiaries with expenditures of $5,000 or more per month.

Table 32 in the Appendix.)

Table 15. Expenditure Caps

Baseline or Performance Year	Non-End-stage Renal Disease Beneficiaries	End-stage Renal Disease Beneficiaries
2010, 2011	$134,644	$422,089
2012	$135,359	$414,767
2013	$143,238	$426,159
2014	$136,852	$410,341

Estimation Strategy

Estimating the treatment effect for AP ACOs involves comparing the outcomes of their assigned beneficiaries with a counterfactual outcome based on a comparison group of beneficiaries drawn from the counties where assigned beneficiaries reside. In the following discussion, we outline how we estimated a treatment effect for a single AP ACO, which shows how we "selected" (weighted) the comparison group for our estimated treatment effects.

Treatment Effect

The two populations, treatment and comparison, in the ACO markets are indexed by $D_i \in \{0,1\}$, where $D_i = 1$ refers to ACO "treatment" beneficiaries and $D_i = 0$ refers to comparison group beneficiaries.

The outcomes over the treated and untreated can be represented by:

$$Y_i = D_i Y_i^1 + (1 - D_i) Y_i^0,$$

where Y_i^1 and Y_i^0 represent the outcomes that individual i would experience if treated or untreated, respectively. Assumptions necessary to estimate the population average treatment effect (ATE) are more restrictive than estimating the average treatment on the treated (ATT) so we focus on estimators for the ATT. Of course, under homogenous treatment effects, the two estimates are equivalent.

The ATT identifies the difference in the expected outcome of the treated population given the treatment relative to outcomes not given the treatment. That is, we identified $E[Y_i^1 - Y_i^0 | D_i=1]$, which can be rewritten as $E[Y_i^1|D_i=1] - E[Y_i^0|D_i=1]$. The estimator for $E[Y_i^1|D_i=1]$ is straightforward, as these outcomes are observed in the data. If N^1 represents the number of treated individuals and y_i^1 the outcome for the ith treated individual, then the sample mean,

$$\overline{Y^1} = \frac{1}{N^1} \sum_{i=1}^{N^1} y_i^1 \ ,$$

is an unbiased efficient estimator for $E[Y_i^1|D_i=1]$.

Rather than a simple mean, we can think of the sample mean as a weighted mean, weighted to the characteristics of the ACO-assigned population. If outcomes vary over observable covariates and these covariates can be used to create mutually exclusive categories (strata), we can calculate the mean for each stratum and average the means over strata, weighting by the proportion of treated individuals in each stratum. For instance, in examining the outcome over strata defined by age groups (<65, 65-74, 75-84, 85+) and sex (male, female), we would have eight permutations of the categorical variables, which can be represented by eight dummy variables equal to 1 if individual i is a member of the age-sex stratum k and 0 otherwise ($I_{i,k}^1=1$ if $x_{i,k}^1=1$). While eight mutually exclusive strata are given as an example, the number of strata is limited only by the data. The proportion of treated individuals in each stratum can be represented as $\pi_k^1 = \frac{1}{N^1}\sum_{i=1}^{N^1} I_{i,k}^1$.

A sample average outcome can be computed for each strata, $\bar{y}_k^1$, and the expected outcome for the treated population is a weighted average of the strata averages.

That is,

$$\bar{Y}^1 = \sum_{k=1}^{K} \pi_k^1 \bar{y}_k^1.$$

However, the counterfactual is not observed. Instead, we observe $E[Y_i^0|D_i=0]$, the average outcome in the comparison market weighted relative to the proportion of comparison beneficiaries in each stratum. Or, as noted above, we observe $\bar{Y}^0 = \sum_{k=1}^{K} \pi_k^0 \bar{y}_k^0$. If selection occurs on the observed characteristics, then we wish to measure the expected comparison market outcome given the observables of the treated individuals, the estimator being $\bar{Y}_1^0 = \sum_{k=1}^{K} \pi_k^1 \bar{y}_k^0$, which gives us the average outcome in the comparison market if the comparison beneficiaries had the same characteristics as the treated beneficiaries.

This approach allows us to measure the difference in the actual outcome for the treatment group versus this counterfactual outcome:

$$\begin{aligned} Effect &= Actual - Counterfacutal \\ &= E[Y_i^1|D_i = 1] - E[Y_i^0|D_i = 1] \\ &= \sum_{k=1}^{K} \pi_k^1 \bar{y}_k^1 - \sum_{k=1}^{K} \pi_k^1 \bar{y}_k^0 . \end{aligned}$$

As noted above, we observe both sample means, $\bar{Y}^1 = \sum_{k=1}^{K} \pi_k^1 \bar{y}_k^1$ and $\bar{Y}^0 = \sum_{k=1}^{K} \pi_k^0 \bar{y}_k^0$. Given their distribution of the K observables, and only need to calculate the counterfactual, $\bar{Y}_1^0 = \sum_{k=1}^{K} \pi_k^1 \bar{y}_k^0$.

If we *weight* the comparison beneficiaries by the ratio of the proportion of treated beneficiaries in stratum k to the proportion of comparison beneficiaries in stratum,

$$w_k = \frac{\pi_k^1}{\pi_k^0} \text{ if } K_i = k ,$$

then, we can obtain the counterfactual:

$$\begin{aligned}\sum_{k=1}^{K} \pi_k^0 \bar{y}_k^0 \, w_k &= \sum_{k=1}^{K} \pi_k^0 \bar{y}_k^0 \frac{\pi_k^1}{\pi_k^0} \\ &= \sum_{k=1}^{K} \pi_k^1 \bar{y}_k^0 \\ &= \bar{Y}_1^0\end{aligned}$$

Therefore, we can obtain the same distribution of observable characteristics in the comparison population and estimate the outcome for the treated individuals had they not received treatment, which provides the necessary component to estimating the ATT.

Covariates

Analyses of expenditure and utilization outcomes followed the difference-in-differences design described above. We included a number of covariates in the regression to control for time-varying observed differences between the treatment and comparison beneficiaries (seeTable 16). We included a number of chronic conditions that are less likely to be affected by the intervention, at least during the period under evaluation. Furthermore, these conditions are less likely to be identified because of differences in treatment or coding patterns of providers. Other chronic conditions or risk scores do not have these characteristics and may be endogenous to the intervention and bias the results. But to include information on a broader number of chronic conditions and pre-ACO illness burden of the treatment and comparison populations, we also included the beneficiary Hierarchical Condition Category scores lagged two years from the year of interest, derived from utilization three years prior to the year of interest. Beneficiaries who were not enrolled in Medicare in prior years were assigned the new enrollee score; an additional indicator was included as a regressor in the model, noting when a beneficiary was missing a lagged HCC score. While a lagged score does not provide the most up-to-date information regarding beneficiaries, these scores were calculated prior to the implementation of the AP model and are thus unaffected by post-ACO provider behavior.

The regression was also estimated over the comparison beneficiary populations and included the same demographic and health-related variables. All covariates were available for the baseline and performance years.

Table 16. Regression Covariates Used to Estimate the Conditional Counterfactual Mean Change in Expenditures and Utilization

Covariate	Specification
Age	Four indicator variables: less than 65 years, 65 to 74 years; 75 to 84 years; and 85 years and older
Sex	Indicator variable equal to 1 if the beneficiary was female
Race	Five indicator variables: white, black, Hispanic, Asian, other race.

Covariate	Specification
Died in year	Indicator variable equal to 1 if the beneficiary died in year
Acute myocardial infarction (AMI) in year	Indicator variable equal to 1 if the beneficiary had an AMI in year indicated
AMI 3 year history	Indicator variable equal to 1 if the beneficiary had an AMI at any time in the 3 prior years
Colorectal cancer in year	Indicator variable equal to 1 if the beneficiary had colorectal cancer in year
Colorectal cancer in 3-year history	Indicator variable equal to 1 if the beneficiary had colorectal cancer at any time in the prior 3 years.
Hip fracture in year	Indicator variable equal to 1 if the beneficiary had a hip fracture in year
Hip fracture 3-year history	Indicator variable equal to 1 if the beneficiary had a hip fracture at any time in the prior 3 years.
Lung cancer in year	Indicator variable equal to 1 if the beneficiary had lung cancer in year
Lung cancer 3-year history	Indicator variable equal to 1 if the beneficiary had lung cancer at any time in the prior 3 years.
Stroke in year	Indicator variable equal to 1 if the beneficiary had a stroke in year
Stroke 3-year history	Indicator variable equal to 1 if the beneficiary had a stroke at any time in the prior 3 years.
End-stage renal disease (ESRD)	Indicator variable equal to 1 if the beneficiary's Medicare status was aged with ESRD, disabled with ESRD, or ESRD only
Medicaid dual eligibility status	Indicator equal to 1 if beneficiary had at least one month of Medicaid dual eligibility in the year
Hierarchical Condition Category score	HCC score of beneficiary two years prior to the year of the outcome. New enrollee score for those without an HCC score two years prior

To check the effect of our adjustment on expenditure outcomes, we examined changes in expenditures from year to year for the treatment and unadjusted and adjusted comparison groups. Table 33 and Table 34 in the Appendix show that the growth in expenditures for the treatment and comparison groups look more similar after applying our adjustment to the comparison group. This check also showed that growth from year to year is within an expected magnitude given national trends.

Using Regression to Reweight Observable Characteristics

Simple comparisons of outcome means across intervention and comparison beneficiaries may be biased, as ACO participants (both providers and the beneficiaries assigned to them) are not randomly selected and may differ in important systematic ways from nonparticipants. Therefore, to estimate the treatment effect on the assigned beneficiaries, we used a difference-in-differences estimator and the Oaxaca-Blinder regression-based reweighting technique to ensure that comparison beneficiaries are similar to treatment beneficiaries (Blinder, 1973; Oaxaca, 1973). The reweighting technique is similar to using a propensity score (reweighting) method (Dinardo, 2002;

Kline, 2011).[32] In essence, the method adjusts, or reweights, the comparison population to remove potential biases from selection on observable characteristics.

Propensity scores are not well suited for the AP ACO evaluation 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 assigned to an ACO based on which providers they receive services from.

A second reason it is problematic to model the propensity that a beneficiary is assigned 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.

Given these conceptual limitations of propensity scores with the AP 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. Oaxaca-Blinder 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 matching step and a regression step.

We calculated the Oaxaca-Blinder reweighting estimator using linear regression. Note that the actual outcome as a function of the *K* strata is the estimate from a linear regression of the outcome *Y* on the vector of *K* indicators.

$$\begin{aligned}\hat{y}_k &= \sum_{k=1}^{K} \hat{\beta}_k I_k \\ &= E[y_i | K_i = k] \\ &= \bar{Y} \\ &= \sum_{k=1}^{K} \bar{y}_k \pi_k\end{aligned}$$

where $I_{i,k}=1$ if $x_{i,k}=1$, as before, and $\hat{\beta}_k = \bar{y}_k$. So, when we regress the outcome variable on the vector of indicators for the comparison population,[33] we then obtain $\hat{\beta}_k^0 = \bar{y}_k^0$. Using the beta

[32] Kline (2011) shows that the Oaxaca (1973)-Blinder (1973) regression based estimate is equivalent to a propensity score reweighting estimator under the assumption of "common support" (see also Dinardo, 2002).

[33] When estimating the regression on the comparison population, we also weighted comparison beneficiaries such that they were proportionally representative of the treatment population by county.

estimates from the regression for the comparison population to predict outcomes for the treatment population provides our previous counterfactual:

$$\begin{aligned}\hat{y}_{k,1}^{0} &= \sum_{k=1}^{K} \hat{\beta}_k^0 I_k^1 \\ &= \sum_{k=1}^{K} \hat{\beta}_k^0 \frac{1}{N^1} \sum_{k=1}^{K} I_k^1 \\ &= \sum_{k=1}^{K} \bar{y}_k^0 \pi_k^1\end{aligned}$$

This result is the Oaxaca-Blinder reweighting technique. The Oaxaca-Blinder approach identifies the counterfactual outcomes if the data-generating process for mean untreated outcomes is linear in the covariates. Kline (2011) additionally showed that this method produces consistent estimates if the odds of treatment are linear in the covariates (i.e. the propensity score). Given these two conditions are sufficient for consistent identification of the treatment effect, the Oaxaca-Blinder reweighting estimator belongs to the family of doubly robust estimators.

To check the goodness of the comparison groups, we compared the adjusted mean baseline expenditures of the comparison group to the adjusted mean baseline expenditures of the treatment group. If the comparisons are appropriate, we would expect to see that the adjusted mean expenditures were similar in more than half of the individual comparisons and the direction of error was both higher and lower (half the ACOs had higher and half lower spending than the comparison groups at baseline). Results in Table 35 through Table 37 are consistent with these conditions.

Estimation Approach for Quality of Care Outcomes

We evaluated AP ACOs' quality of care using two approaches based on data available. For the GPRO process and clinical outcome measures, where we only observe outcomes for the ACOs and not for their comparison group, we estimated models of the measures as functions of a time trend and also ACO- and market-level characteristics. Furthermore, we grouped the 17 individual claims-based measures into four coherent composites (care coordination, diabetes, cardiovascular disease, and preventive care) and analyzed results for all ACO-assigned beneficiaries as well as those with at least one inpatient hospitalization in the year.

The analyses of all of the claims-based quality measures used the same difference-in-differences approach as the expenditures and utilization analyses. Beneficiaries assigned to an ACO in a particular performance year were compared to beneficiaries in the baseline years (2010 and 2011 for ACOs starting in 2012; 2011 and 2012 for ACO starting in 2013) who would be assigned to the ACO in the baseline period, based on the TINs composing the ACO in the particular performance year (2012, 2013, or 2014). We then compared the change in performance over time for ACO-assigned beneficiaries to the change over the same time period for a comparison group of beneficiaries residing in the counties where the ACO's assigned population resides and who were eligible to be assigned to an ACO but were in fact not assigned to any Pioneer or MSSP

ACO. Comparison group beneficiaries were weighted by the proportion of the ACO's assigned population residing in that county (ACO-assigned beneficiaries were given a weight of 1.0).

We used the Oaxaca-Blinder method described previously to calculate risk-adjusted difference-in-differences estimates for quality measures. This method adjusts outcomes for risk factors with a model calibrated on the comparison group, using the difference between the ACO's performance versus what its performance would be if the ACOs' outcomes followed the same relationship with risk factors found in the comparison group. Just as with the cost and utilization measures, we estimated the quality measures as linear models.

Physician Survey Methods

The AP physician survey sample was designed to be representative of primary care physicians participating in the AP ACO Model, rather than individual ACOs. It was limited to ACO-participating physicians with the following specialty designations: general practice (1), family practice (8), internal medicine (11), or geriatric medicine (38).[34] Participating physicians, defined as all NPIs associated with participating TINs,[35] were identified based on PY2 participant lists. The sample was selected randomly from the final list of NPIs participating with AP ACOs. The questionnaire was used to screen providers to eliminate any that had *not* been participating in the same ACO for at least 12 months. Although primary care physicians were targeted, some respondents identified as medical specialists or nurse practitioners or physician assistants.

The survey was fielded from September 2014 through April 2015 using a mixed-mode approach of mail and Web administration with telephone follow-up to non-responders. An option to complete a Web version of the survey was also offered, with a link provided in the cover letter. A $50 prepaid incentive was provided in the initial mailing. The total sample for the AP ACO physician survey was 1,150 physicians; 204 were ineligible,[36] and 545 completed the survey for a response rate of 58 percent. The analysis relied on responses from the 545 physicians participating in an AP ACO. Selected sample characteristics are shown in Table 17.

Table 17. Sample Characteristics

Characteristics	Share of AP Physicians (n=545)
Years in practice	
<10	15%
10 -19	35%
20+	50%
Specialty	

[34] Captured using the TAXONOMY code from the NPPES and the HCFA specialty Taxonomy code crosswalk from CMS: http://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/MedicareProviderSupEnroll/Downloads/TaxonomyCrosswalk.pdf

[35] TINs were excluded if they were in multiple ACOs, were found in the carrier file but no associated NPI was found in the claims, or the TINs were not found in the carrier file. FQHCs and RHCs matched to NPIs were also included. Finally, NPIs were excluded if there was no match in the NPPES or, based on that match, the NPI belonged to a specialist or an organization.

[36] The most common reasons for ineligibility included never having participated in an ACO and not participating in an ACO for at least 12 months. Other reasons included retired, deceased, and no longer in clinical practice.

Characteristics	Share of AP Physicians (n=545)
Primary care physician	90%
Medical specialist	9%
NP/PA	<1%
Practice size (# FTE physicians)	
<5	59%
6-30	35%
31+	6%
Practice type	
Solo	32%
Single specialty group	38%
Multispecialty group	28%
Medical school/hospital	<1%
Compensation	
Fixed salary only	14%
Fixed salary + bonus	26%
Volume-based	35%
Volume-based + bonus	17%
Census region	
Northeast	15%
Midwest	31%
South	50%
West	4%
Urban/rural measure	
Metropolitan	89%
Micropolitan	5%
Rural	6%
MA penetration rate	
20% or less	29%
Greater than 20%	71%

Note: FTE=full time equivalent, NP/PA=nurse practitioner/physician assistant, MA=Medicare Advantage. Medical specialists may include internal medicine physicians with subspecialties who self-report as specialists. There may also be inconsistencies between self-reports and specialty designations in the NPPES due to timing or other issues.
Source: L&M analysis of data from the 2014 Survey of Physicians Participating with Medicare ACOs.

Qualitative Methods

Quarterly assessment interviews and site visits with each AP ACO collected self-reported data on implementation of AP ACO systems, processes, and initiatives to contextualize observed cost, quality, and utilization outcomes. The goal of these activities was to collect first-hand information that helps to explain the drivers underlying ACO performance. They included views into the operations and management of the ACOs, as well as the market context in which they operated, to help explain differences that may not be apparent through traditional secondary data analyses.

Quarterly Assessment Interviews

One-hour quarterly assessment telephone interviews were conducted with each of the AP ACOs. The quarterly assessment interviews were designed to provide the team with continuous, high-level assessments of how the ACOs were performing and evolving. The quarterly assessment interview questions solicited detail that contextualized observed data patterns (i.e., cost, quality, and utilization outcomes); decision processes; and implementation of ACO systems, processes, and initiatives. The findings in the quarterly assessments were also fed into the secondary data analyses to guide the research, as appropriate. Each interview was conducted by a two-person team, with one serving as the interview lead and the other taking transcript-style notes that were coded to organize details from the notes and facilitate analyses of the interview findings. The quarterly assessment interview protocols were organized into modules of questions that address each domain of the project's conceptual framework. The topics and timing of the quarterly assessments, as well as the entry and exit of ACOs into the cohort, from the beginning of the evaluation to date are shown in Table 18.

Table 18. ACO Quarterly Assessment Interviews with AP ACOs, 2012 to 2014

Quarterly Assessment Topic	2012 Starters Interview Date	2013 Starters Interview Date
History, Leadership, and Governance	December 2012–January 2013	March–April 2014
Provider Network	March–April 2013	March–April 2014
Marketplace and Environment	June–July 2013	March–April 2014
Population Health/Care Management	October–November 2013	June–July 2014
Health IT and Information/Data Management	February–March 2014	June–July 2014
Strategy, Finance, and Sustainability	June–July 2014	October–November 2014
Care Continuum	October–November 2014	October–November 2014
ACO Self-Assessment and Model Design	January–March 2015	January–March 2015
Gap Filling	May–July 2015	May–July 2015

Site Visits

A site visit with each ACO provided the opportunity to gather qualitative data from multiple sources.[37] The L&M research team conducted nearly all site visits in 2013 and 2014. The site visits provided access to key stakeholders including ACO administrators, management staff, medical providers, and others, affording the opportunity to better understand successes and challenges affecting an ACO's ability to deliver quality care and contain costs and strategies for mitigating challenges and capitalizing on successes.

[37] Site visits could not be scheduled for two AP ACOs.

Each site visit was typically two full days in length with two members of the study team. A senior researcher and one staff research assistant facilitated all on-site interviews. Key ACO decision-makers and selected ACO staff were asked to participate in the interviews depending on specific informational needs. Selected ACO staff sometimes included nurse managers, site-specific administrators (hospital, SNF, home health, hospice), clinical and non-clinical staff associated with care management, and staff associated with provider communications and incentive structures. The research assistant took transcript-style notes that were coded to organize details from the notes and facilitate analyses of the interview findings. The notes were also turned into a site visit report on each ACO. These reports were organized into key topics (e.g., management, care coordination activities, physician engagement) to facilitate review by the team across ACOs. Each site visit report was reviewed by ACO stakeholders to correct errors of fact.

Analysis

The evaluation team used Dedoose, a relational database built to support mixed-methods research, to store all written interview notes. Dedoose is a secure, Web-based application that facilitates aggregation and storage of historical and current data by a broad team of users, allowing immediate access and real-time data sharing, with tight controls for access levels and version management. Each study document (all relevant primary data) was loaded into Dedoose and coded using a defined list of key topics and themes. The team used coded interview notes in Dedoose to identify relevant themes and excerpts by topic. In addition, we summarized raw site visit debriefs and quarterly assessments using keyword searches and reviews of documents by topic and validated those summaries with the interview teams.

The team developed a list of six features of ACOs' care management and HIT infrastructure using a combination of a literature scan and lead interviewer survey responses on the topic of care management. Feasibility was also a consideration: given the semi-structured interview protocols, our interviews with the ACOs yielded varying levels of detail about any particular topic, limiting how much comparable information we had across all ACOs. These six structure/process features reflected topics for which detailed information was available from quarterly assessment interviews and site visits with AP ACOs for every AP ACO. These features are:

1. AP has care management programs (Yes/No)
2. AP uses claims and/or EHR data to identify patients for care management (Neither claims nor EHR; Claims only; EHR only; Claims & EHR)
3. ACO physicians have a single EHR ("No" = Multiple/no EHRs and "Yes" = single EHR across the ACO)
4. Care managers embedded in any ACO practices (Yes/No)
5. AP routinely receives timely notification from hospitals of inpatient admissions/discharges (Yes/No)
6. Visiting ACO patients during an inpatient stay is part of care management program (Yes/No)

Two reviewers were assigned to each variable and independently reviewed site visit reports for each ACO to determine the correct close-ended response for each AP ACO. Reviewers also recorded the text supporting the selected responses. In instances where sufficient detail was not available in the site visit narrative, reviewers consulted transcript-style notes from relevant quarterly assessment interviews. The reviewers then reconciled their individual responses. In cases

where there was disagreement, reviewers compared textual evidence from the site visit debrief narratives to reach consensus. Once the reviewers reconciled all responses to the six key features, the team circulated the data collection tool to ACO leads who had deep knowledge of the ACOs they interviewed for review and validation. This information has a number of limitations: (1) it was self-reported by the ACO; (2) it was collected at a point in time but may have changed after the interview was conducted; and (3) it does not provide detail on how well or how often certain activities occur, so it may be an insensitive measure of important facets of care management.

Second Stage Regression

We implemented a feasible weighted least squares transformation to adjust for heteroskedasticity in the difference-in-differences estimates. We standardized our results by dividing the outcome (the DD estimate) and the right-hand side covariates (market, ACO, beneficiary, and wage index) by bootstrapped standard errors:

$$\text{(E1)} \qquad \frac{Y_{jt}}{S_{jt}} = \beta_0 \left(\frac{1}{S_{jt}}\right) + \frac{X_{jt}}{S_{jt}}\beta_1 + \frac{e_{jt}}{S_{jt}}$$

The constant term in Equation E1 is replaced by $\frac{1}{S_{jt}}$, where S_{jt} is the bootstrapped standard error corresponding to ACO j in intervention year t. β_0 is interpreted as the average ACO effect, conditional on each of the market, beneficiary, and ACO-specific covariates. X_{jt} is the vector of market, ACO, and beneficiary covariates; we interpret $\beta_1$as the correlation of the covariates with the estimated results. We divide the error term, e_{jt}, by S_{jt} to standardize the residuals.

Meta-evaluation techniques commonly employ the fixed-effect estimation approach highlighted in Equation E1. This strategy assumes a homogenous intervention effect among studies; analogously, the second-stage regression utilizes this estimation strategy to assume a homogenous ACO effect among markets. The small sample sizes used in our approach prohibit the more general random-effects estimation, which allows the underlying true distribution of ACO effects to be normally distributed.

APPENDIX 1. ADDITIONAL DATA TABLES

Table 19. Advance Payment Accountable Care Organizations Beneficiary Counts and Turnover, 2012 to 2014

Name	Location	Beneficiary count			Share of beneficiaries assigned in 2012 that were assigned in 2013	Share of beneficiaries assigned in 2013 that were assigned in 2014	Share of beneficiaries assigned in 2013 that were assigned in 2012	Share of beneficiaries assigned in 2014 that were assigned in 2013
		2012	2013	2014				
April 2012 Starters								
Coastal Carolina Quality Care	New Bern, NC	11,870	11,486	11,403	92%	83%	92%	86%
Comparison Market		41,794	40,337	34,858	NA	NA	NA	NA
Jackson Purchase Medical Associates	Paducah, KY	5,612	5,211	4,910	87%	79%	91%	87%
Comparison Market		27,303	26,484	18,326	NA	NA	NA	NA
North Country ACO	Littleton, NH	7,016	6,071	6,603	81%	72%	83%	76%
Comparison Market		23,470	21,537	16,283	NA	NA	NA	NA
Primary Partners	Clermont, FL	7,554	7,079	6,815	86%	62%	86%	70%
Comparison Market		161,221	151,547	141,527	NA	NA	NA	NA

Name	Location	Beneficiary count			Share of beneficiaries assigned in 2012 that were assigned in 2013	Share of beneficiaries assigned in 2013 that were assigned in 2014	Share of beneficiaries assigned in 2013 that were assigned in 2012	Share of beneficiaries assigned in 2014 that were assigned in 2013
		2012	2013	2014				
RGV ACO Health Providers	Donna, TX	6,090	5,557	7,742	83%	72%	87%	55%
Comparison Market		66,258	62,984	120,522	NA	NA	NA	NA
July 2012 Starters								
Accountable Care Partners	Jacksonville, FL	5,978	5,727	6,250	86%	75%	86%	72%
Comparison Market		128,470	124,572	102,064	NA	NA	NA	NA
Coastal Medical	Providence, RI	9,056	8,973	10,428	89%	80%	83%	75%
Comparison Market		117,035	96,035	78,375	NA	NA	NA	NA
Cumberland Center for Healthcare Innovation	Cookeville, TN	11,206	10,681	12,800	85%	74%	85%	66%
Comparison Market		49,583	45,760	43,338	NA	NA	NA	NA
Golden Life Healthcare	Sacramento, CA	8,743	8,169	7,721	76%	59%	78%	66%
Comparison Market		160,196	155,644	126,418	NA	NA	NA	NA

Name	Location	Beneficiary count			Share of beneficiaries assigned in 2012 that were assigned in 2013	Share of beneficiaries assigned in 2013 that were assigned in 2014	Share of beneficiaries assigned in 2013 that were assigned in 2012	Share of beneficiaries assigned in 2014 that were assigned in 2013
		2012	2013	2014				
Harbor Medical Associates	South Weymouth, MA	7,985	7,306	9,167	88%	83%	85%	74%
Comparison Market		45,693	25,776	21,362	NA	NA	NA	NA
Maryland ACOs of Eastern Shore	Easton, MD	5,886	5,521	12,147	86%	44%	89%	21%
Comparison Market		22,722	21,730	126,210	NA	NA	NA	NA
Maryland ACOs of Western MD	National Harbor, MD	6,018	5,627	5,846	90%	79%	90%	82%
Comparison Market		33,963	33,087	30,704	NA	NA	NA	NA
Medical Mall Services	Jackson, MS	6,256	5,343	5,619	77%	67%	82%	71%
Comparison Market		110,393	108,546	94,007	NA	NA	NA	NA
MPS ACO Physicians	Middletown, CT	5,148	3,290	6,040	61%	69%	88%	42%
Comparison Market		253,497	198,901	174,257	NA	NA	NA	NA
Physicians ACO	Houston, TX	6,357	5,948	7,805	75%	53%	76%	43%

Name	Location	Beneficiary count			Share of beneficiaries assigned in 2012 that were assigned in 2013	Share of beneficiaries assigned in 2013 that were assigned in 2014	Share of beneficiaries assigned in 2013 that were assigned in 2012	Share of beneficiaries assigned in 2014 that were assigned in 2013
		2012	2013	2014				
Comparison Market		254,836	238,252	379,898	NA	NA	NA	NA
PriMed	Shelton, CT	9,884	9,217	NA	NA	NA	NA	NA
Comparison Market		145,463	136,355	NA	NA	NA	NA	NA
Quality Independent Physicians	Louisville, KY	12,936	11,687	12,668	80%	71%	85%	69%
Comparison Market		136,554	127,899	101,897	NA	NA	NA	NA
Reliance Health Network	Tampa, FL	6,030	5,412	4,287	78%	53%	83%	71%
Comparison Market		411,690	384,807	268,865	NA	NA	NA	NA
St. Thomas Medical Group	Nashville, TN	5,099	4,727	5,109	87%	79%	86%	80%
Comparison Market		98,087	90,748	87,201	NA	NA	NA	NA
Texoma	Wichita Falls, TX	6,035	5,641	5,633	88%	82%	91%	85%
Comparison Market		18,375	13,571	16,160	NA	NA	NA	NA
January 2013 Starters								
ACO Health Partners	Jacksonville, FL	NA	10,109	12,908	NA	33%	NA	61%

Name	Location	Beneficiary count			Share of beneficiaries assigned in 2012 that were assigned in 2013	Share of beneficiaries assigned in 2013 that were assigned in 2014	Share of beneficiaries assigned in 2013 that were assigned in 2012	Share of beneficiaries assigned in 2014 that were assigned in 2013
		2012	2013	2014				
Comparison Market		NA	222,477	508,408	NA	NA	NA	NA
American Health Alliance	Ocala, FL	NA	6,493	7,886	NA	77%	NA	76%
Comparison Market		NA	80,111	159,170	NA	NA	NA	NA
American Health Network of Ohio Care Organization	Columbus, OH	NA	7,276	7,886	NA	74%	NA	74%
Comparison Market		NA	127,975	121,171	NA	NA	NA	NA
Bay Area Florida Physicians Trust	Winter Park, FL	NA	8,682	5,782	NA	49%	NA	80%
Comparison Market		NA	151,850	171,169	NA	NA	NA	NA
Fort Smith Physicians Alliance ACO	Fort Smith, AR	NA	10,599	9,650	NA	43%	NA	67%
Comparison Market		NA	134,953	118,880	NA	NA	NA	NA
Integrated ACO	Austin, TX	NA	6,726	9,776	NA	71%	NA	70%
Comparison Market		NA	79,761	163,227	NA	NA	NA	NA

Name	Location	Beneficiary count			Share of beneficiaries assigned in 2012 that were assigned in 2013	Share of beneficiaries assigned in 2013 that were assigned in 2014	Share of beneficiaries assigned in 2013 that were assigned in 2012	Share of beneficiaries assigned in 2014 that were assigned in 2013
		2012	2013	2014				
KCMPA-ACO	Kansas City, MO	NA	11,662	13,271	NA	75%	NA	77%
Comparison Market		NA	145,748	120,648	NA	NA	NA	NA
Lower Shore ACO	National Harbor, MD	NA	10,608	10,143	NA	73%	NA	80%
Comparison Market		NA	72,793	53,245	NA	NA	NA	NA
National ACO	Beverly Hills, CA	NA	4,882	5,222	NA	49%	NA	65%
Comparison Market		NA	340,969	315,579	NA	NA	NA	NA
Nature Coast ACO	Beverly Hills, FL	NA	6,251	6,550	NA	73%	NA	74%
Comparison Market		NA	60,568	59,176	NA	NA	NA	NA
NOMS ACO	Sandusky, OH	NA	7,410	6,895	NA	63%	NA	74%
Comparison Market		NA	129,591	77,552	NA	NA	NA	NA
Owensboro ACO	Owensboro, KY	NA	7,699	8,208	NA	83%	NA	83%
Comparison Market		NA	31,951	29,511	NA	NA	NA	NA
Physicians Collaborative Trust ACO	Maitland, FL	NA	12,796	12,169	NA	71%	NA	80%

Name	Location	Beneficiary count			Share of beneficiaries assigned in 2012 that were assigned in 2013	Share of beneficiaries assigned in 2013 that were assigned in 2014	Share of beneficiaries assigned in 2013 that were assigned in 2012	Share of beneficiaries assigned in 2014 that were assigned in 2013
		2012	2013	2014				
Comparison Market		NA	184,012	170,963	NA	NA	NA	NA
Primary Partners ACIP	Clermont, FL	NA	6,551	6,883	NA	75%	NA	75%
Comparison Market		NA	121,193	161,499	NA	NA	NA	NA
Rio Grande Valley Health Alliance	McAllen, TX	NA	5,392	4,833	NA	64%	NA	78%
Comparison Market		NA	68,525	49,173	NA	NA	NA	NA
SERPA-ACO	Crete, NE	NA	10,742	11,223	NA	83%	NA	85%
Comparison Market		NA	60,276	60,257	NA	NA	NA	NA

Table 20. Estimated Difference-in-Differences for the Evaluation Quality Measures for each ACO, 2012 to 2014

	Admissions For Low-Intensity MS-DRGs Among Elderly Beneficiaries (per 1,000 Admissions)			Admissions With 1 or More HAC (per 1,000 Admissions)			In-Hospital Mortality Among Beneficiaries with High Mortality-Risk Conditions (per 1,000 Person Years)			In-Hospital Mortality with ICU Among Beneficiaries with High Mortality-Risk Conditions (per 1,000 Person Years)			Mortality Among Beneficiaries with High Mortality-Risk Conditions (per 1,000 Person Years)		
	2012	2013	2014	2012	2013	2014	2012	2013	2014	2012	2013	2014	2012	2013	2014
Pooled AP	2.3	-1.1	-4.6*	-0.5	-0.4*	0.0	-47.8	-0.6	-20.6	-23.3	0.2	-0.2	-3.5	-0.9	-5.4
Accountable Care Partners	-28.3*	-21.3	-18.9	-0.2	1.5	-0.5	-34.0	-67.4	-247.4	-135.6	-63.1	-132.0	69.8	2.5	79.7*
ACO Health Partners	NA	-3.3	2.1	NA	-1.1	-0.2	NA	-44.2	70.8	NA	-17.8	31.6	NA	43.6	-60.3*
Am. Hlth. Alliance	NA	-10.2	13.6	NA	-1.3	-1.3	NA	-77.4	81.6	NA	-57.2	-68.1	NA	24.4	-4.5
Am. Hlth. Network of H Care	NA	15.1	11.0	NA	-0.4	-0.5	NA	190.7*	17.6	NA	149.9	1.6	NA	-38.9	48.0
Bay Area Florida Phys. Trust	NA	-4.9	-18.5	NA	-0.2	-0.5	NA	-113.9	-230.9	NA	-94.3	-177.4	NA	-48.1	-56.6
Coastal Carolina Quality Care	-1.1	-10.2	-2.2	-1.7	-2.3	-0.6	-58.1	-84.1	96.8	-133.3	-54.3	-4.9	-3.3	-19.0	13.9
Coastal Medical	4.1	13.6	4.2	-0.1	-0.8	-0.4	34.4	133.5	194.0	43.8	124.7	185.6	-50.9	46.2	-113.3*
Cumberland	9.4	11.9	8.4	-1.2	-0.4	-0.1	-127.5	-67.5	-126.8	-52.8	-32.4	24.6	-62.6*	-61.9	-48.3
Fort Smith	NA	6.7	-14.9	NA	-0.2	0.2	NA	-23.0	17.1	NA	108.6	103.5	NA	-0.3	16.7
Golden Life Healthcare	0.8	-12.3	-6.1	0.1	1.1	-0.8	-48.4	-125.7	-245.3*	1.3	-46.0	-83.2	-105.4*	40.8	-99.3
Harbor Medical Associates	2.4	-1.4	-20.6	0.3	1.1	-0.2	NA	60.4	64.8	NA	92.0	133.6	-19.7	-49.9	-18.1
Integrated ACO	NA	-3.3	-15.6	NA	-0.3	-0.6	NA	1.9	90.6	NA	-91.8	26.4	NA	-34.6	56.4
Jackson Purchase Med. Assoc.	9.6	4.9	5.6	0.6	-1.0	0.0	114.8	57.6	-23.8	15.2	-138.7	-146.3	1.1	-23.3	-30.4
KCMPA-ACO	NA	-16.2	-18.2*	NA	-0.8	0.5	NA	-36.7	-170.7*	NA	-59.7	-123.9	NA	-63.6*	12.3
Lower Shore ACO	NA	-7.7	-5.0	NA	0.1	5.6	NA	7.7	68.7	NA	19.7	56.0	NA	26.0	25.0
Maryland ACOs of East. Shore	19.6	23.7	1.4	3.5	-0.6	1.7	-100.3	-6.8	-89.3	81.0	222.5	-7.9	24.8	12.2	94.8*
Maryland ACOs of West. MD	-8.4	8.0	22.8	-0.8	0.2	0.9	91.6	15.2	-101.4	322.3	122.8	98.2	9.8	19.9	17.5
Medical Mall	6.4	-3.0	-12.4	-1.3	-1.0	0.0	-103.7	45.5	96.9	5.0	45.1	-28.1	27.8	-68.4	-55.2
MPS ACO Physicians	19.2	3.8	15.8	-2.0*	-0.8	-0.2	-89.0	24.0	87.6	-142.4	-35.1	46.6	-27.2	-10.8	-20.7

	Admissions For Low-Intensity MS-DRGs Among Elderly Beneficiaries (per 1,000 Admissions)			Admissions With 1 or More HAC (per 1,000 Admissions)			In-Hospital Mortality Among Beneficiaries with High Mortality-Risk Conditions (per 1,000 Person Years)			In-Hospital Mortality with ICU Among Beneficiaries with High Mortality-Risk Conditions (per 1,000 Person Years)			Mortality Among Beneficiaries with High Mortality-Risk Conditions (per 1,000 Person Years)		
National ACO	NA	-0.9	-19.9	NA	-0.8	0.4	NA	-11.6	-117.3	NA	-64.8	-121.8	NA	28.4	-55.5
Nature Coast ACO	NA	6.5	3.9	NA	-0.4	2.0	NA	13.0	-25.7	NA	-9.7	-20.5	NA	-0.9	-111.1*
NOMS ACO, LLC	NA	14.5	-8.9	NA	0.7	2.9*	NA	-22.9	-99.5	NA	-10.7	-65.9	NA	2.6	-47.5
North Country ACO	13.7	2.6	8.8	1.1	-5.0	-2.4	-350.0	NA	-19.0	-89.5	NA	161.5	142.2	-55.1	-31.7
Owensboro ACO	NA	8.6	7.4	NA	-0.6	-1.4	NA	-43.0	32.3	NA	12.2	62.6	NA	14.5	31.6
Physicians ACO	-11.0	-5.3	-3.5	0.5	-1.5	-0.9	-13.6	8.4	39.6	0.0	8.1	11.6	-20.3	18.3	34.2
Physicians Collaborative Trust	NA	-11.6	-10.3	NA	1.0	0.0	NA	53.9	26.3	NA	60.9	52.2	NA	-51.8	-15.2
Primary Partners	8.0	41.1*	19.4	-1.9*	-1.0	-2.2	NA	-27.3	-127.2	NA	30.3	-56.5	-13.2	1.6	42.6
Primary Partners ACIP LLC	NA	-25.1*	-24.3	NA	-0.6	-0.8	NA	171.3	56.4	NA	98.1	74.9	NA	28.7	57.0
PriMed, LLC	-16.4	12.0	NA	-1.9*	-1.4	NA	44.4	-16.1	NA	44.2	-45.2	NA	-3.1	-20.8	NA
Quality Independent Physicians	0.4	-11.4	2.3	0.3	-0.9	-0.2	-43.4	-40.4	-92.6	-48.9	-53.8	-88.1	18.1	67.9	-52.4
Reliance Healthcare Network	34.7*	15.6	15.7	0.2	1.1	1.0	-105.0	-32.3	-86.7	-23.7	-27.8	-72.6	19.4	-5.6	26.9
RGV ACO Health Providers	-7.9	-29.1*	-24.7*	0.1	0.6	1.0	-159.4	100.2	52.1	-133.3	61.0	70.1	22.8	61.7	38.1
Rio Grande Valley Hlth. Alliance	NA	-8.8	-20.4	NA	0.9	1.5	NA	-3.1	-175.9	NA	92.9	-47.0	NA	55.3	88.5
SERPA-ACO, LLC	NA	2.7	-9.5	NA	0.1	-0.3	NA	227.0*	17.6	NA	33.7	7.1	NA	-34.4	3.5
St. Thomas Medical Group	10.3	7.7	-29.3	NA	NA	NA	NA	NA	318.9	NA	NA	216.8	-0.8	-6.7	146.6*
Texoma	-9.6	-27.9*	-25.7	-0.6	0.3	-0.4	-83.3	174.9	NA	4.8	153.8	NA	99.2	38.4	-37.7

Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.
Notes: MS-DRG=Medicare-severity diagnosis related group, HAC=hospital-acquired condition, ICU=intensive care unit. AP ACOs are in alphabetical order and some names have been abbreviated. Cells with NA reflect that there are no results to report, either because the AP ACO started in 2013 with no results to report for 2012 or there were no results for the measure. Negative numbers indicate improvements. Results for 2012 are for the period beginning with the start of the AP model through the end of 2012 for the 2012 starters. Results for 2013 and 2014 include 2012 and 2013 starters and cover each calendar year. Results adjusted for demographic and health-related characteristics using the Oaxaca-Blinder reweighting method, as discussed in the Methods section. All point estimates noted with an asterisk are significant at the $p<0.05$ level.

Table 21. Estimated Difference-in-Differences for the Evaluation Quality Measures for each ACO, 2012 to 2014 (Continued)

	Physician Visits Within 7 Days of Discharge, Any Reason (per 1,000 Live Discharges) ^			Physician Visits Within 7 Days of Discharge, Same Condition (per 1,000 Live Discharges) ^			Admissions for COPD or Asthma for Adult Beneficiaries with COPD or Asthma (per 1,000 Person Years)			Admissions for Heart Failure for Beneficiaries with Heart Failure (per 1,000 Person Years)			ACSC Composite (per 1,000 Person Years)			Unplanned All-Cause Hospital-Wide Readmissions Within 30 Days of Discharge (per 1,000 Live Discharges)		
	2012	2013	2014	2012	2013	2014	2012	2013	2014	2012	2013	2014	2012	2013	2014	2012	2013	2014
Pooled AP	-68.9	49.4*	5.1	-14.4	7.4	-1.7	3.5	0.7	-3.3*	-3.8	-8.2*	0.3	2.1	-0.4	0.7	-5.7	0.4	-4.9
Accountable Care Partners	114.1	80.7	126.2	26.1	54.7*	77.3*	23.2*	26.0*	2.1	25.0	47.3*	10.5	12.1	15.7*	12.2*	9.2	-7.3	21.5
ACO Health Partners	NA	83.0	-141.3*	NA	-26.0	-70.3*	NA	18.1*	3.3	NA	-29.7	-24.2	NA	-1.0	-2.5	NA	13.2	-14.8
Am. Hlth. Alliance	NA	-38.3	-81.6	NA	-30.5	-14.3	NA	1.9	0.5	NA	-15.8	4.0	NA	-2.9	-0.6	NA	-8.3	-7.5
Am. Hlth. Network of H Care	NA	48.8	5.3	NA	33.0	-27.2	NA	-5.2	3.3	NA	-13.5	22.4	NA	2.6	6.1	NA	29.8*	-16.6
Bay Area Florida Phys. Trust	NA	-71.3	-151.3*	NA	9.2	-14.2	NA	-7.6	-19.9*	NA	-25.0	-32.7	NA	-9.0	-16.1*	NA	-1.3	-15.6
Coastal Carolina Quality Care	-12.7	37.1	8.2	-39.4	-18.7	-40.3	4.5	-2.3	-4.9	-33.4	-26.6	30.0	-3.4	-8.7	-0.8	-31.2*	-39.1*	-34.5*
Coastal Medical	125.7	19.3	-41.3	18.2	-15.7	-76.4*	-0.3	-1.2	-0.3	-9.1	-30.3	6.7	-5.9	-6.2	4.0	-31.3	-13.1	-13.1
Cumberland	-49.8	201.0	36.2	-31.9	46.7	16.1	10.8	10.5	-11.0	-3.6	-11.0	8.4	2.5	1.6	-3.6	-3.7	13.2	6.5
Fort Smith	NA	-9.3	-66.9	NA	-18.2	-9.6	NA	-1.8	3.5	NA	15.6	3.3	NA	4.8	1.0	NA	26.0*	2.4
Golden Life Healthcare	61.1	178.7*	-19.2	-31.5	-58.7*	-29.1	3.4	-1.1	-4.0	13.3	-14.9	-8.3	9.2	6.1	-2.2	-14.7	-14.0	-13.6
Harbor Medical Associates	-104.8	-131.1	-281.3*	-32.0	-33.9	-109.2*	-9.8	0.9	5.8	21.8	-21.7	-29.4	6.9	5.8	5.4	-15.3	-5.9	-17.0
Integrated ACO	NA	22.7	21.3	NA	12.6	-11.6	NA	-2.4	-14.0*	NA	18.6	17.5	NA	1.4	8.6	NA	-4.3	-6.3
Jackson Purchase Med. Assoc.	222.5*	76.8	21.8	72.3*	68.7*	-11.5	19.0	2.6	5.1	-4.4	-37.2	23.1	-1.9	-7.7	-0.1	15.4	-11.9	-19.9
KCMPA-ACO	NA	-17.8	-59.7	NA	-16.1	-13.0	NA	-2.0	-18.3*	NA	-14.2	-1.7	NA	-3.7	-8.2*	NA	-1.1	-7.8
Lower Shore ACO	NA	-36.0	-111.9	NA	-36.4	-12.4	NA	-7.7	-10.3	NA	-8.5	-27.6	NA	-7.1	-11.6*	NA	-0.8	-19.5
Maryland ACOs of East. Shore	125.7	115.7	102.9	12.9	-16.5	7.9	7.7	14.6	-2.2	14.6	-30.2	-28.4	6.9	0.4	-1.7	3.5	-17.8	-6.6
Maryland ACOs of West. MD	64.4	-115.2	-12.1	13.8	-9.4	-55.3*	14.8	12.8	15.9	44.5	32.3	38.0	7.8	1.3	13.0*	9.8	-11.5	-14.7
Medical Mall	59.3	-108.2	63.6	-39.9	-25.2	11.1	17.7	17.7	17.6	-50.6*	-34.9	-30.3	-8.7	-1.1	8.8	-7.5	-11.1	-4.9

	Physician Visits Within 7 Days of Discharge, Any Reason (per 1,000 Live Discharges) ^			Physician Visits Within 7 Days of Discharge, Same Condition (per 1,000 Live Discharges) ^			Admissions for COPD or Asthma for Adult Beneficiaries with COPD or Asthma (per 1,000 Person Years)			Admissions for Heart Failure for Beneficiaries with Heart Failure (per 1,000 Person Years)			ACSC Composite (per 1,000 Person Years)			Unplanned All-Cause Hospital-Wide Readmissions Within 30 Days of Discharge (per 1,000 Live Discharges)		
MPS ACO Physicians	179.4	171.7	355.6*	-20.1	-90.1	7.1	-2.5	11.3	1.0	12.6	1.2	-3.4	10.1	4.3	9.8	-8.7	14.5	31.0*
National ACO	NA	78.3	211.3*	NA	-21.2	6.6	NA	-3.7	-5.0	NA	-18.0	34.1	NA	-0.5	11.1	NA	-3.7	-21.9*
Nature Coast ACO	NA	-13.8	174.7*	NA	-27.1	38.9	NA	4.2	-6.8	NA	-14.7	4.1	NA	3.7	-0.9	NA	16.9	9.2
NOMS ACO, LLC	NA	9.8	-5.5	NA	-6.7	52.2	NA	-13.8	-6.6	NA	-1.5	-23.2	NA	-3.3	-7.6	NA	22.0	2.3
North Country ACO	-121.1	-218.9*	32.5	-82.7	-124.3*	74.0	-28.0*	-8.1	3.6	-5.1	-14.1	-49.0	-4.8	-2.4	-0.2	-24.6	-4.0	9.7
Owensboro ACO	NA	-33.6	-56.3	NA	26.6	-4.4	NA	-4.1	-7.1	NA	-34.9	-2.5	NA	-7.1	-1.3	NA	-6.1	-25.1*
Physicians ACO	-1,380.1*	532.7	226.8	-96.9	107.9	50.9	11.2	-8.5	8.1	26.3	6.8	45.5*	16.2*	3.1	7.0	5.3	-35.2*	-14.9
Physicians Collaborative Trust	NA	36.5	-53.9	NA	41.2	-5.1	NA	5.9	4.7	NA	15.4	-4.9	NA	5.6	1.2	NA	0.5	-5.9
Primary Partners	-70.7	126.9	9.8	28.7	98.5	93.4*	8.0	17.0	10.0	-57.7*	33.1	-7.6	-3.4	9.6	12.8*	-12.6	27.6	-0.9
Primary Partners ACIP LLC	NA	-6.1	95.5	NA	38.6	48.3	NA	8.9	3.9	NA	-20.1	9.1	NA	0.9	8.6	NA	2.4	14.5
PriMed, LLC	-34.8	247.8*	NA	-33.3	112.1	NA	7.6	2.2	NA	-14.4	-14.2	NA	3.6	-0.5	NA	-22.3*	-5.0	NA
Quality Independent Physicians	-13.3	14.6	-99.9*	-1.6	20.1	-33.7	13.2	-3.2	-7.8	-2.3	-8.0	-0.9	16.3*	9.2	1.4	23.2*	20.6*	9.9
Reliance Healthcare Network	-15.9	36.4	19.7	-4.7	30.9	37.2	-11.7	-15.6	-11.6	-0.9	12.6	-13.9	-8.2	-5.1	-6.0	4.5	-8.6	-9.6
RGV ACO Health Providers	66.5	222.6	67.8	4.5	3.2	-8.1	-11.5	-17.8	-21.7*	-33.4	-23.5	-6.4	-7.5	-7.8	-6.8	-4.6	-16.7	-2.5
Rio Grande Valley Hlth. Alliance	NA	-167.4	-79.6	NA	-19.2	-7.3	NA	-4.2	-6.2	NA	4.9	42.1	NA	-1.3	-5.9	NA	-14.2	13.8
SERPA-ACO, LLC	NA	10.1	-3.3	NA	-13.9	-10.0	NA	7.9	-4.2	NA	-35.0*	-7.2	NA	-10.4*	-0.1	NA	3.7	9.4
St. Thomas Medical Group	-39.0	-40.4	-25.4	25.3	-3.1	56.1*	-23.4	-35.6*	-18.6	2.2	17.7	17.3	-0.3	-1.5	0.6	-21.7	-23.1	-8.9
Texoma	-149.9	204.0*	126.5	0.4	133.1*	132.1*	-20.4	-0.2	-9.2	-7.0	14.1	9.1	-16.7*	2.3	5.0	-9.5	27.5	5.6

Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.
Notes: COPD=chronic obstructive pulmonary disease, ACSC=ambulatory care sensitive condition. AP ACOs are in alphabetical order and some names have been abbreviated. Cells with NA reflect that there are no results to report, either because the AP ACO started in 2013 with no results to report for 2012 or there were no results for the measure. Negative numbers indicate improvements with the exception of the two seven-day follow-up physicians visits measures (^), for which a positive estimate denotes improved performance (i.e., more visits within seven days of discharge implies higher-quality care). Results for 2012 are for the period beginning with the start of the AP model through the

end of 2012 for the 2012 starters. Results for 2013 and 2014 include 2012 and 2013 starters and cover each calendar year. Results adjusted for demographic and health-related characteristics using the Oaxaca-Blinder reweighting method, as discussed in the Methods section. All point estimates noted with an asterisk are significant at the p<0.05 level.

Table 22. AP ACO Difference-in-Differences Pooled PBPM Spending by Setting, 2012 to 2014

	2012	2013	2014
Acute Inpatient	-$6.9	-$5.8	$7.3
95% CI lower	-$13.1	-$9.3	$3.4
95% CI upper	-$0.6	-$2.3	$11.1
Physician Services	$3.8	$3.7	$9.1
95% CI lower	$1.5	$2.3	$7.4
95% CI upper	$6.1	$5.0	$10.7
Outpatient Department & Ambulatory Surgery Center	-$2.3	-$3.3	$9.9
95% CI lower	-$4.7	-$4.7	$8.3
95% CI upper	$0.2	-$1.8	$11.5
Skilled Nursing Facility	$5.0	$5.8	-$2.8
95% CI lower	$1.8	$3.8	-$4.5
95% CI upper	$8.1	$7.9	-$1.1
Home Health	-$4.2	-$1.9	-$1.7
95% CI lower	-$5.7	-$2.9	-$2.6
95% CI upper	-$2.6	-$1.0	-$0.9
Other Hospital (IRF, LTCH, IPF)	-$2.4	-$0.9	-$1.5
95% CI lower	-$4.9	-$2.5	-$2.9
95% CI upper	$0.1	$0.7	-$0.1
Durable Medical Equipment	-$0.3	$0.1	$0.7
95% CI lower	-$0.9	-$0.3	$0.3
95% CI upper	$0.3	$0.5	$1.1
Hospice	-$0.4	-$0.1	-$0.8
95% CI lower	-$2.4	-$1.2	-$1.9
95% CI upper	$1.5	$1.1	$0.4

Source: Analysis of Medicare claims data from the Chronic Conditions Warehouse Research Identifiable Files.
Notes: CI=confidence interval, IRF=inpatient rehabilitation facility, LTCH=long-term care hospital, IPF=inpatient psychiatric facility. There were 20 ACOs in 2012, 36 in 2013, and 35 in 2014. Negative numbers indicate lower AP ACO spending growth from baseline relative to comparison groups. Results for 2012 are for the period beginning with the start of the AP model (either April or July) through the end of 2012 for the 2012 starters. Results for 2013 and 2014 include 2012 and 2013 starters and cover each calendar year. Results adjusted for demographic and health-related characteristics using the Oaxaca-Blinder reweighting method, as discussed in the Methods section.

Table 23. Explanatory Variables Used in Second Stage Regressions

Variable	Description	Mean or Percent	Std. Dev.
ACO Variables			
Care management program	AP has care management programs (Yes/No)	0.84	0.14
Uses claims/EHR	AP uses claims and/or EHR data to identify patients for care management (Neither claims nor EHR; Claims only; EHR only; Claims & EHR)	2.07	1.1
Single EHRs	ACO physicians have a single EHR ("No" = multiple/no EHRs and "Yes" = single EHR across the ACO)	0.30	0.21
Care managers embedded	Care managers embedded in any ACO practices (Yes/No)	0.46	0.25
Timely notice	AP routinely receives timely notification from hospitals of inpatient admissions/discharges (Yes/No)	0.59	0.24
Visit inpatient	Visiting ACO patients during an inpatient stay is part of care management program (Yes/No)	0.25	0.19
Breadth of care	Number of different provider types associated with the ACO (self reported) [1]	2.91	2.2
Spending per HCC score ($/HCC)	Divided the baseline year per-beneficiary per-month spending by the two-year baseline year mean HCC score for assigned beneficiaries. HCC score is a function of chronic conditions, gender, and institutional status while being a proxy for relative illness. A higher value may indicate that an ACO has a greater potential/capacity to decrease assigned patients' costs. Value is divided by 100 for presentation purposes.	7.24	9.91
Beneficiaries per PCP	Calculated by dividing the total number of assigned beneficiaries by the total number of participating PCPs.[2]	296.3	173.4
Beneficiary Variables			
Age < 65	Percent of assigned beneficiaries in age category	14.9	6.8
Age 65-74	Percent of assigned beneficiaries in age category	41.3	4.3
Age 75-84	Percent of assigned beneficiaries in age category	28.9	3.6
Age > 84	Percent of assigned beneficiaries in age category	14.9	3.3
AMI	Percent of assigned beneficiaries with presence of acute myocardial infarction	0.94	0.23
Stroke	Percent of assigned beneficiaries with presence of stroke	4.7	1.26
Colorectal cancer	Percent of assigned beneficiaries with presence of colorectal cancer	1.3	0.23
Market Variables			
Socio-economic score	Average percent of unemployed, adult poverty, and non-white populations in the ACOs' market. ACOs in markets with high scores may have more challenges managing their patient population.	0.29	0.09
More than one (non-ACO) CMS initiative	Indicator for markets that contain participants in more than one of the following, as reported by CMS: the Multi-Payer Advanced Primary Care Demonstration, Independence at Home Models, Comprehensive Primary Care Initiative, Federally Qualified Health Center Demonstration, Partnership for Patients.	0.68	NA

Variable	Description	Mean or Percent	Std. Dev.
Other MSSP ACOs	Indicator for markets containing at least one other MSSP ACO.	0.59	NA
At least one Medicaid initiative	Indicator for whether any Medicaid initiatives were present in the state of the ACO, including: Medicaid patient-centered medical homes, health homes, Medicaid-specific ACOs, Medicaid dual-eligible demonstrations, and Medicaid delivery reform programs.	0.51	NA
AHRQ Safety Composite Score	Comprising 11 AHRQ patient safety indicators. Use the average score for hospitals in ACO market weighted by hospital Medicare patient volume.[3] A higher score indicates worse market-level quality.[4]	0.61	0.07
Hip-Knee Replacement Composite Score	Based on the 30-day hip/knee complications score.[3] Averaged the score for hospitals in ACO market, weighted by number of cases. A higher score indicates worse market-level quality.	3.14	0.36
Medicare Advantage penetration	Constructed as the percent of Medicare beneficiaries enrolled in MA in 2013. Markets with more MA experience may have the resources/tools to support population health and ACO efforts.	24.8	11.7
Hospital wage index	Used a hospital wage index to control for the varying cost of labor over time in the ACOs' markets. This index serves to standardize each estimate and uses the Boston wage index as a base indicator.	0.97	0.17

Notes: [1]Potential provider types include: acute care hospital, urgent care center, specialist physician group/practice, rehabilitation hospital, SNF, home health provider, or community-based organization. (See the Methods section for additional detail on primary data collection and analysis.) [2]To identify PCPs, we used NPI lists from CMS for the AP ACOs. We cross-referenced the NPIs with the National Plan and Provider Enumeration (NPPES) database, which is publicly available through CMS to identify specialty of providers. We classified PCPs as those whose primary Medicare Specialty taxonomy code corresponded to Physician/Internal Medicine, Physician/Family Practice, and Physician/Geriatric Medicine (specialty codes 8, 11, and 38).[3]As reported in 2013 Hospital Compare. [4]For more information, see the "Quality Indicator User Guide: Patient Safety Indicators Composite Measures Version 4.3"

Table 24. CMS AP ACO Financial Results and Shared Savings Payments, 2013 to 2015

Name	2013 (PY1) CMS Financial Results	2013 (PY1) Shared Savings Payment	2014 (PY2) CMS Financial Results	2014 (PY2) Shared Savings Payment	2015 (PY3) CMS Financial Results	2015 (PY3) Shared Savings Payment
April 2012 Starters						
Coastal Carolina Quality Care	-$986,668	NA	$1,417,267	NA	-$1,043,371	NA
Jackson Purchase Medical Associates	$5,737,768	$2,811,506	$4,964,871	$2,178,919	$4,627,517	$1,976,694
North Country ACO	$2,050,217	NA	$114,953	NA	-$3,822,509	NA
Primary Partners	-$915,050	NA	-$1,074,892	NA	$7,756,155	$3,729,256
RGV ACO Health Providers	$20,239,381	$11,900,756	$13,767,494	$7,528,797	$21,613,110	$12,619,152
July 2012 Starters						
Accountable Care Partners	$213,744	NA	$499,181	NA	$54,084	NA
Coastal Medical	$7,272,520	$3,563,535	$7,162,344	$3,319,187	$9,657,190	$4,732,023
Cumberland Center for Healthcare Innovation	$4,732,231	NA	$7,004,050	$2,994,177	$4,236,580	$1,863,290
Golden Life Healthcare	-$72,494,752	NA	-$2,653,262	NA	$2,194,753	NA
Harbor Medical Associates	-$1,205,869	NA	-$2,919,768	NA	$1,618,463	NA
Maryland ACO of Eastern Shore	-$7,904,405	NA	-$14,191,575	NA	-$7,876,555	NA
Maryland ACO of Western MD	$1,325,597	NA	-$2,398,290	NA	-$478,092	NA
Medical Mall Services of Mississippi	$15,125,560	NA	$10,270,645	NA	NA	NA
MPS ACO Physicians	-$1,128,596	NA	-$3,534,038	NA	-$3,273,596	NA
Physicians ACO	$12,009,130	NA	$13,222,555	$4,849,165	$15,795,941	$6,991,847
PriMed	$4,151,209	NA	NA	NA	NA	NA
Quality Independent Physicians	$1,289,376	NA	$13,611,421	$6,062,187	$4,179,176	$1,918,442
Reliance Health Network	$4,962,693	$2,431,720	$3,882,063	$1,484,404	$5,315,391	$2,345,345
St. Thomas Medical Group	$1,796,371	NA	$2,543,570	$1,057,032	$260,948	NA
Texoma	-$2,649,375	NA	-$4,451,385	NA	-$8,634,237	NA

Name	2013 (PY1) CMS Financial Results	2013 (PY1) Shared Savings Payment	2014 (PY2) CMS Financial Results	2014 (PY2) Shared Savings Payment	2015 (PY3) CMS Financial Results	2015 (PY3) Shared Savings Payment
January 2013 Starters						
ACO Health Partners	-$8,395,935	NA	$6,476,300	$2,715,442	$7,296,532	$3,103,401
American Health Alliance	$1,630,144	NA	$4,756,401	$1,906,648	$5,485,603	$2,550,532
American Health Network of Ohio Care Organization	-$904,068	NA	$1,641,283	NA	$5,435,247	$2,483,500
Bay Area Florida Physicians Trust	$4,563,811	$2,236,267	$3,935,066	$1,751,289	$4,222,255	$1,947,680
Fort Smith Physicians Alliance ACO	$278,377	NA	$1,844,950	NA	NA	NA
Integrated ACO	$3,567,881	$1,748,262	$9,531,617	$3,952,717	$8,229,027	$3,518,859
KCMPA-ACO	$908,065	NA	-$5,249,924	NA	-$4,775,254	NA
Lower Shore ACO	$1,530,568	NA	$3,344,351	NA	$4,130,951	NA
National ACO	$6,190,919	$3,033,551	$1,581,328	NA	$6,933,257	$3,069,100
Nature Coast ACO	-$1,378,902	NA	-$38,166	NA	$13,515,277	$5,812,172
NOMS ACO	$1,178,926	NA	$1,538,014	NA	-$377,287	NA
Owensboro ACO	$1,936,723	NA	$496,622	NA	$19,763	NA
Physicians Collaborative Trust ACO	$359	NA	$357,539	NA	$692,898	NA
Primary Partners ACIP	-$566,981	NA	$1,660,396	NA	$4,347,600	$2,113,681
Rio Grande Valley Health Alliance	$6,010,705	$2,945,246	$8,671,891	$3,403,175	$14,178,777	$6,947,600
SERPA-ACO	-$1,893,292	NA	-$3,122,580	NA	-$9,052,228	NA
TOTAL	$8,278,382	$30,670,843	$84,662,292	$43,203,139	$112,463,366	$67,722,574

Source: Shared savings data for PY1 downloaded from https://data.cms.gov/ACO/Medicare-Shared-Savings-Program-Accountable-Care-O/yuq5-65xt. Shared savings data for PY2 downloaded from https://data.cms.gov/ACO/Medicare-Shared-Savings-Program-Accountable-Care-O/ucce-h. Shared savings data for PY3 downloaded from https://data.cms.gov/ACO/Medicare-Shared-Savings-Program-Accountable-Care-O/x8va-z7cu.

Notes: Financial savings and losses under the model's payment formula are calculated with the goal of establishing an incentive to reduce spending compared to a benchmark determined by CMS, and ACOs may meet thresholds to earn shared savings payments. Findings under this evaluation differ from the savings and loss calculations for purposes of payment, both at an aggregate level and for individual Pioneer ACOs because of differences in (1) comparison populations (national versus local), (2) approaches in trending methods (projected target spending level for ACO-assigned beneficiaries versus concurrent spending among similar non-ACO beneficiaries), (3) risk-adjustment methods, (4) determination of assigned beneficiary populations, and (5) different time allowed for claims run out.

Table 25. Parallel Trends in Baseline, 2012 Starters

ACO Name	2012 Baseline			2013 Baseline			2014 Baseline		
	DID Parallel Trends	SE	t Statistic	DID Parallel Trends	SE	t Statistic	DID Parallel Trends	SE	t Statistic
Primary Partners	-48.74*	19.18	-2.54	-49.68*	17.81	-2.79	-43.61*	21.09	-2.07
RGV ACO Heath Providers	28.57	30.41	0.94	26.95	29.87	0.90	4.85	23.69	0.20
Jackson Purchase Medical Associates	-39.65	23.08	-1.72	-36.43	29.79	-1.22	15.69	24.37	0.64
Coastal Carolina Quality Care	6.38	21.05	0.30	5.33	21.90	0.24	-0.97	22.92	-0.04
Quality Independent Physicians	-5.72	26.36	-0.22	4.35	25.94	0.17	7.96	27.23	0.29
North Country ACO	27.14	16.33	1.66	28.13	17.44	1.61	33.91*	16.86	2.01
Accountable Care Partners	-5.02	23.63	-0.21	-6.51	20.65	-0.32	14.19	22.84	0.62
Maryland ACO of Western MD	-0.02	26.04	-0.00	0.34	28.50	0.01	0.36	28.62	0.01
Maryland ACO of Eastern Shore	16.63	29.47	0.56	14.48	28.59	0.51	-28.81	18.57	-1.55
St. Thomas Medical Group	-27.63	24.63	-1.12	-28.40	20.86	-1.36	-24.48	19.57	-1.25
Harbor Medical Associates	-4.43	22.23	-0.20	-9.16	21.00	-0.44	-4.39	22.66	-0.19
Texoma	6.17	25.45	0.24	7.47	24.39	0.31	-0.78	25.14	-0.03
PriMed	-6.59	22.00	-0.30	-6.44	22.16	-0.29	N/A	N/A	N/A
MPS ACO Physicians	16.66	24.26	0.69	16.49	23.46	0.70	10.43	23.66	0.44
Cumberland Center for Healthcare Innovation	-0.78	17.78	-0.04	-0.90	21.16	-0.04	-10.69	16.61	-0.64
Coastal Medical	3.55	18.17	0.20	1.66	21.74	0.08	-2.13	18.12	-0.12
Golden Life Healthcare	-11.71	23.53	-0.50	-10.60	27.04	-0.39	-33.48	24.42	-1.37
Medical Mall Services of Mississippi	-7.40	31.55	-0.23	-7.57	30.54	-0.25	2.24	33.09	0.07
Physicians ACO	-45.91	30.19	-1.52	-44.32	30.79	-1.44	-33.96	28.08	-1.21
Reliance Health Network	-1.86	29.81	-0.06	-1.14	30.11	-0.04	2.99	27.24	0.11

Note: DID=difference-in-differences, SE=standard error. All point estimates noted with an asterisk are significant at the p<0.05 level, indicating that baseline trends are not parallel.

Table 26. Parallel Trends in Baseline, 2013 Starters

ACO Name	2013 Baseline			2014 Baseline		
	DID Parallel Trends	SE	t Statistic	DID Parallel Trends	SE	t Statistic
Physicians Collaborative Trust ACO	-0.59	13.49	-0.04	4.00	14.25	0.28
Primary Partners ACIP	23.02	23.17	0.99	24.60	20.10	1.22
ACO Health Partners	11.51	16.57	0.69	-15.16	17.35	-0.87
SERPA-ACO	1.64	19.33	0.08	0.54	20.47	0.03
Nature Coast ACO	-36.80	24.88	-1.48	-27.66	25.52	-1.08
NOMS ACO	-37.47	20.11	-1.86	-41.03*	20.76	-1.98
Lower Shore ACO	-23.85	23.42	-1.02	-17.92	27.82	-0.64
American Health Network of Ohio Care Organization	22.10	22.79	0.97	22.78	19.47	1.17
National ACO	-16.43	37.65	-0.44	-79.91	44.42	-1.80
KCMPA - ACO	-24.85	14.06	-1.77	-38.99*	15.98	-2.44
Integrated ACO	44.41	29.44	1.51	16.50	20.98	0.79
American Health Alliance	-9.21	22.18	-0.42	-4.97	23.41	-0.21
Bay Area Florida Physicians Trust	-7.34	18.24	-0.40	-19.77	19.67	-1.01
Rio Grande Valley Health Alliance	34.22	24.14	1.42	37.00	27.33	1.35
Owensboro ACO	-75.11*	21.50	-3.49	-75.29*	22.81	-3.30
Fort Smith Physicians Alliance ACO	0.07	14.87	0.00	-4.66	19.24	-0.24

Note: DID=difference-in-differences, SE=standard error. All point estimates noted with an asterisk are significant at the p<0.05 level, indicating that baseline trends are not parallel.

Table 27. Percentage of the AP ACO and Comparison Group Beneficiaries Classified as Low Utilizers, 2013

ACO Name	Comparison			AP ACOs		
	BY1	BY2	2013	BY1	BY2	2013
Primary Partners	6%	6%	6%	7%	7%	6%
RGV ACO Heath Providers	7%	8%	7%	4%	3%	3%
Jackson Purchase Medical Associates	9%	9%	9%	7%	6%	6%
Coastal Carolina Quality Care	9%	8%	8%	6%	4%	4%
Quality Independent Physicians	8%	7%	8%	7%	8%	7%

ACO Name	Comparison			AP ACOs		
	BY1	BY2	2013	BY1	BY2	2013
North Country ACO	10%	9%	9%	7%	7%	6%
Accountable Care Partners	7%	6%	6%	6%	6%	6%
Maryland ACO of Western MD	10%	9%	9%	9%	8%	7%
Maryland ACO of Eastern Shore	8%	8%	7%	8%	6%	6%
St. Thomas Medical Group	10%	9%	9%	8%	8%	7%
Harbor Medical Associates	7%	7%	7%	7%	6%	6%
Texoma	9%	9%	8%	10%	7%	7%
PriMed	7%	6%	6%	7%	6%	5%
MPS ACO Physicians	7%	6%	6%	7%	6%	7%
Cumberland Center for Healthcare Innovation	10%	9%	9%	11%	10%	9%
Coastal Medical	8%	7%	7%	6%	5%	5%
Golden Life Healthcare	10%	10%	9%	9%	7%	6%
Medical Mall Services of Mississippi	11%	10%	10%	10%	9%	9%
Physicians ACO	9%	9%	8%	11%	10%	9%
Reliance Health Network	7%	6%	6%	6%	6%	5%
Physicians Collaborative Trust ACO	5%	5%	5%	5%	5%	4%
Primary Partners ACIP	6%	6%	6%	4%	4%	4%
ACO Health Partners	6%	5%	6%	6%	5%	4%
SERPA-ACO	10%	11%	10%	11%	11%	10%
Nature Coast ACO	6%	6%	6%	5%	5%	4%
NOMS ACO	9%	8%	9%	10%	9%	9%
Lower Shore ACO	8%	7%	7%	6%	6%	6%
American Health Network of Ohio Care Organization	10%	9%	9%	10%	9%	9%
National ACO	7%	6%	7%	3%	4%	4%
KCMPA - ACO	9%	8%	9%	8%	7%	7%
Integrated ACO	9%	9%	9%	8%	7%	8%
American Health Alliance	6%	5%	5%	3%	2%	2%
Bay Area Florida Physicians Trust	6%	6%	6%	5%	5%	4%
Rio Grande Valley Health Alliance	7%	7%	7%	6%	6%	5%
Owensboro ACO	9%	9%	9%	9%	8%	8%

ACO Name	Comparison			AP ACOs		
	BY1	BY2	2013	BY1	BY2	2013
Fort Smith Physicians Alliance ACO	11%	10%	10%	11%	11%	11%
Average	**8%**	**8%**	**8%**	**7%**	**7%**	**6%**

Notes: BY=baseline year. Low utilizers are defined as beneficiaries with non-zero monthly expenditures that are less than $25.

Table 28. Percentage of the AP ACO and Comparison Group Beneficiaries Classified as High Utilizers, 2013

ACO Name	Comparison			AP ACOs		
	BY1	BY2	2013	BY1	BY2	2013
Primary Partners	5%	5%	5%	3%	3%	3%
RGV ACO Heath Providers	7%	7%	7%	6%	6%	5%
Jackson Purchase Medical Associates	3%	3%	3%	3%	3%	3%
Coastal Carolina Quality Care	3%	3%	3%	3%	3%	3%
Quality Independent Physicians	3%	4%	4%	2%	2%	2%
North Country ACO	5%	5%	4%	4%	4%	5%
Accountable Care Partners	5%	5%	5%	4%	4%	3%
Maryland ACO of Western MD	5%	5%	5%	3%	3%	3%
Maryland ACO of Eastern Shore	5%	6%	6%	2%	3%	3%
St. Thomas Medical Group	5%	5%	4%	2%	2%	2%
Harbor Medical Associates	6%	6%	6%	2%	2%	2%
Texoma	5%	5%	5%	3%	3%	3%
PriMed	6%	6%	6%	6%	5%	5%
MPS ACO Physicians	6%	6%	6%	5%	5%	5%
Cumberland Center for Healthcare Innovation	4%	4%	4%	4%	5%	4%
Coastal Medical	5%	5%	5%	4%	4%	3%
Golden Life Healthcare	4%	4%	4%	7%	7%	13%
Medical Mall Services of Mississippi	4%	4%	4%	6%	6%	4%
Physicians ACO	7%	7%	7%	8%	7%	6%
Reliance Health Network	6%	6%	5%	6%	6%	6%
Physicians Collaborative Trust ACO	4%	4%	4%	3%	3%	3%
Primary Partners ACIP	6%	6%	5%	4%	4%	4%

ACO Name	Comparison			AP ACOs		
	BY1	BY2	2013	BY1	BY2	2013
ACO Health Partners	5%	5%	5%	3%	3%	4%
SERPA-ACO	3%	3%	3%	3%	3%	3%
Nature Coast ACO	4%	4%	4%	5%	6%	6%
NOMS ACO	6%	5%	5%	4%	3%	3%
Lower Shore ACO	4%	4%	4%	7%	6%	6%
American Health Network of Ohio Care Organization	5%	5%	4%	5%	5%	5%
National ACO	7%	7%	6%	12%	13%	12%
KCMPA - ACO	4%	4%	4%	2%	2%	2%
Integrated ACO	5%	6%	5%	6%	6%	6%
American Health Alliance	4%	4%	4%	4%	4%	4%
Bay Area Florida Physicians Trust	5%	5%	5%	4%	4%	3%
Rio Grande Valley Health Alliance	7%	7%	7%	5%	6%	5%
Owensboro ACO	4%	4%	4%	4%	3%	3%
Fort Smith Physicians Alliance ACO	4%	4%	4%	3%	3%	4%
Average	**5%**	**5%**	**5%**	**4%**	**4%**	**4%**

Notes: BY=baseline year. High utilizers are defined as beneficiaries with monthly expenditures greater than $5,000.

Table 29. Mean PBPM Expenditures for AP ACO Beneficiaries Classified as High Utilizers, 2013

ACO Name	Comparison			AP ACOs		
	BY1	BY2	2013	BY1	BY2	2013
Primary Partners	$8,236	$8,241	$8,346	$7,638	$7,892	$8,037
RGV ACO Heath Providers	$8,824	$8,766	$8,856	$8,566	$8,354	$8,350
Jackson Purchase Medical Associates	$7,590	$7,759	$7,841	$7,686	$7,554	$7,725
Coastal Carolina Quality Care	$8,107	$8,198	$8,195	$7,797	$7,874	$7,848
Quality Independent Physicians	$7,962	$8,052	$8,134	$8,257	$7,535	$7,360
North Country ACO	$8,201	$8,135	$8,235	$8,194	$8,160	$8,467
Accountable Care Partners	$8,361	$8,352	$8,450	$7,941	$7,744	$7,955
Maryland ACO of Western MD	$8,411	$8,313	$8,636	$7,984	$8,167	$8,194
Maryland ACO of Eastern Shore	$8,494	$8,760	$8,778	$8,165	$7,985	$8,116

ACO Name	Comparison			AP ACOs		
	BY1	BY2	2013	BY1	BY2	2013
St. Thomas Medical Group	$8,084	$8,023	$8,208	$8,003	$7,720	$7,613
Harbor Medical Associates	$8,283	$8,257	$8,443	$7,839	$7,754	$7,732
Texoma	$7,998	$7,819	$8,129	$7,730	$7,730	$7,935
PriMed	$8,407	$8,481	$8,634	$8,226	$8,352	$8,392
MPS ACO Physicians	$8,324	$8,367	$8,549	$8,343	$8,117	$8,512
Cumberland Center for Healthcare Innovation	$7,884	$7,823	$8,111	$8,049	$7,798	$7,917
Coastal Medical	$8,252	$8,213	$8,318	$8,218	$8,166	$8,045
Golden Life Healthcare	$8,305	$8,359	$8,506	$8,155	$8,659	$9,099
Medical Mall Services of Mississippi	$8,030	$8,142	$8,167	$8,185	$8,069	$8,095
Physicians ACO	$8,919	$8,864	$9,043	$8,994	$8,829	$8,928
Reliance Health Network	$8,195	$8,228	$8,296	$8,290	$8,330	$8,023
Physicians Collaborative Trust ACO	$7,957	$7,980	$8,139	$7,818	$7,959	$7,918
Primary Partners ACIP	$8,344	$8,319	$8,455	$7,878	$7,845	$8,174
ACO Health Partners	$8,166	$8,145	$8,279	$7,750	$7,854	$8,131
SERPA-ACO	$7,853	$7,794	$8,012	$7,748	$7,916	$7,991
Nature Coast ACO	$7,871	$7,860	$8,032	$7,750	$7,582	$8,063
NOMS ACO	$8,258	$8,330	$8,448	$8,100	$7,888	$8,393
Lower Shore ACO	$8,363	$8,511	$8,621	$8,446	$8,520	$8,425
American Health Network of Ohio Care Organization	$8,416	$8,415	$8,447	$8,129	$8,077	$8,690
National ACO	$8,873	$8,866	$8,974	$9,389	$9,321	$9,228
KCMPA - ACO	$8,106	$8,112	$8,281	$7,869	$7,607	$7,616
Integrated ACO	$8,274	$8,249	$8,458	$7,972	$7,860	$7,939
American Health Alliance	$7,876	$7,974	$8,102	$8,211	$8,391	$8,633
Bay Area Florida Physicians Trust	$8,342	$8,287	$8,408	$7,857	$7,995	$7,975
Rio Grande Valley Health Alliance	$8,775	$8,994	$8,873	$8,720	$8,537	$8,735
Owensboro ACO	$7,882	$7,892	$8,035	$7,873	$7,759	$8,118
Fort Smith Physicians Alliance ACO	$7,983	$8,110	$8,124	$7,999	$7,973	$8,027
Average	**$8,228**	**$8,250**	**$8,377**	**$8,105**	**$8,052**	**$8,178**

Notes: PBPM=per beneficiary per month, BY=baseline year. High utilizers are defined as beneficiaries with monthly expenditures greater than $5,000.

Table 30. Percentage of the AP ACO and Comparison Group Beneficiaries Classified as Low Utilizers, 2014

ACO Name	Comparison			AP ACOs		
	BY1	BY2	2014	BY1	BY2	2014
Primary Partners	6%	6%	6%	6%	6%	4%
RGV ACO Heath Providers	7%	8%	8%	4%	4%	4%
Jackson Purchase Medical Associates	9%	9%	9%	7%	6%	6%
Coastal Carolina Quality Care	9%	8%	8%	6%	4%	3%
Quality Independent Physicians	8%	7%	9%	7%	8%	8%
North Country ACO	10%	9%	9%	7%	7%	5%
Accountable Care Partners	7%	7%	6%	7%	6%	6%
Maryland ACO of Western MD	10%	9%	9%	9%	8%	8%
Maryland ACO of Eastern Shore	8%	8%	7%	7%	6%	5%
St. Thomas Medical Group	10%	9%	9%	8%	8%	6%
Harbor Medical Associates	8%	7%	7%	7%	6%	4%
Texoma	9%	9%	9%	10%	7%	6%
PriMed	9%	9%	9%	10%	7%	6%
MPS ACO Physicians	7%	6%	6%	7%	6%	5%
Cumberland Center for Healthcare Innovation	10%	9%	9%	10%	10%	8%
Coastal Medical	8%	7%	7%	6%	5%	5%
Golden Life Healthcare	10%	9%	9%	9%	8%	8%
Medical Mall Services of Mississippi	11%	11%	10%	10%	9%	10%
Physicians ACO	9%	8%	8%	10%	9%	7%
Reliance Health Network	7%	6%	6%	7%	6%	7%
Physicians Collaborative Trust ACO	6%	5%	5%	5%	5%	4%
Primary Partners ACIP	6%	6%	6%	4%	4%	3%
ACO Health Partners	6%	6%	6%	7%	7%	7%
SERPA-ACO	10%	11%	10%	11%	11%	10%
Nature Coast ACO	6%	6%	6%	5%	5%	5%
NOMS ACO	9%	8%	9%	10%	9%	8%
Lower Shore ACO	8%	7%	7%	6%	6%	6%
American Health Network of Ohio Care Organization	10%	9%	9%	10%	9%	8%

ACO Name	Comparison			AP ACOs		
	BY1	BY2	2014	BY1	BY2	2014
National ACO	6%	6%	7%	4%	5%	4%
KCMPA - ACO	9%	9%	9%	8%	7%	6%
Integrated ACO	9%	9%	9%	8%	7%	8%
American Health Alliance	6%	6%	6%	3%	2%	2%
Bay Area Florida Physicians Trust	6%	6%	6%	5%	6%	5%
Rio Grande Valley Health Alliance	7%	7%	8%	6%	6%	5%
Owensboro ACO	9%	8%	9%	9%	8%	7%
Fort Smith Physicians Alliance ACO	11%	10%	10%	11%	11%	11%
Average	**8%**	**8%**	**8%**	**7%**	**7%**	**6%**

Notes: BY=baseline year. Low utilizers are defined as beneficiaries with non-zero monthly expenditures that are less than $25.

Table 31. Percentage of the AP ACO and Comparison Group Beneficiaries Classified as High Utilizers, 2014

ACO Name	Comparison			AP ACOs		
	BY1	BY2	2014	BY1	BY2	2014
Primary Partners	5%	5%	5%	3%	3%	3%
RGV ACO Heath Providers	7%	7%	6%	6%	6%	5%
Jackson Purchase Medical Associates	3%	3%	3%	3%	3%	2%
Coastal Carolina Quality Care	3%	3%	3%	3%	3%	3%
Quality Independent Physicians	4%	4%	4%	2%	2%	3%
North Country ACO	5%	5%	4%	4%	4%	5%
Accountable Care Partners	6%	6%	5%	3%	3%	4%
Maryland ACO of Western MD	5%	5%	5%	3%	3%	4%
Maryland ACO of Eastern Shore	4%	5%	5%	3%	3%	4%
St. Thomas Medical Group	5%	5%	4%	2%	2%	2%
Harbor Medical Associates	6%	6%	5%	2%	2%	3%
Texoma	5%	5%	5%	3%	3%	3%
PriMed	5%	5%	5%	3%	3%	3%
MPS ACO Physicians	6%	6%	6%	5%	5%	6%
Cumberland Center for Healthcare Innovation	4%	4%	4%	4%	4%	4%

ACO Name	Comparison			AP ACOs		
	BY1	BY2	2014	BY1	BY2	2014
Coastal Medical	5%	5%	5%	4%	4%	3%
Golden Life Healthcare	4%	4%	5%	6%	6%	6%
Medical Mall Services of Mississippi	5%	5%	4%	6%	6%	6%
Physicians ACO	7%	7%	7%	9%	9%	8%
Reliance Health Network	5%	6%	6%	5%	5%	5%
Physicians Collaborative Trust ACO	5%	5%	4%	3%	3%	3%
Primary Partners ACIP	6%	6%	5%	4%	4%	5%
ACO Health Partners	6%	6%	6%	5%	5%	5%
SERPA-ACO	3%	3%	3%	3%	3%	3%
Nature Coast ACO	4%	4%	4%	5%	6%	6%
NOMS ACO	5%	5%	5%	4%	3%	4%
Lower Shore ACO	5%	5%	4%	8%	7%	7%
American Health Network of Ohio Care Organization	5%	5%	4%	5%	5%	5%
National ACO	7%	7%	6%	11%	10%	11%
KCMPA - ACO	5%	4%	4%	3%	3%	3%
Integrated ACO	5%	5%	5%	6%	5%	5%
American Health Alliance	4%	4%	4%	4%	4%	4%
Bay Area Florida Physicians Trust	5%	6%	5%	3%	3%	3%
Rio Grande Valley Health Alliance	7%	7%	7%	5%	6%	5%
Owensboro ACO	4%	4%	3%	4%	3%	3%
Fort Smith Physicians Alliance ACO	4%	4%	4%	4%	4%	5%
Average	**5%**	**5%**	**5%**	**4%**	**4%**	**4%**

Notes: BY=baseline year. High utilizers are defined as beneficiaries with monthly expenditures greater than $5,000.

Table 32. Mean PBPM Expenditures for AP ACO Beneficiaries Classified as High Utilizers, 2014

ACO Name	Comparison			AP ACOs		
	BY1	BY2	2014	BY1	BY2	2014
Primary Partners	$8,252	$8,251	$8,286	$7,812	$7,823	$7,861
RGV ACO Heath Providers	$8,897	$8,827	$8,593	$8,715	$8,311	$9,122
Jackson Purchase Medical Associates	$7,586	$7,745	$7,752	$7,686	$7,540	$7,720
Coastal Carolina Quality Care	$8,115	$8,185	$8,210	$7,790	$7,878	$7,890
Quality Independent Physicians	$7,933	$8,022	$8,165	$8,297	$7,514	$7,588
North Country ACO	$8,209	$8,150	$8,196	$8,171	$8,146	$8,192
Accountable Care Partners	$8,404	$8,365	$8,322	$7,772	$7,548	$7,813
Maryland ACO of Western MD	$8,413	$8,320	$8,362	$7,984	$8,167	$8,017
Maryland ACO of Eastern Shore	$8,264	$8,331	$8,376	$8,218	$8,082	$8,071
St. Thomas Medical Group	$8,083	$8,013	$8,103	$8,003	$7,720	$7,221
Harbor Medical Associates	$8,356	$8,271	$8,472	$7,825	$7,765	$8,149
Texoma	$7,994	$7,819	$8,017	$7,730	$7,730	$7,451
PriMed	$7,994	$7,819	$8,017	$7,730	$7,730	$7,451
MPS ACO Physicians	$8,351	$8,408	$8,405	$8,187	$8,219	$8,263
Cumberland Center for Healthcare Innovation	$7,846	$7,807	$7,900	$8,017	$7,792	$7,668
Coastal Medical	$8,262	$8,225	$8,252	$8,220	$8,174	$7,850
Golden Life Healthcare	$8,308	$8,396	$8,443	$8,206	$8,475	$8,484
Medical Mall Services of Mississippi	$8,049	$8,156	$8,150	$8,179	$8,075	$8,463
Physicians ACO	$8,655	$8,657	$8,707	$9,043	$8,866	$9,175
Reliance Health Network	$8,220	$8,225	$8,236	$8,259	$8,110	$7,891
Physicians Collaborative Trust ACO	$8,139	$8,117	$8,060	$7,758	$7,974	$8,107
Primary Partners ACIP	$8,345	$8,334	$8,270	$7,878	$7,833	$8,167
ACO Health Partners	$8,498	$8,532	$8,452	$8,493	$8,213	$8,290
SERPA-ACO	$7,850	$7,794	$7,849	$7,748	$7,916	$7,906
Nature Coast ACO	$7,871	$7,859	$8,039	$7,754	$7,573	$7,775
NOMS ACO	$8,231	$8,312	$8,358	$8,220	$7,932	$7,889
Lower Shore ACO	$8,426	$8,550	$8,424	$8,450	$8,489	$8,391
American Health Network of Ohio Care Organization	$8,418	$8,415	$8,348	$8,129	$8,077	$8,846

ACO Name	Comparison			AP ACOs		
	BY1	BY2	2014	BY1	BY2	2014
National ACO	$8,962	$8,926	$8,881	$9,583	$9,338	$9,075
KCMPA - ACO	$8,103	$8,113	$8,133	$8,385	$8,127	$8,203
Integrated ACO	$8,326	$8,369	$8,291	$8,078	$8,005	$7,813
American Health Alliance	$7,931	$8,045	$8,103	$8,216	$8,366	$8,285
Bay Area Florida Physicians Trust	$8,348	$8,314	$8,253	$7,930	$7,933	$7,810
Rio Grande Valley Health Alliance	$8,785	$9,013	$8,775	$8,733	$8,537	$8,550
Owensboro ACO	$7,899	$7,902	$7,972	$7,873	$7,761	$7,504
Fort Smith Physicians Alliance ACO	$7,997	$8,078	$8,100	$8,106	$7,903	$8,129
Average	**$8,231**	**$8,241**	**$8,257**	**$8,144**	**$8,046**	**$8,086**

Notes: PBPM=per beneficiary per month, BY=baseline year. High utilizers are defined as beneficiaries with monthly expenditures greater than $5,000.

Table 33. Average Expenditure Growth Rates, 2012 Starters

Average	Growth Rate 2012		Growth Rate 2013		Growth Rate 2014	
	(BY2 - BY1) / BY1	(2012 - BY2) / BY2	(BY2 - BY1) / BY1	(2013 - BY2) / BY2	(BY2 - BY1) / BY1	(2014 - BY2) / BY2
AP ACO Average	0.8%	-2.8%	0.9%	-0.8%	0.3%	3.8%
Unadjusted Comparison Average	0.9%	-4.7%	0.9%	-1.7%	0.1%	-2.1%
Adjusted Comparison Average	1.2%	-0.8%	1.1%	0.4%	0.6%	1.9%

Note: BY=baseline year.

Table 34. Average Expenditure Growth Rates, 2013 Starters

Average	Growth Rate 2013		Growth Rate 2014	
	(BY2 - BY1) / BY1	(2013 - BY2) / BY2	(BY2 - BY1) / BY1	(2014 - BY2) / BY2
AP ACO Average	-0.7%	-1.8%	-2.2%	2.6%
Unadjusted Comparison Average	0.1%	-0.9%	-0.3%	-2.2%
Adjusted Comparison Average	0.2%	-0.8%	-0.6%	1.1%

Note: BY=baseline year.

Table 35. AP ACO and Comparison Market Adjusted Baseline Expenditures, 2012

ACO Name	BY1 AP (in $)	BY1 CM (in $)	BY1 AP Higher than CM?	BY2 AP (in $)	BY2 CM (in $)	BY2 AP Higher than CM?
Primary Partners	712	754	No	696	778	No
RGV ACO Heath Providers	1,183	1,309	No	1,155	1,249	No
Jackson Purchase Medical Associates	747	728	Yes	714	735	No
Coastal Carolina Quality Care	703	686	Yes	692	676	Yes
Quality Independent Physicians	862	845	Yes	875	826	Yes
North Country ACO	602	587	Yes	616	600	Yes
Accountable Care Partners	838	940	No	832	946	No
Maryland ACO of Western MD	685	770	No	736	824	No
Maryland ACO of Eastern Shore	617	703	No	693	769	No
St. Thomas Medical Group	638	726	No	619	729	No
Harbor Medical Associates	579	619	No	597	633	No
Texoma	712	803	No	737	812	No
PriMed	957	987	No	915	950	No
MPS ACO Physicians	863	900	No	876	908	No
Cumberland Center for Healthcare Innovation	845	770	Yes	864	794	Yes
Coastal Medical	746	788	No	760	808	No
Golden Life Healthcare	1,001	937	Yes	1,015	969	Yes
Medical Mall Services of Mississippi	1,120	1,052	Yes	1,100	1,027	Yes
Physicians ACO	1,198	1,229	No	1,158	1,216	No
Reliance Health Network	1,029	1,136	No	1,061	1,151	No

Notes: BY=baseline year, CM=comparison market.

Table 36. AP ACO and Comparison Market Adjusted Baseline Expenditures, 2013

ACO Name	BY1 AP (IN $)	BY1 CM (IN $)	BY1 AP Higher than CM?	BY2 AP (IN $)	BY2 CM (IN $)	BY2 AP Higher than CM?
Primary Partners	711	754	No	697	780	No
RGV ACO Heath Providers	1,183	1,305	No	1,155	1,246	No
Jackson Purchase Medical Associates	747	722	Yes	714	726	No
Coastal Carolina Quality Care	703	686	Yes	692	677	Yes
Quality Independent Physicians	862	844	Yes	875	824	Yes
North Country ACO	603	574	Yes	616	579	Yes
Accountable Care Partners	838	938	No	832	946	No
Maryland ACO of Western MD	685	770	No	736	824	No
Maryland ACO of Eastern Shore	617	703	No	693	771	No
St. Thomas Medical Group	638	725	No	619	729	No
Harbor Medical Associates	573	607	No	594	624	No
Texoma	712	805	No	737	813	No
PriMed	957	985	No	915	948	No
MPS ACO Physicians	863	899	No	876	907	No
Cumberland Center for Healthcare Innovation	845	770	Yes	864	794	Yes
Coastal Medical	747	780	No	760	801	No

ACO Name	BY1 AP (IN $)	BY1 CM (IN $)	BY1 AP Higher than CM?	BY2 AP (IN $)	BY2 CM (IN $)	BY2 AP Higher than CM?
Golden Life Healthcare	1,000	936	Yes	1,015	968	Yes
Medical Mall Services of Mississippi	1,120	1,051	Yes	1,101	1,027	Yes
Physicians ACO	1,198	1,229	No	1,158	1,214	No
Reliance Health Network	1,029	1,136	No	1,061	1,151	No
Physicians Collaborative Trust ACO	707	747	No	699	737	No
Primary Partners ACIP	940	938	Yes	963	938	Yes
ACO Health Partners	800	844	No	810	845	No
SERPA-ACO	738	752	No	734	747	No
Nature Coast ACO	1,034	925	Yes	1,035	977	Yes
NOMS ACO	806	845	No	754	811	No
Lower Shore ACO	1,101	930	Yes	1,084	937	Yes
American Health Network of Ohio Care Organization	864	921	No	874	905	No
National ACO	1,771	1,327	Yes	1,732	1,330	Yes
KCMPA - ACO	653	703	No	639	713	No
Integrated ACO	999	930	Yes	1,033	910	Yes
American Health Alliance	951	804	Yes	961	837	Yes
Bay Area Florida Physicians Trust	844	872	No	832	865	No
Rio Grande Valley Health Alliance	1,074	1,130	No	1,090	1,128	No
Owensboro ACO	774	712	Yes	704	720	No

ACO Name	BY1 AP (IN $)	BY1 CM (IN $)	BY1 AP Higher than CM?	BY2 AP (IN $)	BY2 CM (IN $)	BY2 AP Higher than CM?
Fort Smith Physicians Alliance ACO	684	733	No	703	744	No

Notes: BY=baseline year, CM=comparison market.

Table 37. AP ACO and Comparison Market Adjusted Baseline Expenditures, 2014

ACO Name	BY1 AP (in $)	BY1 CM (in $)	BY1 AP Higher than CM?	BY2 AP (in $)	BY2 CM (in $)	BY2 AP Higher than CM?
Primary Partners	702	749	No	684	763	No
RGV ACO Heath Providers	1,197	1,284	No	1,135	1,214	No
Jackson Purchase Medical Associates	747	704	Yes	716	665	Yes
Coastal Carolina Quality Care	703	670	Yes	693	668	Yes
Quality Independent Physicians	817	813	Yes	840	799	Yes
North Country ACO	600	578	Yes	601	568	Yes
Accountable Care Partners	788	902	No	816	918	No
Maryland ACO of Western MD	685	758	No	736	810	No
Maryland ACO of Eastern Shore	734	745	No	748	790	No
St. Thomas Medical Group	638	723	No	620	724	No
Harbor Medical Associates	574	588	No	595	605	No
Texoma	712	792	No	738	807	No
PriMed	N/A	N/A	N/A	N/A	N/A	N/A
MPS ACO Physicians	874	890	No	905	915	No

ACO Name	BY1 AP (in $)	BY1 CM (in $)	BY1 AP Higher than CM?	BY2 AP (in $)	BY2 CM (in $)	BY2 AP Higher than CM?
Cumberland Center for Healthcare Innovation	822	758	Yes	829	778	Yes
Coastal Medical	746	775	No	762	800	No
Golden Life Healthcare	931	921	Yes	913	941	No
Medical Mall Services of Mississippi	1,122	1,040	Yes	1,103	1,011	Yes
Physicians ACO	1,336	1,261	Yes	1,298	1,251	Yes
Reliance Health Network	979	1,068	No	972	1,044	No
Physicians Collaborative Trust ACO	709	758	No	705	747	No
Primary Partners ACIP	943	942	Yes	962	937	Yes
ACO Health Partners	990	1,018	No	928	970	No
SERPA-ACO	738	749	No	734	745	No
Nature Coast ACO	1,033	932	Yes	1,032	972	Yes
NOMS ACO	814	798	Yes	761	771	No
Lower Shore ACO	1,162	938	Yes	1,133	930	Yes
American Health Network of Ohio Care Organization	864	919	No	873	904	No
National ACO	1,646	1,263	Yes	1,504	1,212	Yes
KCMPA - ACO	724	745	No	692	752	No
Integrated ACO	982	944	Yes	987	932	Yes
American Health Alliance	930	802	Yes	932	826	Yes
Bay Area Florida Physicians Trust	805	855	No	760	818	No

ACO Name	BY1 AP (in $)	BY1 CM (in $)	BY1 AP Higher than CM?	BY2 AP (in $)	BY2 CM (in $)	BY2 AP Higher than CM?
Rio Grande Valley Health Alliance	1,081	1,124	No	1,096	1,117	No
Owensboro ACO	775	710	Yes	705	717	No
Fort Smith Physicians Alliance ACO	734	718	Yes	755	747	Yes

Notes: BY=baseline year, CM=comparison market.

APPENDIX 2. GPRO ANALYSIS

For the Group Practice Reporting Option (GPRO) process and clinical outcome measures, where we only have outcomes for the ACOs and not for their market comparison group, we estimated models of the measures as functions of a time trend and also ACO- and market-level characteristics. We also grouped the 21 individual measures into four coherent composites (care coordination, diabetes, cardiovascular disease, and preventive care), and analyzed results for all ACO-assigned beneficiaries as well as those with at least one inpatient hospitalization in the year.[38] The results for 16 AP ACOs[39] with GPRO, ACO characteristics, and market characteristics data for 2012 through 2014 are in Table 38.

Table 38. Average Values of GPRO Composites, AP ACOs, 2012 to 2014

Measure	All Patients				Patients with at Least One Hospital Discharge			
	2012	2013	2014	% Change 2012-14	2012	2013	2014	% Change 2012-14
Composite: Care coordination	59.7	71.0	74.1	+24.1%	60.3	71.3	73.7	+22.1%
Composite: Diabetes	70.3	72.7	74.7	+6.3%	70.9	74.2	74.2	+4.9%
Composite: Cardiovascular disease	71.0	73.2	76.9	+8.3%	68.7	72.0	76.5	+11.4%
Composite: Preventive care	61.2	68.5	73.8	+20.6%	60.6	67.3	72.1	+19.0%

We found that the GPRO process and clinical outcome measures that showed improvement were driven almost exclusively by time, specifically in 2014 relative to 2012, and do not seem to be associated with ACO and market characteristics. In addition to the time effects, we found statistically significant improvement in only one ACO-level characteristic—visiting hospitalized patients as part of care coordination among cardiovascular beneficiaries with at least one hospitalization.

[38] The beneficiary samples for ACO GPRO quality measure reporting are selected by CMS from each ACO's aligned/assigned population through random sampling. Each measure has specific criteria for determining which sample beneficiaries are included in the denominator. These criteria generally require completeness of information (including whether the person was assessed for the numerator criterion) as well as appropriateness for the measure. For example, for the hypertension measure, the ACO must first be able to find the person in medical records and also not be deceased, out of the country, in hospice, or be enrolled in a Medicare Advantage plan. Then, the person must be age 18 to 85; not be pregnant, have ESRD or stage V kidney disease, or be undergoing dialysis; and have a documented diagnosis of hypertension in the first six months of the measurement period.

[39] There were four ACOs among the 2012 starters for which we were unable to recreate GPRO measures at the person level, and we therefore did not use their data. We needed to use the person-level data, rather than the values of the measures at the ACO level provided by CMS, to identify those individuals with one or more acute hospitalizations in a particular year and to control for their characteristics. Since we created composites from individual measures, to be conservative in the analysis, we required that all measures be populated for an ACO in order to include it.

Table 39 provides summary statistics (means and standard deviations) for the ACO- and market-level characteristics for the 16 AP ACOs in the ACO-GPRO analysis with data for 2012 through 2014.

Table 39. Means and Standard Deviations of ACO- and Market-Level Explanatory Variables, 16 AP ACOs in GPRO Analysis

Explanatory Variable	Mean[40]	Std. Dev.
ACO-Level Explanatory Variables		
Use of claims and EHR to identify patients for care management	18.1%	38.7%
Use of multiple EHRs	70.8%	45.8%
Use of care managers embedded in the clinic setting	48.6%	50.3%
Visiting hospitalized patients as part of care coordination	27.8%	45.1%
ACO log (person-months for assigned beneficiaries in 2013)	12.0	0.9
Market-Level Explanatory Variables		
Whether the state enacted Medicaid delivery reform	54.1%	50.2%
Market HHI for inpatient hospital services in 2013	2.3	1.5
Market MA penetration in 2013	26.1%	12.6%
Market SES composite	70.3%	13.5%
Market AHRQ Safety Composite Score in 2013	0.61	0.07
Market AHRQ Hip-Knee Replacement Composite Score in 2013	3.1	0.3

Table 40 presents the two sets of effects of each of the ACO- and market-level characteristics, time trends (year effects) on the levels of each GPRO composite, and the overall R^2 statistic for each regression model that includes the 16 AP ACOs. The first set of effects represents overall beneficiaries in those ACOs, while the second set applies to beneficiaries with at least one hospitalization. Estimated effects in boldface indicate statistical significance of the coefficient estimate at the five percent level.

We found that AP ACOs' success on improving quality of care appears mixed. Performance on all measures improved significantly between 2012 and 2014. This finding may be from the growing focus on quality improvement in key areas of care nationally. In relationships with ACO and market characteristics, AP ACOs did experience improvements in certain measures of process and clinical outcomes, particularly for cardiovascular conditions, but in many cases this improvement was not statistically significant, and we are unable to determine whether it was specific to the patients of AP ACOs or if care on a broader basis (across all providers in the ACO's market) was also improving over the same time period.

[40] Because the AP ACO GPRO sample differs from that used in the second stage regression analysis, the means and standard deviations of ACO- and market-level characteristics presented in this table differ slightly from those presented in the second stage analysis.

Table 40. Estimated Effects of Each Explanatory Variable on the GPRO Composites, 16 AP ACOs

	Overall				At Least One Hospital Discharge			
Explanatory Variable	**Care Coord.**	**Diabetes**	**CV Disease**	**Prev. Care**	**Care Coord.**	**Diabetes**	**CV Disease**	**Prev. Care**
Year Effects								
Year: 2013 (vs. 2012)	+7.9	+0.9	+0.9	+4.9	+7.5	+2.9	+2.4	+4.1
Year: 2014 (vs. 2012)	**+16.9**	**+5.4**	**+6.7**	**+14.3**	**+15.7**	**+3.3**	**+8.1**	**+13.3**
ACO-Level Explanatory Variables								
Use of claims and EHR to identify patients for care management	-4.1	+0.1	+3.4	-0.4	-3.4	-2.1	+3.8	+2.5
Use of multiple EHRs	+9.0	+3.4	+1.0	+0.2	+10.3	+2.9	+2.5	+1.1
Use of care managers embedded in the clinic setting	+4.2	+3.1	+3.2	+2.5	+5.2	+2.0	+3.6	+3.4
Visiting hospitalized patients as part of care coordination	+9.5	+8.3	+9.9	+7.4	+9.8	+6.4	**+11.3**	+7.4
ACO log person-months for assigned beneficiaries 2013	+0.9	+2.3	-0.4	+0.3	+1.1	+0.3	+0.2	+0.9
Market-Level Explanatory Variables								
Whether the state enacted Medicaid delivery reform	-8.1	+5.2	+2.3	-2.0	-6.7	+3.3	+1.6	-0.0
Market HHI for inpatient hospital services in 2013	-0.8	+0.4	-0.3	-0.7	+0.0	+0.3	-0.0	-0.4
Market MA penetration in 2013	-26.4	-27.8	-12.5	-20.6	-18.2	-24.6	-9.8	-12.0
Market socio-economic status composite	-29.7	-15.7	-8.2	-14.4	-29.6	-16.6	-9.2	-12.7
Market AHRQ safety composite Score in 2013	+7.5	+10.6	-13.5	+18.8	+6.1	+12.8	-17.4	+24.9
Market AHRQ hip-knee replacement composite score 2013	-8.2	-3.3	-6.9	-7.9	-5.8	-2.7	-6.2	-7.9
Overall R^2	0.27	0.35	0.29	0.26	0.26	0.35	0.34	0.24

Notes: CV=cardiovascular, EHR=electronic health record, HHI=Herfindahl-Hirschman index, AHRQ=Agency for Healthcare Research & Quality. Estimated effects for continuously-varying explanatory variables (log assigned beneficiary months, market HHI, market MA penetration. Market SES composite, market safety composite, and market hip-knee composites) expressed as estimated change in the dependent variable from a one standard deviation change in the explanatory variables. Estimated effects for the other explanatory variables (binary categorical) are estimated changes from having the characteristic versus not having the characteristic. Estimated effects in boldface indicate statistical significance of the coefficient estimate at the 5 percent level. Model estimated as a linear model with an ACO-specific random effect.

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