Advanced Primary Care: A Key Contributor to Successful ACOs

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Patient-Centered Primary Care COLLABORATIVE

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Authors

Yalda Jabbarpour, MD
Megan Coffman, MS
Andy Habib, MPH
YoonKyung Chung, Ph.D
Winston Liaw, MD, MPH
Stephanie Gold, MD
Hannah Jackson, MD MPH
Andrew Bazemore, MD MPH
William D. Marder, PhD

Contributing Authors

Chris Koller, MA
Ann Greiner, MCP

Reviewers

Michael Barr, MD, MBA, MACP
Tyler Barreto, MD
Rachel Burton, MPP
Donna M. Daniel, PhD
Lisa Letourneau MD, MPH
John McConnell, PhD
Kay Quam
Robert Saunders, Ph.D.
Stephen M. Shortell, PhD, MBA, MPH

Special Thanks

Chris Carrier, MPH, NCQA
Katie Dayani, AAFP
Lisa Latts, MD, MSPH, MBA, IBM Watson Health
Karen Montemayor, AAFP
Tyler Oberlander, NCQA
Kyu Rhee, MD, MPP, IBM Watson Health
Lisa Watkins, MD, Milbank Memorial Fund

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Executive Summary

Two recent delivery and payment innovations—the patient-centered medical home (PCMH) and accountable care organizations (ACOs)—each promise to help achieve the Triple Aim of improved population health, lower costs, and better patient experiences in health care.[1,2] Though some early proponents imagined the medical home model nested within a broader medical neighborhood and facilitated through ACOs, these two innovations were birthed via separate movements and tested in public and private pilots in relative isolation over approximately the last decade.[2,3]

The PCMH effort is the most widely disseminated example of advanced primary care, a set of models of primary care practice that broaden its scope and responsibilities. This effort has sought to transform primary care by defining a set of structures and processes to produce a greater focus on patient-centered, coordinated, team-based care. Over the last decade, the PCMH movement has become widespread, with nearly 500 public and private sector PCMH initiatives being tracked across the United States.[4] In late 2017, a survey conducted by the American Academy of Family Physicians (AAFP) and Humana found that nearly half of family physicians (49%) are in a practice that is recognized as a medical home. Another 5% are in a practice that has submitted an application for medical home status.[5] Previous Patient-Centered Primary Care Collaborative (PCPCC) evidence summaries have revealed positive effects of the PCMH on health care cost, quality, and utilization that increased over time, though not always uniformly and, in some cases, not of significant magnitude.[6] Where results were mixed, some observers noted expected returns on overall cost and quality from PCMH transformation were unrealistic, given the isolation of these interventions to primary care and the lack of buy-in from a broader medical neighborhood of providers in other health care settings, such as specialists and hospital-based providers.

Accountable care organizations hold groups of providers across different care settings accountable for the cost and quality of care provided to a defined cohort of patients, thus giving a range of providers a shared incentive to work together to better manage their mutual patients. By early 2017, some 923 privately and publicly contracted ACOs across the country were serving more than 32 million individuals, approximately 10% of the U.S. population.[7] As with the PCMH, ACO performance has varied. The Medicare Shared Savings Program (MSSP), the largest of the ACO pilots, has shown quality improvements but not overall net savings for Medicare, although a minority of MSSP ACOs have generated such savings.

Typically, ACOs focus on population health management and the reduction of acute and post-acute care cost drivers, which would seem to depend on foundational elements of effective primary care, such as coordinated, comprehensive, patient-centered care.[3,8] Given this theoretical alignment between advanced primary care and accountable care with respect to performance measures and related incentives, this year's PCPCC evidence review attempts to answer the following question: *What is the role, if any, of advanced primary care models like the PCMH in the success or failure of ACOs?*

Unlike previous PCPCC evidence reviews, this report uses mixed research methods to address this question. As it has in the past, our approach includes a synthesis of peer-reviewed literature, but this year, we have added a thematic analysis of comments made by convened experts on the subject

(*Supplement 1*) and conducted the first use of original secondary data analyses in the PCPCC evidence report series. Our quantitative analysis, explained in detail in the report, examines the relationship between successful ACOs and the presence of recognized PCMHs.

LITERATURE REVIEW

Section 1 summarizes evidence on the general characteristics of ACOs that contribute to shared savings, improved quality, and/or more appropriate utilization of health care services. Our search identified 186 potential studies. After review for relevance to the topic of characteristics of successful ACOs, only 15 of them were included in this report (*see Box 1 for full details*). A thematic analysis of the 15 journal articles found that high performance in the following six domains was important to the success of an ACO:

1. Leadership and Culture
2. Prior Experience
3. Health Information Technology
4. Care Management Strategies
5. Organizational and Environmental Factors
6. Incentive and Payer Alignment

Notably, the characteristics that lead to the success of ACOs are also central to the success of advanced primary care models such as the PCMH. For example, many successful ACOs rely on good care coordination using care managers; robust and timely electronic health record (EHR) information; increased access to care through means such as patient web portals and expanded office hours; and a focus on safety and quality improvement (*Figure 1)*.

Section 2 summarizes evidence on the cost, quality, and utilization outcomes of ACOs that have a specifically articulated advanced primary care focus. With this literature review, our initial search identified 261 peer-reviewed articles, but only 10 discussed cost, quality, or utilization outcomes and made some mention of the impact of primary care (*Figure 2*). While still lacking in depth and populated principally with studies of individual ACOs, this literature suggested that ACOs with a central focus on, or with leadership from, advanced primary care teams experienced positive results in terms of cost, quality, and utilization.

- In terms of cost outcomes, findings were generally positive. Four reported cost savings,[9-11,13] one reported negative cost outcomes,[12] and one reported no difference in cost (*Figure 3*).[14]

- Of the six articles that commented on quality outcomes, all reported positive findings.[10,11,13-16] However, one study showed that there was not a uniform improvement for all quality measures studied,[11] and another showed that quality improvements eventually leveled off.[13]

- In terms of utilization, we were specifically interested in primary care utilization, emergency department (ED) utilization, and inpatient hospitalizations. We considered a study "positive" if it showed an increase in primary care utilization, a decrease in ED utilization, and/or a decrease in inpatient utilization. Three studies showed positive results in terms of utilization,[11,15,16] two were mixed,[17,13] and one showed negative results.[12]

Notably, only one of the studies we looked at compared practices within the ACO that were PCMH certified to practices within the ACO that were not. This study showed positive quality outcomes for ACOs that included PCMH practices but did not compare cost or utilization outcomes.[16] The other studies either used no comparison group,[17] used a non-ACO comparison group with similar characteristics,[13,9] conducted a cross sectional study of all Medicare ACOs[12] or did a pre-post analysis after transforming into an ACO.[10,14,15,11,46] In addition to the small number of studies in total, the possibility of publication bias limits our ability to draw any strong conclusions about the impact

of advanced primary care on ACOs via a literature review. This expected dearth of evidence exploring the intersection of the PCMH and ACOs led us to pursue a quantitative analysis.

QUANTITATIVE ANALYSIS FINDINGS

In Section 3, we report on original analyses of the association between PCMH and ACO outcomes, using NCQA recognition of PCMH practices and 2014 Medicare Shared Savings Program (MSSP) data to stratify ACOs by the level of PCMH penetration (defined as the percentage of ACO primary care physicians (PCPs) with PCMH experience). Many recognition programs exist for PCMH accreditation in addition to NCQA's, including the Accreditation Association for Ambulatory Health Care (AAAHC) Medical Home On-site Certification, the Joint Commission (TJC) Designation for Your Primary Care Home and URAC Patient-Centered Medical Home Accreditation.[16] States such as Oregon and New York, along with others, have established their own criteria for PCMH. Yet NCQA has the highest penetration rate with 24% of PCPs practicing in an NCQA certified PCMH.[48] Therefore, we chose to use these data as a proxy for PCMH status.

In our quantitative analysis, we used NCQA data to identify PCMH PCPs practicing in 2014 MSSP ACOs. To understand the potential association between PCMH and cost and quality outcomes among ACOs, we categorized ACOs into quartiles by the share of PCPs with a PCMH experience. The lowest quartile of ACOs had no PCMH PCPs; the highest quartile had 43% PCMH PCPs. In terms of cost, when adjusting for ACO organization and beneficiary characteristics, we found that having PCMH PCPs was associated with higher savings among ACOs in the 2014 MSSP. Compared to the lowest quartile for PCMH PCP share, ACOs in the second lowest quartile on average had a 1.9 percentage point higher savings rate (p-value 0.03). Though lacking in statistical significance, the savings rates of ACOs in the second highest and the highest quartiles for PCMH PCP share were on average 1.3 and 1.2 percentage points, respectively, higher relative to those in the lowest quartile. The average savings rate was 0.6% for our ACO sample, suggesting that the magnitudes of the cost savings for ACOs with PCMH PCPs were sizeable.

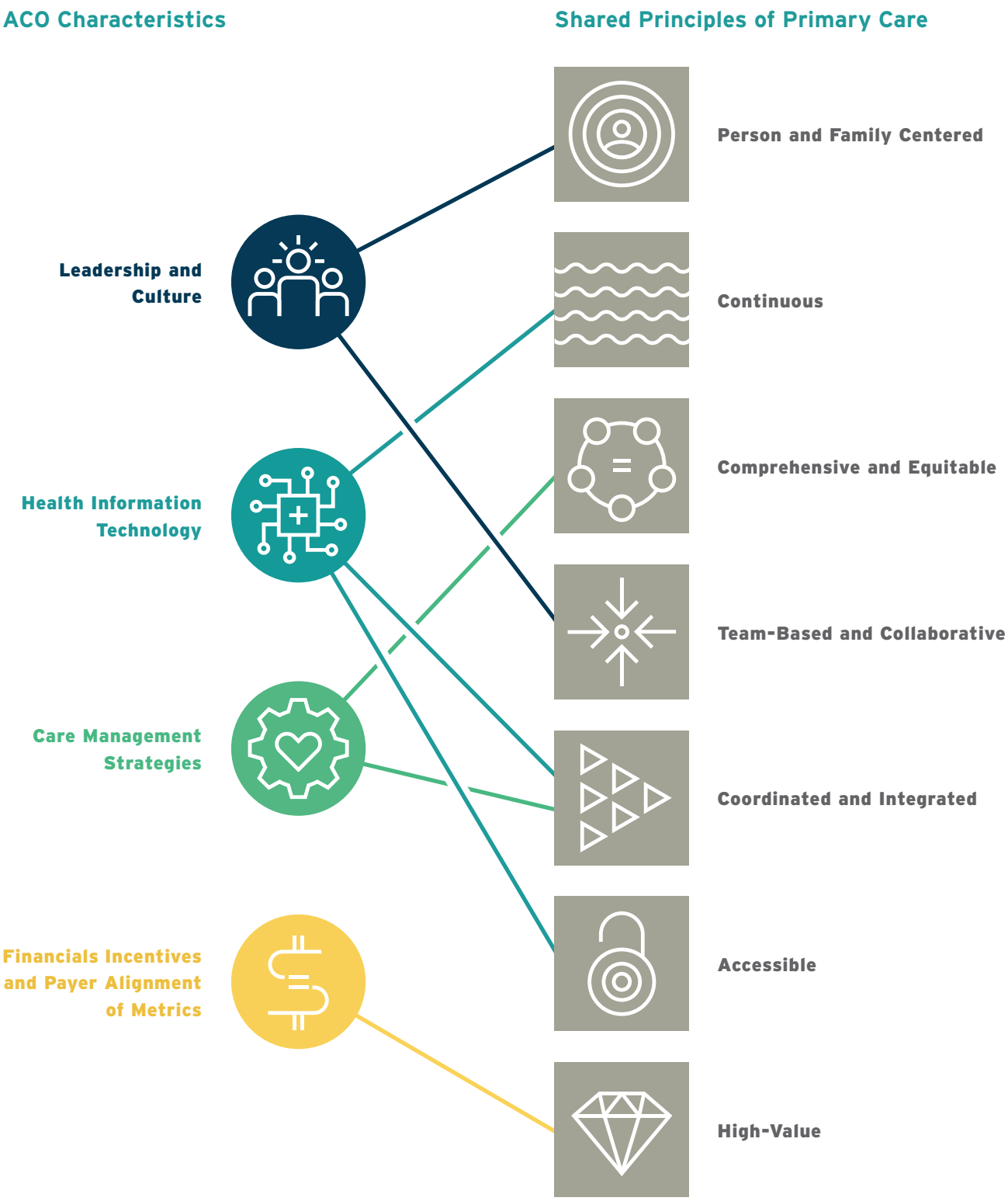
With respect to quality, ACOs in the highest quartile of PCMH PCP share performed better than those in the lowest quartile. In multivariate regression, having a higher share of PCMH PCPs was associated with higher health promotion and higher health status scores (*Table 3*). The preventive service scores were also generally higher: having a higher share of PCMH PCPs was associated with higher pneumococcal vaccination and depression screening scores. ACOs in the higher quartiles had better tobacco screening and cessation intervention scores than the lowest quartile group, especially the second lowest quartile. ACOs in the higher quartile groups also had superior chronic disease management, including higher diabetic and coronary artery disease composite scores.

Overall, our quantitative analysis demonstrated:

1. PCMH PCP share in ACOs varied from 0 percent in the lowest quartile to an average of 43 percent in the highest. ACOs with a higher PCMH PCP share on average had lower historical benchmarks than the lowest quartile. ACO's historical benchmark reflected its recent 3-year average Medicare (Part A and Part B) spending of its beneficiaries prior to joining the program. While this study was not designed to explain this finding, one explanation is that ACOs with more PCMH PCPs are composed of historically efficient practices.

FIGURE 1

Characteristics of Successful ACOs Mapped to the Shared Principles



www.pcpcc.org/about/shared-principles

2. After adjusting for ACO organization and beneficiary characteristics, ACOs with a positive (non-zero) PCMH PCP share were more likely to generate savings, although the relationship was not proportional, meaning that having a higher PCMH PCP share was not associated with more savings. The 1.9 percentage point average difference in the savings rate between the second and the first quartile for PCMH PCP share is sizable given that the mean savings rate among ACOs was 0.6%.

3. After adjusting for ACO organization and beneficiary characteristics, ACOs with a higher PCMH PCP share demonstrated higher quality as well, specifically in health promotion scores, health status scores, preventive service scores and chronic disease management scores.

In summary, a review of published evidence, expert opinions, and secondary data analysis suggests the interdependence of advanced primary care models (such as the PCMH) and ACOs in achieving improved population health, lower costs, and better patient experiences in health care. Much work still remains to gather data and understand the methods that are best suited to study the relationship between advanced primary care models and ACOs. Given these results and the desire of policy makers and accountable health system leaders to derive increasingly better results from delivery and payment transformation, policies that encourage a strong primary care orientation for ACOs should be considered. This orientation could include PCMHs and policies that promote the six characteristics identified in the literature review. Simultaneously, PCMHs should consider the broader ecosystem in which they practice and consider how to align with ACOs that have a primary care orientation. Through this alignment, ACOs and PCMHs have the potential to deliver on the Triple Aim and provide a higher quality of care for their patient populations.

Background

A wealth of evidence supports the role of robust and organized primary care delivery in bolstering population health. In countries and health systems that have increased access to primary care, people feel better and live longer, and health care is more equitably distributed.[18,19,20] While the United States has traditionally been low in primary care investment and worse in health outcomes on the international scale, the past decade has seen a number of advancements in primary care delivery and population health models focused on all settings of care. These new care delivery models, which attempt to embody patient-centered, coordinated, comprehensive, and accessible care with a commitment to quality, have been associated with achievement of better health outcomes at lower costs.[5] Two examples of such care delivery models are the patient-centered medical home (PCMH) and accountable care organizations (ACOs).

The PCMH has its roots in pediatrics with Barbara Starfield and others who first described the four pillars of primary care practice: (1) first-contact care; (2) continuity of care; (3) comprehensive care; and (4) coordination of care. The Joint Principles of the Patient-Centered Medical Home, published more than 10 years ago, began to further refine this definition through the establishment of seven fundamental pillars of a PCMH, which include coordination of care across health care fields and the patient's community; a focus on the "whole person," including acute, chronic, and end-of-life care; and a payment system that recognizes value over volume.[21] The Shared Principles for Primary Care, introduced in 2017, build on these principles and reflect an updated evidence base related to the social determinants of health, an increased focus on team-based care, a deeper appreciation for the importance of patient/family engagement for health, and a greater emphasis on value.[22]

The 2017 *Patient-Centered Primary Care Collaborative* (PCPCC) annual evidence report that focused on advanced primary care models showed positive results with regard to quality, cost, and utilization of care, albeit not uniformly.[6] The mixed findings could be due to a variety of factors, such as the lack of standardized quality measures across studies, differences in PCMH maturity, small sample sizes, lack of standard recognition for the PCMH across studies, and lack of an adequate control group given the widespread nature of PCMH-like care. One must also consider that the PCMH model depends solely on primary care, without any incentive for specialists or hospitals to participate. Accountable care organizations, on the other hand, are incentivized to care for patients along the continuum of care.

Like PCMHs, ACOs aim to deliver high-quality, cost-effective care with an emphasis on population health.[23,24] The ACO model, as it is known today, was first presented by Elliott Fisher in a 2006 meeting of the Medicare Payment Advisory Commission (MedPAC). Fisher presented research that showed Medicare beneficiaries received their care from a relatively stable set of physicians and hospitals, and he suggested they could be grouped together to form "virtual organizations." MedPAC Chair Glenn Hackbarth referred to this model as an "accountable organization," and Fisher

ACOs by the numbers

923

Number of ACOs around the country

32 million

Number of individuals covered by an ACO, 10% of the US population

50

Number of states with ACOs present plus Washington, DC and Puerto Rico

Data Source: Muhlestein DB, Saunders R, McClellan M. Growth of ACOs and alternative payment models in 2017. Health Aff Blog. June 2017. www.healthaffairs.org/do/10.1377/hblog20170628.060719/full/. Accessed February 5, 2018.

Examining the Potential Spillover Effects of Medicare ACOs

An analysis by IBM/Watson Health

To further examine the potential impact of ACOs, a preliminary analysis by IBM Watson Health explored the possibility of spillover effects of Medicare ACOs on their surrounding area.

Data Sources Used

The IBM® MarketScan® Commercial Claims and Encounters Database is the source for the tables presented in this section. The Commercial Database includes insurance claims from nearly 190 million employees and dependents covered by self-insuring employers and by regional health plans. Both large- and medium-sized employers are well represented.

Methods

We limited the study to data contributors (employers and plans) who were present in both 2012 and 2016 to control for potential shifts in sample composition. Individuals were included in the tabulation if they were enrolled in fee-for-service-type health plans to ensure complete recording of covered services (including coverage for outpatient prescription drugs). Patient locations were mapped to MSAs using the U.S Department of Housing and Urban Development's (HUD) ZIP-CBSA crosswalk file for Q4, 2014 for ZIP to MSA correspondence in conjunction with Census Bureau CBSA Population Estimates File for MSA identification and for handling of Metropolitan Divisions.

We used standard Watson Health service categories to identify primary care visits, specialty visits and ER visits (ER are outpatient only). Multiple claim lines in a single day in one of these categories were counted as one visit. Spending is the sum of allowed charges across all types of claims for incurred dates falling in the year.

To create the ACO penetration categories we assigned the ACO penetration rate to each MSA and sorted MSAs from lowest to highest penetration rate. We computed the cumulative number of MarketScan enrollees for each level of ACO penetration for the year 2016 and selected the MSA on the boundary of each quintile to create the categories. We report the midpoint of the category (e.g., 10th percentile value for the first quintile, 30th for the second, etc.).

Limitations

There are several important limitations to keep in mind. It is traditional to identify claims data as the result of administrative processes that are not designed to generate research data. That said, these are summarizations of fully adjudicated claims. More important, this is a descriptive study. The characteristics of MarketScan enrollees will vary from MSA to MSA. No adjustment has been made at this point for this variation. We plan to undertake that adjustment process in future work.

Differences in Private Payer Utilization for Medicare ACO Penetration Level (2012 and 2016)

2012

MSA Group by ACO Penetration Level*	MSA ACO Penetration Level Midpoint*	Private Payer Total Spending per Enrollee	Private Payer Primary Care Visits per Enrollee	Private Payer Specialist Visits per Enrollee	Private Payer ED Usage per Enrollee	Private Payer Hospital Admissions per Enrollee
1	1.6%	4,957	2.352	1.132	0.225	0.061
2	14.7%	5,020	2.332	1.194	0.226	0.064
3	19.6%	5,310	2.410	1.310	0.216	0.062
4	23.3%	5,594	2.529	1.618	0.247	0.064
5	29.9%	4,918	2.329	1.177	0.239	0.063

* Definition of the variable and how it was computed is included in the Methods section.

2016

MSA Group by ACO Penetration Level*	MSA ACO Penetration Level Midpoint*	Private Payer Total Spending per Enrollee	Private Payer Primary Care Visits per Enrollee	Private Payer Specialist Visits per Enrollee	Private Payer ED Usage per Enrollee	Private Payer Hospital Admissions per Enrollee
1	1.6%	5,701	2.161	1.089	0.228	0.055
2	14.7%	5,702	2.175	1.170	0.218	0.058
3	19.6%	6,083	2.248	1.214	0.226	0.055
4	23.3%	6,721	2.313	1.565	0.231	0.058
5	29.9%	5,494	2.170	1.126	0.238	0.056

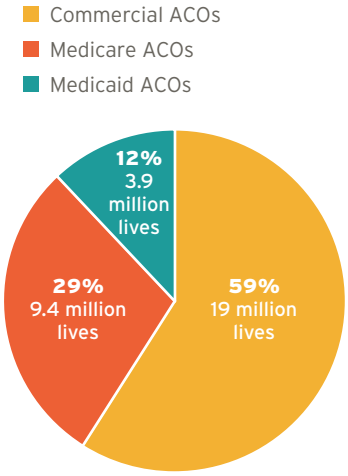
* Definition of the variable and how it was computed is included in the Methods section.

Results

As penetration rates of a Medicare ACOs vary across areas, expenditures and hospitalization rates of commercial patients in those areas vary. The results do not follow a linear pattern in that the areas with highest share of ACOs do not necessarily have the lowest expenditures or more appropriate utilization.

Although there is some variation in outcomes based on ACO penetration level, the trend is non-linear. This implies that there is certainly more at play in the health of a population than the share of ACOs in an area. These results also indicate that higher prevalence of ACOs in the community does not necessarily mean better or more efficient care.

ACO Lives Per Payer



Data Source: Muhlestein DB, Saunders R, McClellan M. Growth of ACOs and alternative payment models in 2017. Health Aff Blog. June 2017. www.healthaffairs.org/do/10.1377/hblog20170628.060719/full/. Accessed February 5, 2018.

adopted this description in a Health Affairs article in which he proposed the term "accountable care organizations."[2,25]

As the ACO program matures, it is increasingly important to understand what contributes to the factors underlying success for an ACO and what impact ACOs have on the cost and quality of health care at the population or community level. A 2017 report by the Office of the Inspector General (OIG) found that only one-third of ACOs taking part in the Medicare Shared Savings Program (MSSP) realized savings.[26] Yet, ACOs outperformed fee-for-service providers on most quality measures, including hospital readmission rates and depression screenings.[25] Furthermore, a small group of the highest-performing ACOs were able to reduce Medicare spending substantially—by about $673 per beneficiary—while providing high-quality care.[26]

The ACO and advanced primary care delivery models are changing the way that health care is organized and delivered, placing increased emphasis on value over volume, proactive population health over reactive visit-based care, and care coordination over fragmentation. Many feel that the synergy of these two models could contribute to the success of both.[3,8] ACOs, with their focus on population health management, depend on the tenets of strong primary care, such as coordinated, comprehensive, patient-centered care. Strong primary care also depends on the larger system to meet its full potential.

We set out to better understand the interaction between advanced primary care and the ACO model through a comprehensive literature review, expert convening, and quantitative analysis. Our first literature review, presented in Section 1, explored the characteristics that are essential to the success of an ACO. Our second literature review, presented in Section 2, focused on ACOs that have a strong advanced primary care foundation (e.g., the PCMH), presenting the cost, quality, and utilization outcomes of these organizations. Section 3 directly studied the impact of the PCMH on ACOs through a quantitative analysis of National Committee for Quality Assurance (NCQA) and Medicare data.

SECTION 1

The Characteristics of Successful Accountable Care Organizations

LITERATURE REVIEW AND EXPERT CONVENING ANALYSIS

INTRODUCTION

Our first literature review in this year's report sought to identify the unique characteristics associated with successful accountable care organizations (ACOs). Through a combination of consultation with our own study team and experts in the field, we developed categories that included characteristics related to ACO organizational structures, unique patient care methods, incentive arrangements, and key leadership/cultural qualities. For a full review of our methods, see *Box 1*.

RESULTS

Thematic analysis of the final included studies revealed a number of key recurring characteristics that help ACOs enhance patient satisfaction, lower costs, and improve population health. These characteristics can be organized within six broad themes:

1. Leadership and Culture
2. Prior Experience
3. Health Information Technology
4. Care Management Strategies
5. Organizational and Environmental Factors
6. Incentive and Payer Alignment

Interestingly, these characteristics of successful ACOs align closely with the attributes of the patient-centered medical home (PCMH) (*Figure 1*).

Leadership and Culture

Qualities related to ACO leadership and culture were among the most commonly cited keys for success in achieving both quality and cost goals, with seven included studies referencing these qualities.[27-31]

One important factor referenced throughout the literature was the involvement of physicians in leadership roles acting as "clinical champions." At an organizational level, a cross-sectional study of Medicare ACOs found a positive correlation between savings per beneficiary and both physician leadership within the ACO and the number of physicians acting on the governing board.[27] Other studies have highlighted the importance of diverse, collaborative governance structures to foster coordinated communication across the ACO.[28] These governance structures would have representation from a wide array of specialties and stakeholders, including leaders in the community.[28] Regardless of whether the practice

The Robert Graham Center convened a meeting entitled the Patient-Centered Primary Care Collaborative Expert Meeting on the Intersection of PCMH (Patient Centered Medical Home) and Accountable Care Organizations (ACOs), on March 22, 2018, in Washington, DC. See the report at: www.pcpcc.org/resource/pcpcc-convening-2018-evidence-report

Expert Panel

Melinda Abrams
The Commonwealth Fund

Linda Brady
The Boeing Company

Rachel Burton
Urban Institute

Lawrence Casalino
Weill Cornell Medical College

Melissa Cohen
Anthem

Annette DuBard
Aledade, Inc.

Keith Fernandez
Privia Health

John McConnell
Oregon Health Science University

Kay Quam
Fairfax Family Practice of Privia Health

Diane Rittenhouse
University of California-San Francisco

Danielle Robertshaw
Hennepin Healthcare

John Westfall
Santa Clara Valley Medical Center Health & Hospital System

Lisa LeTourneau, MD, MPH, FACP
Facilitator

"Leadership is foundational and leadership can be a major barrier to scalability."

Diane Rittenhouse, MD, MPH
Associate Professor of Family Medicine and Health Policy, University of California, San Francisco

"What is a successful ACO? Are the most successful ACOs the ones that started out with the highest PMPM? The ACO winners and losers (receiving or writing the checks in a given year) are not necessarily always the winners and losers from an overall cost and quality perspective."

Melissa Cohen
Staff VP Payment Innovation Strategy, Anthem

"champion" is a physician or not, having top-level leadership that is consistently involved in driving the ACO vision and regularly engages frontline physicians to execute that vision is a key component for system-wide buy-in and performance improvement.[29,30]

The evidence also shows the need to establish a culture of shared commitment and accountability in which staff, clinicians, and administration are encouraged to collaborate to achieve the joint mission of improving quality and cost.[31] The presence of a collaborative culture in which each care team member played an integral role in facilitating successful, continuous patient care was a key reason that two ACOs (Cornerstone Health Care and Summit Medical Group) were able to reach quality goals in the Measure Up/Pressure Down campaign to lower blood pressure.[30] Furthermore, D'Aunno et al. found that within practices that had built collaborative working relationships with local hospitals prior to ACO formation, primary care providers (PCPs) could more easily communicate to learn patients' admission information and discharge status.[32]

Prior Experience

An ACO's prior value-oriented managed care experience is another important factor that was noted throughout the literature. Altogether, seven of our included studies found that experience-related factors were important to ultimate ACO success.[27,32-37]

Using Medicare Shared Savings Program (MSSP) ACO performance data from 2012-2014, Schulz et al. found that experience (defined as time in the MSSP) was significantly associated with a higher probability of achieving shared savings.[33] Similarly, a cross-sectional study by Ouayogodé et al. examining the effect of ACO characteristics on shared savings for 215 Medicare ACOs concluded that prior experience with risk-bearing contracts was significantly associated with ACOs achieving shared savings.[27] As for quality, when focusing on all measures in the MSSP across four key categories (patient/caregiver experience, care coordination/patient safety, clinical care for at-risk populations, and preventive health), Bleser et al. found ACOs that were more mature in terms of number of contracts, program time, and risk-bearing experience were more likely to have higher quality metrics.[34] Several other included sources reiterated the idea that experience with prior risk-bearing agreements is an important factor for ACO success.[35,32,36] These findings suggest that experience makes a difference and that, over time, ACOs are learning and improving to adjust their workflows and capabilities to provide cost-effective, high-quality managed care.[33]

The evidence also suggests that practices with a history of high spending levels have an advantage when it comes to achieving shared savings. Ouayogodé et al. found a positive regression coefficient between ACOs that have a higher financial benchmark and likelihood of earning shared savings payments.[27] Other studies have shown that a benchmark against one's own historical achievement has made it more difficult for practices that are already performing well on cost/quality metrics to achieve savings.[37] However, the recent changes by the Centers for Medicare & Medicaid Services (CMS) to implement regional, more risk-adjusted benchmarks may be an important step to help resolve this problem.[37,47]

Health Information Technology

A robust electronic health record (EHR) system to track a wide breadth of patient care is another key factor mentioned for ACO success. In total, eight studies cited the importance of an EHR.[14,28-32,35,38] The concept of technology and data capabilities goes far beyond simply having an EHR record-keeping system for patient history and past visits. It includes the role of

technology in coordinating care, identifying certain high-risk patient groups who might need tailored care, tracking patient care beyond the ACO (e.g., hospitalizations, emergency department [ED] visits, and visits to other outside providers), and receiving performance data feedback for quality improvement.[35,31] The importance of a robust EHR, with capabilities similar to those outlined above, was reiterated throughout the literature. In a cross-sectional study of 177 MSSP and Pioneer ACOs, Albright et al. concluded that ACOs with greater EHR capabilities were more likely to achieve higher quality scores for disease prevention.[14] This improvement in prevention scores may be due to the fact that robust EHR capabilities can help practices identify patients who are at higher risk and manage their care accordingly. Several studies highlighted the importance of identifying high-risk patient populations, a task that a robust EHR system could be integral to carrying out.[35,29,31]

Finally, information technology (IT) can play a critical role in quality improvement. Several included studies stressed the crucial role of performance data feedback for quality improvement in successful ACOs. A successful ACO studied by Shortell et al. invested in advanced IT to utilize timely, effective metric feedback for physicians to review and make care improvements.[35,32] Furthermore, Lustig et al. revealed that in order to achieve optimal improvements in performance, Cornerstone Health Care and Summit Medical Group fostered an environment of transparency wherein physicians were able to share quality data to learn from one another.[30]

Care Management Strategies

Seven studies emphasized the importance of various care management strategies in successful ACOs.[11,29,32,35,37-39] These strategies included integrating care coordinators into the practice, focusing on decreasing unnecessary ED visits and hospitalizations, emphasizing preventive care, and identifying and effectively managing high-risk patients' care.

Care coordinators spanned a variety of professions and roles, from home health nurses to health care professionals who helped coordinate services.[32] Furthermore, social workers or patient navigators served a vital patient support role in some ACOs, helping patients access important community resources to address social determinants of health (e.g., housing and welfare opportunities).[32,39]

ACOs utilized care management programs, often orchestrated by nurses, with the goal of reducing hospitalizations, readmissions, and ED visits.[35,29,39] A number of studies highlighted the importance of tailoring managed care to address these goals for high-risk populations, with adequate risk prediction modeling supported by the technology and data capabilities described above.[11,35,29] Other studies noted the importance of care coordinators being involved with discharge planning and following up with patients after hospitalizations.[29,38] The use of a care coordinator to improve these transitions of care was shown to decrease readmissions and lower spending.[31]

Organizational and Environmental Factors

Ten studies addressed a variety of organizational elements (e.g., ACO provider and beneficiary makeup) and environmental elements (e.g., regional and market differences) that could impact ACO performance.[14,15,27,33-35,40-43]

A number of organizational factors played a role in ACO performance. A study of 177 MSSP and Pioneer ACOs found that having more Medicare ACO beneficiaries per PCP was associated with significantly better

"When IT works and the team is working efficiently, it gives me that opportunity to build one-on-one relationships with patients to engage them with their health."

John M. Westfall
Senior Scholar,
Farley Health Policy Center

"You just see so clearly that when you step beyond the primary care practice if there isn't some kind of coordination with all that interface between PC and the rest of the healthcare system there is no chance for improving overall quality and decreasing costs."

Diane Rittenhouse, MD, MPH
Associate Professor of Family Medicine and Health Policy, University of California, San Francisco

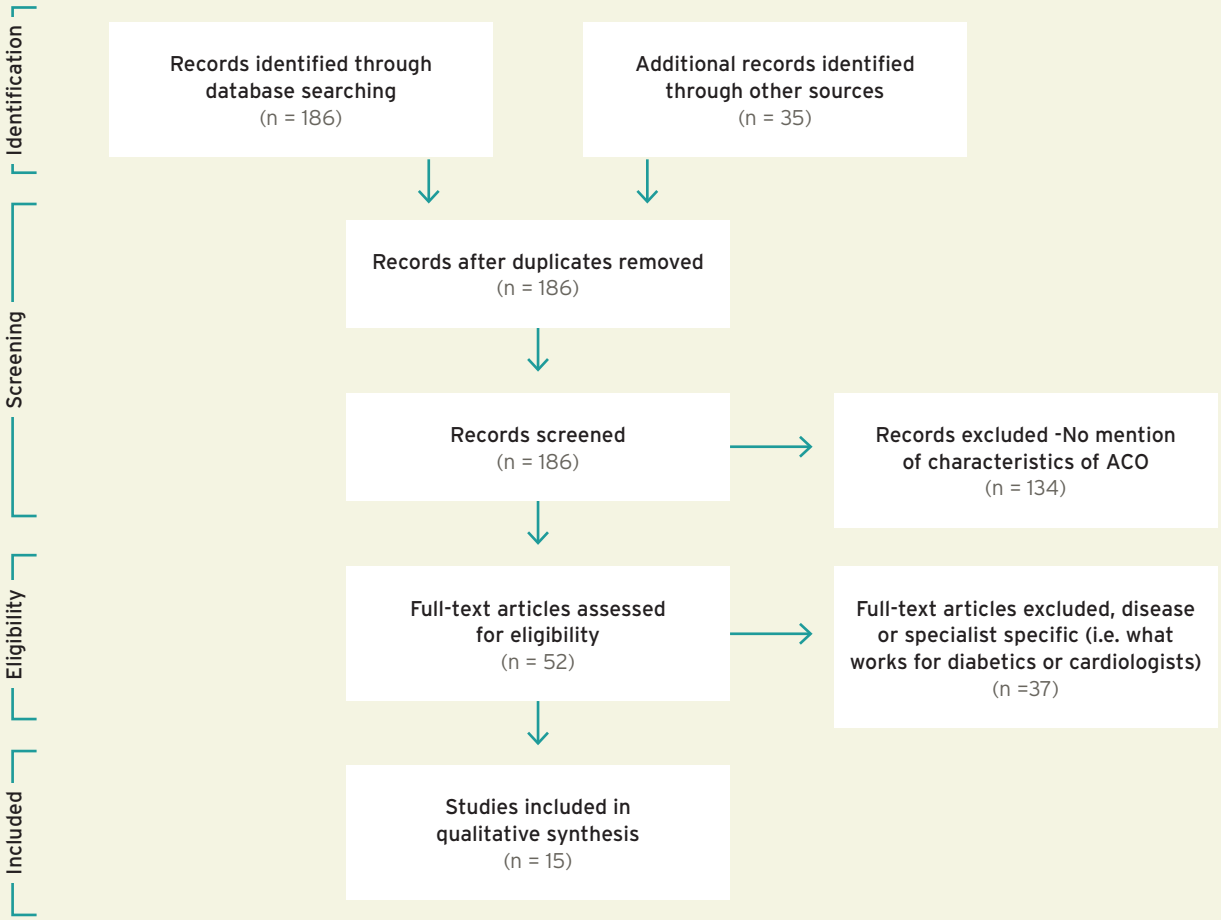
BOX 1

Methods for Section 1—Characteristics of Successful ACOs

Search Strategy: To locate relevant studies, we searched PubMed and Ovid from inception until May, 2018, using key terms identified by expert input and mapped to MESH headings. (*Appendix 1.1*). Once articles were identified for inclusion we also scanned bibliographies for additional references.

Selection Criteria: The initial search yielded 186 non-duplicate studies. Inclusion criteria included articles that made mention of characteristics that helped ACOs succeed. We included both quantitative studies examining ACO characteristics and their association with cost and/or quality, as well as qualitative studies that thematically analyzed interviews with ACO leaders in ACOs that had demonstrated success either in terms of shared savings or improved quality. Furthermore, macro-level analyses (evaluating large numbers of ACOs) and micro-level case reports were also both eligible for inclusion. Studies examining ACOs of all types, including Medicare, Medicaid, or commercial payers, were included. Articles were excluded if they were focused on factors of ACO success for a specific specialty, diseases process, or patient population. We also excluded articles that focused on characteristics associated with ACO adoption but not necessarily with ACO success. After screening for inclusion by title and abstract by two separate reviewers (AH and YJ), we were left with 52 studies. A full review of the article by two reviewers led to an exclusion of an additional 37 articles for a total of 15 articles used in inclusion. Bibliographies of articles were then scanned to ensure no additional articles were missed and this yielded no additional studies to use for inclusion. A full study flow diagram can be seen below.

Literature Flow Diagram—Section 1



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

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quality measures for disease prevention and annual health screenings.[14] Similarly, Bleser et al. found a significant positive association between ACO size and quality scores.[34] Shortell et al. emphasized that an ACO's enrollment size is important, with a minimum of 25,000-50,000 enrollees necessary to create economies of scale to achieve significant savings.[35] However, in a cross-sectional study of 339 MSSP ACOs, Schulz et al. did not find a significant association between number of ACO beneficiaries and ability to earn shared savings.[33] It should be noted that although many of the cited articles showed that quality improves with scale, there is some evidence that smaller ACOs have a greater potential to achieve shared savings.[40]

Regarding ACO physician makeup, studies suggest that a higher proportion of PCPs is associated with better quality and cost outcomes. In one study, Albright et al. found that ACOs with a larger primary care workforce were more likely to perform better on quality measures related to disease prevention, while a study by Ouayogodé et al. found a positive correlation between proportion of PCPs and an ACO's ability to earn shared savings.[15,27] In order to achieve cost/quality goals, many of the ACOs studied by Lewis et al. pursued PCMH accreditation because they believed ACO and PCMH values were closely aligned.[41]

Two key environmental factors that impacted ACO success were identified in the included studies: rurality and overall ACO market penetration.[27,34,42] Zhu et al. found that among 2014 Medicare MSSP ACOs, those in rural counties performed better on overall quality scores than those in urban counties.[42] Likewise, a study by Bleser et al. found that rurality was generally associated with higher quality metrics.[34] However, it should be noted that a more recent 2014-2015 analysis by Zhu et al. of more than 300 MSSP ACOs found that after adjusting for organizational and service-provision factors, there was no significant difference between the average quality performance of rural and non-rural ACOs.[43] One study found a positive correlation between market penetration of ACOs and an ACO's ability to earn shared savings.[27]

Financial Incentives and Payer Alignment of Quality Metrics

A number of included studies highlighted the importance of incorporating and aligning financial incentives within ACOs and quality measures between payers. Six studies addressed factors in this category.[27,29-31,35,36]

Several studies discussed financially incentivizing physicians within ACOs to achieve quality/cost goals.[27,35,29,31,30] While examining characteristics associated with achieving shared savings in 215 Medicare ACOs, Ouayogodé et al. found a positive correlation between offering financial incentives to physicians and earning shared savings payments.[27] Powers et al. noted that Aledade financially incentivizes their practices by taking a small membership fee ($1 per member), which helps motivate practices to make up the loss by meeting quality/cost goals to receive shared savings.[11] To further incentivize practices, Aledade uses a formula to distribute shared savings to individual practices within their ACOs based on the following components: 1) the size of the practice; 2) participation and leadership to "incentivize engagement in practice transformation and best practices dissemination"; and 3) key performance measures.[11] Many practices involved in the Alternative Quality Contract program by Blue Cross Blue Shield of Massachusetts incentivized physicians by tying compensation to performance to meet quality and utilization goals.[29] While transitioning to a value-based payment system, Summit Medical Group achieved organizational buy-in by incorporating value-based payments into the provider bonus pool that was distributed on the basis of performance.[30]

"With ACOs it's somewhat difficult to articulate the value to patients since ACOs at their heart are payment arrangements between payers and providers whereas PCMH is more about a delivery model focused on the patient centered experience. Being able to translate that [patient centered care] to the broader ACO context could be very helpful."

Melissa Cohen
Staff VP Payment Innovation Strategy, Anthem

"Getting some upfront payment to primary care is important to ACO success."

K. John McConnell, PhD
Director OHSU Center for Health Systems Effectiveness

In addition to highlighting the importance of aligning financial incentives within the ACO, studies also suggested that external misalignment of performance metrics among payers could be a substantial barrier to achieving cost/quality goals for many ACOs.[35] To overcome this challenge, it is important for ACOs to develop a closer relationship with payers in order to build shared aims and interests.[36] This effort could help ACOs and payers make more substantial progress on choosing a common set of quality and cost measures that decrease administrative burden, as well as supporting other mutual goals (e.g., building data-sharing arrangements).[36]

CONCLUSION

A review of the literature revealed that a wide variety of elements can play a role in ACO success, including factors related to leadership and culture; value-oriented experience; health information technology; care management strategies; organizational and environmental factors; and incentive and payer alignment. As we analyzed factors associated with successful ACOs, we noted that many of them are also closely aligned with the characteristics of successful advanced primary care in a PCMH (*Figure 1*).

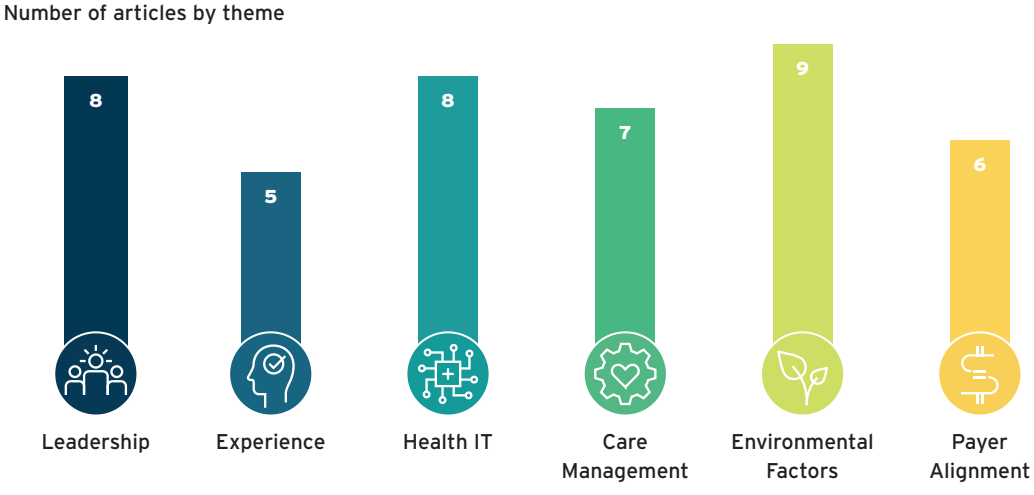
Factors discussed in this review that are also closely aligned with successful advanced primary care include the following:

- Importance of a clinical champion dedicated to transforming care
- Collaborative culture of accountability among staff
- Need to integrate an advanced EHR to identify and manage care for high-risk patients
- Emphasis on performance feedback
- Focus on decreasing costly ED visits and hospitalizations
- Value of enhanced access to PCPs

It should be emphasized that ACOs have an explicitly broader charge than advanced primary care—namely, to affect total costs of care for an assigned population. In addition, every ACO is unique, functioning in a particular environment with a particular population of patients. Nonetheless, this initial literature review offers some insight into the interaction between advanced primary care and ACOs, showing that characteristics of successful ACOs align closely with the attributes of the PCMH. To understand the actual impact of advanced primary care on ACOs, we conducted a narrower search of the literature, which is discussed in Section 2.

FIGURE 2

Summary of Outcomes from Section 1 Literature Review



SECTION 2

The Cost, Quality, and Utilization Outcomes of Advanced Primary Care on Accountable Care Organizations

LITERATURE REVIEW

INTRODUCTION

To further explore the relationship between advanced primary care models and accountable care organizations (ACOs), we focused our second literature review on outcomes of ACOs that had a strong advanced primary care foundation. As with last year's report, we defined advanced primary care by either self-reported patient-centered medical home (PCMH) status (regardless of recognizing body) or PCMH-like attributes. Primary care practices with PCMH-like attributes included those that had implemented one or more of the principles of the patient-centered medical home (*see Appendix 2.2 for details*). Given our interest in the interaction between advanced primary care and the ACO model, we did not examine all studies of ACO results, but instead examined studies that specifically looked at ACOs with a strong advanced primary care orientation. Although there is a tendency to group physician-led ACOs with ACOs that have a strong primary care base and to group hospital-led ACOs with ACOs that have a weak primary care base, these generalizations do not necessarily hold true. Therefore, we included both hospital-led and physician-led ACOs in our analysis if the ACO was centered around an advanced primary care model. For a full review of our methods, see *Box 2*.

RESULTS

Seven of the included studies were limited to case reports that described the effect of advanced primary care or the PCMH on ACOs. The organizations included physician-led ACOs,[9,10,11] hospital-led ACOs,[17] and integrated models.[13,15,16] Two studies did not look at one organization in particular, but instead examined the impact of primary care in general (as opposed to advanced primary care) on the Medicare Shared Savings Program (MSSP).[12,14] Although these two articles did not specifically discuss advanced primary care models, they helped explain national trends, and their mixed results imply that primary care is not the only factor that matters.

Altogether, we found 10 reports that included quantitative outcomes on cost, quality, or utilization (*Appendix 2.2*).

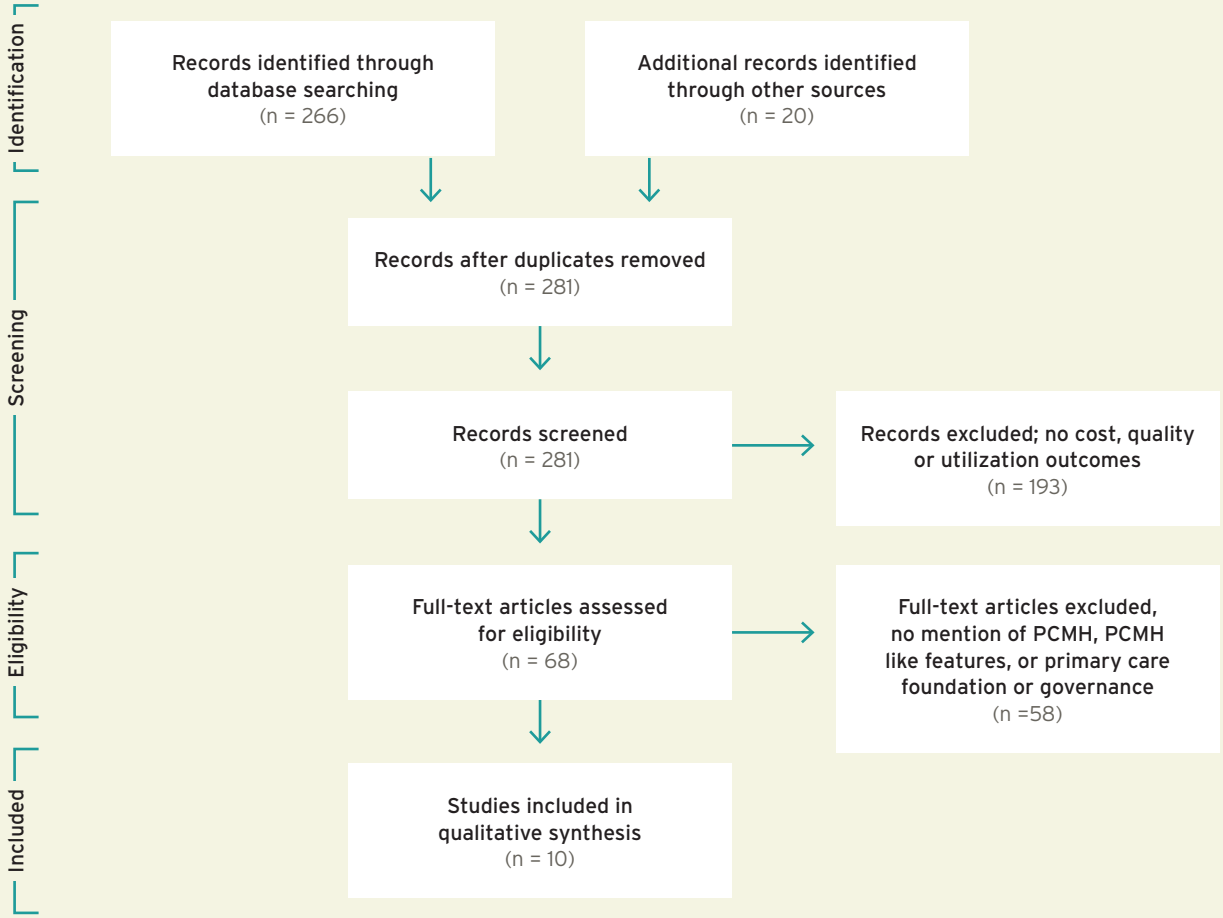
BOX 2

Methods for Section 2—Cost, Utilization and Quality Outcomes for Advanced Primary Care Based ACOs

Search Strategy: After consultation with experts in the field of PCMH and/or ACO as well as with a library scientist from the American Academy of Family Physicians (AAFP) we created a list of search terms that would capture advanced primary care and ACOs (*Appendix 2.1*). We identified peer-reviewed articles for use by searching PubMed, Ovid, EMbase and CinAhl. Our goal was to identify both peer-reviewed literature and "grey literature" such as published reports or conference presentations, yet despite a full review of multiple grey literature data sources including state reports and conference abstracts, no grey literature was found that examined the impact of advanced primary care on ACOs. Unlike our report on PCMHs last year, we did not have any date restrictions given that there was much less literature available with the addition of ACOs as a part of the search, but for practical purposes we set an end date of May 1, 2018.

Selection Criteria: We found 261 articles using the search terms identified in appendix 3. Two authors (YJ and HJ) reviewed titles and abstracts of all 261 papers to establish whether or not they met our inclusion criteria. Inclusion criteria included any article that mentioned the impact of cost, quality or utilization outcomes for ACOs centered on advanced primary care. In total, 68 of articles were identified. Articles were further excluded if a full review of the article demonstrated that no actual analysis of cost, quality or utilization data were conducted (i.e. opinion or theoretical pieces) or if the organization was not centered on advanced primary care (as defined above). Conflicts of scoring (16 articles) were then reviewed by a third author (MC) to determine eligibility for our final review. In total, we ended up with 9 articles for inclusion. Using a snowball approach, we subsequently scanned bibliographies of these papers to identify potential articles for inclusion until we reached saturation, and 1 additional article was found for a total of 10 articles. Finally, we engaged an advisory group in the form of tertiary reviewers to ensure that additional articles of value weren't excluded and to gauge the merit of threshold articles.

Literature Flow Diagram—Section 2



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

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Of these, seven studies reported cost outcomes, six reported utilization outcomes, and five commented on quality outcomes.

Cost Outcomes

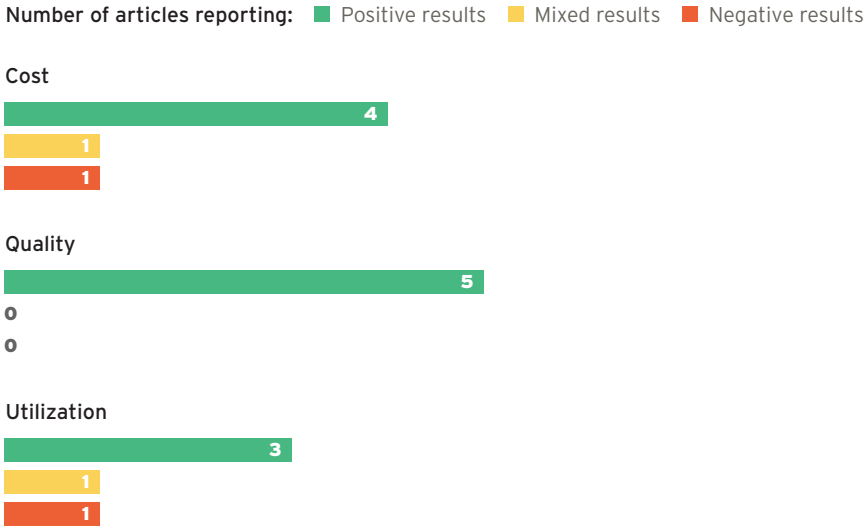
In terms of cost outcomes, findings were generally positive. Four reported cost savings,[9-11,13] one reported negative cost outcomes,[12] and one reported no difference in cost (*Figure 3*).[14] Four of the articles that demonstrated cost savings used comparison groups not enrolled within the ACO and reported savings compared to comparisons.[9,10,11,13] Christensen et al. did not use comparison groups but instead stratified patients within a pediatric ACO by length of attribution to their primary care provider (PCP).[17] They found that those with more consistency in primary care (as defined by attribution length) had a total cost reduction of 15.7%.[17] McConnell et al. and Christensen et al. reported that a majority of these savings came from reductions in inpatient utilization,[13,17] whereas Song et al. reported that savings were most pronounced in the outpatient setting and were driven by savings on imaging, laboratory, and outpatient procedures.[10] Ho et al. reported that significant cost savings were achieved with inpatient facility, outpatient facility, and other medical service payments, and about half of the savings resulted from using lower-priced sources of care.[9] Song et al. also commented that approximately 60% of the savings were driven by lower prices and 40% by decreases in volume.[10] Powers et al. studied two ACOs run by Aledade, a company that helps primary care practices organize into ACOs.[11] They found that both ACOs spent at levels higher than their benchmarks, despite gains in appropriate utilization of services.

Utilization Outcomes

Six studies commented on utilization, specifically inpatient utilization, emergency department (ED) utilization, and

FIGURE 3

Summary of Outcomes from Section 2 Literature Review



PCP utilization.[11-13,15-17] In an efficient system that provides quality care, one would expect PCP utilization to increase, especially if better access to primary care results in decreases in ED and inpatient utilization. Three studies showed positive results in terms of utilization,[11,15,16] two were mixed,[17,13] and one showed negative results.[12] Aledade was able to reduce inpatient utilization by 9% for one of its ACOs and by 2% for the other ACO studied.[11] In another study, early results from Cambridge Health Alliance showed a decrease in inpatient hospitalization compared with rates for the rest of the nation,[16] although it is unclear if this decrease was statistically significant. An early evaluation of Hennepin Health showed a 3.3% increase in outpatient visits and a 9.1% decrease in ED visits.[15] Christensen et al. showed that patients who had longer attribution to their primary care home had more PCP visits and fewer hospitalizations, but they also had more ED visits.[17]

An evaluation of Oregon's coordinated care organizations (CCOs) showed a significant decrease in inpatient stays, ED visits, and preventable hospitalizations;[13] however, rates of primary care visits also declined. The

authors suggest this decrease could be due to an expansion of Medicaid in the state that increased the need for primary care without increasing the workforce. They also attribute much of the decrease in ED and inpatient utilization to increased use of services provided outside the medical office, such as engagement with community health workers and social services. This finding highlights the importance of a global budget that allows flexibility to spend funds for non-traditional support services and transition programs.

By contrast to these case studies, a review of MSSP data by Herrel et al. showed that ACOs in the highest quartile of PCP focus (based on percentage of all ambulatory evaluation and management services delivered by a PCP) had higher adjusted rates of hospital admissions and ED visits.[12] However, this study only evaluated PCP focus and not necessarily whether a system provided PCMH-like care. These findings may show that it is not primary care alone that matters within an ACO. Organized primary care models such as the PCMH may be required in order to have a true impact on outcomes.

Quality Outcomes

Of the six articles that commented on quality outcomes, all reported positive findings.[10,11,13-16] However, one study showed that there was not a uniform improvement for all quality measures studied,[11] and another showed that quality improvements eventually leveled off.[13] Albright et al. looked at whether characteristics of MSSP ACOs impacted performance on preventive care quality, defined as disease prevention (vaccines and cancer screening) and wellness screening (annual primary care health checks).[14] They found that ACOs on the extremes of the continuum (i.e., either the lower end of PCP numbers or the higher end of specialty numbers) did worse on preventive measures, which points to the importance of primary care within an ACO.[14] Although this overview of MSSP characteristics indicates the importance of primary care in general within an ACO, it does not comment on the impact of advanced primary care delivery models.

The other five articles that commented on quality did focus on the interplay between advanced primary care models and ACOs, and all showed favorable outcomes.[13,10,11,15,16] Sandberg et al. explored the impact of the Hennepin Health ACO, a safety-net ACO anchored by an advanced primary care model.[15] They found that the program increased the percentage of patients receiving optimal diabetes, vascular, and asthma care. The study also showed a high patient satisfaction rating, reporting that 87% of the ACO's members were satisfied with their care. A case study on the Alternative Quality Contract program by Blue Cross Blue Shield of Massachusetts showed improvements over the national average on Healthcare Effectiveness Data and Information Set (HEDIS) measures of chronic disease management, adult preventive care, and pediatric care; however, these measures leveled out in the last year studied (2012).[10] The two Aledade practices studied by Powers et al. also showed positive quality results, with one of their systems in the 98th percentile for composite quality scores and the other in the 88th percentile.[11] Another study, done by Hacker et al., demonstrated the importance of the PCMH within an ACO by comparing results from National Committee for Quality Assurance (NCQA) Level 3-recognized sites to results from the unrecognized sites within the same ACO.[16] Early results showed that NCQA Level 3-recognized sites had better quality, access, and patient experience scores than the unrecognized primary care sites within the same ACO.

Finally, McConnell et al. examined the interaction between ACOs and the PCMH in a slightly different way, looking at the impact of ACO formation on an already established advanced primary care practice.[13] They compared quality outcomes

in Oregon's CCO program—a Medicaid ACO-type model centered around advanced primary care—to outcomes in neighboring Washington's Medicaid program. With its health care homes initiative, Washington's program is also rooted in advanced primary care, but is not part of an ACO. The study found that Oregon had statistically significant improvements in two out of five measures of low-value care compared to Washington; there was not a statistically significant difference in the other three measures.[13] Since both programs were rooted in advanced primary care, it is possible that the use of an ACO-type model might be the reason that Oregon's program performed better than Washington's program. This study suggests that formation of an ACO could help support a medical home-type model.

The included articles are limited in their number and scope (i.e., most look at only one ACO), and they lack a direct comparator (i.e., only one looks directly at PCMH versus non-PCMH in the same ACO). Consequently, clear-cut conclusions about the impact of advanced primary care on ACOs cannot be inferred. However, advanced primary care-based ACOs were more successful than their fee-for-service counterparts, so there does seem to be some association between ACOs that perform well and a primary care orientation. In combination, the included studies show that the relationship between ACOs and advanced primary care is complex and is not unidirectional, with each reform potentially helping to support others. A quantitative analysis, described in Section 3, allows for further exploration of the relationship between the PCMH and ACOs.

SECTION 3

Cost and Quality Outcomes of PCMH on ACOs

AN ANALYSIS OF NCQA AND MEDICARE DATA

INTRODUCTION

Our literature reviews above examined the characteristics of successful ACOs and the cost, quality and utilization outcomes of ACOs with a strong primary care foundation. Although we did find favorable cost, quality and utilization outcomes, none of the studies we looked at quantified the relationship between advanced primary care and ACOs at the national level. In the analysis below, we used the National Committee Quality Assurance (NCQA) data to identify PCMH primary care physicians (PCPs) within an ACO and compared cost and quality outcomes across ACOs with differing levels of a PCMH primary care workforce. Although many accrediting bodies for PCMH exist and some states have established their own criteria for PCMH, 24% of primary care physicians practice in an NCQA certified PCMH.[48] Therefore, because of the high penetration rate, we use NCQA certification as a proxy for PCMH.

DATA AND METHODS

Specifically, we estimated the associations between the Patient-Centered Medical Home primary care physician (PCMH PCP) share in the ACO workforce and ACO savings and quality performance using cross-sectional variation across ACOs that participated in the Medicare Shared Savings Program (MSSP) in 2014. The data sources used in our analysis are as follows: The NCQA PCMH Recognition Program historical data, 2012-2014 Medicare Data on Provider Practice and Specialty (MD-PPAS), 2014 MSSP ACO Provider-level Research Identifiable File (RIF), 2014 Performance Year MSSP ACO Public Use file (PUF) and MSSP ACO Performance Year 2014 Results PUF. (*See appendix 3.1 for description of data sources*).

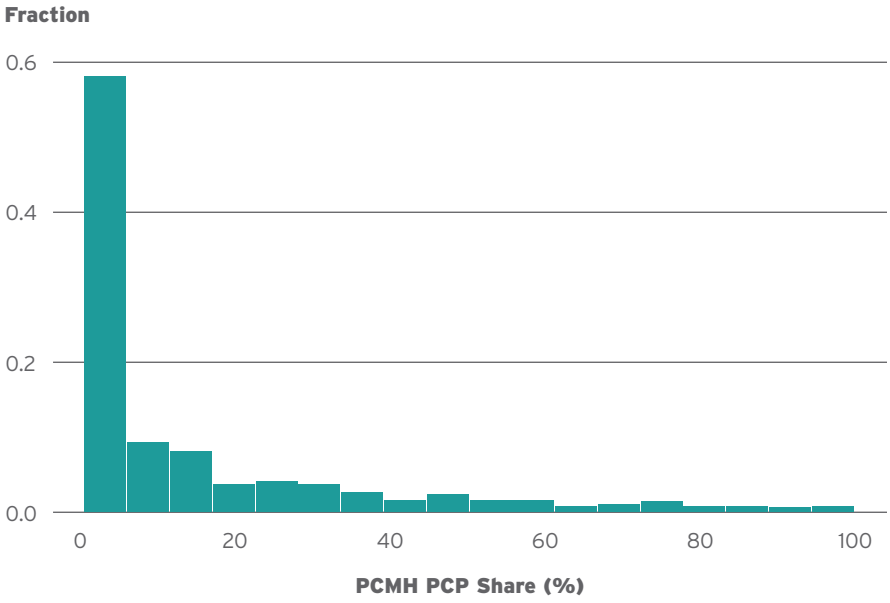
The outcome variables for the analysis were ACO savings rate and performance on quality measures. The savings rate was the difference between the actual and benchmark expenditures as a fraction of the benchmark. The benchmark expenditure was established by CMS based on the ACO's past assigned beneficiaries' Medicare spending prior to joining the program trended forward using the growth in national per capita Medicare expenditures, adjusted for changes in the health risk due to newly assigned beneficiaries. In other words, it measured how much an ACO saved (or dissaved) relative to its adjusted historical expenditure trend. ACOs could only share in savings if their savings rate exceeded the ACO-specific minimum savings rate (MSR), which was solely determined by the number of assigned beneficiaries.

ACOs in the MSSP were also required to maintain certain quality standards to be eligible for shared savings but in a phased-in manner. In the first performance year (PY) of the program, ACOs only had to submit "full and accurate" reporting of specified quality measures, while in the second PY, ACO performance on some of the measures were assessed and scored and by the third PY, all but one quality measure was scored. For the 2014 performance year, there were 33 ACO quality measures that spanned across four domains: patient/caregiver experience, care coordination/patient safety, preventive health, and clinical care for disease-specific at-risk populations. We used performance rates of 26 quality measures, diabetes and coronary artery disease composite measures, which together composed of the remaining seven individual quality measures, as our outcome variables in accordance with the quality assessment structure of the MSSP. For all but four measures, the higher rate indicated better performance. We dropped 26 ACOs that had a missing performance rate for any of the 33 quality measures either due to unsatisfactory reporting or non-applicability of the measure from the quality analysis.

The following ACO organization and beneficiary characteristics derived from 2014 PY MSSP ACO PUF were included in the analysis: the fraction of PCPs in the ACO physician workforce, per capita historical benchmark expenditure, ACO size in terms of the number of assigned beneficiaries, MSSP entry year, ACO service (Census) region, fractions of beneficiaries over age 85, female, Black, Hispanic, aged dual eligibles, and disabled, and the weighted average CMS Hierarchical Condition Category (HCC) risk score of the assigned population. We adjusted for the ratio of PCPs to total number of physicians since PCMH recognition is primarily targeted to primary care practices. We took into account that historical benchmarks may be correlated with PCMH PCP share. For example, it could be that those ACOs that deliver less advanced primary care were more likely to be historically cost-inefficient leading to higher benchmarks, making it easy for them to save under the MSSP. The ACO's MSSP entry year was added to account for potential systematic differences between early and later ACO participants in implementing primary care focused innovative practices. We also adjusted for a range of beneficiary demographic characteristics, while using the aged dual variable, which represented the share of ACO beneficiaries that also qualified for Medicaid, as a proxy for economic status of the assigned population. To adjust for the average relative health status of the assigned population, we created the weighted average CMS-HCC risk score across enrollment type.

FIGURE 4

Distribution of PCMH Primary Care Physician Share among ACOs in 2014



ANALYSIS

We first calculated the share of PCMH PCPs in the ACO primary care workforce for each ACO in the 2014 MSSP: the number of PCPs

TABLE 1

ACO Characteristics by PCMH Primary Care Physician Share

	Lowest Quartile in PCMH PCP Share (n = 106)		Highest Quartile in PCMH PCP Share (n = 83)		Difference
	Mean	SD	Mean	SD	*p* value
Savings Rate (%)	**0.249**	**5.593**	**0.554**	**4.854**	**0.694**
PCMH PCP Share (%)	**0.000**	**0.000**	**42.643**	**21.515**	**0.000**
Number of Providers	129.0	150.3	515.9	535.8	0.000
Number of PCPs	47.8	42.4	147.0	112.7	0.000
Number of Specialists	51.1	80.6	225.2	300.1	0.000
Historical Benchmark Expenditure ($)	11,320	2856.8	9,620	1912.5	0.000
Number of Assigned Beneficiaries	9,163	5525.8	19,747	14635.9	0.000
< 10,000	0.745	0.438	0.253	0.437	0.000
10,000 ~ 29,999	0.236	0.427	0.542	0.501	0.000
>= 30,000	0.019	0.137	0.205	0.406	0.000
Program Entry Year					
2012	0.245	0.432	0.470	0.502	0.001
2013	0.340	0.476	0.289	0.456	0.462
2014	0.415	0.495	0.241	0.430	0.012
Region					
Northeast	0.075	0.265	0.410	0.495	0.000
Midwest	0.170	0.377	0.169	0.377	0.984
South	0.547	0.500	0.386	0.490	0.027
West	0.208	0.407	0.036	0.188	0.000
Puerto Rico*	0.000		0.000		
Beneficiary Characteristics					
Fraction 85+	0.132	0.037	0.115	0.031	0.001
Fraction Female	0.578	0.021	0.573	0.024	0.117
Fraction Black	0.098	0.105	0.124	0.157	0.174
Fraction Hispanic	0.034	0.063	0.020	0.039	0.084
Fraction Dual Eligibles	0.097	0.121	0.069	0.064	0.056
Fraction Disabled	0.130	0.047	0.175	0.104	0.000
HCC Risk score**	1.106	0.109	1.039	0.076	0.000

* There were two ACOs in Puerto Rico, but neither were in the lowest or the highest PCMH PCP share quartile group.

** HCC Risk score is the weighted average of average CMS Hierarchical Condition Category (HCC) risk scores across Medicare eligibility category–disabled, end-stage renal disease, aged, duals and aged non-duals–using the shares in eligibility type as weights.

who ever worked in a PCMH practice by Jan 1st, 2014 was divided by the total number of PCPs in the ACO. Figure 4 shows variation in the share of PCMH PCPs across ACOs in 2014. Then, we compared mean ACO characteristics between those ACOs in the highest quartile of PCMH PCP share with those in the lowest quartile (*Table 1*). The lowest quartile group had no PCMH PCPs in their workforce, while the mean PCMH PCP share for the top quartile was 42.6%.

To examine whether ACOs with a higher share of PCMH PCPs saved more in the MSSP, we regressed the ACO savings rate and quality performance rates on indicators for PCMH PCP share quartiles with the lowest quartile as the omitted category. For the multivariate approach, we adjusted for the list of observable ACO organization and beneficiary characteristics described above. Each quartile regression coefficient represented the percentage point difference in the average savings rate of ACOs in the quartile group relative to the lowest quartile group (*Table 2*).

We then repeated the same OLS specifications for ACO quality measures to identify potential associations between ACO PCMH composition and care quality. For all but four quality measures, positive coefficients indicated that those ACOs in the higher PCMH PCP share quartile groups performed better relative to those in the lowest PCMH PCP share group. While the negative coefficients indicated better quality performance relative to the lowest PCMH PCP share quartile group for the three quality measures related to hospital admissions in the Care Coordination/ Patient Safety domain and the proportion of diabetes patients with a poor hemoglobin A1c level for the At-Risk Population Care domain (*Table 3*).

We experimented with different approaches in specifying the variation in the levels of PCMH PCP share across ACOs: Alternatively, we used the actual PCMH PCP share and divided the ACOs into two groups by whether the ACO had a non-zero PCMH PCP share (any PCMH PCP share). The results from these specifications are available upon request. Since almost one third of ACOs did not have any PCMH PCPs in their physician workforce and PCMH PCP share cannot be a negative value, using variation in the PCMH share may mask the differences that exist across ACOs in the zero PCMH share group and end up giving more weight to this zero-share group. However, dividing the ACOs into zero versus non-zero PCMH PCP share groups would ignore the variation in the PCMH PCP share across ACOs in the non-zero group that may be associated with better ACO outcomes. Thus, we used the PCMH PCP share in quartiles for the report, dividing the ACOs into four groups with respect to the level of their PCMH PCP share.

RESULTS

We included 333 ACOs that participated in the 2014 MSSP in this analysis. In this sample, 330 participated in track 1 and 3 in track 2. The mean number of assigned beneficiaries was 16,006. Twenty-six percent (86 ACOs) shared in savings where the savings rate exceeded the MSR and the quality requirements were satisfied. The mean savings rate was 0.6% while the mean MSR was 3.0%. With respect to the ACO workforce, the mean number of physicians was 279, 41.8% of whom were primary care physicians. Of these ACOs, 227 had any PCMH physicians (*Table 1*). The mean percentage of primary care physicians in PCMHs (PCMH PCP share) was 12.6%. The lowest PCMH PCP share quartile consisted of ACOs that had no PCMH PCPs, while among those ACOs with any PCMH physicians, the mean PCMH PCP share was 19.2% with the highest quartile, 42.6%.

Those ACOs with high and low PCMH PCP share differed across several domains. First, compared to the lowest quartile, those in

TABLE 2

Associations between PCMH Primary Care Physician Share and ACO Savings Rate

	PCMH PCP Share in Quartiles					
	Coeff.	*p* value	Coeff.	*p* value	Coeff.	*p* value
PCMH PCP Share* (%)						
Quartile 1	Reference Category		Reference Category		Reference Category	
Quartile 2	0.609	0.457	1.463	0.068	1.910	0.026
Quartile 3	0.550	0.442	1.248	0.068	1.312	0.091
Quartile 4	0.305	0.689	1.425	0.063	1.201	0.179
Organization Characteristics						
PCP Share			2.665	0.022	1.073	0.389
Historical Benchmark Expenditures in Tertiles						
Tertile 1			Reference Category		Reference Category	
Tertile 2			1.365	0.022	1.654	0.007
Tertile 3			3.299	0.000	4.536	0.000
Size (Number of Assigned Beneficiaries)						
< 10,000					Reference Category	
10,000 ~ 29,999					-0.752	0.285
>= 30,000					-0.400	0.647
Program Entry Year						
2012					Reference Category	
2013					-1.073	0.113
2014					-1.754	0.005
Region						
NorthEast					Reference Category	
Midwest					1.240	0.101
South					2.227	0.009
West					-1.804	0.064
Puerto Rico					8.495	0.000
Beneficiary Characteristics						
Fraction 85+					-31.015	0.013
Fraction female					15.440	0.336
Fraction Black					-4.881	0.180
Fraction Hispanic					-4.567	0.550
Fraction Dual Eligible					2.600	0.221
Fraction Disabled					4.135	0.384
HCC Riskscore**						
Tertile 1					Reference Category	
Tertile 2					-0.490	0.438
Tertile 3					-0.070	0.940

* All ACOs in the PCMH PCP share Quartile 1 group had no PCMH PCPs, while Quartile 2 to Quartile 4 had average PCMH PCP shares of 1.8%, 8.6% and 42.6% respectively.

** HCC Risk score is the weighted average of average CMS Hierarchical Condition Category (HCC) risk scores across Medicare enrollment category–disabled, end-stage renal disease, aged duals and aged non-duals–using the shares in enrollment category as weights.

the highest quartile for PCMH PCP share (Quartile 4) were larger (19,747 vs. 9,163 beneficiaries), were more likely to be in the Northeast region (41% vs 8%), had more physicians (516 vs. 129), had lower historical benchmarks ($9,620 vs. $11,320), and had lower weighted HCC risk scores (1.04 vs. 1.11) (*Table 1*).

The unadjusted regression analysis showed no statistically significant association between PCMH PCP share and savings (coefficient 0.3, p-value 0.69 for the highest quartile for PCMH PCP share (Q4) compared to the lowest quartile (Q1)) (*Table 2*). As shown in Table 1, the top PCMH PCP share quartile group was more likely to have a lower benchmark than those in the lowest quartile group. At the same time, by construction, it is harder for ACOs with a lower benchmark to save. This suggests that not adjusting for benchmarks would lead to an under-estimation of the association. Once we adjusted for historical benchmark and PCP share, we found that PCMH PCP share level was associated with savings at the 10% significance level (*Table 2*).

Our full model that adjusts for other ACO organization and beneficiary characteristics confirmed the above findings, where the second lowest quartile for PCMH PCP share was associated with a 1.9 percentage point increase in the savings rate (p-value 0.03) relative to the lowest quartile group. Though not statistically significant at the 5% level, the savings rates of ACOs in the second highest and the highest quartiles for PCMH PCP share were on average 1.3 and 1.2 percentage points, respectively, higher relative to those in the lowest quartile group. The magnitudes of the estimates were non-trivial given that the mean savings rate was 0.6% for the study sample. In addition, the estimates suggest an inverse U-shaped relationship between PCMH PCP share and ACO savings, implying that there may exist an optimal level of PCMH penetration in the ACO workforce for cost savings (*Table 2*).

With respect to quality, ACOs in the highest quartile of PCMH PCP share generally outperformed those in the lowest quartile. In multivariate regression, having more PCPs with PCMH experience, as measured by quartiles for PCMH PCP share, was associated with higher health promotion and higher health status scores (*Table 3*). The preventive services delivered were also generally higher. Specifically, having a higher share of PCMH PCPs was associated with higher pneumococcal vaccination and depression screening scores, while ACOs in the higher quartiles had better tobacco screening and cessation intervention scores compared to the lowest quartile group, especially the second lowest quartile. These ACOs also had better chronic disease management scores. ACOs in the higher quartiles of PCMH PCP share scored higher on diabetic and coronary artery disease composite measures relative to the lowest quartile group. These composite measures assessed whether disease markers were controlled and whether patients were receiving evidence-based therapy.

LIMITATIONS

There are several limitations to our approach in studying the potential role the PCMH model—advanced primary care—plays in achieving the aims of ACOs. First, we could not observe all the practices that had adopted the PCMH primary care delivery model. There were other entities besides the NCQA that offered PCMH recognition programs. Also, since the PCMH is not a certification but a concept that outlines how primary care should be delivered, no formal recognition is needed for practices to adopt the model. This may have led to an under-estimation of the association. In addition, even though the PCMH recognition occurred at the practice-level, we could only identify PCMH status at the provider-level for our ACO analysis. We used the share of PCPs who ever worked at a PCMH practice as a proxy for the ACO level of PCMH adoption; however,

TABLE 3

Associations between PCMH Primary Care Physician Share and ACO Quality Measures

Quality Measures	Mean	SD	Adjusted*		
			PCMH PCP Share	Coeff.	*p* value
			Quartile 1	Reference Category	
Patient/Caregiving Experience					
Getting Timely Care	80.39	3.50	Quartile 2	0.329	0.533
			Quartile 3	0.076	0.896
			Quartile 4	0.599	0.304
How Well Your Doctors Communicate	92.48	1.62	Quartile 2	-0.069	0.781
			Quartile 3	-0.013	0.962
			Quartile 4	0.226	0.410
Patients' Ratings of Doctor	91.67	1.68	Quartile 2	-0.093	0.736
			Quartile 3	-0.035	0.895
			Quartile 4	0.184	0.527
Access to Specialists	84.09	2.37	Quartile 2	-0.066	0.851
			Quartile 3	0.012	0.974
			Quartile 4	-0.246	0.505
Health Promotion and Education	58.27	3.72	Quartile 2	1.005	0.058
			Quartile 3	1.386	0.018
			Quartile 4	2.569	0.000
Shared Decision Making	74.65	2.52	Quartile 2	0.282	0.512
			Quartile 3	0.556	0.170
			Quartile 4	0.372	0.400
Health Status/Functional Status	71.15	2.33	Quartile 2	0.260	0.339
			Quartile 3	0.432	0.171
			Quartile 4	0.710	0.043
Care Coordination/Patient Safety					
All Condition Readmissions	15.14	0.78	Quartile 2	-0.174	0.151
			Quartile 3	-0.068	0.549
			Quartile 4	-0.042	0.742
COPD Admissions	1.07	0.36	Quartile 2	-0.054	0.338
			Quartile 3	-0.044	0.438
			Quartile 4	-0.035	0.527
Heart Failure Admissions	1.19	0.24	Quartile 2	-0.025	0.466
			Quartile 3	-0.008	0.819
			Quartile 4	-0.006	0.868
% PCPs who Qualified for EHR Incentive Payment	77.71	17.39	Quartile 2	0.865	0.725
			Quartile 3	-0.192	0.933
			Quartile 4	4.270	0.062
Medication Reconciliation	84.06	19.73	Quartile 2	-0.221	0.950
			Quartile 3	-1.416	0.664
			Quartile 4	-4.258	0.262
Screening for Fall Rsk	47.02	22.69	Quartile 2	3.362	0.399
			Quartile 3	4.178	0.250
			Quartile 4	6.105	0.127

Quality Measures	Mean	SD	Adjusted*		
			PCMH PCP Share	Coeff.	*p* value
			Quartile 1	Reference Category	
Preventive Health					
Influenza Immunization	58.19	14.66	Quartile 2	0.167	0.944
			Quartile 3	4.120	0.068
			Quartile 4	4.868	0.054
Pneumococcal Vaccination	55.89	18.83	Quartile 2	2.771	0.328
			Quartile 3	7.623	0.003
			Quartile 4	10.834	0.000
Adult Weight Screening and Follow-up	67.83	14.99	Quartile 2	0.397	0.889
			Quartile 3	1.138	0.652
			Quartile 4	0.906	0.748
Tobacco Use Assessment and Cessation Intervention	87.42	13.00	Quartile 2	6.830	0.008
			Quartile 3	5.481	0.032
			Quartile 4	4.811	0.084
Depression Screening	39.63	22.70	Quartile 2	0.162	0.966
			Quartile 3	3.469	0.315
			Quartile 4	8.842	0.019
Colorectal Cancer Screening	56.99	14.32	Quartile 2	1.292	0.586
			Quartile 3	3.074	0.164
			Quartile 4	4.473	0.113
Mammography Screening	62.00	14.02	Quartile 2	1.697	0.466
			Quartile 3	2.052	0.366
			Quartile 4	2.503	0.396
Blood pressure Screening	61.08	21.15	Quartile 2	4.115	0.309
			Quartile 3	2.364	0.481
			Quartile 4	-2.879	0.459
At-Risk Population Care					
% Beneficiaries with Diabetes whose HbA1c in Poor Control (>9 percent)	19.49	9.45	Quartile 2	-2.059	0.324
			Quartile 3	-2.472	0.138
			Quartile 4	-2.786	0.115
Diabetes Composite	26.04	9.56	Quartile 2	4.324	0.005
			Quartile 3	3.426	0.025
			Quartile 4	3.014	0.072
% Beneficiaries with hypertension whose BP < 140/90	68.84	7.78	Quartile 2	1.596	0.455
			Quartile 3	1.349	0.406
			Quartile 4	1.537	0.369
% Beneficiaries with IVD with complete lipid profile and LDL control < 100mg/dl	58.20	10.12	Quartile 2	0.044	0.983
			Quartile 3	1.835	0.280
			Quartile 4	1.208	0.577
% Beneficiaries with IVD with use of Aspirin or other antithrombotic	82.05	12.85	Quartile 2	2.686	0.362
			Quartile 3	4.732	0.068
			Quartile 4	1.543	0.626
Beta-Blocker Therapy for LVSD	84.15	14.71	Quartile 2	0.076	0.976
			Quartile 3	-1.364	0.597
			Quartile 4	-3.015	0.406
CAD Composite	67.78	14.69	Quartile 2	6.314	0.046
			Quartile 3	6.831	0.019
			Quartile 4	9.897	0.002

* The above OLS models were adjusted for the following ACO organization and beneficiary characteristics: the fraction of PCPs in the ACO physician workforce, per capita historical benchmark expenditure in tertiles, ACO size in terms of the number of assigned beneficiaries, MSSP entry year, ACO service Census region, fractions of beneficiaries over age 85, female, Black, Hispanic, aged dual eligible, and disabled, and the weighted average CMS Hierarchical Condition Category (HCC) risk score of the assigned population. The weighted average CMS-HCC risk score was calculated by averaging the average CMS-HCC risk scores across enrollment type—disabled, end-stage renal disease, aged duals, and aged non-duals—using the shares in enrollment type as weights.

TABLE 4

Comparison NCQA 2017 PCMH and CPC + Requirements: Summary Table

NCQA PCMH Concept	NCQA PCMH Competency	Comparison with CPC+ Track 2	Alignment
Team-Based Care and Practice Organization	A: The practice is committed to transforming the practice into a sustainable medical home. Members of the care team serve specific roles as defined by the practice's organizational structure and are equipped with the knowledge and training necessary to perform those functions.	Both NCQA and CPC+ require demonstration of leadership support, definition of practice organizational structure and staff roles, involvement of patients/families/caregivers in governance, and use of a certified EHR.	Fully or mostly aligned
	B: Communication among staff is organized to ensure that patient care is coordinated, safe and effective.	Both NCQA and CPC+ require regular care team meetings and include an option for behavioral health care management. NCQA requires care team meetings focused on individual patient care which is not specified in CPC+.	Fully or mostly aligned
	C: The practice communicates and engages patients on expectations and their role in the medical home model of care.	This competency is not specified in CPC+.	Not in CPC+
Knowing and Managing your Patients	A: Practice routinely collects comprehensive data on patients to understand background and health risks of patients. Practice uses information on the population to implement needed interventions, tools and supports for the practice as a whole and for specific individuals.	NCQA requires documentation of an up-to-date problem list and specifies items to be included in a comprehensive health assessment; these are not included in CPC+. Depression screening is required in NCQA and optional as one of the possible reporting measures in CPC+. Elective NCQA criteria on oral health assessment and evaluation of communication preferences are not specified in CPC+.	Partially aligned
	B: The practice seeks to meet the needs of a diverse patient population by understanding the population's unique characteristics and language needs. The practice uses this information to ensure linguistic and other patient needs are met.	This competency is not specified in CPC+.	Not in CPC+
	C: The practice proactively addresses the care needs of the patient population to ensure needs are met.	This competency is not specified in CPC+, though measures on preventive care service delivery and chronic and acute care services may incentivize proactive reminders.	Not in CPC+
	D: The practice addresses medication safety and adherence by providing information to the patient and establishing processes for medication documentation, reconciliation and assessment of barriers.	Both NCQA and CPC+ require medication reconciliation as part of care transitions. NCQA additionally requires maintenance of up-to-date medication lists and has elective criteria that include assessment of understanding to medications, barriers to adherence, and obtaining prescription claims data.	Partially aligned
	E: The practice incorporates evidence-based clinical decision support across a variety of conditions to ensure effective and efficient care is provided to patients.	This competency is not specified in CPC+.	Not in CPC+
	F: The practice identifies/considers and establishes connections to community resources to collaborate and direct patients to needed support.	Both NCQA and CPC+ require assessment of psychosocial needs, maintenance of a community resource list, and provision of self-management support. NCQA includes elective criteria on assessing usefulness of community supports, provision of oral health resources, and use of shared decision-making aids.	Fully or mostly aligned

NCQA PCMH Concept	NCQA PCMH Competency	Comparison with CPC+ Track 2	Alignment
Patient-centered Access and Continuity	A: The practice seeks to enhance access by providing appointments and clinical advice based on patients' needs.	Both NCQA and CPC+ require enhanced patient access. NCQA also requires specification for same day appointment availability and providing timely advice by telephone. NCQA elective criteria include availability of electronic system for two-way communication, scheduling appointments, and refills.	Fully or mostly aligned
	B: Practices support continuity through empanelment and systematic access to the patient's medical record.	Both NCQA and CPC+ include criteria for empanelment, continuity, and access to medical record information after hours. NCQA includes elective criteria on panel size management and reconciliation with plan attribution.	Fully or mostly aligned
Care Management and Support	A: The practice systematically identifies patients that would benefit most from care management.	Both NCQA and CPC+ require risk-stratification for determination of which patients will benefit from care management.	Fully or mostly aligned
	B: For patients identified for care management, the practice consistently uses patient information and collaborates with patients/families/caregivers to develop care plans that address barriers and incorporates patient preferences and lifestyle goals documented in the patient's chart. Demonstration of such may be through reports, file review or live demonstration of case examples.	Both NCQA and CPC+ require personalized, written care plans for patients identified for care management that document patient preferences, include self-management goals and are accessible across care settings. NCQA includes an elective criterion on identification of barriers to goals.	Fully or mostly aligned
Care Coordination and Care Transitions	A: The practice effectively tracks and manages laboratory and imaging tests important for patient care and informs patients of the result.	This competency is not specified in CPC+.	Not in CPC+
	B: The practice provides important information in referrals to specialists and tracks referrals until the report is received.	Both NCQA and CPC+ require identification of specialists most commonly used by the practice, setting expectations for information sharing, and behavioral health integration (elective in NCQA). NCQA additionally requires referral tracking and specific information to be included in referrals, and other elective criteria include determination of appropriateness of referrals and consideration of specialist performance in making referrals.	Partially aligned
	C: The practice connects with other health care facilities to support patient safety throughout care transitions. The practice receives and shares necessary patient treatment information to coordinate comprehensive patient care.	Both NCQA and CPC+ require identification of patients seen in the ED or hospital, information exchange with EDs or admitting hospitals, contacting patients for follow up, and ability to access patient information after hours. NCQA has additional elective criteria on information exchange with external entities and care plans for complex patients transitioning out of the practice.	Fully or mostly aligned
Performance Measurement and Quality Improvement	A: The practice measures to understand current performance and to identify opportunities for improvement.	Both NCQA and CPC+ require monitoring of quality, utilization, and patient experience. NCQA requires monitoring of types of access and has an elective criterion on monitoring health disparities.	Fully or mostly aligned
	B: The practice evaluates its performance against goals or benchmarks and uses the results to prioritize and implement improvement strategies.	Both NCQA and CPC+ require acting upon the above data types to improve population health management. (NCQA requires this for measures of access which is not specified in CPC+.)	Fully or mostly aligned
	C: The practice is accountable for performance. The practice shares performance data with the practice, patients and/or publicly for the measures and patient populations identified in the previous section.	Both NCQA and CPC+ require sharing performance data within the practice, value-based contracting, and inclusion of patients in quality improvement activities. NCQA includes an elective criterion on sharing data with patients or the public.	Fully or mostly aligned

the validity of this proxy could not be tested. Third, due to data availability, the analysis was performed at the ACO-level masking the potential variation across practices within an ACO. Depending on the degree of heterogeneity in the organizational structure of the ACOs, the practice-level analysis may be needed to determine the role of PCMH in an ACO practice. Fourth, the MD-PPAS data we used to identify ACO workforce excluded those who worked exclusively in institutional outpatient settings such as federally qualified health centers, rural health clinics, and other outpatient facilities. Fifth, our analysis may not have adequately controlled for ACO beneficiary characteristics due to limited information. For example, we did not have distributional information on the health status of assigned beneficiaries even though the potential effect of advanced primary care is likely to be greatest for those with complex conditions. Lastly, our analysis was limited to ACOs that participated in a public ACO program for the Medicare Fee-for-Service population, thus our results may not be generalizable to the private ACO programs that serve non-Medicare population.

CONCLUSION

In this novel analysis assessing the contribution of PCMHs to ACOs, we report three main findings about ACOs with a higher share of PCPs with PCMH experience (second, third, and fourth quartiles) compared to those with no PCPs with PCMH experience (first quartile). First, these ACOs on average had lower historical benchmarks. ACO's historical benchmark reflected its recent 3-year average Medicare (Part A and Part B) spending of its beneficiaries prior to joining the program. While this study was not designed to explain this finding, one explanation is that ACOs with more PCMH PCPs are composed of historically efficient practices. Second, adjusted for ACO organization and beneficiary characteristics, ACOs with PCMH penetration were more likely to generate savings, although the relationship was not proportional, meaning that having higher PCMH penetration was not associated with more savings. The 1.9 percentage point average difference in the savings rate between the second and the first quartile for PCMH PCP share is sizable given that the mean savings rate across ACOs was 0.6%. Finally, and very importantly from the patient and PCP perspectives, these ACOs not only saved money but they demonstrated higher quality across a wide range of quality measures, including process indicators, intermediate outcome measures and outcome measures.

This analysis only looked at a subset of advanced primary care practices, namely those with an NCQA PCMH certification. Yet, many practices employ the PCMH model that are not NCQA certified potentially understating these favorable findings. One such model is CPC+. In total 2,965 practices across the nation are participating in CPC+.[44] Although CPC+ and NCQA certified PCMH are two distinct models of care delivery, a crosswalk of the requirements of both show a great deal of similarity. (Supplement 2 and Table 4) Given that 41% of CPC+ practices exist within an ACO and that the private sector often replicates success in the federal sector, the potential impact of advanced primary care or PCMH-like care on ACOs could be even greater than reported here.[45] Given the alignment of CPC+ with PCMH-like care, future analyses should assess the impact of CPC+ practices on ACOs.

Final Discussion

The accountable care organization (ACO) program is a model of care delivery that has the potential to move health care in the United States toward improved quality while containing cost. Although recent evaluation of one of these models—the Medicare Shared Savings Program (MSSP)—has shown that a majority of ACOs did not share in savings, quality outcomes were more favorable.[26] Moreover, while many ACOs did not attain their savings goal, there was a small subset of high-performing ACOs that had significant savings, many of which shared characteristics such as higher primary care utilization and greater risk sharing.[26]

As the ACO program continues to mature in both public and private markets, it is important that we better understand differences among ACOs and determine what factors contribute to some ACOs outperforming others. This report aimed to better identify these factors, with a particular focus on the role of advanced primary care in an ACO's success. Through our review of the literature on successful ACOs, our own analysis of National Committee for Quality Assurance (NCQA) and MSSP data, and an expert convening, we found the following to be true:

Success is multifactorial.

Defining success is paramount. If shared savings is the sole goal, only one-third of the MSSP ACOs attained success. However, if success is defined as improvement in quality of care, the large majority of ACOs are hitting the mark.[26] A related measure of success might be patient experience, as both our own NCQA analysis and a number of our case studies measured improvement in this domain.[15,16] Most likely, we need to consider all of these factors, and perhaps even more that have not yet been considered. It is important for researchers and policy makers to clearly define goals in order to make appropriate judgments on success.

External factors contribute to outcomes and success.

This report demonstrated that there were a number of "external" factors, independent of an ACO's use of advanced primary care, that contributed to outcomes and success, particularly regarding shared savings. These included the following:

- **Benchmarks:** It is important to always account for the benchmark being used to measure an ACO's shared savings. The higher the benchmark, the easier it is for an ACO to successfully save.
- **Experience:** A practice or medical group's experience with bundled payments, risk bearing, and practice transformation—including adoption of a high-functioning electronic health record (EHR)—directly impacts its performance. In the same vein, the longer an ACO has been operating, the more likely it is that it has achieved cost savings in the MSSP.
- **Proportion of ACO patients in a practice:** Practices or medical groups with larger numbers of ACO-covered patients have more incentive to change processes that will lead to savings or quality improvement.
- **Culture and leadership:** While less well-defined than other factors, and perhaps harder to scale, the role of strong leadership in shaping an ACO-centric, patient-centered culture is a theme that recurred throughout the literature and expert convening.

Advanced primary care—and the patient-centered medical home (PCMH) in particular—contribute to an ACO's success.

Our literature review found that both hospital-led ACOs and physician-led ACOs built on advanced primary care models performed better. Our initial literature review of the characteristics of successful ACOs provided some initial explanation of why this phenomenon exists. The themes that dominated this literature, such as coordination of care through care management strategies, accessible care through EHR implementation and after-hours access, and a commitment to quality and safety through alignment of measures and incentives, mirror the Joint Principles of the Patient-Centered Medical Home and the Shared Principles of Primary Care. (Figure 1) Therefore, the systems that employed advanced primary care were naturally set up for some of the care delivery changes sought by ACOs. In fact, our second literature review, which examined the cost, quality, and utilization outcomes of ACOs centered around advanced primary care models, showed that there may be an association between success of an ACO and primary care orientation. Furthermore, our analysis of NCQA and Medicare data demonstrated that the PCMH does have a positive impact on an ACO's cost and quality outcomes. In many ways, ACOs and advanced primary care models are synergistic. Systems that already provided advanced primary care had a strong foundation on which to build an ACO, while becoming an ACO helped advanced primary care systems succeed by encouraging structural changes that align well with the PCMH model.

As the ACO program matures, it is increasingly important to understand the factors that contribute to success. This analysis showed the key role that advanced primary care plays in creating and sustaining success through ACO models, both in savings and in quality. We need to gather more data and determine better methods for studying the intersection of ACOs and advanced primary care models. In the meantime, policy makers need to be made aware of this important relationship now as they work to shape ACO federal regulations and private sector policies, including those related to encouraging PCMH formation and evolution. Achieving the Triple Aim in the United States involves more than simply spending less, and the synergy between the ACO payment model and the PCMH care delivery model has the potential to move us closer to the goal of containing costs while providing high-quality care and improving the patient experience.

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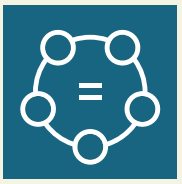
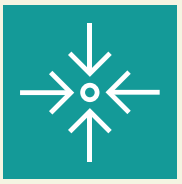
Shared Principles of Primary Care

Person and Family Centered

Continuous



Comprehensive and Equitable



Team-Based and Collaborative

Coordinated and Integrated

Accessible

High-Value

Primary care is widely acknowledged to be essential for better health and wellbeing in the US health care system and should be foundational to all health care systems worldwide (WHO, 2008) (IOM, 1994) (Starfield, 1992). Access to high-quality primary care can help people live longer, feel better, and avoid disability (Commonwealth Fund, 2013).

Primary care has experienced significant changes in the way it is organized, financed and delivered in response to greater demand for high-quality services, rising health care costs, and increasing burden of disease across populations (Bitton et al 2016). Concepts such as the Patient Centered Medical Home emerged to describe a more advanced model of primary care. Based on lessons learned over the past decade and the continued rapid pace of change, the time is right to revisit the future of primary care.

Realizing the ideal vision of primary care occurs faster when all stakeholders can speak with one voice. These Shared Principles—developed by stakeholders representing all aspects of health care—are designed to move the United States toward a vibrant future of person-centered, team-based, community aligned primary care that will help achieve the goals of better health, better care, and lower costs. Achieving this future requires a common vision as well as appropriate payment, investment, training, workforce and other resources to support it.

Appendices

APPENDIX 1.1

Search Terms for Literature Review #1—The Characteristics of Successful ACOs

Key Words

PCMH	ACO	Characteristics
Medical Home	Population Health Management	Financial Incentives
Primary Care Medical Home	Alternative Payment Models	Organizational Characteristics
Advanced Primary Care	Medicare Shared Savings Program	Legal Considerations
High Performing Primary Care		Attributes
Primary Care Home		
Team-Based Care		

Suggested combination: "accountable care organization"[All Fields] OR "population health management" [All Fields] OR "alternative payment models" [All field] OR "Medicare Shared Savings Program [All fields] AND "financial incentives" or "organization characteristics" or "characteristics" or "attributes"

Years: Until May 1, 2018

Inclusion criteria: ACO and primary care, discussion of characteristics for success (or failure)

Exclusion criteria: Hospital based ACOs

APPENDIX 1.2

Summary of all Articles Used in Literature Review #1

Design	Source	Outcomes	Factors
Determinants of Success in Shared Savings Programs: An Analysis of ACO and Market Characteristics[27]			
Cross-sectional study of Medicare ACOs financial performance during first year of contract. Multivariate regression to see if ACO-level/regional factos led to savings. Logistic regression for determinants of ACO that resulted in shared savings from Medicare.	National Survey of ACOs for 215 ACOs.	1) Savings per beneficiary derived from the gross savings. 2) Whether ACO received shared savings.	Positive Corr to saving per beneficiary: higher proportion of PCPs, more physicians on governing board, physician leadership, active effort to reduce hospital readmissions, higher proportion of disabled Medicare beneficiaries in ACO, physicians offered financial incentives, larger financial benchmark, higher market penetration of ACOs Significant Assoc. w/ receiving shared savings: prior experience with risk-bearing contracts. No factor was significantly assoc w/ both savings per beneficiary AND earning shared savings.
Factors that distinguish High-Performing ACOs in the Medicare Shared Savings Program[32]			
Convience sample of 16 large physician group ACOs in Medicare Shared Savings program. 60 interviews at 3 high performing and 3 low performing ACOs	Claims data from CMS & data from 60 interviews	1) Measures of avoidable costs and 2) quality of care.	6 factors distinguishing high from low perf. ACOs: 1) Collaborative working relationship with local hospitals prior to ACO formation 2) Prior experience delivering cost-effective care prior to ACO formation 3) Effective, long-serving physician leaders4) Sophisticated EMR system 5) Providing effective, timely feedback to physician 6) Integration of Care Coordinators into Practice
The Central Role of Physician Leadership for Driving Change in Value-Based Care Environments[30]			
Observational and interviews with leaders in ACOs that were successful in meeting blood pressure quality metrics	2 multi-specialty, physician owned, ACO-participant, practices. Summit Medical Group (SMG) in northern/ central NJ w/ 550 physicians, 73 locations, 440,000 pts. & Cornernstone Health Care (CHC) throughout central NC, 375 docs, 250,000 pts.	Ability to successfully reduce blood pressure through Measure Up/Pressure Down campaign.	6 key themes identified which influenced quality improvement: 1) Transitioning to value-based care and payment 2) Creating a supportive culture that leads to physician buy-in: listening to staff,3) Leveraging program champions 4) Sharing quality data- 5) Promoting care team collaboration. 6) Leveraging health information technology-
Regional cost and experience, not size or hospital inclusion, helps predict ACO success[33]			
Used financial results from 2013-2014 for all 339 MSSP ACOs starting from 2012-2014. Cross sectional analysis; multivariate regression to predict prob of achieving shared savings.	Primary data from CMS ACO performance datasets for yr 1-2. Via CMS public reporting ACO website info.	Likelihood of achieving shared savings after accounting for regional cost differences.	1) Regional differences were significant- as HRR cost per capita increased (higher benchmark expenditures), likelihood that ACO would achieve shared savings increased. 2) Experience- longer ACOs were in program, more likely they were to realize savings. Implies they are learning to manage care, improve quality, etc. *Size and hospital/academic med center inclusion inclusion were not found to significantly impact likelihood of realizing shared savings.

Design	Source	Outcomes	Factors
Preventive Care Quality of Medicare Accountable Care Organizations[14]			
Cross-sectional study focusing on Medicare Shared Savings Program and Pioneer ACOs. Linked descriptive National ACO Survey data to quality performance. Linear regression analysis to study associated ACO characteristics.	2 main sources: 1) quality performance & descriptive data from CMS (publicly reported) and 2) Data from NSACO. Included 177 eligible ACOs created before 2013 who completed NSACO survey.	Looked at factors that impacted ACOs scoring higher on prevention quality measures. Two main composites: disease prevention & wellness screenings.	Significantly associated w/ better performance for BOTH prevention & wellness screening 1) Being a member of the Advanced Payment Model, where rural ACO startups given upfront investments, and 2) More Medicare beneficiaries per PCP in ACO, and 3) Having less specialists in ACO. Significantly associated w/ better prevention performance: 1) ACOs with included hospital (than those with no hospital). 2) Increased EMR capabilities 3) Less minority status beneficiaries 4) More PCP workforce.
Engaging small independent practices in value-based payment: Building Aledade's medicare ACOs[11]			
Commentary (case report) based on published literature, ACO experiences, and discussion with experts.	Aledade leadership providing their insights about what factors are important (from their own experience) to help ACOs made of smaller practices be successful.	Not really specific outcomes, but just advice to help get ACOs up and running, and improve cost/quality outcomes.	Identified "4 key drivers" for quality and cost savings: 1) Focus on preventive medicine 2) Reduce preventable ED visits: often ED visits higher bc of limited access to PCP, increase PCP capacity/accessibility possible solutoin. 3) Improve transitions of care: better transition between PCP & hosp shown to decrease readmission & lower spending. 4) Manage high risk pts. Identified 4 core competencies: 1) Panel management 2) Care management 3) Quality improvement 4) Influences over external care. Aledade also provides practices with advanced, cloud-based pop health oriented IT platform.
Oregon's Medicaid Transformation—Observations on Organizational Structure and Strategy[28]			
Commentary of the overall structure/practices of Oregon's Coordinated Care Organizations (CCOs)	Observations from research; 81 interviews with stakeholders from each CCO, thorough review of CCO documents, monthly state contacts.	Not any one outcome: broad ranging view of qualities including EMR capabilities, QI practices, governance structure, financial management, and quality/ savings results.	1) Nearly 60% of practices use EMR; many are on same platform. 2) CCOs regularly use QI to track performance and use feedback to "facilitate benchmarks" and improve. Big focus on implementing innovations. 3) Collaborative governance structures including representation from community members, dental orgs, health systems, mental, behavioral professionals. 4) CCOs trying to implement alternate payment systems (capitated model)5) Use PCMH-like models (called PCPCH). 6) Focus on the community and accountability- gave better understanding of local culture/needs.

Design	Source	Outcomes	Factors
Medicare Accountable Care Organizations: Quality Performance by Geographic Categories[42]			
Policy brief that analyzes performance of MSSP ACOs on 4 quality measure domans/overall quality score with different amounts of "rurality"	n/a	Overall quality score, & of 4 domains	Rural ACOs performed better than urban county ACOs in overall quality score in 2014.
ACO Quality Over Time: The MSSP Experience and Opportunities for System-Wide Improvement[34]			
Over 4 years ACO data. Fixed effects use to find association between ACO quality metrics and key variables such as post acute care spending and size (number of beneficiaries). Subgroup fixed effect analysis and linear regression used to investigate other key traits like taxonomy, risk bearing experience, commercial contract presence, and degree of rurality.	Public use Secondary MSSP files linked to Leavitt Partners database of ACOs.	Change in quality metrics of ACOs over time; specifically 4 domains: pt/caregiver experience, care coordination/ pts safety, clinical care for at-risk populations, & preventive health.	1) As ACO size increased, quality score improved; though "growing pains" experienced for those that grew quickly first 3 years (of 4) esp. for care of at-risk populations. 2) Generally, as PAC expenditures increased, quality decreased. This effect mitigated partially by experienced ACOs. 3) Hospital-led ACOs higher avg quality in preventive care and clinical care for at-risk populations quality measures; while provider-led had better patient experience quality scores. 4) Risk-bearing experience/maturity had consistent positive association with quality metrics. 5) Rurality generally also associated with higher quality.
Clinical coordination in accountable care organizations: A qualitative study[41]			
Semi structured interviews w/ executives from 30 ACOs between July-Dec 2013.	When interview occurred, ACOs were in the first 12-18 months of contracts. ACOs were both MSSP and Pioneer.	Better understanding of what these ACOs were doing to try to achieve savings/quality.	1) Primary Care Transformation- tried to have better PC access with 24 hour call lines for pts, extended hours, weekend hours extension, and better same/next day scheduling availability. Many intended to pursue PCMH certification, seeing the values closely aligning with that of ACOs.. 2) Focus on reducing ED utilization 3) Solidifying/ expanding Care Management:. 4) New Boundary Spanning Roles (Care Coordinators)- 1st model- practice-based spanners (87% of ACOs did this), wherein care managmers were based at each PC practice, and were mostly relied on as individuals to coordinate patient care. 2nd model- ACO level coordination teams- centralized teams overlaying the entire ACO, and care management at individual practices. Worked to connect across PCP practices and hospitals. Challenge to effectively link centralized care management team with individual practices' care management.

Design	Source	Outcomes	Factors
Accountable Care Organizations: The National Landscape[35]			
Review of prior studies and data looking at ACOs at large and the ACOs in CA compared to rest.		Broad array, including cost and quality.	Lessons included: 1) Importance have having previous experience with managing risk for pt. populations. 2) EHR capability w/ performance feedback 3) Care management programs led by nurses often w/ goal of heping pts avoid hosp/ED. 3) Strong physician clinical champions to spear head process/cultural changes. 4) Experience with QI like PDSA methods. Consider 6 issues that they believe will dominate ACO disussion moving forward. 1) Enrollment size of ACOs is important. Need enough enrollees to create economies of scale to achieve significant savings. Describe minimum as 25 - 50,000 enrollees. 2) Care management for the high risk/high cost patients, with adequate risk prediction modelling. 3) EHR system/information exchange methods to allow providers to interchange info across full care continuum. 4) Various payers, including Medicare and commercial, need to choose a common/ standard set of quality and cost measures 5) Providers should make new partnerships with mental health, community-health, post-acute care, social welfare agencies. 6) Transform care to be more patient-centered, expanding the role pt. and family plays in care decision-making.
Medical Group Responses to Global Payment: Early Lessons from the 'Alternative Quality Contract' in Massachusetts[29]			
Looked at characteristics of organizations involved in 'Alternative Quality Contract' program by Blue Cross Blue Shield of MA. Global payment/ fixed payment for care of pt population over set period of time (considered prototype ACO). Interviewed org. representatives.	Semi-structured interviews with senior executives from 8 medical groups in the Alternative Quality Contract	Describe strategies generally used by health groups, also showed cost/quality outcomes for Alternative Quality Contract (AQC) orgs.	Strategies for success used by AQC members: 1) Quality improvement was a top priority. On top of providing PCP with financial incentives to improve quality, they also provided regular feedback on their quality scores. 2) Focusing on changing referral patterns. Encouraged PCPs to either keep pts within network (minimize leakage), or send them to less expensive out of network providers. 3) Coordinating Care for high risk pts. 4) Tying physician compensation to performance- many relied heavily on incentivizing physicians through compensation to meet quality and utilization goals. 5) Importance of data analysis, reporting- Many had advanced pt registries , with list of updated pts and diagnoses, as well as a centralized outreach and scheduling system so pts "with gaps in recommended care" can have prompt appointments without adding to admin burden. 7) Importance of engaging "frontline" physicians
Accountable Care Organizations Serving High Proportions of Racial and Ethnic Minorities Lag in Quality Performance[39]			
Included all MSSP ACOs with at least 1 year of data. Regressed each quality performance measure to proportion minority served by ACO to find impact. Multiple regression allowed them to consider other factors/ comorbidities.	Used National Survey of ACOs. Compared high prop minority ACOs to others for characteristics.	Score on 36 ACO quality measures.	Found that proportion of minority pts was associated with worse quality performance on 27/36 measures when unadjusted, and 25/36 when adjusted. These gaps in quality measures for higher minority-prop ACOs (compared to other ACOs) was not decreased between the first and second year of data. Providers with higher proportion minority pts had lower overall quality scores as well as lower quality performance across all 4 domains of quality scoring.

Design	Source	Outcomes	Factors
Insights From Tranformations Under Way At Four Brookings-Dartmouth Accountable Care Organization Pilot Sites[36]			
Multiday site visits and semistructured interviews with individuals at all levels from senior management to PCP/specialty providers. Reviewed documents, observed meetings, and toured facilities. During March/April 2011	This study looked at 4 ACO pilot sites associated with Brookings-Dartmouth. These sites were in the process of creating an ACO contract with commercial payers. Groups: 1) HealthCare Partners in Torance CA- medical group/ ind. practice association. 2) Monarch HealthCare Irvine CA, ind. practice assoc, 3) Tucson Med Center AZ, comm hospital working w/ provider gropus 4) Norton Healthcare Louisville KY- integrated delivery system.	No outcomes. Just insights about important characteristics and qualities for ACO formation and how to successfully transform care delivery.	Factors important : 1) Dedicated Executive Leadership & Governance 2) Strong Payer-Provider Relatinships" 3) Experience with performance-based payment
Care Transformation Strategies and Approaches of Accountable Care Organizations[38]			
Learned clinical strategies implemented to meet quality and cost goals through 17 semi-structured interviews with clinical leadership across 16 ACOs (1 had follow up). Used qualitative analysis software to find important themes.	In June & July of 2014 outreach occurred to 22 potential ACOs chosen for representation across geography, payer mix, safety net provider inclusion, and leadership structure. Ended up doing interviews with 16 ACOs in July/August 2014	No outcomes. Just insights about important strategies and characteristics ACOs were focusing on to meet quality/cost goals.	ACOs had 2 general approaches to transforming clinical care/outcomes. 1) Overlay approach- where an ACO added new systems on top of the existing clinical practices, often from a centralized ACO-level body. These existed on top and independent of the already functioning practices, and minimally interfered with their routines. Instead, they sought to help provide practices with useful services to fill gaps, not require workflow/practice tranformation. Example would be a centralized team of coordinators who do home visits, visit pts in hospital after discharge, reach out to pts via phone, etc. Overlay ACO made a point for doc not to see ACO as added burden. Overlay required strong centralized system/leadership. 2) Second broad approach was the "practice change" approach, which interefered with practice workflow and roles and tried to fundamentally change how care was delivered at practice level. This might mean having MAs do more screenings so physicians could focus on clinical. ACO leaders admitted this was a slower process, but believed it would yield better, lasting results, cultural shift, down the road. Interestingly, ACOs with one practice tended to use practice change, those with several practices used more centralized system (maybe bc difficult to change care culture at so many ind. practices. All following methods could be done at centralized or practice level. Main methods ACOs used for change: 1) Patient Support Roles- care coordinators, patient navigator, etc. 3) Tracking and Identifying Pts- focused on using tech/tools to track high risk/high need/high cost pts and trying to monitor their care/utilization.

APPENDIX 2.1

Search Terms for Literature Review #2—Cost, Quality and Utilization Outcomes of ACOs with Advanced Primary

Key Words

Care
("patient centered medical home"[All Fields] OR "medical home"[All Fields] OR "primary care medical home"[All Fields] OR "health home"[All Fields] OR "advanced primary care"[All Fields] OR "team based care"[All Fields] OR "team based primary care"[All Fields] OR "high performing primary care"[All Fields] OR "primary care home"[All Fields] AND "accountable care organization"[All Fields] or "ACO"[All fields] or "quality contracts" [All Fields] or "alternative payment models" [All fields])

Years: Until May 1, 2018

Inclusion criteria: ACO evaluations mentioning cost, quality or utilization outcomes

Exclusion criteria: no mention of primary care

APPENDIX 2.2

Summary of all Articles Used in Literature Review #2

Study Design	Cost	Utilization	Quality	PCMH or PCMH like characteristics
Engaging small independent practices in value-based payment: Building Aledade's medicare ACOs[11]				
Case Study of two primary care based ACO managed by Aledade (APC and DE)	Total spending for the APC ACO was 0.3% higher than the benchmark and for the DE ACO was 2.5% higher than the benchmark	APC reduced inpatient utilization by 9% and DE reduced inpatient utilization by 2%.	98th percentile for APC and 88th% for DE	PCMH-like: Panel and population health management via a cloud based app, support for practice transformation, care coordination tools, quality improvement activities
Measuring the Cost Implications of the Collaborative Accountable Care Initiative in Texas[9]				
Evaluation of a Medical Home type care ACO (Texas CAC's). Used pre and post ACO implementation compared to controls in the same area	Statistically significant decrease in average spending per enrollee per 6 month period by 128.30, net savings of 106.25 or 5.7%			PCMH: practices were NCQA PCMH certified
Primary care focus and utilization in the Medicare shared savings program accountable care organizations[12]				
Impact of Primary Care on ACOs	No difference in cost	ACOs with the higher quartile of PCP focus had higher adjusted rates of hospital admissions and ED visits.		Primary care focus, not necessarily any PCMH like characteristics
Preventive Care Quality of Medicare Accountable Care Organizations[14]				
Cross-sectional study of Medicare Shared Savings Program and Pioneer participants. Linked quality performance to descriptive data from the National Survey of ACOs.			1. Fewer specialists and more primary care physicians results in better preventive care measures 2. ACOs with a higher patient to PCP ratio performed better. Thus assuming each PCP sees the same number of patients, the more PCP's you have in your ACO the better. 3. ACOs that include a hospital did better on disease prevention measures (vaccinations). 4. Participants in the Advanced Payment Model did better	Not PCMH or PCMH like necessarily, but points to the importance of primary care within the Medicare ACO program
Effect of Attribution Length on the Use and Cost of Health Care for a Pediatric Medicaid Accountable Care Organization[17]				
Used attribution length as a proxy for consistent primary care within the Children's Hospital and Clinics of Minnesota ACO (a Medicaid ACO). Studied the effects of longer attribution lengths on utilization and cost	Increased attribution length was associated with decreased cost. Cost reductions largest at 13-18 months	Longer attribution was associated with decreased inpatient resources, but increase in PCP visits, ED visits and pharmaceuticals		PCMH: Patients studied were assigned to CHC Health Care Homes within the Medicaid ACO. CHC is the state of Minnesota's certification for patient centered medical home care. Centered on team based, coodinated, patient centered care

Study Design	Cost	Utilization	Quality	PCMH or PCMH like characteristics
Early experience of a safety net provider reorganizing into an accountable care organization[16]				
Review / case-study- First yr of ACO transformation with a safety-net focus - "mixed-methods" - interviews, doc review, analysis quality/ utilization data)		Decrease in inpatient hospital utilization for CHA patients as compared to the rest of the network.	NCQA-PCMH sites show significantly better PC quality, access, pt experience scores	PCMH: Cambridge Health Alliance is an ACO centered on advanced primary care with many of its primary care offices holding NCQA PCMH certification. CHA focusses on establishments of care teams, care managers, integrated EMR's
Hennepin Health: a safety-net accountable care organization for the expanded Medicaid population[15]				
Case-study with some observational outcomes of cost and quality changes from year 1 of implementation to year two		Dec. ED visits 9.1% / Inc. outpt visits 3.3%	Inc. percentage pts received "optimal level" chronic care mgmt (diabetes 8.6->10.0% / vascular 25->36.1% / asthma 10.6->13.8%) from 2012-2013 ||| 87% pt satisfaction	PCMH-like: Hennepin Health brings together primary care, specialty care, hospital services and community resources. Model of care includes development of patient care teams, access to care coordination, increased access to primary care via walk-in clinics, integrated EHR's, coordination with social services and behavioral health.
Changes in Health Care Spending and Quality 4 Years into Global Payment[10]				
BCBS AQC Case Study. Control group is similar populations in other states	Average savings of 6.8% compared to controls. Savings most pronounced in outpatient setting (imaging, procedures and tests)		Increase of 3.9 percentage points over the control group on HEDIS measures of chronic disease management. Performance in adult preventive care and pediatric care increased by 2.7 percentage points and 2.4 percentage points, respectively	PCMH-like: Centered on primary care that is "patient centered"
Oregon's Medicaid Reform and Transition to Global Budgets were associated with reductions in expenditures[13]				
Comparison of Oregon's CCO to neighboring Washington's Medicaid program which was not an ACO but did have health care homes	CCO Intervention was associated with a savings of 7% or 6.65 decrease in standardized expenditures per member per month. Savings concentrated to inpatient stays	ED visits decreased over time with a significantly larger decrease in year 2, but no difference in overall 2 year results. Decrease in inpatient days (also seen in Washington), but the rate in Oregon decresed relative to Wasington and was statistically significant in year 2. Overall preventable hospital admissions declined, significant in year one but the two year rate was not significant. Primary care visits decreased in Oregon but increased in Washington	Statistically significant improvements in 2 of 5 measures of low value care as compared to Washington (imaging of uncomplicated headache and avoidance of unneccessary cervical cancer screening.	PCMH-like: CCOs are partnerships of payers, providers, and community organizations that provide coordinated health care for children and adult Oregon Health Plan Enrollees. CCOs build on pre-existing initiatives in the state including the Patient-Centered Primary Care Home (PCPCH) Program created in 2009 which encouraged practices to adopt the medical home model.
Early Performance of Accountable Care Organizations in Medicare[46]				
Difference in Difference design looking at changes in spending and performance before the start of ACO contracts to after the start using non-ACO provider controls	Greater savings for independent primary care groups than for groups integrated with hospitals			Not PCMH or PCMH like necessarily, but points to the importance of primary care within the Medicare ACO program

APPENDIX 3.1

Section 3. Data Sources

National Committee Quality Assurance Patient-Centered Medical Home Recognition Program Historical Data: NCQA's PCMH program provides an official PCMH recognition to practices that adopt the patient-centered medical home (PCMH) model in delivering care. The Program data contained detailed information on PCMH-recognized practices including clinicians, recognition dates and duration, and versions and levels of PCMH recognition achieved. Using this data, we classified clinicians who ever worked at PCMH practices by the beginning of year 2014 as PCMH clinicians.

Medicare Data on Provider Practice and Specialty: The MD-PPAS file is based on Medicare Part B non-institutional claims data that contains provider-level (NPI-level) information including providers' demographic, professional biographic and tax identification number (TIN)-based practice information. We used the most recent specialty information in the MD-PPAS file to identify primary care physicians (PCPs). We defined PCPs as physicians that practiced Family Practice, Internal Medicine, General Practice and Geriatric Medicine.

Medicare Shared Savings Program ACO Provider-Level Research Identifiable File: The MSSP Provider-Level RIF contains information on all ACOs and their individual and organization TIN participants that participated in the Medicare Shared Savings Program. We identified the workforce of MSSP ACOs by merging the RIF with the MD-PPAS above using TINs as identifiers. This gave us the list of providers that worked at each MSSP ACO in 2014 and their credential type and specialty. Then, we merged the NCQA historical data using NPIs to identify PCMH PCPs within ACOs.

Medicare Shared Savings Program Public Data: The Centers for Medicare and Medicaid Services (CMS) Performance Year MSSP ACO Public Use File (PUF) and MSSP ACO Performance Year Results are publicly available ACO-level data that provide information on ACOs that participated in the MSSP. Performance Year MSSP ACO PUFs included information on ACO savings rate, cost, benchmark expenditure, and assigned beneficiary characteristics, while ACO Performance Year Results provided quality performance on 33 ACO quality measures including two composite measures (diabetes and coronary artery disease) for at-risk patient population. The 2014 Public data comprised of ACOs who entered the program in 2012, 2013 and 2014.

About the Patient-Centered Primary Care Collaborative

Founded in 2006, the Patient-Centered Primary Care Collaborative (PCPCC) is a not-for-profit multi-stakeholder membership organization dedicated to advancing an effective and efficient health system built on a strong foundation of primary care and the patient-centered medical home. Representing a broad group of public and private organizations, PCPCC's mission is to unify and engage diverse stakeholders in promoting policies and sharing best practices that support growth of high-performing primary care and achieve the "Quadruple Aim": better care, better health, lower costs, and greater joy for clinicians and staff in delivery of care.

PCPCC is and will position itself as an advocacy organization—a coalition that serves as a "driver of change," educating and advocating for ideas, concepts, policies, and programs that advance the goals of high-performing primary care as the foundation of our health care system.

www.pcpcc.org

About the Robert Graham Center

The Robert Graham Center aims to improve individual and population healthcare delivery through the generation or synthesis of evidence that brings a family medicine and primary care perspective to health policy deliberations from the local to international levels.

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Patient-Centered Primary Care COLLABORATIVE

PCPCC.ORG

601 Thirteenth Street, NW
Suite 430 North
Washington, DC 20005

ROBERT GRAHAM CENTER

GRAHAM-CENTER.ORG

1133 Connecticut Avenue, NW
Suite 1100
Washington, DC 20036

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75 Binney Street
Cambridge, MA 02142

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MILBANK.ORG

645 Madison Avenue
15th Floor
New York, NY 10022