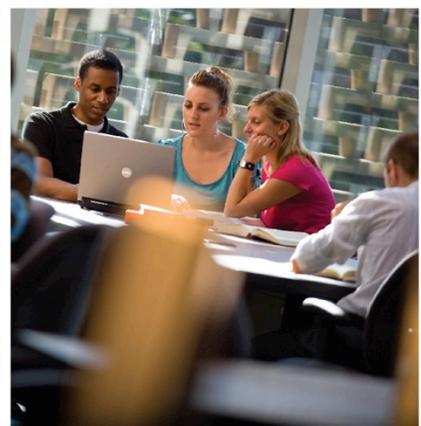
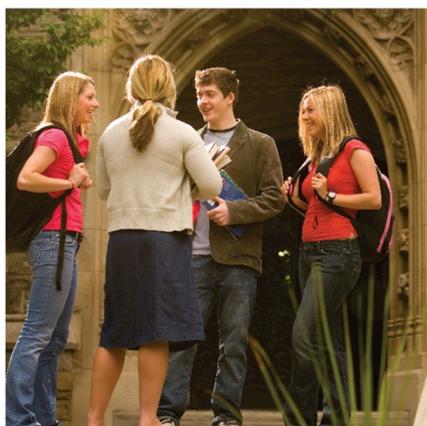
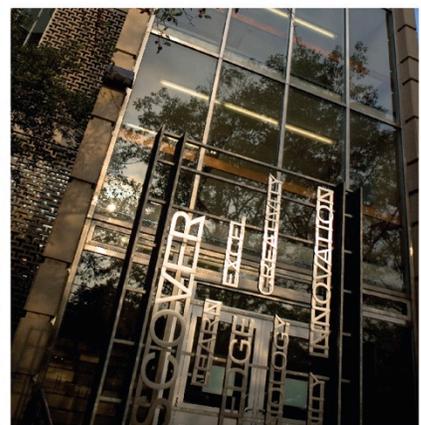




EXAMING THE IMPACTS OF  
ACCOUNTABLE CARE  
ORGANIZATIONS ON PATIENT  
EXPERIENCE, POPULATION  
HEALTH AND COSTS



EVIDENCE >> INSIGHT >> ACTION



**Rapid Synthesis:  
Examining the Impacts of Accountable Care Organizations on  
Patient Experience, Population Health and Costs**

28 March 2016

#### McMaster Health Forum

For concerned citizens and influential thinkers and doers, the McMaster Health Forum strives to be a leading hub for improving health outcomes through collective problem solving. Operating at regional/provincial levels and at national levels, the Forum harnesses information, convenes stakeholders, and prepares action-oriented leaders to meet pressing health issues creatively. The Forum acts as an agent of change by empowering stakeholders to set agendas, take well-considered actions, and communicate the rationale for actions effectively.

#### Authors

Adrian Guta, PhD, Co-Lead, Evidence Synthesis, McMaster Health Forum

Michael G. Wilson, PhD, Assistant Director, McMaster Health Forum, and Assistant Professor, McMaster University

John N. Lavis, MD PhD, Director, McMaster Health Forum, and Professor, McMaster University

#### Timeline

Rapid syntheses can be requested in a three-, 10- or 30-business day timeframe. This synthesis was prepared over a 30-business day timeframe. An overview of what can be provided and what cannot be provided in each of the different timelines is provided on McMaster Health Forum's Rapid Response program webpage (<http://www.mcmasterhealthforum.org/policymakers/rapid-response-program>).

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#### Conflict of interest

The authors declare that they have no professional or commercial interests relevant to the rapid synthesis. The funder played no role in the identification, selection, assessment, synthesis or presentation of the research evidence profiled in the rapid synthesis.

#### Merit review

The rapid synthesis was reviewed by a small number of policymakers, stakeholders and researchers in order to ensure its scientific rigour and system relevance.

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## KEY MESSAGES

### Questions

1. What are the core characteristics of accountable care organizations (ACOs) and of the approaches used to monitor and evaluate them?
2. What impacts have ACOs had on improving the patient experience of care and population health outcomes, and on keeping the per capita cost of care manageable?
3. How and why have such impacts been achieved through ACOs?

### Why the issue is important

- In Ontario 5% of patients account for two-thirds of healthcare costs, and many of these individuals are living with multiple, complex conditions, and have diverse health and social care needs.
- ACOs have been developed in the U.S. as a way to provide coordinated high quality care and keep costs manageable by replacing traditional fee-for-service payment models with pay-for-performance models that reward physicians, other healthcare providers, and hospitals for improved patient health outcomes.
- The Ontario Ministry of Health and Long-Term Care (MOHLTC) has included many of the features of ACOs in its design of Health Links, which seeks to meet the needs of the top 5% of health systems' users.
- With the aim of informing the evaluation of the Health Links model, we reviewed studies comparing ACOs to traditional fee-for-service payment models.

### What we found

- We identified 20 primary studies that evaluated the impact of implementing an ACO pay-for-performance model compared to traditional fee-for-service payment models.
- The studies were all conducted in the U.S., with most using either retrospective Centers for Medicare & Medicaid Services (CMS) claims data and satisfaction surveys, or primary data collected through surveys and qualitative interviews.
- Studies indicated that the implementation of an ACO model:
  - improved or maintained the patient experience while also reaching quality targets for established treatment goals;
  - had mixed results in terms of population health, with some studies showing improved care and reduced mortality, while others did not; and
  - achieved cost savings in most instances (though not always statistically significant) and especially among complex patients, with savings usually achieved in the form of reduced spending on outpatient services (e.g., diagnostic tests).
- Summary of lessons learned for a future evaluation of Health Links:
  - a Health Links evaluation could include objective clinical measures and patient self reports to determine the patient experience.
  - a Health Links evaluation will need to identify relevant existing data and/or future data requirements to assess population health outcomes of the program.
  - a Health Links evaluation will need to consider a broad range of costs, the kinds of savings that have been produced and/or increases that have been offset.
  - a Health Links evaluation could also examine process issues, from the perspective of Health Links leaders related to the implementation of the model.

## **QUESTIONS**

This rapid synthesis addresses three questions:

1. What are the core characteristics of accountable care organizations (ACOs) and of the approaches used to monitor and evaluate them?
2. What impacts have ACOs had on improving the patient experience of care and population health outcomes, and on keeping the per capita cost of care manageable?
3. How and why have such impacts been achieved through ACOs?

## **WHY THE ISSUE IS IMPORTANT**

Strengthening Ontario's health system is important for achieving the triple aim outcomes of: 1) improving the patient experience of care; 2) improving population health; and 3) keeping per capita costs of healthcare manageable.(3-4) Strengthening the system is particularly important for patients with complex needs who may require considerable resources to maintain their health. In Ontario just 5% of patients account for two-thirds of healthcare costs because many are living with multiple, complex conditions and additional social care needs.(5) In response, the Ontario Ministry of Health and Long-Term Care (MOHLTC) has developed and implemented Health Links as a way of providing coordinated, effective and efficient care to patients with complex needs.(6) A Health Link is "a voluntary coalition of partners that treat Ontarians with complex needs,"(7) and each has to:

- serve a population of at 50,000 people;
- demonstrate that 65% of the family physicians in the area are willing to be part of a Health Links;
- include, as partners, healthcare providers who care for the high-need, complex patients;
- require the partners to be able to track these patients; and
- connect with each partner group in a Health Links.(8)

The partners in a Health Link need to include family physicians, the Community Care Access Centre (CCAC) in the area, a local hospital, and specialists caring for complex patients. These partners support the provision of coordinated, comprehensive and team-based care to patients with multiple chronic health conditions (often seniors) who are served through a Health Link.(6;9)

Key goals (and potential measures of success) of the Health Links include reducing avoidable emergency room visits and readmissions, reducing the number of patients in hospital whose needs could be better met in the community, and "reducing the average cost of delivering care, without compromising quality."(8) Efforts are now underway to develop and implement an evaluation to examine the impact of the Health Links, and this rapid synthesis has been requested to inform its design.

### **Box 1: Background to the rapid synthesis**

This rapid synthesis mobilizes the available research evidence about a question submitted to the McMaster Health Forum's Rapid Response program. Whenever possible, a rapid synthesis summarizes research evidence drawn from systematic reviews of the research literature and occasionally from single research studies. A systematic review is a summary of studies addressing a clearly formulated question that uses systematic and explicit methods to identify, select and appraise research studies, and to synthesize data from the included studies. The rapid synthesis does not contain recommendations, which would have required the authors to make judgments based on their personal values and preferences.

Rapid syntheses can be requested in a three-, 10- or 30-business-day timeframe. An overview of what can be provided and what cannot be provided in each of these timelines is provided on the McMaster Health Forum's Rapid Response program webpage (<http://www.mcmasterhealthforum.org/policymakers/rapid-response-program>)

This rapid synthesis was prepared over a 30-business day timeframe and involved five steps:

- 1) submission of a question from a health system policymaker or stakeholder (in this case, the Ontario Ministry of Health and Long-Term Care);
- 2) identifying, selecting, appraising and synthesizing relevant research evidence about the question;
- 3) drafting the rapid synthesis in such a way as to present concisely and in accessible language the research evidence; and
- 4) finalizing the rapid synthesis based on the input of two merit reviewers.

To do this we sought to identify evaluations of similar models, which led us to focus on the accountable care organization (ACO) model in the U.S., which is arguably the most comprehensive model for integrating care and reducing cost. While we describe the features of ACOs and the approaches that have been used to monitor and evaluate them in more detail below (as part of our findings for question 1), ACOs are broadly characterized by groups of physicians, hospitals and other healthcare providers who voluntarily enrol in a network to provide coordinated high-quality care and to lower costs.(10-11) In addition, ACOs are meant to provide a mechanism for avoiding duplication of services, preventing medical errors, and reducing unnecessary spending.(10)

ACOs were formally implemented as part of changes to the U.S. Patient Protection and Affordable Care Act made in 2012 with the goal of linking payment for healthcare to quality outcomes, encouraging integrated health systems, reducing the cost of care and administration, and understanding and addressing health disparities.(12-13) However, variations of such pay-for-performance models have been operating for some time in the U.S., as well as in the U.K. and Australia.(14) In the U.S. these models emerged from efforts by for-profit and not-for-profit insurance companies and the Centers for Medicare and Medicaid Services (CMS) to address quality differences and curb increasing healthcare costs.(15-16) The earliest of these were Health Maintenance Organizations (HMOs), which had some success in reducing costs (sometimes by restricting patient access to care), but failed to achieve long-term impacts.(17) Understandably, concerns have been raised that if not properly implemented, current pay-for-performance models could increase healthcare disparities by restricting access and penalizing physicians who work with those experiencing the greatest needs.(18-19) As well, “population health” has not been well defined among ACOs, and is usually taken to mean the health of a panel (group of patients). Towards meeting the population health goals of the triple aim, it has been emphasized that ACOs should consider the health needs of the actual communities they serve and not just patients.(20)

Overall, ACOs are becoming a popular model for coordinating care in the U.S., through CMS as well as among some private insurers.(21) Given that ACOs share many similar goals with Ontario’s Health Links, we provide an overview of their key characteristics (including the approaches used to monitor and evaluate them), their impact on the triple aim outcomes, and how these impacts have been achieved (see Box 2 for a description of how we identified documents to inform this review).

## **WHAT WE FOUND**

We did not identify any systematic reviews that directly addressed the questions. However, we identified 20 primary studies evaluating the outcomes of implementing an ACO model compared to traditional fee-for-service payment models. Of these studies, 19 primary studies provide insights into whether ACOs improve the patient experience of care and population health, and keeps per capita cost of care manageable (question 2).

### **Box 2: Identification, selection and synthesis of research evidence**

Research evidence (systematic reviews and primary studies) was identified by searching Health Systems Evidence ([www.healthsystemsevidence.org](http://www.healthsystemsevidence.org)) and PubMed. In Health Systems Evidence, we searched for “accountable care organization” OR “accountable care organizations” OR “accountable care organisation” OR “accountable care organisations” using the open search. In PubMed, we conducted an open search using the same combination of terms using the filter for reviews. We also conducted related articles searches in PubMed using two highly relevant background articles that we identified from preliminary searches of the literature.(1-2)

The results from the searches were assessed by one reviewer for inclusion. A document was included if it fit within the scope of the questions posed for the rapid synthesis.

For primary research we included in the synthesis, we documented the focus of the study, methods used, a description of the sample, the jurisdiction(s) studied, key features of the intervention, and key findings. We then used this extracted information to develop a synthesis of the key findings from any included reviews and primary studies.

To identify the key characteristics of ACOs, we hand searched relevant websites [www.cms.gov](http://www.cms.gov) and [www.medicare.gov](http://www.medicare.gov), reviewed relevant references from studies identified from the database search outlined above, and requested literature from the merit reviewers, as well as from a steering committee for a broader project that this synthesis was designed to inform.

For the third question, we found one primary study identifying the ways an ACO model has improved the quality of pediatric care across a dozen settings.

All of the included studies that address questions 2 and 3 are from the U.S., with seven based on data from single states: one from Florida,(22) five from Massachusetts;(23-27) one from Minnesota;(28) and one from Ohio.(29) Another study used comparative data from Arizona, New Hampshire and Texas.(30) Finally, 12 of the studies used national data.(22;31-41) The majority of studies used Medicare and Medicaid claims data to statistically compare service utilization and spending between ACOs and traditional fee-for-service payment models.(22-23;25-26;29;31;33-42)

The majority of the 20 studies are quasi-experimental and cross-sectional, comparing pre-intervention and post-intervention retrospective claims data.(23-27;29-31;33-36;38-42) Many provide a difference-in-difference analysis with statistical regression to determine cost savings.(31;33;35;40-42) Only one study uses panel data.(22) Five of the studies used survey data (publicly available and/or collected for the study),(27-28;31-32;34) five used interviews,(27-28;32;39-40) one included site visits to hospitals,(32) and one included focus groups.(40) Several of the studies have the same lead author.(23-26;33-35;42) Importantly, the studies that examined the Pioneer and Medicare Shared Savings Plan models (see the section for question 1 below for a description of these models) only have data for a one- to three-year period, whereas the studies that describe the implementation of the Medicare Physician Group Practice Demonstration (PGD) use data for the five-year demonstration period.

### **Question 1: What are the core characteristics of accountable care organizations (ACOs) and of the approaches used to monitor and evaluate them?**

#### *Core characteristics of ACOs*

ACOs are “provider-led healthcare entities that bear responsibility for the financial and clinical outcomes of a defined population”.(43) ACOs share a common goal of achieving the triple aims of improving the experience of care, improving population health, and reducing per capita costs of healthcare.(20) Towards achieving these goals, ACOs must:

- create a care delivery network to service a population of patients in a specific area using provider resources (primary-care physicians, specialists, hospitals, etc.);
- define the clinical populations for which the ACO is willing and able to assume risk for;
- systematically ensure the appropriate quality and amount of care is being delivered to those populations; and
- systematically eliminate waste to reduce per member per month costs.(44)

A central feature of ACOs is the collection and use of secured electronic health records that document patients’ medical history, medical conditions, prescriptions and past visits, for use by affiliated care providers.(45) These medical data are used to monitor and evaluate whether the ACO is eligible to benefit from shared savings by meeting “specific quality and efficiency goals such as reducing emergency department (ED) visits, increasing the efficiency of specialists for high-risk patients, or providing coordinated clinical/social supports to improve health”.(46) We discuss shared savings and quality measures in greater detail in following sections.

ACOs are diverse and “vary considerably in their organizational structure, ownership and patient care focus”.(43) ACOs can “range in size from primary care-focused physician groups with a handful of offices to large, multi-state integrated delivery systems with dozens of hospitals and hundreds of office locations”.(43) Desired characteristics of an ACO include:

- strong joint governance;
- executive leadership from all partners;
- trust and transparency across all partners;
- material investment by all parties;

- a global budget approach that aligns financial interests and shares risk;
- long-term commitments;
- data infrastructure that enables fluid clinical data capture for use in treatment and management settings;
- data sharing across all partners;
- aligned clinical and operational processes;
- care coordination across the entire spectrum of care; and
- goals and metrics that will define and measure success.(47)

A detailed account of all of the possible variations within what has been termed the “universe of ACOs” (32) exceeds the scope of this synthesis, but we have identified two taxonomies that describe some common organizational features of ACOs.(43;48) First, Shortel et al offer a taxonomy of ACOs based on their size:

- large: “integrated systems that offer a broad scope of services and frequently include one or more post-acute facilities”;
- moderate: “joint hospital–physician and coalition-led groups that offer a moderately broad scope of services with some involvement of post-acute facilities”; and
- small: “physician-led practices, centered in primary care, and that possess a relatively high degree of physician performance management”.(48)

A second taxonomy by Muhlestein et al. 2014 (see Table 1) provides a structural classification based on ACO type using their level of integration (the range of services provided directly to the defined population), differentiation (the range of services provided to the defined population directly, or through contracted providers), and their centralization (governance and decision-making processes).(43)

**Table 1: Structural classification of ACOs (adapted from Muhlestein et al. 2014)(43)**

ACO Type	Integration	Differentiation	Centralization
Full spectrum integrated (directly provides all aspects of healthcare to their patients)	Full spectrum	Advanced care	Single or multiple owners
Independent physician group (a single physician group owner who does not contract with other providers for additional services)	Outpatient	Ambulatory	Single owner
Physician group alliance (includes multiple participating physician groups)	Outpatient	Ambulatory	Multiple owners
Expanded physician group (only offers outpatient services directly, but they do contract with other providers to offer hospital or advanced care services)	Outpatient	Hospital - advanced care	Single or multiple owners
Independent hospital (have a single owner that directly offers inpatient services)	Inpatient	Hospital - advanced care	Single owner
Hospital alliance (have multiple owners with at least one owner directly providing inpatient services)	Inpatient	Hospital - advanced care	Multiple owners

These taxonomies are broad and do not necessarily reflect the structure and composition of an individual ACO. Later we identify specific publicly funded ACO models that are discussed at length in the literature and which inform this synthesis.

*ACO risk and compensation structure*

Within traditional healthcare payment models, physicians and other healthcare providers are reimbursed directly, or by their employer, through a capitation model (where a set amount is received for each enrolled

patient) or through a fee-for-service model (in which a fee is paid for each visit). In either case, payment is not determined by the quality of care provided (e.g., ordering relevant diagnostic tests) or whether patients' individual and/or collective health outcomes improve.(49) Given the potential for unmet health needs (e.g., patients returning multiple times without having their health issue addressed) and replication of services (e.g., having the same tests ordered multiple times because of poor record keeping), traditional compensation models have been associated with unnecessary health care utilization and short- and long-term costs.

In contrast to traditional payment models, ACOs are held 'accountable' to patients and payers through a pay-for-performance model whereby payments are linked, in full or in part, to achieving population-based quality benchmarks and reducing costs.(49-50) Taking more of a public health approach, this care delivery and payment model "provides financial incentives for providers to prevent illness".(46) ACOs must ensure that cost savings are not achieved at the expense of patient care and population health outcomes.(51) According to the American Academy of Family Physicians, "payment and incentives within an ACO should be structured to foster a shared sense of responsibility for both cost and quality". and "by working together, a group of providers can deliver care at equal (or better) quality while reducing the cost below projections".(50)

ACO compensation models include the following (or some combination):

- productivity-based compensation: physician income based on percentage of either billings or collections;
- incentive-based compensation: a portion of physician income is based on measurable performance around their ACO goals and benchmarks;
- capitation: physician income based on a pre-established percentage of the total revenue from system payers (private and public); or
- straight salary: set income negotiated at time of hiring and re-negotiated at set intervals, which may include a bonus/incentive program.(50)

ACOs contract with public and private payers to determine quality benchmarks that have to be reached, and how any shared savings will be calculated and distributed to the various stakeholders.(50) While this system offers opportunities for greater profits, it also brings risks in the form of financial penalties if agreed upon targets are not met.(49;52) ACO payment arrangements have varying levels of financial risk, including:

- "two-sided" shared savings: ACOs receive payment primarily from fee-for-service and are eligible for a portion of any savings (and are at risk for a portion of spending over the designated target);
- bundled/episode payments: ACO receives one payment for an entire episode of care (at risk for costs that exceed the payment);
- partial capitation/global payments: ACOs take on financial risk for some, but not all, of the items and services provided to patients; and
- global payments: ACOs set budgets and take on full risk if the expenses exceed the expected budget.(53)

#### *How ACOs have been monitored and evaluated*

All ACOs collect and report on various aspects of the care they provide, but only ACOs participating in Centers for Medicare & Medicaid Services (CMS) ACO programs are required to collect data and publicly report on 34 nationally recognized quality measures (this was updated from 33 to 34 in 2016, but all of the studies reviewed here refer to the original 33).(54-55) These 34 quality measures span the four quality domains of 1) patient/caregiver experience, 2) care coordination and patient safety, 3) preventive health, and 4) clinical care for at-risk populations, the details of which we summarize in Table 2.(55)

**Table 2: Summary of ACO quality measures (55)**

Quality domain	Measures used
Patient and caregiver experience	<p>Consumer Assessment of Healthcare Providers and Systems (CAHPS) survey data for:</p> <ul style="list-style-type: none"> <li>• getting timely care, appointments, and information (ACO-1: CAHPS for ACOs);</li> <li>• how well your providers communicate (ACO-2: CAHPS for ACOs);</li> <li>• patient rating of provider (ACO-3: CAHPS for ACOs);</li> <li>• access to specialist (ACO-4: CAHPS for ACOs);</li> <li>• health promotion and education (ACO-5: CAHPS for ACOs);</li> <li>• shared decision-making (ACO-6: CAHPS for ACOs);</li> <li>• health status/functional status (ACO-7: CAHPS for ACOs); and</li> <li>• stewardship of patient resources (ACO-34: CAHPS for ACOs).</li> </ul>
Care coordination and patient safety	<p>Claims-based and administrative data for the domain care coordination/patient safety are collected from routine billing activities and include:</p> <ul style="list-style-type: none"> <li>• ACO-8: risk standardized all condition readmission;</li> <li>• ACO-35: skilled nursing facility 30-day all-cause readmission measures (SNFRM);</li> <li>• ACO-36: all-cause unplanned admissions for patients with diabetes;</li> <li>• ACO-37: all-cause unplanned admissions for patients with heart failure;</li> <li>• ACO-38: all-cause unplanned admissions for patients with multiple chronic conditions;</li> <li>• ACO-9: ambulatory sensitive conditions admissions for chronic obstructive pulmonary disease (COPD) or asthma in older adults;</li> <li>• ACO-10: ambulatory sensitive conditions admissions for heart failure (HF);</li> <li>• ACO-11: per cent of primary care physicians who successfully meet meaningful use requirements;</li> <li>• ACO-39 (CARE-3): documentation of current medications in the medical record; and</li> <li>• ACO-13 (CARE-2): falls: screening for future fall risk.</li> </ul>
Preventive health	<p>Items for the preventive health domain are collected from the Group Practice Reporting Option (GPRO) Web Interface (WI) and include:</p> <ul style="list-style-type: none"> <li>• ACO-14 (PREV-7) preventive care and screening: influenza immunization;</li> <li>• ACO-15 (PREV-8) pneumonia vaccination status for older adults;</li> <li>• ACO-16 (PREV-9) preventive care and screening: body mass index (BMI) screening and follow-up;</li> <li>• ACO-17 (PREV-10) preventive care and screening: tobacco use: screening and cessation intervention;</li> <li>• ACO-18 (PREV-12) preventive care and screening: screening for clinical depression and follow-up plan;</li> <li>• ACO19 (PREV-6) colorectal cancer screening;</li> <li>• ACO-20 (PREV-5) breast cancer screening;</li> <li>• ACO-21 (PREV-11) preventive care and screening: screening for high blood pressure and follow-up documented; and</li> <li>• ACO-42 (PREV-13) statin therapy for the prevention and treatment of cardiovascular disease.</li> </ul>
Clinical care for at-risk populations	<p>Measures for at-risk populations are collected through GPRO WI and include:</p> <ul style="list-style-type: none"> <li>• coronary artery disease measures: <ul style="list-style-type: none"> <li>○ CAD-7: Coronary artery disease (CAD): angiotensin-converting enzyme inhibitor or angiotensin receptor blocker therapy; diabetes or left ventricular systolic dysfunction (LVEF &lt; 40%)</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>• diabetes measures:             <ul style="list-style-type: none"> <li>○ DM-2 (NQF 0059): Diabetes: hemoglobin A1c poor control</li> <li>○ DM-7 (NQF 0055): diabetes: eye exam (scored together as a composite measure)</li> </ul> </li> <li>• heart failure measures:             <ul style="list-style-type: none"> <li>○ HF-6: heart failure (HF): beta-blocker therapy for left ventricular systolic dysfunction (LVSD)</li> </ul> </li> <li>• hypertension measures:             <ul style="list-style-type: none"> <li>○ HTN-2: controlling high blood pressure</li> </ul> </li> <li>• ischemic vascular disease measures:             <ul style="list-style-type: none"> <li>○ IVD-2: ischemic vascular disease (IVD): use of aspirin or another antithrombotic</li> </ul> </li> <li>• mental health:             <ul style="list-style-type: none"> <li>○ MH-1: depression remission at twelve months</li> </ul> </li> </ul>
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There has been debate about whether quality metrics are the best indicators of quality care, and their relationship to actual health outcomes.(56-57) Some measures may be selected based on the availability of data, rather than on any impact they may have on patient outcomes.(58) Moreover, the focus on quality metrics has the potential to distort care by influencing care providers to invest more in healthier people with easily attainable but less urgent goals, and may lead to unnecessary testing for some issues that have been identified as important, distract from patients’ expressed needs, and prioritize process over the experience of care.(56) As well, some private ACOs appear to be measuring performance based on metrics that were never intended to be measures of quality care.(56) Some have argued that the shift to performance-based payments is promising in terms of curbing unnecessary health spending, but a focus on quality metrics may undermine other promising approaches focused on the social determinants of health and addressing multimorbidity and complexity.(59-60) Saver et al (2015) have provide their own recommended measures that address many of the aforementioned challenges, and their measures are summarized in Table 3.(56)

**Table 3. Comparison of typical performance measures and recommendations adapted from Saver et al 2015 (56)**

Current approaches	Recommended approaches
Binary (cut-point) thresholds of risk	Continuous measures of risk
Surrogate outcomes	Patient-centred outcomes
No accounting of staff effort required to have an impact on performance measures	Accounting of staff effort
Lack of emphasis on shared decision-making and eliciting patient preferences	Individualization and shared decision-making as a default expectation
No articulation of NNT, NNH and NNS*	Transparency and referencing of NNT, NNH and NNS*
Measures focused on individual risk factors	Aggregate risk measures
Isolated morbidities	Recognition that multimorbidity may modify or invalidate some measures in individuals
No accounting for social determinants of health	Inclusion of social determinants of health
Multiple metric sources with varying biases and transparency	Single, independent, transparent and unbiased source
* NNT: number needed to treat; NNH: number needed to harm; NNS: number needed to screen	

A Health Links evaluation could benefit from using a range of measures that require data from a range of stakeholders (clinicians and patients), consider complexity, and address the social determinants of health.

*ACO models evaluated in the included studies*

The 20 studies we identified to answer questions 2 and 3 focused on CMS-affiliated ACO programs in the form of the Medicare Physician Group Practice Demonstration (PGP), the Blue Cross & Blue Shield “Alternative Quality Contract” (AQC), and the more recent Medicare Shared Savings Program (MSSP), the Pioneer ACO Model, and the Advance Payment ACO Model (see Table 4 for a summary of the initiator and time period for each). As of 2015 there were 404 MSSPs and 19 Pioneer ACOs covering 7.92 million assigned Medicare beneficiaries in 49 states plus Washington, D.C., and Puerto Rico.(61) ACOs in CMS programs currently serve an estimated 35 million non-Medicare patients.(62) There are also 159 ACOs that are not participating in CMS programs and serve between nine and 15 million patients.(62) Only ACOs with public payer contracts are required to disclose their performance data, which limits the amount of publicly available comparative data on ACO models and cost-effectiveness.(63)

The PGP was launched in 2005 as the “first pay-for-performance initiative for physicians under the Medicare program”, and involved 10 large physician groups whose members received incentives for “improving patient outcomes by proactively coordinating their patients’ total health care needs, especially for beneficiaries with chronic illness, multiple comorbidities, and transitioning care settings”.(64) Following the completion of the demonstration period, seven of the 10 sites participated in the Physician Group Practice Transition Demonstration from 2010-2012 and three transitioned into Pioneer ACOs (discussed in the next section).(65)

**Table 4: Summary of ACO models included in the rapid synthesis**

<b>ACO model</b>	<b>Initiator</b>	<b>Time period</b>
Medicare Physician Group Practice Demonstration (PGP)	Centers for Medicare & Medicaid Services	Launched 2005 (5-year demonstration period)
Alternative Quality Contract (AQC)	Blue Cross Blue Shield of Massachusetts	Launched 2009
Medicare Shared Savings Program (MSSP)	Centers for Medicare & Medicaid Services	Launched 2009
Advance Payment ACO	Centers for Medicare & Medicaid Services	Launched 2011
Pioneer ACO model	Centers for Medicare & Medicaid Services	Launched 2012

The PGP was launched in 2005 as the “first pay-for-performance initiative for physicians under the Medicare program,” and involved 10 large physician groups whose members received incentives for “improving patient outcomes by proactively coordinating their patients’ total healthcare needs, especially for beneficiaries with chronic illness, multiple comorbidities, and transitioning care settings”.(64) Following the completion of the demonstration period, seven of the 10 sites participated in the Physician Group Practice Transition Demonstration from 2010-2012, and three transitioned into Pioneer ACOs (discussed in the next section).(65)

The Alternative Quality Contract (AQC) payment arrangements were launched in 2009 by the public/private health insurer Blue Cross Blue Shield of Massachusetts for both quality purposes and cost savings.(66) AQCs employ an “innovative global payment model that uses a budget based methodology, which combines a fixed per-patient payment (adjusted annually for health status and inflation) with substantial performance incentive payments (tied to the latest nationally accepted measures of quality, effectiveness, and patient experience”).(67) AQCs are said to “enable the delivery system to give the patient the best result from the most appropriate treatment (e.g., based on the best medical evidence), by the right kind of provider (e.g., specialist, family doctor, nurse), at the right time (when intervention is most appropriate), and in the most appropriate setting (e.g., hospital, physician office, independent laboratory, home)”.(67)

Next we briefly describe each of the CMS ACO models operating across the U.S. in turn. First, the Medicare Shared Savings Program (MSSP) model “aims to encourage coordination and cooperation among providers to improve the quality of care for Medicare fee-for-service beneficiaries and reduce unnecessary costs”.(68) Specifically, the MSSP requires that enrolled ACOs:

- promote evidence-based medicine;
- promote beneficiary engagement;
- report internally on quality and cost metrics; and
- provide coordinated care across and among primary-care physicians, specialists and acute and post- acute providers.

Participating MSSP ACOs “must serve at least 5,000 Medicare beneficiaries, and must include enough primary care ACO professionals to serve the Medicare fee-for-service beneficiaries assigned to the ACO”.(68)

The Advance Payment model is “designed for physician-based and rural providers who have come together voluntarily to give coordinated high quality care to the Medicare patients they serve. Through the Advance Payment ACO Model, selected participants will receive upfront and monthly payments, which they can use to make important investments in their care coordination infrastructure.” There are 35 ACOs participating in the Advance Payment ACO model.(69)

Lastly, the Pioneer ACO model is similar to the MSSP ACO model but is “designed for healthcare organizations and providers already experienced in coordinating care for patients across care settings. It enables these provider groups to move more rapidly from a shared savings payment model to a population-based payment model on a track consistent with, but separate from, the Medicare Shared Services Program.”(70) To participate in the Pioneer ACO model, organizations are required to provide or supply services structured as:

- ACO professionals in group practice arrangements;
- networks of individual practices of ACO professionals;
- partnerships or joint venture arrangements between hospitals and ACO professionals;
- hospitals employing ACO professionals; or
- federally qualified health centres (FQHC).

Organizations participating in the Pioneer ACO model are required to have “a minimum of 15,000 aligned beneficiaries; unless located in a rural area, in which case they are to have a minimum of 5,000 beneficiaries”.(71) The original 32 Pioneer ACOs dropped to 19,(71-72) and most recently down to nine.(73)

## **Question 2: What impacts have ACOs had on improving the patient experience of care and population health outcomes, and on keeping the per capita cost of care manageable?**

### *Patient experience of care*

The patient experience of care was explored in 12 of the primary studies we reviewed and was assessed using patient satisfaction surveys, patient and family engagement measures, and various clinical quality measures (e.g., the use of recommended diagnostic tests).(23;26;28-32;34-35;37-38;40)

Five studies examined patient satisfaction and patient and family engagement within ACOs.(28;31-32;34;40) One study reported the overall ratings of care and interactions with physicians did not change differentially between the ACO group (comprised of both Pioneer and MSSP models) and the control group (comprised of a traditional fee-for-service billing model) between the pre-intervention and post-intervention periods, but self reports of timely access to care improved in the ACO group.(34) One study that compared Pioneer ACOs and traditional fee-for-service Medicare recipients using patient survey responses found that beneficiaries reported similar satisfaction with access to care across both groups, and slightly higher satisfaction with clinician communication among the ACO beneficiaries.(31) One study evaluated patient and family activation and engagement as reported by a sample of physicians recruited from a range of ACOs, and found that the majority were implementing some engagement strategies, such as contacting clients by

telephone or email, and allowing patients access to their medical records.(32) However, the study indicated that the majority of ACOs in the sample still required improvement in supporting shared decision-making, developing care plans, and increasing patient involvement in governance board discussions and quality-improvement activities.(32) The same study also found that the size of an ACO does not determine the level of patient and family activation and engagement.(32) One study examining Pioneer ACOs in the state of Minnesota adapted a patient engagement measure traditionally used to assess patient involvement for use by physicians, and found that:

- 10% of survey respondents identified the need for more focus on patient activation and/or patient skills for self-managing chronic conditions;
  - 34% indicated that quality metrics are not good indicators of the quality of care; and
  - 29% indicated there is too much focus on quality metrics and not enough on patients' immediate needs.
- (28)

Perceived obstacles to the use of quality metrics identified in the survey included: patients' unwillingness to change behaviours (70%); lack of time to spend with patients (65%); and a lack of high-quality support resources for patients such as diabetes educators, coaches and blood pressure nurses (48%). Qualitatively, physicians expressed concerns that they were being held responsible for patients' lifestyle choices (e.g., smoking) which they described as being outside of their control.(28) Lastly, one study examining patient experience based on the Consumer Assessment of Healthcare Providers and Systems (CAHPS) survey results, found little change over a two-year period among the 32 Pioneer ACOs.(40)

Six studies found that the implementation of ACOs resulted in improvements on different clinical quality indicators,(23;26;30;34;38;40) and one study comparing two pay-for-performance models found no difference between the Pioneer and MSSP models, and a traditional physician group-practice (PGP) model (non-Medicare and not enrolled as an ACO) on measures of quality.(37) Key findings from the six studies indicated that:

- a PGP received better scores on six of seven quality indicators for measures of diabetes mellitus, congestive heart failure, coronary artery disease, and preventive care, compared to traditional care models;(38)
- the implementation of an AQC resulted in a 3% increase in the proportion of eligible enrollees meeting chronic care management thresholds, and an increase of 0.7% in the proportion of eligible enrollees meeting pediatric care thresholds;(26)
- three AQC groups were superior to their local comparison group across five evidence-based performance standards of care (e.g., screening mammogram in past 24 months for female patients aged 42–69; serum creatinine test in the past 12 months for patients with hypertension, etc.), with the exception of one hemoglobin measure at one site;(30)
- across 32 Pioneer ACOs there were significant reductions on a number of acute hospital admissions related to key prevention quality indicators (PQIs) for chronic obstructive pulmonary disease, older adult asthma, or heart failure control, as well as significantly increased rates from 2012-2013 for post-discharge physician follow-up in the week immediately following an inpatient discharge;(40)
- medically complex beneficiaries with seven or more chronic conditions in the ACO group (comprised of Pioneer and MSSP models) improved in average performance based on standard ACO quality measures from the 82<sup>nd</sup> to 96<sup>th</sup> percentile;(34) and
- the implementation of a pediatric ACO produced modest improvements across a range of pediatric quality indicators, including gastroenteritis admission rates, pediatric quality acute and overall composite health scores, neonatal intensive care days, and the number of routine check-ups provided.(29)

However, three other studies reported less significant findings in terms of quality of patient care. For example, in one of the studies, only 45% of ACOs reported that their high-risk chronically ill patients were receiving health coaching.(32) Another study found that the PGPs did not limit the utilization of discretionary carotid imaging, discretionary coronary imaging, discretionary carotid revascularization or coronary revascularization. In this study the difference-in-difference associated with the ACO implementation for non-discretionary cardiovascular imaging or procedures was “essentially zero.”(35) Lastly, a third study found that

a commercial ACO was not associated with consistently improved quality of care based on cardiovascular disease, diabetes-related measures, re-admissions, and low-density lipoprotein (LDL) testing in year one, but showed significant improvements for LDL testing and diabetes-related measures in year two of the contract.(23) The same authors note that measurable improvements to patient care outcomes may take time to be achieved.(23)

Collectively, these studies provide important information for Health Links and their evaluation. For example, an evaluation of Health Links could similarly include both clinical quality measures and self-reported satisfaction to assess patient experience. However, while clinical quality measures could be obtained through administrative data, Ontario does not currently have a system in place that is similar to the centralized CAHPS survey. As a result, new data collection may be needed (e.g., by mail, telephone, or through internet-based surveys) to reliably measure patient and caregiver experience. Recognizing that improvements can take time to become evident, evaluation data will need to be collected at different points over time.

### *Population Health*

Population health was indirectly explored in two of the primary studies through measures of mortality outcomes.(22;42) The first study found that a PGP site produced a significant reduction (5.6%) in mortality among cancer patients.(42) The second study found hospitals that became more centralized through a Pioneer or advance payment ACO model had significantly larger reductions in mortality compared with those that remained free-standing. However, the study warned that ACOs with tightly integrated physician-hospital linkages were actually associated with increased mortality, which led to the conclusion that not all ACO models are beneficial, and that hospitals should consider the specific types of alignments they develop with local physician organizations.(22)

Two phases of an evaluation of 32 Pioneer ACOs identified gaps in current data collection practices that limit the ability to analyze beneficiary data from a population perspective.(39-40) This reflects previously mentioned concerns that “population health” has not been well defined among ACOs. In relation to a Health Links evaluation, these studies point to the need to clearly identify key population-level outcomes, the data necessary to assess those outcomes, and whether the data are available through existing sources (e.g., through the Institute for Clinical Evaluative Sciences).

### *Per capita cost of care*

Of the primary studies we reviewed, 15 assessed cost savings related to ACO implementation as compared with traditional fee-for-service compensation models.(23-26;29-33;36;38-42) A 16th study raised important questions about the relationships between compensation and quality.(28) ACOs were associated with either per capita cost savings or with increased spending that was lower than traditional models, except in one study that did not find statistically significant cost savings from an AQC.(30)

A review of the PGPs found a combined savings of \$171 (2.0%) per assigned beneficiary person year during the five-year demonstration period, and that savings of \$69 per person year were still achieved when Medicare performance bonuses to participating physicians that averaged \$102 per beneficiary year were included.(38)

AQCs were generally associated with savings, with one achieving an average savings of \$34 per beneficiary in year one, and an additional \$51 in savings per beneficiary in year two across 11 provider organizations, with \$73 of the total per-beneficiary savings attributed to a shift away from more expensive outpatient care.(23) Notably, the study found the greatest savings was among beneficiaries with five or more conditions (\$125 per beneficiary) compared to those with fewer conditions (\$61 per beneficiary).(23) A second study found the AQC group was associated with a decrease in spending of \$22.58 per enrollee per quarter compared to the control group, with an average of 2.8% savings over the first two years of the intervention, and reductions in outpatient facility spending on procedures, imaging and tests accounting for 75% of the savings.(25) Similarly, a third study found the AQC was associated with a \$15.51 decrease in average quarterly spending per enrollee

and 1.9% savings relative to the control group, with the majority of savings (80%) attributed to reduced costs in procedures, imaging and testing.(26) In addition, enrollees in the highest quartile of risk score (based on diagnostic-cost-group scoring system) accounted for most of the savings at \$14.75.(26) Lastly, a longitudinal study found the AQC group had an average savings of \$62.21 per enrollee per quarter compared to the control group during the four-year post-intervention period.(24) Savings were concentrated in the outpatient-facility setting with savings of 4.0% in professional spending, 19.3% for facility spending, 8.7% in procedures, 10.9% for imaging and 9.7% in tests.(24)

The first year of operation of the Pioneer ACO program was associated with a 4.5% total reduction in spending on low-value services (defined as services that provide minimal clinical benefit on average) compared to the control group.(41) An evaluation that compared data for 32 Pioneer ACOs to traditional fee-for-service models found total cost savings of approximately \$384 million for the ACO group in its first two years.(40) Elsewhere, a sample of Pioneer ACOs increased their spending by \$385 million (\$280 million in year one and \$105 million in year two), which was less than spending increased in a traditional fee-for-service Medicare comparison group.(31) Pioneer ACOs have been found to produce additional savings in the form of:

- reduced spending by \$20 per beneficiary per month compared to the control group;(39)
- decreased spending by \$29.2 per beneficiary per quarter compared to the control group, which was consistent with a 1.2% savings reduction relative to an expected quarterly mean of \$2,455.80 in 2012 for the ACO group;(33) and
- smaller increase per beneficiary per month in adjusted expenditures of \$35.62 in 2012 and \$11.18 in 2013.(31)

Three of the studies indicated that differential cost savings were achieved for some ACOs within specific populations or groups (e.g., medically complex and socially vulnerable patients, pediatric patients, and cancer patients). Key findings from these studies indicate that:

- a PGP site produced a mean savings of \$114 annually per beneficiary, but the distribution of savings was skewed with much higher savings (\$532 annually per beneficiary) attributed to dually eligible (Medicare and Medicaid) beneficiaries who tend to be medically complex and socially vulnerable, compared to non-dually eligible beneficiaries (\$59 annually per beneficiary);(36)
- 10 PGP sites produced \$721 in reductions annually for Medicare spending on cancer patient beneficiaries across the participating sites, and an annual reduction of 3.9% in payments per cancer patient, which were derived entirely from reductions in acute care payments for inpatient stays that could be attributed to either reduction in utilization or reduction in the price of services;(42) and
- the per-member costs per month in a pediatric ACO grew at a much lower rate of \$2.40 per year compared to \$16.15 in Medicaid fee-for-service and \$6.47 in managed care.(29)

Lastly, one study points to the importance and potential cost savings of targeted patient and family activation and engagement activities (e.g., patient/family participation in ACO advisory councils, quality-improvement initiatives, and in decisions about care self-management).(32) The 26% of the diverse ACOs that had calculated the return on investment (ROI) from such patient and family activation and engagement activities reported ratios of between 2:1 and 4:1 ROI based primarily on reduced emergency room visits and hospitalizations.(32) Finally, there were some concerns raised about Pioneer ACO compensation models, with one study reporting that 36% of physicians found the compensation model too complex, and the same percentage felt that patients' lifestyle behaviours, which they cannot control, influenced their salary.(28)

Several implications for evaluating Health Links can be identified from these studies, which include the need to compare the Health Links model to the traditional standard of care offered by non-Health Links enrolled healthcare providers in Ontario by monitoring:

- costs per patient and total costs over time at the population level, but also for different groups (e.g., elderly versus younger people and for those with multiple chronic conditions);
- the rate of growth to identify trends over time;

- how savings are being produced (e.g., reduced ordering of particular tests and/or use of services); and
- whether and how costs affect the quality of care.

**Question 3: How and why have such impacts been achieved through ACOs?**

We found one qualitative study relevant to question 3, and it focuses on an Alternative Quality Contract (AQC) that incentivized the enrolled ACOs to meet new pediatric care incentives.<sup>(27)</sup> Interviews were conducted with 22 leaders of 12 ACOs. These participants reported improvements in the quality of their pediatric care efforts in the form of new practices, metrics and related monitoring (e.g., some started holding meetings to discuss pediatric quality improvement), following the implementation of a pediatric performance-based compensation structure. However, the ACO leaders also reported that the AQC did little to incentivize pediatric care in general (e.g., starting pediatric programming) or improve care for children with specialized needs. Given this, they called for future incentive-based programs to include care for children with special healthcare needs.<sup>(27)</sup> Lastly, the study indicated that ACO leaders reported that while they implemented attempts to monitor and reduce pediatric spending patterns to align with the incentives offered through the AQC, their attempts did not necessarily change patients' utilization patterns.<sup>(27)</sup>

This lack of research evidence about how and why impacts are achieved in ACOs points to the need to include such process evaluations in an evaluation of Health Links (e.g., by interviewing leaders about what they found to be the essential components for success, as well as what factors acted as barriers to implementation).

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## **APPENDICES**

The following tables provide detailed information about the primary studies identified in the rapid synthesis, which includes the focus of the study, methods used, study sample, jurisdiction studied, key features of the intervention and the study findings (based on the outcomes reported in the study).

All of the information provided in the appendix tables was taken into account by the authors in describing the findings in the rapid synthesis.

**Appendix 1: Summary of findings from primary studies about accountable care organizations**

Question addressed	Focus of study	Study characteristics	Sample description	Key features of the intervention(s)	Key findings
<p>What impacts have accountable care organizations (ACOs) had on improving the patient experience of care and health of populations and on reducing the per capita cost of care?</p>	<p>Compared a commercial Alternative Quality Contract (AQC) to a traditional fee-for-service Medicare model (23)</p> <p><i>ACO model: AQC</i></p>	<p><i>Publication date: 2013</i></p> <p><i>Jurisdictions studied: U.S.</i></p> <p><i>Study period: 2007-2010</i></p> <p><i>Methods used: Quasi-experimental comparisons of patient data</i></p>	<ul style="list-style-type: none"> <li>Data were collected from Medicare claims from 2007-2010 in Massachusetts</li> <li>The study sampled elderly fee-for-service Medicare beneficiaries in Massachusetts (equivalent to 1,761,325 person-years) served by 11 provider organizations entering an AQC in 2009 or 2010</li> <li>The AQC group was comprised of 417,182 person-years and the control group consisted of beneficiaries served by traditional providers, which was comprised of 1,344,143 person-years</li> </ul>	<p>The intervention group was comprised of the elderly adult beneficiaries of 11 provider organization (comprised of groups of three or more primary care physicians) entering into a commercial AQC.</p>	<p><i>Patient experience of care</i></p> <p>The AQC was not associated with consistently improved quality of care based on indicators that looked at cardiovascular disease or diabetes related measures, re-admissions, and LDL testing. Significant improvements were seen for LDL testing for beneficiaries with diabetes in the alternative quality contract group in the forms of an increase of 5.2% in year two, with a differential of 3.1% to the control group.</p> <p><i>Population health</i></p> <p>Not addressed by the study</p> <p><i>Cost of care</i></p> <p>The AQC was associated with lower spending in year one of \$34 per beneficiary and additional savings in year two of \$51, and especially for those with five or more conditions (\$125) compared to those with fewer conditions (\$61). Savings of \$73 were attributed to a shift away from more expensive outpatient care. Overall, savings were achieved without compromising the quality of care.</p>
	<p>Compared a Pioneer ACO model to a traditional fee-for-service Medicare model (31)</p> <p><i>ACO model: Pioneer</i></p>	<p><i>Publication date: 2015</i></p> <p><i>Jurisdictions studied: U.S.</i></p> <p><i>Study period: 2012 &amp; 2013</i></p> <p><i>Methods used: Difference-in-differences multivariable regression</i></p>	<ul style="list-style-type: none"> <li>Data were collected from national Medicare claims for 2012 and 2013</li> <li>The study sampled fee-for-service Medicare beneficiaries aligned with 32 Pioneer ACOs (675,712 in 2012; 806,258 in 2013) and a comparison group of alignment-eligible beneficiaries in the same markets (13,203,694 in 2012; 12,134,154 in 2013) across the U.S.</li> <li>Data were also used from consumer assessment of healthcare providers and</li> </ul>	<p>The intervention group was comprised of all the beneficiaries covered under the 32 Pioneer ACOs.</p>	<p><i>Patient experience of care</i></p> <p>Based on consumer assessment of healthcare providers and systems (CAHPS) survey results, beneficiaries aligned with the ACO, as compared with general Medicare beneficiaries, reported similar satisfaction with access to care and slightly higher satisfaction with clinician communication.</p> <p><i>Population health</i></p> <p>Not addressed by the study</p> <p><i>Cost of care</i></p> <p>Beneficiaries aligned with the Pioneer ACOs had smaller</p>

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			<p>systems (CAHPS) surveys for 775 randomly selected beneficiaries per accountable care organization compared to traditional Medicare recipient respondents.</p>		<p>changes per beneficiary per month in adjusted expenditures of □ \$35.62 in 2012 and □ \$11.18 in 2013.</p> <p>Beneficiaries aligned with the Pioneer ACOs exhibited smaller changes in total Medicare expenditures of -\$385 million over two years (-\$280 million in year one and -\$105 million in year two) as compared to fee-for-service Medicare models.</p>
	<p>Evaluated “patient and family activation and engagement” (PAE) among ACOs (32)</p> <p><i>ACO model:</i> All those included under “the universe of ACOs”</p>	<p><i>Publication date:</i> 2015</p> <p><i>Jurisdictions studied:</i> U.S.</p> <p><i>Study period:</i> 2012 &amp; 2013</p> <p><i>Methods used:</i> Mixed survey, phone interviews, and site visits</p>	<p>The study sampled ACOs which ranged in size from 15 to 2,100 full time employed physicians with a mean of 227 full time employed physicians (standard deviation = 311) for the following research methods:</p> <ol style="list-style-type: none"> <li>1. Web-based survey: National Survey of ACOs, 173 completed.</li> <li>2. Patient Activation and Engagement Survey, 101 completed.</li> <li>3. Phone interviews: 11 sites selected from 173 completed national survey of ACOs.</li> <li>4. Site-visits: Two-day site visits. Two sites selected from the 101 completed patient activation and engagement surveys.</li> </ol>	<p>N/A</p>	<p><i>Patient experience of care</i></p> <p>The majority of ACOs in this study reported implementing some patient and family activation and engagement strategies (e.g., 100% contact clients by telephone or email), and allowing patients access to their medical records (71%), but only 24% permitted access to clinical notes.</p> <p>Only 45% of ACO respondents reported that their high-risk chronically ill patients were receiving health coaching.</p> <p>The size of an ACO does not determine the level of patient and family activation and engagement.</p> <p>Hospital owned ACOs do not engage in greater patient and family activation and engagement.</p> <p>Level of physician compensation based on patient experience scores was not positively associated with more patient and family activation and engagement activities.</p> <p>ACO leader’s perceptions of the impact of patient and family activation and engagement activities was positively associated with the use of these activities.</p> <p><i>Population health</i></p> <p>Not addressed by the study</p> <p><i>Cost of care</i></p> <p>The 26% of ACOs who had calculated the return on investment (ROI) from patient and family activation</p>

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					and engagement activities reported ratios of between 2:1 and 4:1 ROI based primarily on reduced emergency room visits and hospitalizations.
	<p>Compared the spending of 32 Pioneer ACOs to a traditional Medicare model (33)</p> <p><i>ACO model:</i> Pioneer</p>	<p><i>Publication date:</i> 2015</p> <p><i>Jurisdictions studied:</i> U.S.</p> <p><i>Study period:</i> Pre-intervention 2009-2011 and post-intervention 2012</p> <p><i>Methods used:</i> Difference-in-differences analysis with linear regression</p>	<ul style="list-style-type: none"> <li>Data were collected from national Medicare claims from 2009 through 2012 for a random 20% sample of Medicare claims (14,876,933 beneficiary years from 2009 through 2011 and 5,043,581 beneficiary years in 2012)</li> <li>The sample was further divided between a control group comprised of traditional beneficiaries (14,310,523 in 2009-2011/4,841,937 in 2012), and enrollees of Pioneer ACOs (566,410 in 2009-2011 and 201,644 in 2012) beneficiary years.</li> </ul>	<p>The intervention group was comprised of all the beneficiaries covered under the 32 Pioneer ACOs.</p>	<p><i>Patient experience of care</i></p> <p>Not addressed by the study</p> <p><i>Population health</i></p> <p>Not addressed by the study</p> <p><i>Cost of care</i></p> <p>The total adjusted per-beneficiary spending decreased in the Pioneer ACOs by \$29.2 per quarter, compared to the control, and were consistent with a 1.2% savings. The savings were greater for ACOs, which were above average in spending or those serving high-spending areas.</p>
	<p>Compared a pediatric ACO to Medicaid fee-for-service and managed care (29)</p> <p><i>ACO model:</i> Partners for Kids (PFK) pediatric ACO</p>	<p><i>Publication date:</i> 2015</p> <p><i>Jurisdictions studied:</i> U.S.</p> <p><i>Study period:</i> 2008-2013</p> <p><i>Methods used:</i> Observational study of costs before/after intervention (control)</p>	<ul style="list-style-type: none"> <li>Data were collected from pediatric Medicaid claims at one site serving 300,000 low-income children in central and southeastern Ohio, U.S., and were compared to statewide Medicaid fee-for-service (FFS) and managed care (MC) cost histories.</li> </ul>	<p>The intervention group was comprised of beneficiaries covered under Partners for Kids (PFK), an exclusively pediatric ACO which serves Medicaid enrollees aged 0 to 18 years.</p>	<p><i>Patient experience of care</i></p> <p>There were modest improvements across a range of pediatric quality indicators between the periods of 2008-2010 and 2011-2013 for gastroenteritis admission rate, a pediatric quality acute composite measure, and a pediatric quality overall composite measure.</p> <p>There were significant decreases in the number of neonatal intensive care days per 1,000 member-months (-0.57) and increases in routine check-ups (+7.77).</p> <p><i>Population health</i></p> <p>Not addressed by the study</p> <p><i>Cost of care</i></p> <p>The per-member-per-month costs in the pediatric ACO grew at a rate of \$2.40 per year compared to \$16.15 in the Medicaid fee-for-service and \$6.47 in managed care.</p>
	<p>Compared the use of low-value services in</p>	<p><i>Publication date:</i> 2015</p>	<ul style="list-style-type: none"> <li>Data were collected from a national random sample of 20%</li> </ul>	<p>The intervention group was comprised of all the</p>	<p><i>Patient experience of care</i></p>

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	<p>Pioneer ACOs to traditional Medicare claims (41)</p> <p><i>ACO model:</i> Pioneer</p>	<p><i>Jurisdictions studied:</i> U.S.</p> <p><i>Study period:</i> Pre-intervention 2009-2011 and post-intervention 2012</p> <p><i>Methods used:</i> Difference-in-differences analysis</p>	<p>of Medicaid claims from 2009-2012</p> <ul style="list-style-type: none"> <li>Data were collected from clients of 32 Pioneer ACOs which totalled 693,218 person years compared to 17,453,423 in the traditional Medicare control group</li> </ul>	<p>beneficiaries covered under the 32 Pioneer ACOs.</p>	<p>Not addressed by the study</p> <p><i>Population health</i></p> <p>Not addressed by the study</p> <p><i>Cost of care</i></p> <p>The first year of the ACO program was associated with a 4.5% differential reduction in spending on low-value services compared to the control group.</p>
	<p>Compared the patient experience of ACO beneficiaries to a control group of traditional Medicare (34)</p> <p><i>ACO model:</i> Pioneer and Medicare Shared Savings Plan (MSSP).</p>	<p><i>Publication date:</i> 2014</p> <p><i>Jurisdictions studied:</i> U.S.</p> <p><i>Study period:</i> 2009-2013</p> <p><i>Methods used:</i> Before/after intervention (control)</p>	<ul style="list-style-type: none"> <li>Data for this study came from annual CAHPS survey, and linked Medicare claims, administered nationally to a representative, cross-sectional sample of traditional fee-for-service Medicare beneficiaries</li> <li>Data from 32,334 beneficiaries enrolled in ACOs were compared to 251,593 beneficiaries in a control group of traditional Medicare</li> </ul>	<p>The study used comparison groups comprised of the two dominant ACO models. Group 1 was comprised of all the beneficiaries covered under the 32 Pioneer ACOs. Group 2 was comprised of 219 ACOs entering the MSSP between 2012-2013. Both were compared to a traditional control.</p>	<p><i>Patient experience of care</i></p> <p>Overall ratings of care and interactions with physicians did not change differentially across the ACO group and the control group during the pre-intervention to post-intervention period (P = 0.01 and P = 0.006). However, self reports of timely access to care differentially improved in the ACO group.</p> <p>Sub-group analysis was conducted for medically complex (seven or more chronic conditions) patients and showed beneficiaries in the ACO group improved significantly as compared with similar patients in the control group resulting in improved average performance from the 82<sup>nd</sup> to 96<sup>th</sup> percentile among the ACOs.</p> <p><i>Population health</i></p> <p>Not addressed by the study</p> <p><i>Cost of care</i></p> <p>Not addressed by the study</p>
	<p>Compared the effect on spending and quality in an Alternative Quality Contract (AQC) to traditional Medicare fee-for-service(24)</p> <p><i>ACO model:</i> AQC</p>	<p><i>Publication date:</i> 2014</p> <p><i>Jurisdictions studied:</i> U.S.</p> <p><i>Study period:</i> 2006-2009</p> <p><i>Methods used:</i> Before/after intervention (control)</p>	<ul style="list-style-type: none"> <li>Data were collected from Blue Cross Blue Shield of Massachusetts recipients</li> <li>The intervention group consisted of four cohorts of AQC enrolled organizations that were defined by their first contract year: 2009 (490,167), 2010 (177,312) 2011 (97,754),</li> </ul>	<p>The intervention group was comprised of beneficiaries of Blue Cross Blue Shield of Massachusetts whose physician provider organizations entered into an AQC from 2009 – 2012.</p>	<p><i>Patient experience of care</i></p> <p>Not addressed by the study</p> <p><i>Population health</i></p> <p>Not addressed by the study</p> <p><i>Cost of care</i></p>

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			and 2012 (583,002) compared to a control group of 966,813 traditional Medicare enrollees		<p>The AQC intervention group had an average savings of \$62.21 per enrollee per quarter compared to the control group during the four-year post-intervention period, for a 6.8% average savings for the 2009 cohort, 8.8% savings for the 2010 cohort, 9.1% savings for the 2011 cohort, and 5.8% savings for the 2012 cohort compared to the control group.</p> <p>Savings were concentrated in the outpatient-facility setting with savings of 4.0% in professional spending, 19.3% for facility spending, 8.7% in procedures, 10.9% for imaging and 9.7% in tests.</p>
	<p>The study compared utilization of cardiovascular care before and after the Physician Group Practice (PGP) demonstration was implemented to examine both discretionary and non-discretionary carotid and coronary imaging and procedures (35)</p> <p><i>ACO model:</i> PGP</p>	<p><i>Publication date:</i> 2014</p> <p><i>Jurisdictions studied:</i> U.S.</p> <p><i>Study period:</i> Pre-intervention 2002-2004 and post-intervention 2005-2009</p> <p><i>Methods used:</i> Difference-in-difference with matched controls</p>	<ul style="list-style-type: none"> <li>• Data were collected from Medicare administrative fee-for-service claims data from 2001-2010</li> <li>• The study sample was comprised of an intervention group receiving care from 10 physician groups participating in a Medicare pilot ACO project (819,779) and similar traditional Medicare patients (934,621 patients) from the same regions</li> </ul>	<p>The intervention group was comprised of the beneficiaries from 10 physician groups participating in the PGP demonstration pilot.</p>	<p><i>Patient experience of care</i></p> <p>The implementation of a pilot ACO in the form of a PGP did not limit the utilization of discretionary or non-discretionary cardiovascular care in 10 large enrolled health systems in a statistically significant manner (calculated based on percentage point change in proportion of ACO versus control) for:</p> <ul style="list-style-type: none"> <li>• discretionary carotid imaging (0.17%; 95% CI -0.51% to 0.85%, p=0.595);</li> <li>• discretionary coronary imaging (-0.19%; 95% CI -0.73% to 0.35%, p=0.468);</li> <li>• discretionary carotid revascularization (0.003%; 95% CI -0.008% to 0.002%, p=0.705); and</li> <li>• coronary revascularization (-0.02%, 95% CI -0.11% to 0.07%, p=0.06).</li> </ul> <p>The difference-in-difference associated with the ACO implementation for non-discretionary cardiovascular imaging or procedures was “essentially zero”.</p> <p><i>Population health</i></p> <p>Not addressed by the study</p> <p><i>Cost of care</i></p> <p>Not addressed by the study</p>

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	<p>Compared the effect on spending and quality two years into a five-year Alternative Quality Contract (AQC), compared to a traditional fee-for-service Medicare group(25)</p> <p><i>ACO model: AQC</i></p>	<p><i>Publication date:</i> 2012</p> <p><i>Jurisdictions studied:</i> U.S.</p> <p><i>Study period:</i> 2006-2010</p> <p><i>Methods used:</i> Before/after intervention (quasi-experimental)</p>	<ul style="list-style-type: none"> <li>Data were collected from Blue Cross Blue Shield of Massachusetts enrollees from January 2006 through December 2010 who were continuously enrolled for at least one calendar year</li> <li>The sample includes a cohort of 428,892 enrollees covered under an AQC and 1,339,798 covered under traditional Medicare</li> </ul>	<p>The intervention group was comprised of beneficiaries of Blue Cross Blue Shield of Massachusetts aligned with seven physician provider organizations entered into an AQC in 2009.</p>	<p><i>Patient experience of care</i></p> <p>Not addressed by the study</p> <p><i>Population health</i></p> <p>Not addressed by the study</p> <p><i>Cost of care</i></p> <p>The AQC group was associated with a decrease in spending of \$22.58 per enrollee per quarter compared to the control group, with an average of 2.8% savings over the first two years of the intervention.</p> <p>Reductions in outpatient facility spending on procedures, imaging and tests accounted for 75% of the savings.</p>
	<p>Compared the difference in spending between an Alternative Quality Contract (AQC) to a traditional fee-for-service Medicare group(26)</p> <p><i>ACO model: AQC</i></p>	<p><i>Publication date:</i> 2011</p> <p><i>Jurisdictions studied:</i> U.S.</p> <p><i>Study period:</i> 2006-2009</p> <p><i>Methods used:</i> Before/after intervention (quasi-experimental)</p>	<ul style="list-style-type: none"> <li>Data were collected from Blue Cross Blue Shield of Massachusetts enrollees from January 2006 through December 2009</li> <li>The study sample was comprised of 1,634,514 Medicare beneficiaries with 380,142 subjects in the AQC group and 1,351,446 subjects in the tradition Medicare control group</li> </ul>	<p>The intervention group was comprised of beneficiaries of Blue Cross Blue Shield of Massachusetts aligned with seven physician provider organizations entered into an AQC in 2009.</p>	<p><i>Patient experience of care</i></p> <p>The intervention resulted in increases of 2.6% in the proportion of eligible enrollees meeting chronic care management thresholds, and an increase of 0.7% in the proportion of eligible enrollees meeting pediatric care thresholds.</p> <p>Not addressed by the study</p> <p><i>Population health</i></p> <p>Not addressed by the study</p> <p><i>Cost of care</i></p> <p>The intervention was associated with a \$15.51 decrease in average quarterly spending per enrollee in 2009, a 1.9% savings relative to the control group. The majority of savings (80%) was attributed to reduced costs in procedures, imaging and testing.</p> <p>Enrollees in the highest quartile of risk score (based on diagnostic-cost-group scoring system), accounted for most of the saving at \$14.75.</p> <p>The no-prior-risk subgroup showed higher rates of</p>

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	Estimated cost savings between a Medicare Physician Group Practice Demonstration (PGP) and traditional Medicare beneficiaries from the same regions(36)  <i>ACO model:</i> PGP	<i>Publication date:</i> 2012  <i>Jurisdictions studied:</i> U.S.  <i>Study period:</i> Pre-intervention 2001-2004 and post-intervention 2005-2009  <i>Methods used:</i> Quasi-experimental analyses comparing pre-intervention and post-intervention trends	<ul style="list-style-type: none"> <li>Data were collected from Medicare records from across the U.S.</li> <li>The study sample consisted of 990,177 enrolled in a Medicare PGP and 7,514,453 traditional Medicare beneficiaries from the same regions. Within the sample 15% were eligible for both Medicare and Medicaid</li> </ul>	The intervention group was comprised of the beneficiaries from 10 PGPs in the demonstration pilot.	savings at of \$45.52, or 6.3%.  <i>Patient experience of care</i>  Not addressed by the study  <i>Population health</i>  Not addressed by the study  <i>Cost of care</i>  The study found the PGP had modest estimates of overall savings of a mean of \$114 annually per beneficiary.  However, most of this savings were attributed to the dually eligible (Medicare and Medicaid) beneficiaries, who tend to be medically complex and socially vulnerable, had an average annual savings of \$532, with a non-significant \$59 in the non-dually eligible beneficiaries.
	Estimated changes between beneficiaries enrolled in the Medicare Physician Group Practice (PGP) demonstration and traditional Medicare funded care(42)  <i>ACO model:</i> Medicare PGP model.	<i>Publication date:</i> 2013  <i>Jurisdictions studied:</i> U.S.  <i>Study period:</i> Pre-intervention 2001-2004 and post-intervention 2005-2009.  <i>Methods used:</i> Difference-in-difference with regression analysis	<ul style="list-style-type: none"> <li>Data were collected from Medicare fee-for-service claims data from 2001 to 2009</li> <li>An intervention cohort consisted of data for beneficiaries from 10 PGP demonstration sites, and compared with traditional Medicare beneficiaries residing in the same counties as the intervention group members</li> <li>The sample was further refined to individuals with at least one inpatient claim with a cancer diagnosis, or two physician visits at least a week apart with a specific cancer diagnosis based on Chronic Conditions Warehouse software, but omitting skin cancer. The analytic sample had 988,781 person years</li> </ul>	The intervention group was comprised of the beneficiaries from 10 physician groups participating in the PGP demonstration pilot, with a focus on beneficiaries receiving cancer care.	<i>Patient experience of care</i>  Not addressed by the study  <i>Population health</i>  The PGP demonstration sites produced a significant reduction in mortality among cancer patients of 0.65%, a 5.6% reduction.  <i>Cost of care</i>  The PGP demonstration produced reductions in Medicare spending of \$721 annually on average in payments for cancer patient beneficiaries across the participating sites, and an annual reduction in 3.9% in payments per cancer patient.  The savings were derived entirely from reductions in acute care payments for inpatient stay which may be attributed to either reduction in utilization or price of services.

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	<p>Examined ACO characteristics and competencies, facilities, health information technology, monitoring and reporting infrastructure, and mortality and costs for the Medicare population(22)</p> <p><i>ACO model:</i> Pioneer model and advance payment ACO model.</p>	<p><i>Publication date:</i> 2015</p> <p><i>Jurisdictions studied:</i> U.S.</p> <p><i>Study period:</i> 2006-2009</p> <p><i>Methods used:</i> Panel study design, retrospective</p>	<ul style="list-style-type: none"> <li>Data used were collected from multiple national and Florida databases (Medicare, inpatient hospital discharge, vital statistics, the American Hospital Association, the Healthcare Information and Management Systems Society, etc.)</li> <li>Panel data were assembled (2006-2009) based on inpatient hospital discharge,</li> <li>vital statistics, the American Hospital Association, the Healthcare Information and Management Systems Society, and other databases</li> </ul>	<p>The intervention group was comprised of Centers for Medicare &amp; Medicaid Services sponsored ACOs in Florida, including Pioneer ACOs and advance payment ACO models.</p>	<p><i>Patient experience of care</i></p> <p>Not addressed by the study</p> <p><i>Population health</i></p> <p>The study observed that those hospitals which became more centralized between 2006 and 2009 had significantly larger reductions in mortality compared with those that remained free-standing.</p> <p>However, the authors warn that ACOs with tightly integrated physician-hospital linkages and infrastructure for monitoring and reporting population health were actually associated with increased mortality.</p> <p><i>Cost of care</i></p> <p>Not addressed by the study</p>
	<p>Compared the quality between ACOs and physician group practice models (37)</p> <p><i>ACO model:</i> ACOs (including Pioneer and Medicare Shared Savings Plan (MSSP)) compared to a physician group practice not participating in an ACO program.</p>	<p><i>Publication date:</i> 2015</p> <p><i>Jurisdictions studied:</i> U.S.</p> <p><i>Study period:</i></p> <p><i>Methods used:</i> Retrospective, statistical analysis</p>	<ul style="list-style-type: none"> <li>Data were collected from the Medicare physician compare website made available by the Centers for Medicare &amp; Medicaid Services</li> <li>Data for 2012 are available for the 146 shared savings program and pioneer ACOs that participated, compared to 66 independent physician group practices</li> </ul>	<p>The intervention group was comprised of Centers for Medicare &amp; Medicaid Services sponsored ACOs (MSSP and Pioneer ACO) compared to a traditional physician group practice model which has not enrolled in the ACO program, but has attempted to improve quality and reduce costs along similar indicators.</p>	<p><i>Patient experience of care</i></p> <p>There was no statistically significant difference in reported quality measures between the ACOs and physician group practice models.</p> <p>The study shows that physician group practice can achieve outcomes similar to ACOs.</p> <p><i>Population health</i></p> <p>Not addressed by the study</p> <p><i>Cost of care</i></p> <p>Not addressed by the study</p>
	<p>Examined the impact of the Medicare Physician Group Practice Demonstration (PGP) on expenditure, utilization and quality outcomes (38)</p>	<p><i>Publication date:</i> 2014</p> <p><i>Jurisdictions studied:</i> U.S.</p> <p><i>Study period:</i> Pre-intervention 2001-2004 and post-intervention 2005-2010.</p>	<ul style="list-style-type: none"> <li>Data were collected from 3,355,467 Medicare claims from 2001-2010 for 1,776,387 person years assigned to 10 participating provider organizations enrolled in a PGP demonstration, and</li> <li>1,579,080 person years in the</li> </ul>	<p>The intervention group was comprised of the beneficiaries from 10 physician groups participating in the PGP demonstration.</p>	<p><i>Patient experience of care</i></p> <p>Using claims-based process quality indicators the PGP demonstration received better scores on six of seven quality indicators [i.e., measures for diabetes mellitus (HbA1c management, lipid measurement, nephropathy care, eye exams), congestive heart failure (left ventricular ejection fraction testing), coronary artery disease (lipid</p>

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	<i>ACO model:</i> PGP	<i>Methods used:</i> Pre-post comparison group observational design	<p>corresponding local</p> <ul style="list-style-type: none"> <li>comparison groups</li> </ul>		<p>profile), and preventive care (breast cancer screening)].</p> <p><i>Population health</i></p> <p>Not addressed by the study</p> <p><i>Cost of care</i></p> <p>Across the 10 PGP sites there was a combined savings of \$171 (2.0%) per assigned beneficiary person year during the five-year demonstration period.</p> <p>Despite Medicare performance bonuses to the participating physicians that averaged \$102 per person year, the net savings to the Medicare program was \$69 (0.8%).</p>
	<p>Explored incentivizing primary care in a Pioneer ACO.(28)</p> <p><i>ACO model:</i> Pioneer</p>	<p><i>Publication date:</i> 2015</p> <p><i>Jurisdictions studied:</i> U.S.</p> <p><i>Study period:</i> 2012 &amp; 2013</p> <p><i>Methods used:</i> Interview, survey</p>	<ul style="list-style-type: none"> <li>Data were collected through two waves of a web-based survey and interviews with primary-care providers working in a Pioneer ACO in Minneapolis, Minnesota</li> <li>Surveys: survey one in 2012 included 157 respondents (55% response rate) and survey two in 2013 had 150 respondents (56% response rate), and a “panel” comprised of 85 who responded to both surveys</li> <li>Interviews: interviews were conducted with 48 primary care physicians: interviews six-month post intervention with 18 and interviews one-year post intervention with 30</li> </ul>	<p>The intervention group was comprised of all the beneficiaries covered by a Pioneer ACO located in Minnesota with 44 primary care clinics, seven hospitals, and multiple specialty clinics located in urban and rural sites, with an average panel size of approximately 12,000 patients.</p>	<p><i>Patient experience of care</i></p> <p>The Patient Assessment of Chronic Illness Care (used to assess patient involvement) was adapted and asked of physicians. The scores remained stable over the study period and only 10% of survey respondents identified the need for more focus on patient activation and/or patient skills for self-managing chronic conditions. Physicians expressed frustration with some aspects of the model: 34% felt the quality metrics are not good indicators of the quality of care; and 29% felt there is too much focus on quality metrics and not enough on patients’ immediate needs.</p> <p>Obstacles to improving quality metrics identified in the 2013 survey were: patients’ unwillingness to change behaviours (70%); lack of time to spend with patients (65%); and a lack of high-quality support resources for patients such as diabetes educators, coaches, and blood pressure nurses (48%).</p> <p>Qualitatively physicians expressed that they were being held responsible for lifestyle choices outside of their control (e.g., whether a patient stops smoking).</p> <p><i>Population health</i></p>

Question addressed	Focus of study	Study characteristics	Sample description	Key features of the intervention(s)	Key findings
					<p>Not addressed by the study</p> <p><i>Cost of care</i></p> <p>Physicians expressed frustration with some aspects of the model: 36% felt the model is too complex; 36% felt patients' lifestyle behaviours influence their salary.</p>
	<p>Compared three commercial ACOs to comparison groups in their regions for outcomes related to total medical costs and a quality of care index (30)</p> <p><i>ACO model:</i> Cigna commercial ACO.</p>	<p><i>Publication date:</i> 2012</p> <p><i>Jurisdictions studied:</i> U.S.</p> <p><i>Study period:</i> 2009-2010</p> <p><i>Methods used:</i> Retrospective claims data were used to calculate the effects of an intervention (comparison)</p>	<ul style="list-style-type: none"> <li>Data were collected from Cigna ACOs initiatives in three sites: <ul style="list-style-type: none"> <li>New Hampshire, 1,018 physicians providing care to 16,654 patients</li> <li>Arizona, 158 physicians serving 14,575 patients</li> <li>Texas, 141 primary-care physicians and 8,753 patients with a comparison group in each market</li> </ul> </li> </ul>	<p>The intervention group was comprised of all the beneficiaries covered by a commercial ACO model characterized by the use of registered nurses who serve as care coordinators employed by participating practices.</p>	<p><i>Patient experience of care</i></p> <p>The three Cigna ACO sites were superior to their comparison groups across five evidence-based performance standards of care (e.g. creatinine, mammogram, cholesterol, diabetes, neuropathy), with the exception of one hemoglobin measure at one site.</p> <p><i>Population health</i></p> <p>Not addressed by the study</p> <p><i>Cost of care</i></p> <p>Differences between the test group and control group were not statistically significant for cost savings.</p>
	<p>Compared the 32 Pioneer ACOs costs to traditional Medicare spending between 2011 and 2012 (39)</p> <p><i>ACO model:</i> Pioneer</p>	<p><i>Publication date:</i> 2013</p> <p><i>Jurisdictions studied:</i> U.S.</p> <p><i>Study period:</i> Market data from 2009-2010 and claims data from 2011-2012.</p> <p><i>Methods used:</i> Quasi-experimental comparisons of patient data and qualitative interviews</p>	<ul style="list-style-type: none"> <li>Data were collected in the form of monthly Medicare claims records for 2011 and 2012 in the CMS Chronic Condition Warehouse, and market level data from 2009 and 2010, and through interviews with participants affiliated with the target ACO. Specific details about the samples are not provided</li> </ul>	<p>The intervention group was comprised of all the beneficiaries covered under the 32 Pioneer ACOs.</p>	<p><i>Patient experience of care</i></p> <p>Not addressed by the study</p> <p><i>Population health</i></p> <p>The study identified limitation in Pioneer ACOs' data collection practices that would enable the analysis of beneficiary data from a population perspective.</p> <p><i>Cost of care</i></p> <p>Overall spending was \$20 per beneficiary per month less among the 32 Pioneer ACOs compared to the control group in the same markets.</p> <p>Across the 32 ACOs:</p> <ul style="list-style-type: none"> <li>eight had significantly lower growth in spending per beneficiary per month than their local market</li> </ul>

Question addressed	Focus of study	Study characteristics	Sample description	Key features of the intervention(s)	Key findings
	<p>Compared the 32 Pioneer ACOs costs to traditional Medicare spending in the years 2012 and 2013 (40)</p> <p><i>ACO model:</i> Pioneer</p>	<p><i>Publication date:</i> 2015</p> <p><i>Jurisdictions studied:</i> U.S.</p> <p><i>Study period:</i> 2012-2013</p> <p><i>Methods used:</i> Difference-in-differences design/quasi-experimental comparisons of patient data, semi-structured quarterly assessment interviews, site visits, and focus groups</p>	<ul style="list-style-type: none"> <li>Data were collected in the form of Medicare claims records for 32 Pioneer ACOs (total pooled beneficiary months of 7,851,613 in 2012 and 9,349,724 in 2013), from the CMS Chronic Condition Warehouse and through Consumer Assessment of Healthcare Providers and Systems (CAHPS) results from 2012 and 2013</li> <li>Sixty ACOs participated in the quarterly assessment interviews. The evaluation team interviewed three national commercial payers and two regional commercial payers</li> <li>The focus groups were comprised of 22 ACO leaders</li> </ul>	<p>The intervention group was comprised of all the beneficiaries covered under the 32 Pioneer ACOs.</p>	<p>comparison groups, ranging from \$32.58 to \$102.21 and totalling an estimated \$155.4 million less that year if the accountable care model had not been in place;</p> <ul style="list-style-type: none"> <li>one had significantly higher growth per beneficiary per month than its local market by \$34.05; and</li> <li>twenty-three had spending growth per beneficiary that was similar to their local markets.</li> </ul> <p><i>Patient experience of care</i></p> <p>The 32 Pioneer ACOs collectively had statistically significant reductions on number of acute hospital admissions related to key prevention quality indicators (PQIs) for chronic obstructive pulmonary disease, older adult asthma, or heart failure in 2013, compared to the control in the form of -12,594 for any PQI admissions, and -21.32 per 1,000 admissions.</p> <p>Pioneer ACOs had significantly increased rates of post-discharge physician follow-up in the week immediately following an inpatient discharge in 2012 (effect size -3.45) and 2013 (effect size -3.94).</p> <p>There was little change in patient experience between the first and second year based on Consumer Assessment of Healthcare Providers and Systems (CAHPS) surveys results.</p> <p><i>Population health</i></p> <p>The study identified ongoing limitation in Pioneers ACOs' data collection practices that would enable the analysis of beneficiary data from a population perspective.</p> <p><i>Cost of care</i></p> <p>The Pioneer ACO model achieved total savings of approximately \$384 million in its first two years:</p> <ul style="list-style-type: none"> <li>Year one (2012) savings of \$279.7 mil; year 2 (2013) savings of \$104.5 mil; and</li> <li>Year 1 (2012) savings of \$35.62 per beneficiary per</li> </ul>

Question addressed	Focus of study	Study characteristics	Sample description	Key features of the intervention(s)	Key findings
<p>How and why have impacts on improving the patient experience of care, health of populations and reducing the per capita cost of care been achieved through accountable care organizations (ACOs)?</p>	<p>Examined the extent to which the implementation of an Alternative Quality Contract (AQC) model improved pediatric care quality (27)</p> <p><i>ACO model: AQC</i></p>	<p><i>Publication date:</i> 2015</p> <p><i>Jurisdictions studied:</i> U.S.</p> <p><i>Study period:</i> 2009-2010</p> <p><i>Methods used:</i> Retrospective cross-sectional study</p>	<ul style="list-style-type: none"> <li>Data were collected from Blue Cross Blue Shield of Massachusetts affiliated hospitals using the Massachusetts' Health Quality Partners 2011 provider database and the American Hospital Association's 2009 annual survey database, and through semi-structured interviews with 22 leaders of 12 ACOs that participated in an Alternative Quality Contract in 2009 or 2010</li> </ul>	<p>The intervention group was comprised of adult-oriented ACOs which entered into an AQC which were incentivized to increase their capacity to provide pediatric care.</p>	<p>month and year 2 (2013) savings of \$11.18 per beneficiary per month.</p> <p><i>Patient experience of care</i></p> <p>The ACOs included in this study had varying pediatric infrastructure that ranged from "extremely limited" (e.g., no general pediatric workforce) to an over 40% focus on pediatric care.</p> <p>Interview participants, leaders in their respective ACOs, reported improvements to the quality of their pediatric care efforts in the form of new practices, metrics and related monitoring (e.g., some started holding meetings to discuss pediatric quality improvement where they had not before).</p> <p><i>Population health</i></p> <p>Interview participants reported that the AQC did little to incentivize pediatric care in general (i.e., starting pediatric programing) or care for children with specialized needs. They called for future incentive-based programs to include care for children with special healthcare needs.</p> <p><i>Cost of care</i></p> <p>Interview participants reported attempts to monitor and reduce pediatric spending patterns in line with the incentives offered through the alternative quality contract, but these did not necessarily change patients' utilization patterns.</p>



**McMaster**  
**HEALTH FORUM**

**>> Contact us**

McMaster Health Forum  
1280 Main St. West, MML-417  
Hamilton, ON Canada L8S 4L6  
Tel: +1.905.525.9140 x 22121  
Email: [mhf@mcmaster.ca](mailto:mhf@mcmaster.ca)

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