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Permalink

<https://escholarship.org/uc/item/1nq388qb>

Journal

Value in Health, 20(1)

ISSN

1098-3015

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Publication Date

2017

DOI

10.1016/j.jval.2016.09.2402

Peer reviewed

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/jval

Decision Making on Medical Innovations in a Changing Health Care Environment: Insights from Accountable Care Organizations and Payers on Personalized Medicine and Other Technologies

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ABSTRACT

Background: New payment and care organization approaches, such as those of accountable care organizations (ACOs), are reshaping accountability and shifting risk, as well as decision making, from payers to providers, within the Triple Aim context of health reform. The Triple Aim calls for improving experience of care, improving health of populations, and reducing health care costs. **Objectives:** To understand how the transition to the ACO model impacts decision making on adoption and use of innovative technologies in the era of accelerating scientific advancement of personalized medicine and other innovations. **Methods:** We interviewed representatives from 10 private payers and 6 provider institutions involved in implementing the ACO model (i.e., ACOs) to understand changes, challenges, and facilitators of decision making on medical innovations, including personalized medicine. We used the framework approach of qualitative research for study design and thematic analysis. **Results:** We found that representatives from the participating payer companies and ACOs perceive similar challenges to ACOs' decision making in

terms of achieving a balance between the components of the Triple Aim—improving care experience, improving population health, and reducing costs. The challenges include the prevalence of cost over care quality considerations in ACOs' decisions and ACOs' insufficient analytical and technology assessment capacity to evaluate complex innovations such as personalized medicine. Decision-making facilitators included increased competition across ACOs and patients' interest in personalized medicine. **Conclusions:** As new payment models evolve, payers, ACOs, and other stakeholders should address challenges and leverage opportunities to arm ACOs with robust, consistent, rigorous, and transparent approaches to decision making on medical innovations.

Keywords: accountable care organizations, coverage policy, decision making, personalized medicine.

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Introduction

In a 2008 seminal article, Berwick et al. [1] proposed the Triple Aim for US health care: improving the experience of care, improving the health of populations, and reducing health costs. The Triple Aim became an overarching objective of the US 2010 health reform and precipitated the rise of new payment and care organization models [2,3]. The accountable care organization (ACO) model, first introduced in 2006 as a means to shift accountability from the individual provider to the organization level [4], emerged in the health reform era as a mechanism for achieving the Triple Aim and health system transformation [3,5]. An ACO is a provider-led organization with a strong base of primary care, collectively accountable for quality and per capita

costs across the full continuum of care [6]. In 2012, the Centers for Medicare & Medicaid Services launched two ACO initiatives—the Pioneer ACO Model and the Medicare Shared Savings Program [7]. Early results have been promising in the overall cost savings and quality improvement, but showed modest cost impact, some patient attrition, as well as variability in results across participating ACOs [8–13]. All along, experts viewed the ACO model as work in process and highlighted the necessity to continue its evolution and enhancement [14–18]. Nevertheless, adoption of the ACO model by payers and health systems continues to gain momentum [5,19–21].

An ACO's accountability for the Triple Aim inherently entails assuming a higher degree of financial risk, previously carried by health care payers [7,18], as well as increased responsibility for

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<http://dx.doi.org/10.1016/j.jval.2016.09.2402>

decision making on how to achieve the Triple Aim [15,20,22]. Berwick et al. [1] argued that this decision making is “an exercise in balance” because some actions could advance one aim but counter other aims. They noted that the adoption of innovative medical technologies was a critical example of the necessity to balance decisions in the Triple Aim context because some technologies could improve the health of individuals and certain populations but raise costs. Furthermore, a simulation of ACO results showed that use of guideline-recommended tests and drugs improves quality but reduces cost savings or increases costs [23]. As scientific progress produces new diagnostics, therapeutics, and digital health technologies, it becomes crucial to understand how and by whom decisions on medical innovations are made in the era of the Triple Aim and ACOs.

The importance of ACO decision making has been described in the literature, with the focus on decisions about whether a provider organization should form an ACO [24], agreeing how to structure ACO governance and risk [15,22], engaging physicians in key aspects of ACO decision making, including clinical protocols [20,25,26], and determining what care to refer to outside providers [27]. Nevertheless, ACO decision making on adoption of innovative medical technologies does not appear to have received attention: we found only two commentaries highlighting this topic and expressing concerns about disincentives for ACOs to adopt medical technology innovations [28,29].

To address this gap, we undertook a study with ACOs and private payers on aspects relevant to decision making. In the non-ACO environment, payers evaluate an innovative technology, and whether it is medically necessary, and then convey this decision in a coverage policy [30–32]. A payer’s positive coverage decision determines whether the technology is reimbursed for the payer’s enrollees (subject to benefit design) and has considerable influence on providers’ decisions to adopt and use this technology [33–37]. To examine whether or how decision making is changing in the ACO environment, it was important to include both sides of the ACO arrangement—ACOs and payers. We focused on private payers because they cover two-third of the US insured population [38], increasingly participate in ACO arrangements [16,19,39], and their participation is considered key to the long-term success of the ACO movement [8,26,40,41].

To examine decision making on innovative technologies, we focused on personalized medicine (also referred to as precision or genomic medicine)—an important field with accelerating scientific and technological development and substantial promise for health, health care, and prevention [42–45]. Payers have reported challenges to their coverage decisions on personalized medicine, including the fast-paced scientific development, rapid proliferation of tests, as well as the lack of evidence on the validity and utility of many tests [30–32,46–50]. These challenges may also be relevant in ACO decision making on personalized medicine. We used a specific example of innovative cancer genomic panels that identify a variety of an individual’s cancer germline (cancer risk) or somatic (tumor) mutations in one test. These panels are often expensive [51,52], not yet consistently covered by payers [50,51,53–56], and their use in clinical practice is controversial and hotly debated [57–68]. Thus, they present an opportunity to explore decision making on innovative technologies in the ACO setting.

Methods

Study Cohort and Methods

The study was conducted in accordance with the protocol approved by the University of California, San Francisco Institutional Review Board. We used qualitative research methodology,

specifically the framework approach [69,70], to design and conduct the study. This method uses semistructured interviews and thematic analysis and has been effectively used in our and others’ research to examine payer and provider decision making on medical innovations [31,46,47,49,50,71–74].

The interview cohort was assembled using purposive sampling [75]. To identify and recruit payer representatives, we leveraged our University of California, San Francisco Center for Translational and Policy Research on Personalized Medicine (TRANSPERS) Evidence and Reimbursement Policy Advisory Council. The cohort included 10 senior executives from 10 private payers, including six major national and four regional plans. Together, the 10 payers cover more than 125,000,000 enrollees [76], which comprises approximately 44% of all covered lives in the United States [77]. The executives were responsible for, and knowledgeable of, technology decision making and the ACO arrangements in their respective organizations.

The cohort also included six executives from six ACOs. We identified and recruited these representatives through a Chicago-based collaboration of medical centers and other stakeholders on personalized medicine in oncology. All six ACOs were located in the Midwest, but represented a range of characteristics. They varied in 1) academic affiliation (one academic and five non-academic organizations); 2) size (two large systems [10 or more hospitals], two medium-sized systems [4 or more hospitals], and two single-hospital systems); and 3) experience with the ACO model (two ACOs with 3 years or more since implementation; one with 1 year since implementation; and three in the beginning stages of implementation). All recruited ACO representatives had knowledge of their respective ACO arrangements.

On the basis of the goal and topics of our study, we developed an interview questionnaire (Table 1) and provided it to the cohort members ahead of the interviews. We started the payer interviews with the topics of the landscape, arrangement structures, and future direction of ACOs in their respective provider bases. These topics were beneficial to include because they provided important context for the understanding of ACO decision making and related challenges and facilitators conveyed by interviewees. The topic of ACO landscape was relevant only to payer interviewees because they work with multiple ACOs in their network, whereas ACO interviewees provided perspectives from one ACO. All other interview topics were included in both payers’ and providers’ questionnaires and focused on their perspectives on the shift of decision making between payers and ACOs and factors impacting ACO decisions on medical technologies, using the example of cancer genomic panels.

The interviews were conducted between January and July 2015, took 30 to 45 minutes each, and were taped and transcribed. Two investigators independently performed thematic analyses and coding according to the framework approach of qualitative research [69,70]. Disagreement was resolved by discussing differences and reaching consensus. Analysis showed saturation of themes, that is, repetition of themes across interviewees, and thus sufficiency of the interview cohort for the purposes of this study [78].

Cancer Genomic Panels

Cancer genomic panels are defined here as innovative genomic tests interrogating multiple cancer genes and/or syndromes that use next-generation sequencing and contain well-studied and less-studied genes. These panels could test for somatic mutations (tumor genetic testing) and/or germline mutations (for hereditary cancers). Cancer genomic panels are available commercially [51,52] and offer important benefits to patient and providers, compared with traditional single-gene/single-syndrome tests, for example, faster testing, more comprehensive genetic picture,

Table 1 – Interview questionnaire.

Questions for payers	
(Interviewer provides a brief overview of cancer genomic panels)	
1	What is the current state and future direction of the ACO model within your network?
	• Do you observe growth? At what pace? • What are the typical characteristics of providers entering the ACO arrangements? • What are the key features of ACOs in your network? • What is your future direction related to the ACO model?
2	What is your perspective on the shift in decision making on medical technologies to the ACOs?
	• What should be the scope of ACO decision making, if they assume risk? • What is the role of payer coverage policies in the ACO environment? • How does this impact ACO decisions on cancer genomic panels, which are not yet covered by payers?
3	What are the factors that impact ACO decision making on cancer genomic panels and other medical innovations?
	• What are the challenges of decision making and adoption? What are your concerns related to these challenges? • What are the facilitators of decision making and adoption?
Questions for ACOs	
(Interviewer provides a brief overview of cancer genomic panels)	
1	What is your perspective on the shift in decision making on medical innovations to the ACOs?
	• What should be the scope of ACO decision making, if they assume increased risk? • What is the role of payer coverage policies in the ACO environment? • How does this impact ACO decisions on cancer genomic panels, which are not yet covered by payers?
2	What are the factors that impact your decision making on cancer genomic panels and other medical innovations?
	• What are the challenges of decision making and adoption? What are your concerns related to these challenges? • What are the facilitators of decision making and adoption?
ACO, accountable care organization.	

avoidance of patient's testing fatigue, and others [57,63,65,79,80]. Panels are, however, still considered controversial for use in clinical practice [57–64,66–68], and are not yet broadly covered by payers for reasons including lack of evidence of clinical utility [50,51,53–56]. Cancer genomic panels are relatively expensive, ranging from approximately \$1500 to \$5000 [51,52]. Nevertheless, they are being rapidly adopted in clinical practice for asymptomatic patients as well as patient populations diagnosed with cancer [59,65]. Thus, cancer genomic panels present an excellent case for exploring decision making on innovative technologies between payers and ACOs.

Results

Payers' ACO Landscape, Features, and Future Direction

Table 2 presents payers' description of the ACO landscape and relevant features. All payers reported “exponential growth” in the number of ACO arrangements in their respective provider networks, especially in the last 1 to 2 years. They attribute this proliferation to several factors: the continuing effort of the Centers for Medicare & Medicaid Services to roll out ACO-like arrangements for Medicare and Medicaid beneficiaries; providers' growing comfort with, and interest in, the ACO model; and the

Table 2 – Payers' description of the ACO landscape and relevant features (results of thematic analysis).

Topic/category	Theme from payer interviews
Proliferation of ACO arrangements with private payers	• Substantial growth in the number of ACOs • In the past, providers initiated ACO arrangements with private payers; now, payers initiate ACO arrangements • Growth seen across all geographic areas, ACO types, sizes, and settings (e.g., urban and rural) • Variability in ACO stages and experience within one payer's network
Key features of ACOs	• Triple Aim is the overarching guiding objective • Cost reduction is the primary aim while controlling for two other aims (care quality and patient satisfaction) • Wide spectrum of risk/award arrangements, from no risk and rewards for savings in total costs to full risk/reward structures • Variability in quality metrics across ACOs within an individual payer's networks
Future direction of private payers related to ACOs	• Payers express satisfaction with the ACO model • Intend to increase the number of ACO arrangements in their networks • Plan to increase risk sharing and move ACOs toward full-risk arrangements • Intend to increase member enrollment with specific ACOs
ACO, accountable care organization.	

increasing initiative by private payers to form ACO arrangements, as opposed to being pursued by providers, as in the preceding years. Payers reported ACO proliferation in all states of their jurisdiction and in both urban and rural settings. In their respective markets, payers observe a variation in ACO sizes, from single-site hospitals to large health systems, and in ACO types, from hospitals to provider groups. Payers also observe variation in ACOs' maturity because some ACOs have just entered these arrangements, whereas others have multiple years of experience.

Although the Triple Aim is used in all ACO agreements, payers shared that year-to-year cost reduction is the primary goal while maintaining two other aims—quality and patient satisfaction—at certain levels. Specific cost and risk-reward arrangements were reported to be highly variable across ACOs, even within one payer's network. An ACO could be anywhere in the risk-reward spectrum: from newer ACOs, still on the fee-for-service basis, with rewards for annual total cost reductions, to more advanced models in which an ACO assumes a larger degree of risk and could incur cost-related rewards or penalties, to those assuming total risk and full financial impact. Payers also noted a large variation in quality metrics used to control care quality across ACOs.

Despite the variable and evolving ACO landscape, all payers expressed general satisfaction with the ACO model, especially with their ability to collaboratively focus on cost reduction with ACOs, which was limited in the fee-for-service environment. All interviewed payers conveyed their intention to expand their respective ACO footprint, increasing the number of ACOs within their provider networks, increasing the number of their patient members formally enrolled in ACOs, as well as transferring more risk to the ACOs, with the ultimate goal for ACOs assuming the full risk for their patient populations.

Opinions on the Shift in Decision Making on Medical Technologies from Payers to ACOs

Table 3 presents ACO and payer opinions on the shift in decision making on innovative medical technologies from payers to ACOs. Payers' decision making on medical technologies takes the form of evidence assessment and issuance of a coverage policy declaring the technology medically necessary or experimental/investigational. Coverage policy becomes the basis for reimbursement and typically has a strong influence on whether the technology is used by providers. In our study, the ACO interviewees believed that their heightened risk and accountability should be accompanied by an expanded scope of decision making on what kind of new technologies their organizations should adopt. Therefore, they argued that they should increasingly use payers' coverage policies as guidance only, and as the ACO risk level increases, their use of payer coverage policies should phase out. Specific to cancer genomic panels, ACO interviewees thought that relevant specialists within their organizations, such as geneticists, oncologists, and pathologists, should collectively develop and implement internal policies on whether to adopt panels, irrespective of payer coverage.

Payers' opinions on the future role of coverage policies varied. Forty percent expected coverage policies to become suggestions-only for ACOs, and welcomed the transition, especially for cancer genomic panels. These payers noted that they "struggle with controversial and expensive genomic technologies." They explained that similar to Medicare, they make coverage policy decisions on the basis of medical necessity determination and typically do not include cost considerations, although, unlike Medicare, they are not prohibited by federal law to consider costs in decisions. These payers believe that ACOs are in a better position to balance benefits, risks, and costs. In contrast, other payers (60%) wanted coverage policies to retain their role in defining the use of medical technologies by ACOs, especially for genomic technologies and panels, because of the complexity and cost implications of these decisions.

ACO interviewees believed that along with the expanded decision making, they should assume other responsibilities, presently performed by payers: health technology assessment (HTA) and the decision on whether to monitor use of new technologies. Payers' opinions were, again, split; those in favor of retaining coverage decision authority (60%) also needed to retain the HTA function, and the right to monitor overuse of expensive technologies, such as cancer genomic panels. Payers favoring transition of decision making to ACOs (40%) expected to stop monitoring overuse and potentially start monitoring underuse of genomic technologies, including cancer genomic panels, when they become standard of care. Several payers (20%) expected to ultimately stop any monitoring of use and rely on ACO metrics for assessment of care quality.

Table 3 – ACO and payer perspectives on the shift in decision making on innovative medical technologies from payers to ACOs (results of thematic analysis).

Topic/category	Themes from ACO interviews	Themes from payer interviews
Role of payer coverage policies in decisions to use new medical technologies	Coverage policies should be for guidance only. ACOs should make their own decisions and policies, if they assume partial or full risk	- Coverage policies should be for guidance only, for ACOs assuming partial or full risk - Coverage policies should retain their present role and define the use of new technologies by ACOs
Decisions on cancer genomic panels	ACO internal specialists should take decisions on whether to use cancer genomic panels	- Payers struggle with decisions on cancer genomic panels and welcome transition of decision making to ACO - Payers worry about transitioning decisions on cancer genomic panels to ACO because of high cost and downstream impact
Function of HTA	- Should transition to ACOs with decision-making function - No opinion—not yet considered this function	- Should transition to ACOs with decision-making function - Should be retained by payers
Payer role to enforce coverage policy/monitor use	ACOs, not payers, should decide whether to monitor the use of new technologies, according to their internal decisions	- Payers should continue monitoring use, especially of expensive technologies such as cancer genomic panels - Payers should switch to monitoring underuse, not overuse - Payers should stop monitoring the use of genomic technologies and rely on ACO quality metrics
ACO, accountable care organization; HTA, health technology assessment.		

Factors Influencing Decision Making on Adoption of Cancer Genomic Panels

Table 4 presents ACO and payer perspectives on factors influencing decision making on cancer genomic panels. Payers and ACOs

expressed similar opinions on challenges of ACO decision making on innovative technologies, and cancer genomic panels specifically. They expressed concern that ACO contracts driven by annual cost-reduction objectives create disincentives to adopt technologies that may be cost-effective, but not cost-saving within a year. They explained that this applies to cancer genomic panels, which are relatively expensive in the short run but may save expenses over several years by better cancer therapy selection or broader surveillance for cancer detection. As ACOs reach a cost-reduction plateau after several years of “cutting easy fat out of the system,” these disincentives toward innovative technologies could intensify. Interviewees perceived ACO quality metrics as too broad and nonspecific to cancer or genomic assessment to guard against cost-driven decisions. Another noted challenge was the perceived deficiency in ACO capabilities required for informed and balanced decision making. These included limitations in ACOs’ analytic capacity to accurately assess internal cost/outcome impact of cancer genomic panels, as well as insufficient experience and expertise in evidence and

technology assessment of complex modalities, such as cancer genomic panels.

Interviewees noted several factors that facilitate decision making and adoption of cancer genomic panels. Intensified competition for patients across ACOs, as well as continued media and consumer interest in genomics, may drive ACO adoption of these technologies for marketing reasons. Payers expressed hope that as cancer genomic panels become standard of care, even in the absence of relevant quality metrics, patients could be the driving force of ACOs adopting these panels.

Discussion

Our study examined transitions, challenges, and facilitators of decision making on medical innovations between private payers and ACOs by elucidating payer and ACO executives’ perspectives. Our findings indicate that ACOs in the private payer setting are here to stay and expand because private payers plan to accelerate ACO growth and evolution toward full-risk transfer in their respective networks. This underscored the need for our study and the necessity to understand ACO decision making on medical innovations, including personalized medicine. We found incongruence of payers’ and ACOs’ opinions on decision making. ACOs believed that they should assume decision-making responsibilities along with risk. Some payers expressed similar opinions, whereas others expected to retain decision-making authority via coverage policy and functions of HTA. We also found that payers and ACOs perceive similar challenges to ACOs’ balanced decisions within the Triple Aim, including the cost-driven approach to decisions and insufficient analytical and technology assessment capacity for complex innovations, such as cancer genomic panels. Nevertheless, facilitators of decision making were also reported, such as increased competition across ACOs for patients who are knowledgeable and interested in genomics.

Our findings give rise to several topics for further study and a broader dialogue with relevant health care stakeholders, including ACOs, payers, patient organizations, and policymakers. The first topic is the potential increase in variability in decision making on medical technologies, translating into varying technology adoption across ACOs. Personalized medicine is a key example of this concern. In the non-ACO setting, in which payers’ coverage policies are key in determining technology adoption, studies have shown variability in decision-making approaches and in coverage decisions on genomic technologies across payers [31,47,49], which contributes to variation in genomic technology adoption [33,36]. Our findings indicate that with ACO proliferation and decision authority transfer, decision-making variation may increase because of the rising number of decision-making entities—ACOs, inconsistency of ACO contracts and metrics, and varying maturity in decision capabilities. This could lead to increasingly variable care practices across ACOs.

The second topic is maturity and transparency of ACOs’ technology decision making. As longtime technology decision makers, payers have developed methodologies and expertise in HTA and evidence evaluation, as well as decision frameworks for medical innovations [30,31,47]. They established often sizable technology evaluation and coverage policy departments, which integrate internal evidence assessment with reports from external technology assessment groups and bodies, such as the Blue Cross Blue Shield Center for Clinical Effectiveness (formerly known as Technology Assessment Center) [81], Hayes, Inc. [82], Evaluation of Genomic Applications in Practice and Prevention [83], and the Institute for Clinical and Economic Review [84]. Sophisticated methodologies tailored to specifics of personalized medicine are used to evaluate genomic technologies, including analytic validity, clinical validity, and clinical utility [30,31,48].

Table 4 – Common themes from ACO and payer perspectives on factors influencing decision making on cancer genomic panels.

Topic/category	Theme from payer and ACO interviews
<i>Challenges to decision making and adoption of cancer genomic panels</i>	
Cost-driven contracts	• Cost reduction basis drives focus on cost savings, not cost-effectiveness • Annual scope of cost reductions and metrics limits horizon for longer term impact of medical innovations • ACOs reach cost-reduction plateau; incentive to avoid technologies not required by specific quality metrics, such as cancer genomic panels
Limitations of metrics and measurements	• ACO metric systems are broad and few • ACO metrics focus on generic conditions, relevant to large populations; lack details necessary for cancer genomic panels • ACO analytical capabilities are limited; accuracy of cost and outcome measurements is a challenge
Lacking HTA capabilities	• ACOs have not yet recognized the need for HTA • ACOs do not have experience and expertise to perform systematic HTA
<i>Facilitators of decision making and adoption of cancer genomic panels</i>	
Competition between ACOs	• ACO competition for patients is expected to increase • Genomics and other innovative technologies could be used by ACOs for marketing to attract patients
Patient interest in cancer genomic panels	• Genomics, including cancer genomic panels, continue to be visible and of interest to patients
Genomic research at some ACOs	• ACOs involved in genomic research may also adopt them in clinical practice
ACOs, accountable care organization; HTA, health technology assessment.	

Resulting coverage policies are publicly available and updated regularly. Our study findings indicate that ACOs lack the capacity for ongoing, systematic rigorous technology evaluation and decision making that would parallel payers' approaches. Although some ACOs in our cohort were familiar with HTA and believed they should develop these functions, others did not recognize this necessity. As the ACO model evolves, an effort to determine a nimble but rigorous approach to support ACOs' technology decisions will be necessary. Payers and external HTA bodies could augment ACOs' evidence assessment functions, but in the spirit of accountability, each ACO will need to take responsibility for the rigor, soundness, and transparency of its decisions.

The third topic that emerged from our study is the impact of ACO decision-making transition on the patient. As ACOs grow in number and size, they will serve more and more patients whose care will increasingly depend on ACO decisions [85,86]. Our findings indicate that shorter term cost focus in ACO technology decisions may overshadow other considerations, including patient centeredness. The variation in decisions across ACOs could increase variability in patient care practices and quality, including those in personalized medicine. Some payers in our study suggested that many patients who are active, empowered, and informed about innovative technologies, such as genomics, could influence ACO decision making on adoption of these technologies. Experts have called for increasing patient engagement in ACO decision making at several levels, including the system level [25,85–87]. It, however, remains to be seen whether patients could serve as their own advocates, vis-à-vis ACOs that are growing in size and power [16,40,41,88]. Further research is needed to understand patients' perspectives and roles in this context, and further efforts are also needed to make these issues visible to patients.

Our study had limitations. We used a small, but representative, cohort of 10 private payers—they collectively cover more than 125,000,000 enrollees across US geographies—but our ACO cohort consisted of 6 organizations all located in the Midwest and was a convenience sample. This cohort, however, included a range of ACO characteristics, including size, academic affiliation, and experience with the ACO arrangement. We believe that our findings from the ACO cohort may be generalizable to other US regions with a similar mix of ACO characteristics, as in the Midwest. Generalizability of our findings across the United States should be a subject of further study. Although our two cohorts were sufficient for the exploratory purposes and the qualitative methodology of our study (we achieved saturation of themes within the two cohorts), further studies on the subject of ACO decision making should expand the ACO cohort to include various sizes, types, and geographies. This would allow examining whether and how ACO characteristics correlate with their decision-making practices and approaches. In addition, future research should examine the effect of different payment methods, including bundled payment, on decision making on medical innovations, as well as the interaction effect between bundle payment, various types of payers, and status of ACO.

Conclusions

Our findings indicate that ACO proliferation continues within the Triple Aim, and they assume an increasing level of risk and decision authority, including decision on technology adoption. Nevertheless, we found challenges to ACOs' balanced and informed decision making, such as focus on short-term cost reduction and insufficient technology assessment and analytical capabilities. Using relatively short time horizons in modeling the expected benefit of a particular diagnostic or therapeutic

intervention could also lead to underuse of diagnostic tools that may prove to have high value in the long run. These gaps may challenge decisions on adoption of new technologies, such as cancer genomic panels, and contribute to variation in ACOs' patient care practices. As ACOs evolve, mechanisms and capacity for decisions on medical innovations should be developed.

Source of financial support: This study was partially funded by the National Human Genome Research Institute (grant no. R01HG007063 to K.A.P.).

REFERENCES

- [1] Berwick DM, Nolan TW, Whittington J. The triple aim: care, health, and cost. *Health Aff (Millwood)* 2008;27:759–69.
- [2] US House of Representatives. Compilation of Patient Protection and Affordable Care Act [as amended through May 1, 2010], Title III, Subtitle A, Part 3, Section 3022. 2010:313–8.
- [3] Obama B. United States health care reform: progress to date and next steps. *JAMA* 2016;316:525–32.
- [4] Fisher ES, Staiger DO, Bynum JP, et al. Creating accountable care organizations: the extended hospital medical staff. *Health Aff (Millwood)* 2007;26:w44–57.
- [5] Skinner J, Chandra A. The past and future of the Affordable Care Act. *JAMA* 2016;316:497–9.
- [6] McClellan M, McKethan AN, Lewis JL, et al. A national strategy to put accountable care into practice. *Health Aff (Millwood)* 2010;29:982–90.
- [7] Centers for Medicare & Medicaid Services. Accountable care organizations (ACOs): general information. Available from: <http://innovation.cms.gov/initiatives/aco/>. [Accessed August 2, 2016].
- [8] Toussaint J, Milstein A, Shortell S. How the pioneer ACO model needs to change: lessons from its best-performing ACO. *JAMA* 2013;310:1341–2.
- [9] Pham HH, Cohen M, Conway PH. The pioneer accountable care organization model: improving quality and lowering costs. *JAMA* 2014;312:1635–6.
- [10] Nyweide DJ, Lee W, Cuerdon TT, et al. Association of pioneer accountable care organizations vs traditional Medicare fee for service with spending, utilization, and patient experience. *JAMA* 2015;313:2152–61.
- [11] McWilliams JM, Cherner ME, Landon BE, et al. Performance differences in year 1 of pioneer accountable care organizations. *N Engl J Med* 2015;372:1927–36.
- [12] McWilliams JM, Hatfield LA, Cherner ME, et al. Early performance of accountable care organizations in Medicare. *N Engl J Med* 2016;374:2357–66.
- [13] Hsu J, Price M, Spirt J, et al. Patient population loss at a large pioneer accountable care organization and implications for refining the program. *Health Aff (Millwood)* 2016;35:422–30.
- [14] Berwick DM. ACOs—promise, not panacea. *JAMA* 2012;308:1038–9.
- [15] Burns LR, Pauly MV. Accountable care organizations may have difficulty avoiding the failures of integrated delivery networks of the 1990s. *Health Aff (Millwood)* 2012;31:2407–16.
- [16] Casalino LP. Accountable care organizations—the risk of failure and the risks of success. *N Engl J Med* 2014;371:1750–1.
- [17] Casalino LP. Pioneer accountable care organizations: traversing rough country. *JAMA* 2015;313:2126–7.
- [18] McClellan M. Accountable care organizations and evidence-based payment reform. *JAMA* 2015;313:2128–30.
- [19] Muhlestein D. Continued growth of public and private accountable care organizations. 2013. Available from: <http://healthaffairs.org/blog/2013/02/19/continued-growth-of-public-and-private-accountable-care-organizations/>. [Accessed April 3, 2016].
- [20] Colla CH, Lewis VA, Shortell SM, et al. First national survey of ACOs finds that physicians are playing strong leadership and ownership roles. *Health Aff (Millwood)* 2014;33:964–71.
- [21] Colla CH, Lewis VA, Tierney E, et al. Hospitals participating in ACOs tend to be large and urban, allowing access to capital and data. *Health Aff (Millwood)* 2016;35:431–9.
- [22] Fisher ES, Shortell SM, Kreindler SA, et al. A framework for evaluating the formation, implementation, and performance of accountable care organizations. *Health Aff (Millwood)* 2012;31:2368–78.
- [23] Eddy DM, Shah R. A simulation shows limited savings from meeting quality targets under the Medicare Shared Savings Program. *Health Aff (Millwood)* 2012;31:2554–62.
- [24] Larkin H. ACO or no: how to decide. Hospitals must weigh the benefits and the risks before choosing their paths. *Trustee* 2014;67:15–6,21–3: 1.
- [25] Singer S, Shortell SM. Implementing accountable care organizations: ten potential mistakes and how to learn from them. *JAMA* 2011;306:758–9.

- [26] Tallia AF, Howard J. An academic health center sees both challenges and enabling forces as it creates an accountable care organization. *Health Aff (Millwood)* 2012;31:2388–94.
- [27] Hayen AP, van den Berg MJ, Meijboom BR, et al. Accountable care organizations: how to dress for success. *Am J Manag Care* 2013;19:517–9.
- [28] Teng K. A shift toward personalized healthcare: does the Affordable Care Act provide enough incentive for change? *Per Med* 2015;12:231–5.
- [29] Hernandez J, Machacz SF, Robinson JC. US hospital payment adjustments for innovative technology lag behind those in Germany, France, and Japan. *Health Aff (Millwood)* 2015;34:261–70.
- [30] Deverka PA. Pharmacogenomics, evidence, and the role of payers. *Public Health Genomics* 2009;12:149–57.
- [31] Trosman JR, Van Bebber SL, Phillips KA. Coverage policy development for personalized medicine: private payer perspectives on developing policy for the 21-gene assay. *J Oncol Pract* 2010;6:238–42.
- [32] Phillips KA, Trosman JR, Kelley RK, et al. Genomic sequencing: assessing the health care system, policy, and big-data implications. *Health Aff (Millwood)* 2014;33:1246–53.
- [33] US Department of Health and Human Services. Secretary's Advisory Committee on Genetics, Health and Society [SACGHS]. Coverage and Reimbursement of Genetic Tests and Services: Report of the Secretary's Advisory Committee on Genetics, Health, and Society. Washington, DC: Department of Health and Human Services, 2006.
- [34] Coye MJ, Kell J. How hospitals confront new technology. *Health Aff (Millwood)* 2006;25:163–73.
- [35] Ward E, Halpern M, Schrag N, et al. Association of insurance with cancer care utilization and outcomes. *CA Cancer J Clin* 2008;58:9–31.
- [36] Engstrom PF, Bloom MG, Demetri GD, et al. NCCN molecular testing white paper: effectiveness, efficiency, and reimbursement. *J Natl Compr Canc Netw* 2011;9(Suppl. 6):S1–16.
- [37] Au DW, Menachemi N, Panjamapirom A, et al. The influence of payer mix on electronic prescribing by physicians. *Health Care Manage Rev* 2011;36:95–101.
- [38] Smith JC, Medalia C. Health insurance coverage in the United States: 2014. September 2015. Available from: <https://www.census.gov/content/dam/Census/library/publications/2015/demo/p60-253.pdf>. [Accessed May 7, 2016].
- [39] Higgins A, Stewart K, Dawson K, et al. Early lessons from accountable care models in the private sector: partnerships between health plans and providers. *Health Aff (Millwood)* 2011;30:1718–27.
- [40] Goldsmith J. Accountable care organizations: the case for flexible partnerships between health plans and providers. *Health Aff (Millwood)* 2011;30:32–40.
- [41] Song Z, Chokshi DA. The role of private payers in payment reform. *JAMA* 2015;313:25–6.
- [42] Gazdar AF, Minna JD. Precision medicine for cancer patients: lessons learned and the path forward. *J Natl Cancer Inst* 2013;105:1262–3.
- [43] Garraway LA, Verweij J, Ballman KV. Precision oncology: an overview. *J Clin Oncol* 2013;31:1803–5.
- [44] The White House, Office of the Press Secretary. Remarks by the president on precision medicine. Available from: <https://www.whitehouse.gov/the-press-office/2015/01/30/remarks-president-precision-medicine>. [Accessed January 30, 2015].
- [45] Collins FS, Varmus H. A new initiative on precision medicine. *N Engl J Med* 2015;372:793–5.
- [46] Van Bebber SL, Trosman JR, Liang SY, et al. Capacity building for assessing new technologies: approaches to examining personalized medicine in practice. *Per Med* 2010;7:427–39.
- [47] Trosman JR, Van Bebber SL, Phillips KA. Health technology assessment and private payers' coverage of personalized medicine. *Am J Manag Care* 2011;17(Suppl. 5):SP53–60.
- [48] Deverka PA, Dreyfus JC. Clinical integration of next generation sequencing: coverage and reimbursement challenges. *J Law Med Ethics* 2014;42(Suppl. 1):22–41.
- [49] Trosman JR, Weldon CB, Schink JC, et al. What do providers, payers and patients need from comparative effectiveness research on diagnostics? The case of HER2/Neu testing in breast cancer. *J Comp Eff Res* 2013;2:461–77.
- [50] Trosman JR, Weldon CB, Kelley RK, et al. Challenges of coverage policy development for next-generation tumor sequencing panels: experts and payers weigh in. *J Natl Compr Canc Netw* 2015;13:311–8.
- [51] Clain E, Trosman JR, Douglas MP, et al. Availability and payer coverage of BRCA1/2 tests and gene panels. *Nat Biotechnol* 2015;33:900–2.
- [52] Gray SW, Cronin A, Bair E, et al. Marketing of personalized cancer care on the web: an analysis of Internet websites. *J Natl Cancer Inst* 2015;107.
- [53] Deverka PA, Kaufman D, McGuire AL. Overcoming the reimbursement barriers for clinical sequencing. *JAMA* 2014;312:1857–8.
- [54] Chakradhar S. Tumor sequencing takes off, but insurance reimbursement lags. *Nat Med* 2014;20:1220–1.
- [55] Chakradhar S. Insurance companies are slow to cover next-generation sequencing. *Nat Med* 2015;21:204–5.
- [56] Burns J. Health insurers struggle to manage number, cost of genetic tests. *Manag Care* 2016;25:20–3.
- [57] Stadler ZK, Schrader KA, Vijai J, et al. Cancer genomics and inherited risk. *J Clin Oncol* 2014;32:687–98.
- [58] Robson M. Multigene panel testing: planning the next generation of research studies in clinical cancer genetics. *J Clin Oncol* 2014;32:1987–9.
- [59] Swisher EM. Usefulness of multigene testing: catching the train that's left the station. *JAMA Oncol* 2015;1:951–2.
- [60] Katz SJ, Kurian AW, Morrow M. Treatment decision making and genetic testing for breast cancer: mainstreaming mutations. *JAMA* 2015;314:997–8.
- [61] Domchek SM. Evolution of genetic testing for inherited susceptibility to breast cancer. *J Clin Oncol* 2015;33:295–6.
- [62] Easton DF, Pharoah PD, Antoniou AC, et al. Gene-panel sequencing and the prediction of breast-cancer risk. *N Engl J Med* 2015;372:2243–57.
- [63] Kurian AW, Ford JM. Multigene panel testing in oncology practice: how should we respond? *JAMA Oncol* 2015;1:277–8.
- [64] Schrijver I, Aziz N, Farkas DH, et al. Opportunities and challenges associated with clinical diagnostic genome sequencing: a report of the Association for Molecular Pathology. *J Mol Diagn* 2012;14:525–40.
- [65] Manolio TA, Chisholm RL, Ozenberger B, et al. Implementing genomic medicine in the clinic: the future is here. *Genet Med* 2013;15:258–67.
- [66] Johansen Taber KA, Dickinson BD, Wilson M. The promise and challenges of next-generation genome sequencing for clinical care. *JAMA Intern Med* 2014;174:275–80.
- [67] West HJ. No solid evidence, only hollow argument for universal tumor sequencing: show me the data. *JAMA Oncol* 2016;2:717–8.
- [68] Subbiah V, Kurzrock R. Universal genomic testing needed to win the war against cancer: genomics IS the diagnosis. *JAMA Oncol* 2016;2:719–20.
- [69] Ritchie J, Lewis J, Nicholls CM, et al. *Qualitative Research Practice: A Guide for Social Science Students and Researchers*. Thousand Oaks, CA: Sage, 2013.
- [70] Smith J, Firth J. Qualitative data analysis: the framework approach. *Nurse Res* 2011;18:52–62.
- [71] Weldon CB, Trosman JR, Gradishar WJ, et al. Barriers to the use of personalized medicine in breast cancer. *J Oncol Pract* 2012;8:e24–31.
- [72] Bombard Y, Rozmovits L, Trudeau M, et al. Access to personalized medicine: factors influencing the use and value of gene expression profiling in breast cancer treatment. *Curr Oncol* 2014;21:e426–33.
- [73] Huseareau D, Marshall DA, Levy AR, et al. Health technology assessment and personalized medicine: are economic evaluation guidelines sufficient to support decision making? *Int J Technol Assess Health Care* 2014;30:179–87.
- [74] McGowan ML, Settersten RA Jr, Juengst ET, et al. Integrating genomics into clinical oncology: ethical and social challenges from proponents of personalized medicine. *Urol Oncol* 2014;32:187–92.
- [75] Patton M. *Qualitative Research and Evaluation Methods: Integrating Theory and Practice: The Definitive Text of Qualitative Inquiry Frameworks and Options*. Thousand Oaks, CA: Sage, 2014.
- [76] AISHealth. Top 25 U.S. health plans, ranked by total medical enrollment (as of December 2014). Available from: <https://www.aishealth.com/health-plan-business/data/enrollment>. [Accessed August 10, 2016].
- [77] The Henry J. Kaiser Family Foundation. State health facts. Health insurance coverage of the total population. Timeframe: 2014. Available from: <http://kff.org/other/state-indicator/total-population/>. [Accessed April 15, 2016].
- [78] Pope C, Mays N. *Qualitative Research in Health Care*. Third Edition. 2006. Blackwell Publishing Ltd, Oxford, UK.
- [79] Robson ME, Bradbury AR, Arun B, et al. American Society of Clinical Oncology policy statement update: genetic and genomic testing for cancer susceptibility. *J Clin Oncol* 2015;33:3660–7.
- [80] Kim RY, Xu H, Myllykangas S, et al. Genetic-based biomarkers and next-generation sequencing: the future of personalized care in colorectal cancer. *Per Med* 2011;8:331–45.
- [81] Blue Cross Blue Shield Association. Center for Clinical Effectiveness (CCE). Available from: <http://www.bcbs.com/cce/>. [Accessed August 15, 2016].
- [82] Hayes, Inc. The Hayes Rating. Available from: <http://www.hayesinc.com/hayes/>. [Accessed August 15, 2016].
- [83] Evaluation of Genomic Applications in Practice and Prevention. About EGAPP. Available from: <http://www.egappreviews.org>. [Accessed August 15, 2016].
- [84] Institute for Clinical and Economic Review. What Does ICER Do? Available from: <https://icer-review.org/>. [Accessed August 15, 2016].
- [85] Sinaiko AD, Rosenthal MB. Patients' role in accountable care organizations. *N Engl J Med* 2010;363:2583–5.
- [86] Springgate BF, Brook RH. Accountable care organizations and community empowerment. *JAMA* 2011;305:1800–1.
- [87] DeCamp M, Sugarman J, Berkowitz SA. Meaningfully engaging patients in ACO decision making. *Am J Manag Care*. Available from: <http://www.ajmc.com/journals/ajac/2015/2015-vol3-n2/meaningfully-engaging-patients-in-aco-decision-making>. [Accessed June 12, 2015].
- [88] Richman BD, Schulman KA. A cautious path forward on accountable care organizations. *JAMA* 2011;305:602–3.