

RESEARCH REPORT

What allows a health care system to become a learning health care system: Results from interviews with health system leaders

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Abstract

Introduction The US health care system faces pressure to improve quality while managing complexity, curbing costs, and reducing inefficiency. These shortcomings have sparked interest in the Learning Health Care System (LHCS) as an alternate approach to organizing research and clinical care. Although diverse stakeholders have expressed support for moving toward an LHCS model, limited guidance exists for institutions considering such a transition.

Methods Interviews were conducted with institutional leaders from 25 health care systems considered to be at the forefront of LHCS. Interviews focused on the process of transitioning toward an LHCS, including motivations for change, key components, challenges encountered, and strategies for success, and on ethics and regulatory issues encountered. Qualitative analysis identified key themes across institutions.

Results Respondents described 5 themes related to the origin of their LHCS transformation: (1) visionary leadership or influence of a key individual, (2) adaptation to a changing health care landscape, (3) external funding, (4) regulatory or legislative influence, and (5) mergers or expansions. They described 6 challenges: (1) organizational culture, (2) data systems and data sharing, (3) funding learning activities, (4) limited supply of skilled individuals, (5) managing competing priorities, and (6) regulatory challenges. Finally, they suggested 8 strategies to support transformation: (1) strong leadership, (2) setting a limited number of organizational priorities, (3) building on existing strengths, (4) training programs, (5) “purposeful” design of data systems, (6) internal transparency of quality metrics, (7) payer/provider integration, and, within academic medical centers, (8) academic/clinical integration.

Conclusions Even institutions at the forefront of LHCS described the transition as difficult. Their experiences provide insight into other institutions considering similar transitions, including elements essential for success and likely challenges.

KEYWORDS

delivery of health care, learning health system, quality of health care

1 | INTRODUCTION

The US health care faces pressure to improve quality while managing complexity, curbing costs, and reducing inefficiency. We spend US \$3 trillion on health care annually—US \$750 billion of which is believed unnecessary, ineffective, preventable, or harmful,¹ yet patients receive only 55% of recommended care.² The National Academies of Medicine

(NAM; formerly the Institute of Medicine) asserts, “Too much care that is important is often not delivered, and too much care that is delivered is often not important.”³

These shortcomings have sparked interest in alternate approaches for organizing research and clinical care. The Learning Health Care System (LHCS) involves a structural commitment to a bidirectional feedback loop whereby data collection is embedded into care delivery

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processes, and care is changed in response to evidence generated. The LHCS offers the promise to improve the evidence base and care delivery while reducing costs.¹

Diverse stakeholders have expressed support for moving toward more continuous learning in health care.⁴⁻⁶ Nevertheless, for institutions considering this transition, limited guidance exists. In partnership with the NAM Leadership Consortium for Value and Science-Driven Health Care (LCVSHC), we interviewed leaders from US health care institutions transitioning toward LHCS. We were interested in why they moved toward this new model, what was needed for success, and what challenges they faced.

2 | METHODS

2.1 | Sample selection and recruitment

Participants were recruited using purposive sampling, targeting institutions identified by the National Academy of Medicine's LCVSHC as being at the forefront of LHCS, and individuals with different responsibilities, including clinical and executive leadership, operations, research, strategy, and quality improvement. NAM colleagues proposed institutions and respondents, drawing from participants at NAM meetings on LHCS. Additional respondents were identified via snowball sampling. NAM sent invitation letters describing the project and that it was conducted by colleagues at the Johns Hopkins Berman Institute of Bioethics.

2.2 | Study procedures

Hour-long, semistructured telephone interviews were conducted with institutional leaders at 25 health care institutions (Table 1). One of 2 authors (SM or NK) led the interviews, using interview guides (available on request) focusing on (1) the process of transitioning toward an LHCS, including motivations for change, key components, challenges encountered, and strategies for success (the focus of this manuscript),

TABLE 1 Participating institutions

Participating Institutions	
Advocate Health Care	HCA/Hospital Corporation of America
Baylor Scott & White Health	HealthPartners
Bellin Health	Health Share
Bon Secours Health System	Intermountain Healthcare
Boston Children's Hospital	Kaiser Permanente Colorado
Carolinas HealthCare	Marshfield Clinical Health System
Cincinnati Children's Hospital Medical Center	Nemours
Christiana Care Health System	New York-Presbyterian Hospital
Dartmouth Hitchcock Health	Palo Alto Medical Foundation
Denver Health	Penn State Health
Duke University Health System	Sutter Health
Geisinger Health System	Vanderbilt
Group Health	

and (2) ethics and regulatory issues encountered (reported elsewhere). Most interviews were with 1 institutional leader, although some requested involvement of another colleague(s). Interviews were audiorecorded and transcribed. The Johns Hopkins Bloomberg School of Public Health Institutional Review Board classified this as nonhuman subjects research.

2.3 | Analysis

An integrated approach was used to develop the coding structure.⁷ A priori codes, drawn from our interview guide, provided the organizing analytical framework. One investigator (SM) reviewed transcripts for accuracy and to identify subthemes. Subthemes were grouped within the main a priori codes to develop our codebook, which 1 investigator (SM) applied to transcripts using NVIVO10 software. Memos were written for each a priori code, describing subthemes and their frequency, and presenting exemplifying quotations. Another author (NK) reviewed memos. Differences of opinion were discussed and resolved through discussion and comparison to raw data.

3 | RESULTS

3.1 | Sample characteristics

Between October 2014 and February 2015, 25 interviews were conducted with 29 institutional leaders from quality/safety, research, clinical, operations, overall leadership (CEO), and strategy (Table 2).

3.2 | Motivations for transitioning to an LHCS model

In describing the origin of their institution's transformation toward an LHCS model, 5 themes emerged: (1) visionary leadership or influence of a key individual; (2) adaptation to a changing health care landscape; (3) external funding; (4) regulatory or legislative influence, and (5) mergers or expansions.

3.2.1 | Visionary leadership or influence of a key individual

Respondents from 14 institutions identified visionary leadership or the influence of a key individual as instrumental in spearheading the transition toward LHCS. Influential leaders included visionary leaders who identified the need and opportunity for change, internal champions who inspired others to share the vision, and external thought leaders.

TABLE 2 Study sample

Primary Role	No. Respondents
Quality/safety	7
Research	6
Clinical	5
Operations	5
CEO/leadership	4
Strategy	2

Self-reported data from respondents as to their primary role within their institution.

Respondents from 11 systems attributed their system's initial transformation as driven, at least partially, by a leader who saw the potential for bringing an empirical approach to health care delivery and applying research as a means for improvement. For some, this initial vision came from research or clinical leaders. In others, it came from board members who drew on experience with other industries. For example, 1 board member drew on extensive experience in consumer products to encourage the institution toward a consumer-focused model in which research becomes a “driver of innovation of [the institution's] products and services,” rather than merely contributing to the knowledge base.

Internal champions were described as vital in promoting the LHCS vision across institutions. Respondents from 5 institutions described the critical effect of well-respected clinicians or research leaders securing peer buy-in. For example, clinical champions could lend credibility to a message with less resonance than if from nonclinicians: “I think the difference between [academic researchers] and myself would be that they're not in the health system, and so physicians listening to them would say, ‘That's interesting, but you don't understand what I do...’”.

Finally, some respondents credited interaction with external leaders as inspiring transformation. One noted that trainings with senior institutional leaders on Deming's “PDSA cycle,” a 4-step method for continuous improvement popular in management circles, fostered long-term commitment to continuous learning, which became “imbued” into institutional culture.

3.2.2 | Adaptation to and competitive advantage in a changing health care landscape

Eight respondents described their institutions' transition as driven by current or anticipated changes in the health care landscape. Respondents referenced changes in health care financing and reimbursement, and a shift from systems oriented around volume toward systems directed at value. The decision was framed not as whether to change, but when, and how quickly. One stated, “the biggest issue right now that we face is the movement towards value versus volume and how quickly we move down that spectrum.”

Changes were framed as both a threat and an opportunity. For some, change was akin to survival. One described, “... within this local environment, people are saying if we do not get better, if we do not lower our costs, we will not be around a decade from now.” For others, transitioning toward an LHCS was seen as a providing a competitive advantage.

3.2.3 | External funding

Three respondents referenced receiving federal grants as supporting transformation, not in inspiring the LHCS vision, but rather in advancing its realization. Two respondents described PCORI funding extending their ability to conduct research on patient outcomes and population health. A third described a CMS Innovation Center grant to promote continuous workforce development and quality improvement as the “springboard” for their transformation.

CMS was also described as having an additional influence through the Physician Group Practice Demonstration project. Three of our respondent institutions were among the 10 institutions

selected by CMS for the Physician Group Practice initiative, which launched in 2005 to explore strategies to enhance quality while lowering costs.

3.2.4 | Regulatory and legislative influences

Three respondents referenced regulatory or state-level legislative actions as influential. These respondents pointed to state legislatures as creating financial incentives to encourage activities consistent with an LHCS. Under California law, nonprofit hospitals affiliated with physician practices must conduct medical research and education in addition to delivering health care. Oregon's legislative actions have also been influential. A longtime leader in Medicaid innovation, Oregon has recently encouraged providers to form Coordinated Care Organizations, which use global payments linked to quality metrics and targets for reduced expenditure growth.

3.2.5 | Mergers or expansions

Two respondents described mergers or expansions driving their transformations. One explained, “the major [influence] was our merger ... that really provided us with a perfect opportunity to look at comparative practices, quality improvement, LEAN management ... we had our own laboratory where we could be learning from each other ... So I think that was really where we started looking at delivery system enhancement.”

3.3 | Challenges facing LHCS

Respondents emphasized that transitioning to an LHCS is tremendously challenging. Six challenge types emerged: (1) organizational culture, (2) data systems and data sharing, (3) funding learning activities, (4) limited supply of skilled individuals, (5) managing competing priorities, and (6) regulatory challenges.

3.3.1 | Organizational culture

Nine respondents described cultural transformation as central to LHCS—but also the most challenging transformation to undertake. One declared, “The number one (challenge) will be their own habits.” Several underscored the importance of culture through contrasts with other challenges: “I think the big barriers are actually sort of cultural ... I think culture trumps technical infrastructure every time really.” Another explained,

Any individual place will have to take a biopsy of where they are along this whole dimension ... Always with the back of their mind this notion that culture will eat strategy for breakfast and structure for lunch, right? What people tend to do is develop strategy and create structure and they ignore culture, and they fail or they get nowhere close to optimal results ... [but] one has to attend to all three. Most people don't know how to affect culture ... And yet, it's fundamentally the most important component.

In describing cultural challenges, respondents identified features of traditional health care systems as poorly aligned with continuous learning. Four respondents described shifting from a system emphasizing

physician autonomy to one using team-based care and standard processes as a cultural challenge. One respondent stated,

I think physicians ... traditionally have always thought that taking care of a patient is an art and not a science, and their patient's too complicated for any formula ... to tell them how to manage their patient. But I think more and more people know that that's not true ... There is a best way to do a procedure. There's a best way to order medications ... So the struggle has been in getting people to accept and adhere to that, and not as much as figuring out what the best thing to do is.

Four respondents from academic medical centers (AMCs) suggested that AMCs present particular cultural challenges. For example, each department within a medical school often operates semiautonomously, which can lead departments to be siloed, constraining collaboration. One respondent observed,

I thought that we were one organization ... But I came to learn that ... there are 18 semi-independent businesses ... clearly matched to those 18 academic departments ... And the joke used to be ... that a vote of 17 to 1 is a tie. And so that's how much influence those independent departments really had on the organizational structure...

3.3.2 | Data systems and data sharing

Respondents from 15 institutions described challenges in data systems and data sharing, highlighting two types of challenges: system design and regulatory burdens.

Respondents noted that, while a wealth of data is being collected, existing data systems have limited capability to analyze and share data on health and operations to facilitate learning. One stated, "... We have just a massive volume of data that's trapped in our EHR, but we're not quite sure how to get it, how to standardize it, how to use it yet... very few sites I think have figured that piece out." Another observed, "The limitations of electronic medical records really are one of the significant issues that we face in using research and the results of research around clinical care and then integrating it into everyday practice." Four respondents suggested a mismatch between the design of health IT systems and the features needed to support continuous learning. One described,

[W]e're taking clinical information systems that have been designed to do one thing, and we're trying to make them do multiple things. So when you think about how clinical information systems have developed, it really has been ... [to] allow a practitioner to provide care for a specific patient during a visit, and ... to see information over time ... but now we also want to be able to look at this across populations of patients. And so I think one of the challenges is that we've taken systems that were designed for a specific purpose and we're trying to morph them into something else...

Five respondents noted that the lack of data system interoperability impedes sharing within and across systems: "[T]here's no apparent

connectivity between health record systems ... the fact that even EPIC systems don't talk to EPIC systems is a huge barrier..."

Eleven respondents observed that regulatory barriers could impede data sharing. One noted that Institutional Review Boards (IRBs) could be reluctant to permit data to be shared outside the institution, even when deidentified. Another described the current regulatory environment makes data sharing with those outside the institution "demanding" and a "pain point."

3.3.3 | Funding and financial structure

Eleven respondents described challenges securing internal and external resources to support learning activities.

The most common challenge was the persistence of fee-for-service (FFS) and the alignment of incentives around volume rather than value. One respondent stated, "I think we all have the barriers ... in the sense that it's financially not in our best interest to do what I'm talking about ... Most institutions are still in fee-for-service. As long as that exists, they'll stay in it because that's the financial model."

Several respondents who referenced the FFS or volume-driven orientation of health care perceived the US system shifting toward a value-oriented model. One explained, "Everyone knows that the future is going to be probably 100% incented on quality ... And your quality is publicly reported and ... you have to have great quality and you have to have low cost or else you go out of business." Nevertheless, several respondents described this shift as challenging, particularly given the long history of the FFS model.

Three respondents described challenges in securing internal investments to support research and delivery science. One noted that two thirds of American hospitals operate with margins at or below 2%. Consequently, hospitals may not incur short-term costs to support learning activities, despite potential long-term efficiencies.

Four respondents characterized most grant cycles as not keeping pace with operational decision-making needs. One suggested that the federal government should fund learning activities through a model similar to that used by venture capital, with rapid funding decisions for initial investment and ongoing assessments to determine additional support.

Finally, four respondents described a challenge securing time for clinicians to engage in continuous learning activities. Respondents pointed to federal grant salary limitations (which set a ceiling on the reimbursement rate that may be awarded for investigators' salaries) as being obstacles, stating, "The pay lines are so low that you can't keep good people without some internal subsidy."

3.3.4 | Limited supply of skilled individuals

Five respondents described challenges finding and supporting individuals capable of leading continuous learning activities. Respondents asserted that LHCS require individual with a unique intersection of skills and training. One described, "There's only so many people that intellectually have this intersection of systems engineering, health services, and clinical medicine. So finding the right people ... is a challenge."

Two respondents attributed this to clinical curricula. One explained, "It's not a standard skill that you learn in medical school ... So I think eventually the supply will catch up, but right now I think it's a supply constraint situation."

3.3.5 | Managing competing priorities: the bandwidth issue

Five respondents noted that learning activities could present a “bandwidth issue.” One stated, “I think one of the biggest challenges we have—and probably everybody else—is multiple priorities.” This challenge concerned how to prioritize between different learning activities and how to weigh them against the long list of competing institutional priorities. One respondent described institutions adding more to the workload, but in the meantime, “no one left their day job.”

3.3.6 | Regulatory environment

Although respondents identified some regulatory activities as encouraging of LHCS, they identified other regulations as presenting obstacles, including federal laws governing research oversight, quality measures, and monopolies. Challenges in ethical oversight and IRB are described elsewhere, suggesting that federal human subject regulations may “hamper” or “chill” learning health care activities, including a potential mismatch between regulations’ original purpose and the of modern health systems.⁸

Respondents described two additional regulatory challenges. Three respondents described frustration at having quality goals set by regulatory agencies or insurance companies via reporting requirements. “The danger for an organization like ours that was doing ruthless, relentless process improvement anyway is it takes away from us the ability to choose the metrics we think are going to help our patients the most and forces us to pay attention to those metrics which somebody else has decided to measure and report.”

Second, two participants noted that antitrust laws could frustrate collaboration and care coordination. Although care coordination and cooperative agreements between clinicians could improve quality and efficiency, these respondents believed federal regulators viewed such activities with skepticism, as consolidation could also consolidate market power and increase prices.

3.4 | Strategies and conditions to support transformation

Respondents identified eight strategies to support the transition toward an LHCS: (1) strong leadership, (2) setting a limited number of organizational priorities, (3) building on existing strengths, (4) training programs, (5) “purposeful” design of data systems, (6) internal transparency of quality metrics, (7) payer/provider integration, and, within AMCs, (8) academic/clinical integration.

3.4.1 | Strong leadership

Sixteen respondents emphasized the importance of institutional leaders in spearheading change and for investing in day-to-day processes necessary for transformation. One explained, “It really has to start with senior leaders ... because the change here is significant. It’s a cultural change. It really requires discipline, and rigor, and accountability ... if the CEO isn’t buying in ... It just won’t go very far, unfortunately.”

Another respondent emphasized leaders needing to provide both vision and cheerleading, “I think having a good leadership team is critical. I mean, if you don’t have people with a collective vision, if you

can’t articulate where you’re going, you can’t rally people to a common cause ... So to me, this is all community organizing ... [Y]ou have to have the sort of leader ... to be able to articulate the vision, and you have to be able to figure out how you keep people engaged in that vision.”

Four respondents emphasized the important role leaders play not only in initiating change, but in keeping transformation on the agenda, acting as its “spokesperson” and using the “bully pulpit” to focus the institution on improvement. One explained, “You really need to hit it every day and keep creating the environment ... for that to happen.” Another stated, “I’ve been very fortunate to have two CEOs that I’ve been working for that have been pushing quality as the number one agenda. I certainly don’t think it could have happened without them. And it’s not just about resources ... But really just their personal involvement I found to be probably the most important factor.”

3.4.2 | Prioritize strategically

Thirteen respondents emphasized the importance of alignment and prioritization. Respondents advised institutions to recognize their “limited organizational energy” and to focus on achieving high-priority goals. They advised selecting a finite number of issues to achieve transformational change, setting system-wide goals to address those issues, and regularly examining whether current activities advance those goals. One explained, “[We] have to be disciplined to always tie [potential projects] back to some enterprise wide goal ... [W]e go through a very formal goal-setting process at the enterprise level. And every new initiative has to have some direct tie to a goal.”

Several respondents described the guiding role of an organization’s strategic plan or mission statement. One characterized the strategic plan as the “conscience of an organization,” setting the institutional agenda for improvement, quality, and transformation. Three others noted the expressed institutional mission can ground systems in selecting priorities and maintaining alignment on high-level goals.

3.4.3 | Build on existing strengths and priorities

Respondents from three institutions advised institutions to identify and build on existing organizational strengths and priorities. One respondent from an AMC described, “[O]ne of the important things that we did early on was to recognize the language of the organization was research. That was what was valued. That was what was held in high regard ... So we were rigorous in our measurements ... Our practice was scientific. We decided that we would not water it down, that—for it to be accepted in the organization, there had to be a scientific process. And that made a huge difference because there was a shift from excitement for generating evidence to excitement for applying the evidence.” These respondents also noted the importance of connecting the goals of learning health care to the motivations of clinicians and others within the institution:

Physicians and nurses and medical professionals can really get behind quality improvement. You come and say, “Okay, we’ve got this cost-cutting plan—very few people cheer.” If you talk about “We’re going to improve the quality of care that we provide, and we expect that will reduce total cost of care, people can get, if not

excited, they can certainly be supportive, or at a minimum obviously they can't say they're not interested in improving quality.

Another respondent suggested the importance of finding synergy between organizational goals and individual clinicians' interests:

I think engaging physicians ... around areas in which they get excited about is really a key to success. Just forcing people on committees that they're not interested in I don't think works very well. But finding those areas that excite somebody is kind of magical.

3.4.4 | Training programs

Respondents from fourteen institutions described three ways internal training programs can support their transformation toward an LHCS. First, trainings can build skills necessary for continuous improvement, including quality improvement methods and statistical analysis, which may be lacking in traditional clinical education programs: “[We] have to teach people how to do this type of work. Rapid cycle improvement—learning from the results you have today, changing what you do tomorrow—it’s actually a science, and people just don’t naturally know how to do that.”

Second, training programs can foster cultural transformation. One respondent described “basic common education” on quality improvement methods as “really critical” for changing culture. Another similarly attributed his ability to build an institutional “consensus for change” to an influential training program with senior leadership on quality improvement principles. Third, training programs can provide an organization’s staff with a “common language,” supporting interdisciplinary collaboration necessary for learning activities. One respondent explained,

[A]ll the people necessary to run a healthcare facility come from different disciplines with different training, and you've got to get them to have a common language ... I have to understand cost per unit of service as a clinician, and the finance people have to understand what mortality is ... I think a lot of what we worked on ... was to force people to learn each other's language.

3.4.5 | Purposeful design of data systems

Seven respondents described the importance of being “purposeful” about data collection. One described,

How do you decide what goes in your [EMR]? ... [The] technique used by most EMRs is you pick a clinical topic, you get [topical experts] together in a room ... and you basically ask them what you should track. This ‘expert opinion-based model’ creates something ... the vast majority of [which] turns out to be useless. It might be interesting ... [but] it's not useful ... Well we used a modification of the method ... purpose specific to manage that clinical process. And they worked because they're designed for it ... you actually invested less in collecting data because you don't do “recreational data collection,” and it tends to be all the right stuff.

This “purposeful” approach, according to the respondent, involved creating a data collection system that benefited both the clinical management of patients and provided what he characterized as a “framework for research” to enable continuous improvement.

3.4.6 | Internal transparency of quality metrics

Seven respondents recommended making data transparent across the institution, capitalizing on clinicians’ natural competitiveness. Three respondents described presenting data within the system at regular intervals (monthly or quarterly), enabling care teams to track their performance, and to compare results to their peers. As one explained, “[W]e’ve been very transparent ... so everybody can see anybody’s metrics ... It takes advantage, I think, of the underlying both competitiveness and the desire to be the best.” Another respondent similarly observed,

Everybody's wired for grades ... The day I gave the head of the congestive heart failure program a C ... he's in my office, [saying] “I don't get C's.” I'm like, “Well, you got a C. This is how we measure it. This is how we assign a grade. And if you want it not to be a C you've got to move these three measures.” I'm telling you he's the best performer. He's an A now. It's all because he got a C.

3.4.7 | Payer/clinical integration

Respondents from six institutions described two ways integration between those who pay for care and those who provide care as supportive. First, payer-provider integration could shift financial incentives toward improving quality, alleviating some of the disincentives commonly associated with FFS systems. One explained, “Because we’re the payer within this integrated system, we have a little bit more ability to pull on some levers ... And that’s why I think payers do play an important role in this discussion, because ... you have to incent the behavior that you want, right?” Second, payer-provider can support a corresponding integration of payment and clinical data, thereby providing a more comprehensive picture of overall patient and population health. One respondent from an HMO described,

[O]ne critical structural piece is that we are an integrated health system ... So, we know who our members are whether or not they come in to see us ... We have a comprehensive electronic health record ... we get all that clinically rich detail, along with pharmacy, laboratory, all the clinical data to complement the administrative and claims and registration data that other healthcare systems have. So, we have very rich and comprehensive data on a defined population. That's a really critical structural component to doing this well.

3.4.8 | Academic/clinical integration

Respondents from four AMCs identified integration within AMCs as supportive of LHCS, suggesting approaches that unify medical schools, affiliated physician networks, and hospitals into one common structure

can promote collaboration and streamline efforts. However, respondents characterized such integration as rare. One explained,

[B]ecause we own everything, which is very uncommon, we all get along ... unlike many academic medical centers where the school of medicine is one entity, the practice plan might even be a separate entity, and the hospital systems tend to be their own entity. [Here], everything belongs to [name of institution]. It all reports up to [one executive] ... We have an executive team that plays well together, and we move money back and forth real easily. So that allows us to be way more nimble and collaborative ... [O]ur ability to do a lot of these things—which requires a lot of inter-professional and interdisciplinary interaction because of the nature of the team sport of improving care and creating a learning health organization—is part of the fabric of who we are. And so it's much easier to do.

4 | DISCUSSION

The LHCS has attracted attention for its potential to improve the quality, efficiency, and value of health care. Multiple organizations are moving closer to achieving this vision, suggesting it can be a reality rather than simply an interesting idea. Yet even these leading institutions described the transition as difficult. Their experiences provide insight into other institutions considering similar transitions, including elements essential for success and likely challenges.

The most consistent theme was the need for a strong, committed leadership. Respondents emphasized institutional leaders set the vision for change, contribute financial and personnel resource investments, and sustain personal engagement; they similarly attributed organizational culture as the biggest barrier to transformation. These themes are consistent with management literature highlighting the role of transformational leaders in changing organizational culture,⁹ and with reports within the LHCS context and continuous quality improvement efforts on the importance of culture and leadership.¹⁰⁻¹² Elsewhere, health system CEOs with commitments to high-value health care labeled “visible and determined leadership by CEO and board” as the “key ingredient to achieving high-value care.”¹³

Respondents also stressed infrastructure elements necessary to support the LHCS vision and to sustain change. Observations that thoughtful design of data systems can enable continuous learning to emerge from day-to-day operations echo prior literature emphasizing the essential role of organizational infrastructure, including integrated data systems and clinical integration, for continuous quality improvement.^{12,14}

Respondents emphasized, however, that EHR adoption is only the beginning: data systems are incomplete if data cannot be readily shared. Our findings reinforce arguments elsewhere that lack of EHR interoperability remains a critical challenge,^{15,16} with extensive variation in categorization, structure, and reporting methods within and across systems.¹⁶ Strategies to improve interoperability have been

proposed.^{17,18} However, other interoperability barriers may prove larger, including the mismatch between market-driven motivations viewing data as a proprietary asset and LHCS goals to advance quality and efficiency.¹⁹⁻²¹

Other features also were described as important, including integration across payers and providers. Literature similarly emphasizes how integration can link use to clinical outcomes to identify high-risk patients who should receive care coordination, and to make claims-based data regarding diagnoses, procedures, and pharmaceutical information available to emergency rooms in real time.³ Furthermore, as argued elsewhere,²² integration can align financial incentives toward high-value care, reducing institutional disincentives in an FFS model to invest in quality improvement efforts that may reduce the volume of compensable services.²³

Respondents noted the challenge of managing institutional bandwidth, consistent with the observation that high-value health care organizations share a commitment to specification and planning.²⁴ Reported successful strategies for prioritization include targeting institutional processes accounting for the largest proportion of care, the largest effect by patient population, with the greatest unjustified variation, or those with evidence-based best practices.²⁵ For example, Intermountain Healthcare elsewhere reported identifying 7% of institutional processes that accounted for 95% of their care delivery. Focusing on these processes, executives argued, was central to Intermountain's success in improving quality while reducing costs.²²

Interestingly, respondents did not describe the role for patients in pushing the LHCS agenda or in prioritizing transparency to ensure patients are aware of ongoing learning activities. This theme might become more prominent in the future, given ongoing initiatives to engage patients as partners in health improvement.^{26,27} Future efforts may consider how patients can drive transformation toward continuous learning.

Also interesting is that some of the factors identified as catalysts for moving toward an LHCS, such as the need to adapt to a changing health care landscape or shifting regulatory incentives or funding models, affect all health care institutions, and yet only some ultimately seek to become an LHCS. One potential explanation might be that the changing health care landscape becomes a stimulus to change the fundamental organization of a system only when leadership and institutional culture—the factors mentioned most frequently by respondents as being central to whether or not an organization becomes an LHCS—respond in that direction. However, further work should be carried out to identify what factors are most influential in encouraging and supporting similar transformations.

This project targeted those considered by peers to be thought leaders in LHCS; we undoubtedly omitted some who should have been included. Respondents also represent “early pioneers” and experiences may not reflect what others on a similar path might face. Self-reported data may be biased; good or bad experiences may have been exaggerated. However, examples of challenges and successes from respondents suggests that many important facets of LHCS transition were represented.

As health care costs soar and “quality chasms” continue to be identified, efficient strategies are needed to identify what works—and what

does not. LHCS leaders suggest visionary leadership, targeted priorities, nimble and interoperable data systems, and trained personnel who believe in the vision and have technical capacity to advance its fulfillment are key. Integrated learning and care, as outlined elsewhere,¹ can improve research efficiency while providing feedback loops to speed translation into improved care.

We hope these data can inform institutions about the necessary, albeit not sufficient, components necessary for transitioning toward becoming an LHCS.

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