Harvard Business Review
ANALYTIC SERVICES

Research Report

LEADING A NEW ERA IN HEALTH CARE

Innovation through Data-Driven Diagnostics

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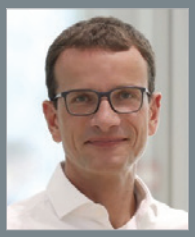

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GLOBAL HEAD DIAGNOSTICS INFORMATION SOLUTIONS

ROCHE DIAGNOSTICS

Today, using data and technologies together offers incredible opportunities to improve outcomes in health care for laboratories, for providers, and, most importantly, for patients. Compared with other sectors, the digital transformation of health care, particularly diagnostics, is only beginning to accelerate. The full potential of analytics, machine learning, and other digital tools is not yet entirely understood or sufficiently valued, and is often overlooked.

This report, developed by Harvard Business Review Analytic Services and sponsored by Roche, outlines the opportunities and challenges facing health care leaders today when generating, aggregating, integrating and interpreting data. The goal here is to provide new perspectives for achieving true transformation in the delivery of care with data.

At Roche, we firmly believe that by working together and bringing health care thinking to technology, we can deliver innovative health care solutions to providers and patients. As a global pioneer in diagnostics and pharmaceuticals, Roche has a long track record of innovating and advancing science to improve people's lives. Today, personalized health care is a strategic priority, as we merge the global breadth of our experience in medicine and science with the latest technologies. Laboratories today are the engine of digital transformation in health care, as the data they generate can influence up to 60-70% of clinical decision making.[1] Globally, laboratories using Roche products generated more than 20 billion test results in 2018—real-world data that helps labs create value for the physicians and patients they serve[2] and supports the move to truly individualized care.

We continue to invest heavily in innovation and technology to deliver earlier, targeted diagnoses and enable access to information that supports decision making. The integration of our own and our partners' (hospitals and labs) solutions is just beginning. There is huge potential to connect systems, correlate data points, and create new information for improved outcomes that impact:

- Operational excellence (in the delivery of care)
- Sustainability of health care organizations (generating data-based insights for more informed decision making)
- Health care transformation (to create better informed patient care—for example, in cancer—by integrating clinical and workflow data efficiently and more holistically)

The growing availability, standardization, and integration of data across connected systems presents several opportunities. It also raises new challenges with respect to managing the data in ways that comply with data privacy, medicine, and intellectual property security requirements and regulations.

Digital transformation requires a holistic approach. Expert consultants in health care can help co-create digital solutions in partnership with labs and hospitals—solutions that accelerate transformation, add valuable insights, and better manage the cultural changes required by all. Our experience indicates that when we combine solid health care experience with emerging digital technologies, we can deliver medical value to patients and our communities. Prevention of disease, improved health outcomes, and a more individualized approach are key needs and opportunities in health care. With the rapidly evolving mega trends, such as aging populations and continually mounting cost pressures, now is the time to make this culture shift so we can deliver more personalized care and improved medical value, faster and earlier, for better patient outcomes.

We welcome the opportunity to work together in partnership with others across health care who share our purpose: "*Doing now what patients need next.*"

1 Rohr U-P, Binder C, Dieterle T, Giusti F, Messina CGM, Toerien E, et al. (2016) The Value of In Vitro Diagnostic Testing in Medical Practice: A Status Report. PLoS ONE 11(3): e0149856. https://doi.org/10.1371/journal.pone.0149856.

2 Roche Annual Report 2018.

LEADING A NEW ERA IN HEALTH CARE

Innovation through Data-Driven Diagnostics

EXECUTIVE SUMMARY

Organizations across the health care sector recognize that the innovative use of data—when information is combined for advanced analysis and managed across disciplines, systems, and settings—is crucial to solving the most challenging problems in both patient health and operational efficiency.

Despite this widespread recognition, only 15% of respondents to a recent global survey of 742 health care leaders describe their organization today as being mature in its ability to access, integrate, and analyze health care data from diverse sources. FIGURE 1 Half of the participants in the study, conducted by Harvard Business Review Analytic Services, say they are developing these capabilities, but decision making is slowed by gaps in the digital workflow. And a third say that while they have some data management tools, pulling relevant data together is a slow and challenging process. Respondents represent a range of health organizations, with a plurality being care providers. SEE METHODOLOGY AND PARTICIPANT PROFILE

To benefit from being more data-driven, health care organizations need to adopt new analytic tools and break down silos—starting with silos of data and systems, but also bridging silos within organizational functions and across organizational boundaries. The most successful will take a broad view of their improvement goals, looking not just at automating a discrete activity or function but rather approaching the effort as a true transformation of data flows and processes among various parts of the health system.

Respondents recognize the importance of sharing and managing data—both clinical and operational—across settings. But the survey found only 19% are very successful at managing clinical data across care settings today. FIGURE 2 Even the leaders have a ways to go, with only 50% claiming to be very successful.

The picture is no better when it comes to managing operational data across care settings—only 16% say they are very successful doing so.

There are a number of reasons for the large gap between the importance organizations place on the successful management of data and their current level of maturity. These include:

- Poor data quality and inconsistency from one source and setting to another
- Cultural problems, including organizational silos and a lack of leadership
- Data security, privacy, governance, and compliance concerns
- Technical issues such as a lack of integration and system compatibility
- Misaligned interests between providers, pharmaceutical companies, and payers

HIGHLIGHTS

95%
OF ALL RESPONDENTS SAY MANAGING CLINICAL DATA ACROSS CARE SETTINGS IS VERY IMPORTANT

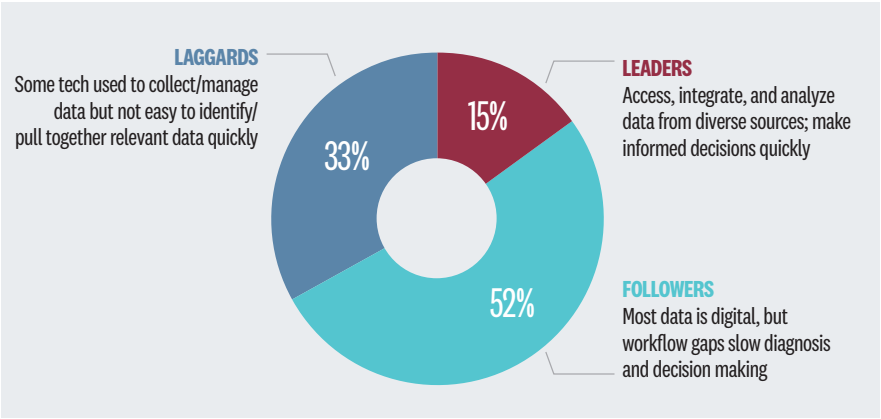
15%
OF RESPONDENTS DESCRIBE THEIR ORGANIZATION TODAY AS BEING MATURE IN ITS ABILITY TO ACCESS, INTEGRATE, AND ANALYZE HEALTH CARE DATA FROM DIVERSE SOURCES

19%
ARE VERY SUCCESSFUL AT MANAGING CLINICAL DATA ACROSS CARE SETTINGS TODAY

FIGURE 1

ONLY 15% OF ORGANIZATIONS ARE FULLY EQUIPPED TO MAKE QUICK DATA-DRIVEN DECISIONS

Most are building their capabilities, while a third lag behind



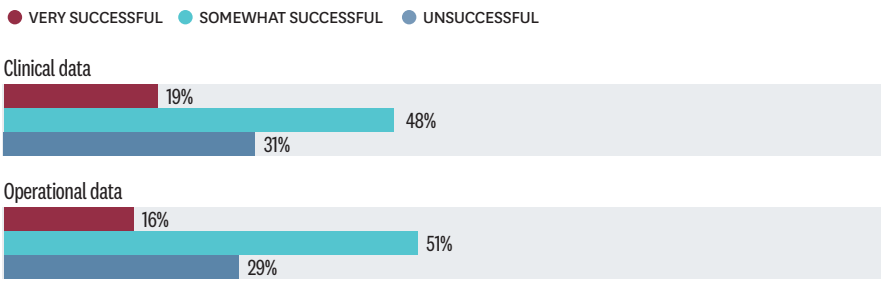
SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, APRIL 2019

FIGURE 2

LESS THAN A FIFTH SUCCESSFULLY MANAGE DATA ACROSS CARE SETTINGS

95% say it is VERY IMPORTANT to manage clinical data across care settings.
84% say the same for operational data, but few excel.

DEGREE OF SUCCESS MANAGING DATA ACROSS CARE SETTINGS.



SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, APRIL 2019

Leaders—those 15% who describe their organization as adept at leveraging data from diverse sources—are not immune from these inhibitors, but change-driving leadership, higher levels of funding, and advantageous relationships are helping them to navigate the process.

To pick up the pace of their digital transformation and realize the care-delivery and cost-efficiency benefits, providers need to:

- Make data-driven health care a key priority that is led from the center of the organization.
- Adopt a true digital transformation approach to data-driven health care, collaborating across silos—both within their organizations and externally, with other providers, technology suppliers, pharmaceutical companies, payers, and patients.
- Realign their data strategy to a value-based approach to health care.
- Apply innovation not only to incrementally improve existing operations but to radically change the nature of care delivery.

The digital transformation journey in health care has just begun. Today electronic medical records (EMRs) are fairly prevalent, at least within individual care settings, but the same cannot yet be said of shared medical records or digital tools to support clinical and operational decision making. And there is plenty of scope to grow the use of cloud-based services and platforms to bring together and interpret health data.

How Data Can Improve Outcomes in Health Care

There is a clear and compelling link between a better use of data and both improved health outcomes and operational efficiencies. Done right, the data-driven approach can increase speed and improve the quality of diagnosis and treatment while taking waste out of the system and lowering costs. But it's not enough just to have more data along a single dimension: Being data-driven includes looking

"IF I CAN MAKE INFORMED DECISIONS ON A MILLION PATIENTS VERSUS ON 10,000, I THINK I LIKE MY ODDS ON THE INFORMED DECISIONS ON A MILLION."
MATTHEW ROMAN, CHIEF DIGITAL STRATEGY OFFICER, DUKE HEALTH

at patterns of data that encompass a variety of factors—such as the patient's age, gender, prior conditions and outcomes, and test data—across disciplines, from the lab to the bedside, over time.

"If we define up front the patterns of patients according to the risk of having cancer, we could shorten their way to the final diagnosis, avoiding unnecessary exams, biopsies and tests, and spend less money along the way," says Dr. Victor Piana de Andrade, medical director at AC Camargo Cancer Center in Brazil. Close to two-thirds of respondents (64%) strongly believe becoming more data-driven will improve the efficiency and effectiveness of health care delivery.

This thinking is inextricably linked to the shift in reimbursement models, from fee-for-service to value-based care. The Institute for Healthcare Improvement (IHI), a U.S.-based organization working to improve health and health care outcomes globally, uses a framework it calls the Triple Aim: (1) improve the patient experience of care (including quality and satisfaction); (2) improve the health of populations; and (3) reduce the per capita cost of health care. The future of health care depends on improving all three in a way that ensures the sustainability of health organizations. The ability to share, aggregate, integrate, and analyze data effectively is what makes this possible.

Those on the front lines of health care—hospitals, clinics, integrated care systems, medical universities, etc.—increasingly work across numerous data domains and employ a variety of digital tools. The EMR, used by three-quarters of frontline respondents, has been an important first step in the digitization of health data, and it becomes even more powerful when it can cross institutions, with primary, secondary, and tertiary providers all working from and adding to the same record. But less than half (47%) of respondents' EMRs extend beyond their own organization's walls. Frontline leaders are significantly more likely to have EMRs that are available across institutions. FIGURE 3

Three decades ago, University Hospitals Leuven, the largest university hospital in Belgium, built its own EMR. It now shares the system with about 30 other hospitals—half of all the hospitals in the Flanders region of Northern Belgium—in addition to its own two facilities.

"It's not only that they're using the same software, but we're working within one medical file per patient with all of those hospitals," says Dr. Frank Rademakers, chief medical technology officer. This ensures that conversations and tests that occur in one place are immediately available to others in the network that the patient might see. This improves the patient experience and avoids having data duplicated or lost, cutting the time to diagnosis and treatment. Nearly two-thirds (62%) of respondents say such data sharing will improve the consistency of quality care. To cover even more of that care spectrum, by the end of the year, University Hospitals Leuven will extend its EMR to include primary care physicians and nurses who work in patients' homes.

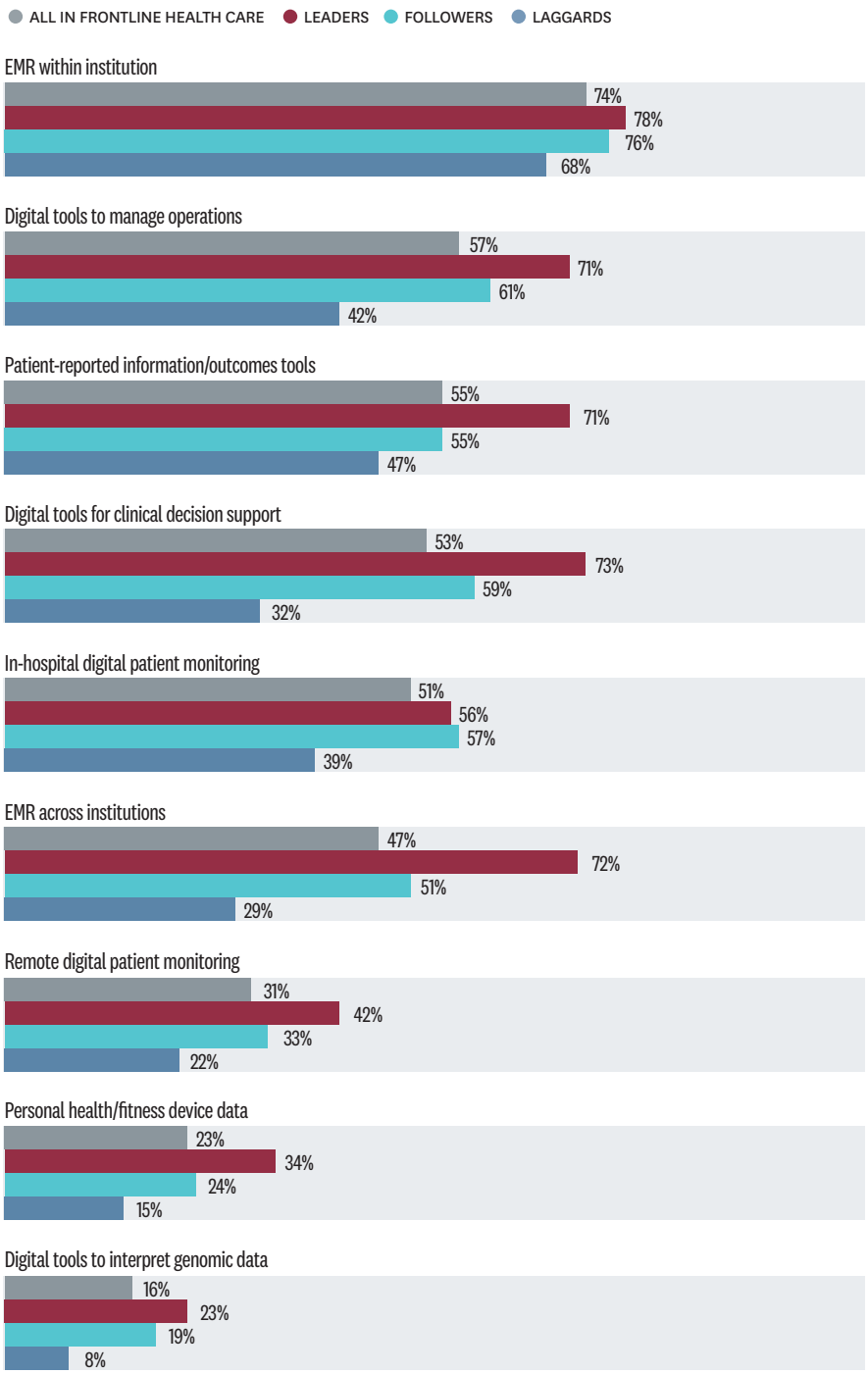
The EMR is just one tool available to health care organizations in their digitalization journeys. Labs and hospitals increasingly use a variety of tools to gain and share insights from data and to improve their operations. More than half of respondents routinely use digital tools to manage hospital or lab operations (57%) and for clinical decision support (53%).

THERE IS A CLEAR AND COMPELLING LINK BETWEEN A BETTER USE OF DATA AND BOTH IMPROVED HEALTH OUTCOMES AND OPERATIONAL EFFICIENCIES.

FIGURE 3

LEADERS' EXPANSIVE USE OF DATA AND TOOLS

EMRs, though prevalent, are just the beginning



SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, APRIL 2019

Why Sharing Data Isn't Easy

Few health care providers have the benefit of this kind of shared system. In the U.K., for example, "we're called the National Health Service, but actually we're currently a bunch of separate institutions delivering different aspects of the care pathway," says Dr. Nick de Pennington, Digital Innovation and Population Health Lead at Oxford University Hospitals. This includes different hospitals, clinics, and doctors' offices and also social services agencies. "We are looking for ways to, in the first case, improve the quality of the care we give and the patient experience, but also to deliver a more efficient service. That's the high-level vision."

Health care organizations share data with a wide variety of entities, not just other providers. FIGURE 4 While respondents' organizations have strong existing ties with regulatory bodies, professional associations, and other providers, they expect collaboration with health IT companies and health data providers to grow. Hospitals collaborate more than others with diagnostics, health IT, and medical device companies.

The shift to a value-based medical reimbursement model, where hospitals and doctors are paid based on medical outcomes rather than just for delivering a service, is creating greater demand for good data. By collaborating with other data-rich entities like pharmaceutical companies and payers in a shared-risk model, providers and labs could achieve better results at lower costs—and share the financial risks and benefits with those other entities. Getting there won't be easy, but health leaders interviewed for this report believe it is well worth the effort to work through the challenges.

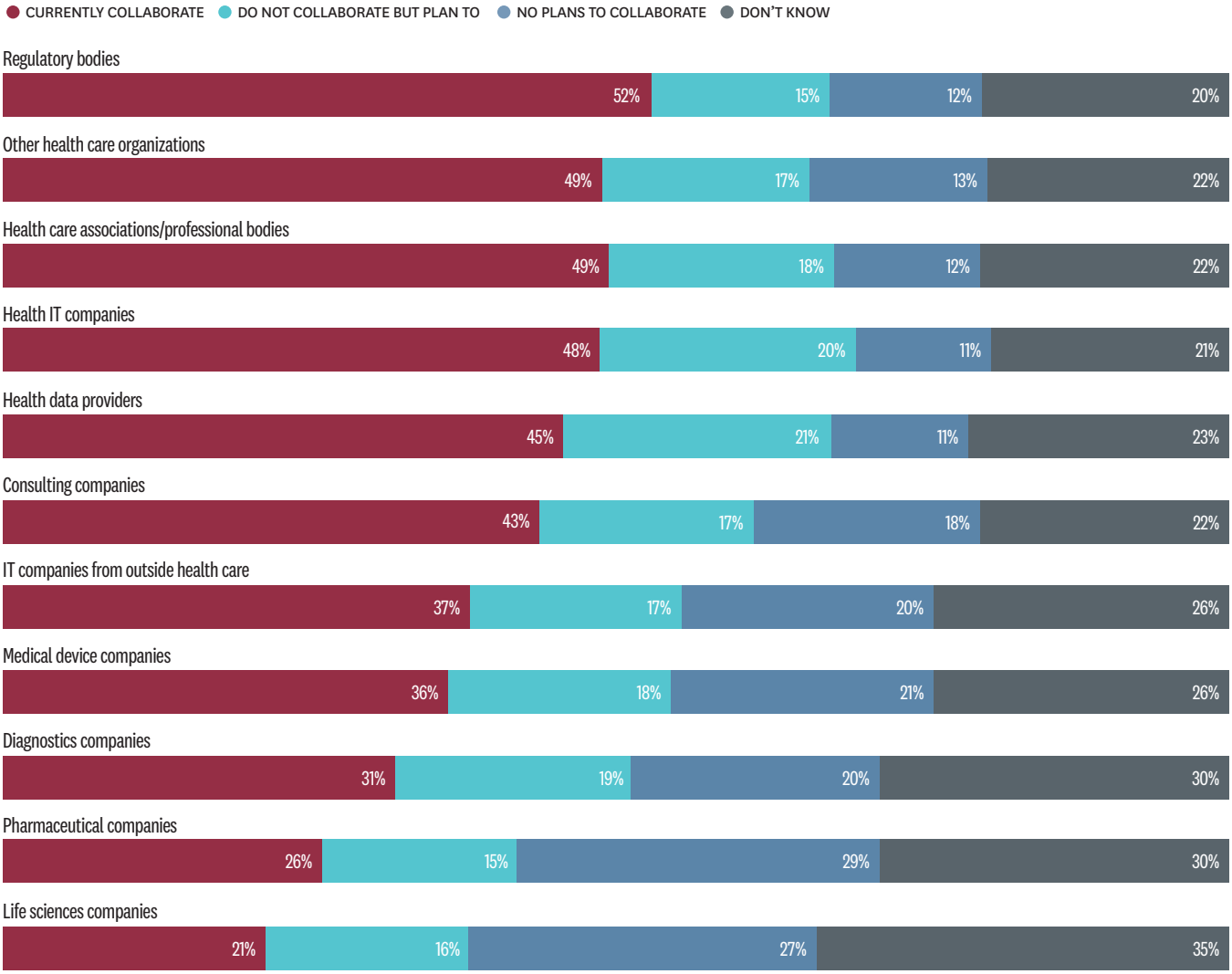
"I'm a strong believer in collaboration between academia and pharma and technology companies," says Rademakers, "but we do need to acknowledge the fact that the overall goal of a company is to improve value for their shareholders."

Fundación Valle del Lili, an acute care hospital in Colombia, has formed an alliance with three insurers in whose

FIGURE 4

COLLABORATION IS WIDESPREAD

Hospitals collaborate more than others with diagnostics, health IT, and medical device companies.



SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, APRIL 2019

data it has confidence, according to Dr. Ludwig Albornoz, Lab Director and Head of the Department of Pathology and Laboratory Medicine. They have assumed a risk-sharing model with the insurers, believing that with better data they can achieve better outcomes. "We feel that we can only predict how things will be in the future when there is good data from [the insurers]," he said.

Insurers aren't the only entities with valuable data to share. A regional health organization in Africa, whose goal is to eliminate a particular disease by the year 2030, must influence governments to gain access to the data it needs. "It is an issue that requires political will," said the organization's CEO. "It is an issue that needs to be negotiated country by country. Therefore, the most important thing is to give the country confidence around the security of data and also who will have access to what data."

Pharmaceutical companies provide another rich source of data that could

IN SOME REGIONS, THE PAYER AND THE REGULATING ENTITY ARE THE SAME.

78% OF RESPONDENTS STRONGLY AGREE THAT INTEGRATING DATA FROM OPERATIONS ACROSS INSTITUTIONS ENABLES BETTER, MORE CONSISTENT CARE TO COMMUNITIES.

help produce better outcomes. AC Camargo Cancer Center in Brazil is seeking an opportunity to run a proof-of-concept triad alliance, with one provider, one pharmaceutical company, and one payer sharing data openly and working together to generate value in patient care. Medical director Piana de Andrade believes that demonstrating the advantages that such collaboration can produce will lead others to follow this example. "This will be an evolution toward quality and sustainability for the whole health care system," he said. However, he also believes that it may require a third party to start this open conversation, bring different entities to the table, and make these alliances work, given the different interests of the parties involved.

Increased sharing of data not only leads to greater efficiencies throughout the system and better outcomes for individual patients; 78% of respondents strongly agree that integrating data from operations across institutions such as hospitals and laboratories enables better, more consistent care to communities, especially as more organizations monitor a variety of population health issues. FIGURE 5 Data-driven leaders are able to do more in this regard.

For example, University Hospitals Leuven has built a large, rich database of a diverse population of patients from the over five million patient records in its network of hospitals of different types and sizes. This data is used for benchmarking patient outcomes, staffing, and patient-flow data, among other things. To further expand its insight, the hospital also shares select and anonymized data with a pan-European group and with a global collaborative.

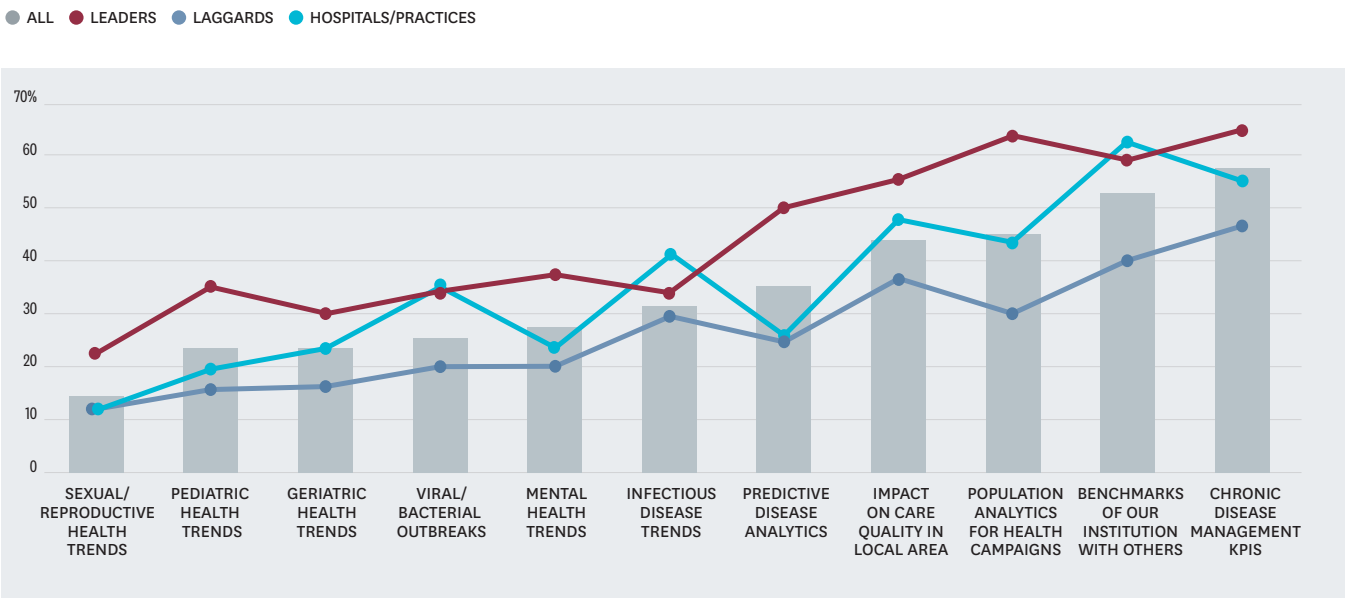
Overcoming Silos of Systems, Data, and Organization

University Hospitals Leuven is in a unique position because its homegrown EMR makes it easy to share data within its network. This lets it overcome at least one of the top two inhibitors to becoming more data-driven—silos of systems and data, named a top inhibitor by 37% of respondents. FIGURE 6 Mandates and incentives to increase system

FIGURE 5

LEADERS DO MORE TO TRACK POPULATION HEALTH

Hospitals focus more on benchmarking and tracking outbreaks and disease trends



SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, APRIL 2019

interoperability in various markets should help others move forward, but that will take time. Albornoz, at the Fundación Valle del Lili, would like to see a state-driven initiative in which the medical record is electronic and available to all providers in Colombia.

Health care organizations are leveraging a number of new technologies to make better use of data. These include data warehouses and data lakes (a repository of both structured and unstructured enterprise data) to make better use of data internally; sophisticated analytics to make better, faster diagnoses; and health care data-sharing platforms, patient portals, and API-based systems to facilitate the better flow of data to and from devices, patients, and other members of the health ecosystem.

AC Camargo Cancer Center in Brazil built a data lake to make use of the volumes of data generated across its operations—both structured and unstructured, clinical and financial. It has the technical and analytic skills it needs to work with this data at the research level. Now it's in the process of pulling in the data to make decisions that will help patients and the business.

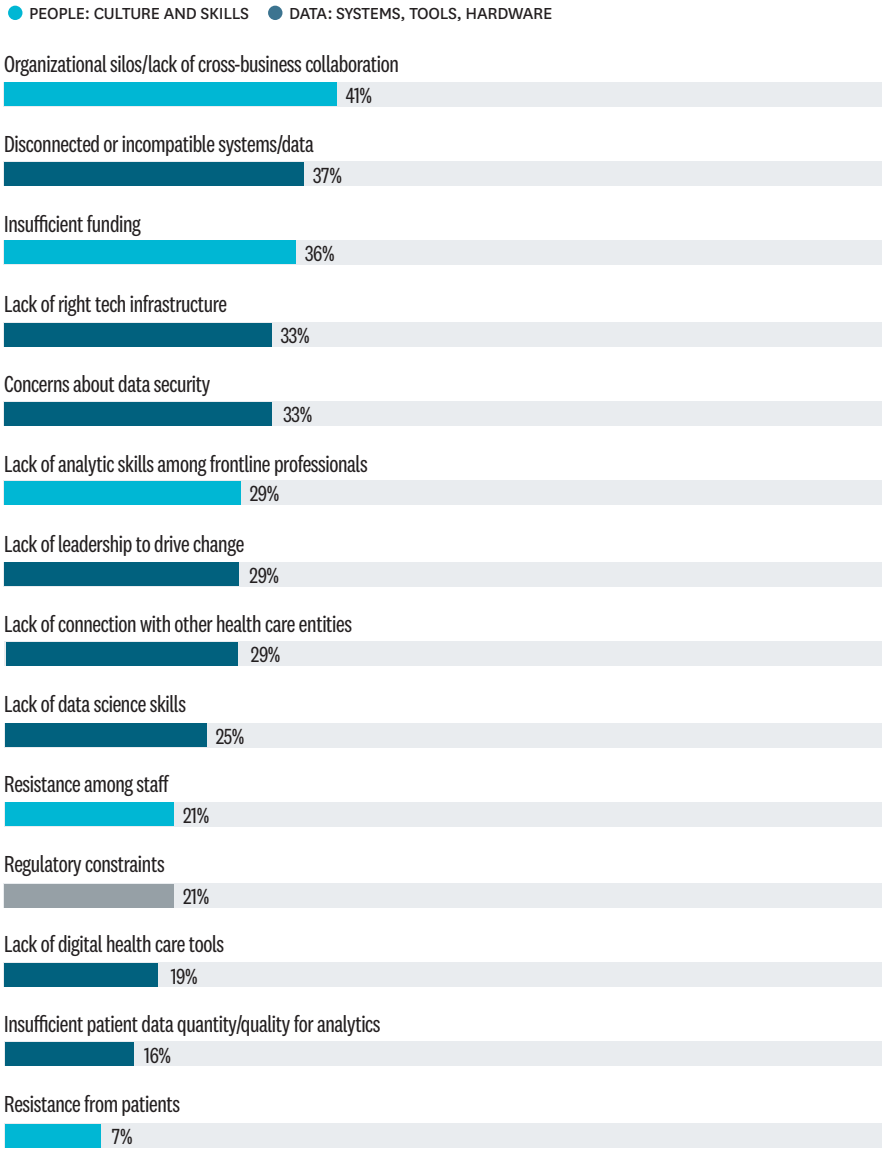
"We have different pieces in different systems, and we need to combine them in one data lake," says Piana de Andrade. "That's our missing part." While Brazil still operates under a fee-for-service model, "we believe big data and analytics will help the institution survive on cost-effectiveness as well." Roughly half of hospitals and practices use software to pull together data from diverse sources to diagnose and treat individual patients. FIGURE 7

Many health care providers are betting that richer connections with patients will improve outcomes for both patients and the organization. Duke Health, an integrated university health system based in the U.S., is building a digital asset library for patients. The assets will include a wide range of things, such as mobile phone apps patients can download, educational content, and services within the health system and the community.

FIGURE 6

SILOS—OF GROUPS, SYSTEMS, AND DATA—ARE HOLDING THINGS BACK

Health care organizations face a complex mix of hard and soft challenges



SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, APRIL 2019

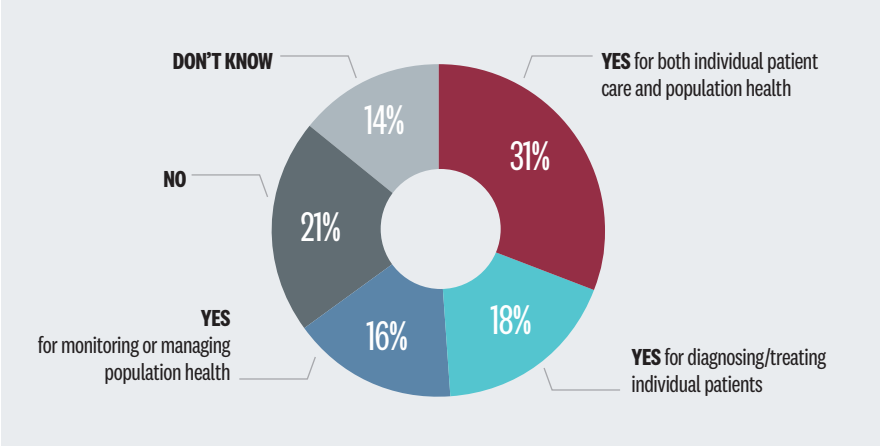
"The purposes of these assets include helping patients to better engage and make progress toward their health goals between clinical encounters," said Matthew Roman, chief digital strategy officer.

To truly be useful, this library must be intelligent enough to help providers

FIGURE 7

ROUGHLY HALF USE SOFTWARE TO ACCESS AND INTEGRATE DATA FOR PATIENT CARE

Does your organization use software applications or tools to pull together data from diverse sources?

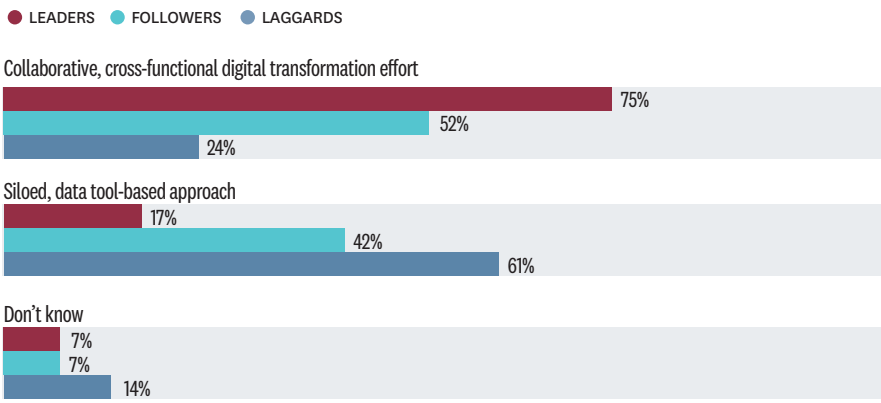


SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, APRIL 2019

FIGURE 8

LEADERS ARE COLLABORATIVE TRANSFORMERS

A siloed, tool-based approach to data-driven health care is leaving many organizations behind



SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, APRIL 2019

assign specific assets to patients "based on their disease state, their clinical condition, their health journey, their socioeconomic status, their technology comfort or savvy, their access to whatever tools are available," says Roman. "We need to know an awful lot about a patient to be able to serve the right asset to them." This requires a platform that is stable and reliable but also flexible, Roman adds, so "we can apply asset A to you and asset B to your sister who might look very similar, but be very different." And it requires data from a large number of patients in order for the algorithms to make the right assumptions. "It's making a decision for one patient based on the data of a million."

Overcoming silos of systems and data is only half the battle. Organizational silos and a lack of collaboration across functions was rated an even greater inhibitor. Health care organizations struggle as much as enterprises in other industries to break through to a more open, collaborative way of working. Leaders approach their shift to data-driven health care as a real transformation that encompasses more of the health care continuum and breaks through old silos, whereas slow-going organizations are more likely to adopt new tools piecemeal, department by department. FIGURE 8

The intersection between the lab and physicians is one area that's ripe for improvement, says Dr. William G. Morice, II, M.D., Ph.D., chair of Mayo Clinic's department of laboratory medicine and pathology, and president of Mayo Clinic Laboratories. "The bulk of the quantitative data in the medical record comes from the laboratory," he explains. In the fee-for-service world, the value of the lab was based on it producing individual pieces of information, running tests, and making diagnoses with little concern over the efficiency of the process or even its contribution to a good outcome. That led to a lot of waste in test ordering, he says.

"If there's not a lot of understanding about what tests are being ordered, how they're being ordered, or how the data is being created, you have a lot of waste

data in the system," says Morice. Even if the individual data is high quality in terms of being accurate, it's not really high quality if it's not informative.

"The real question should be: how do we as the physicians and scientists think about how to use the laboratory to support clinical care?" he says. "What's the real value proposition in the use of laboratory data as an engine to help drive health care outcomes?"

To that end, Mayo Clinic Laboratories has been working to influence provider test ordering. It uses decision support to enhance insights from the information being created, which makes it more effective in driving decision making and thus improving results.

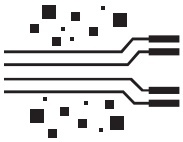
The handoff at the other end of the process, from test results to treatment, is another opportunity for improvement. The test process at the Fundación Valle del Lili in Colombia is working efficiently, according to Lab Director Albornoz, but a lack of quality indicators and mechanisms that can transform that data into actionable insights makes delivery of the intervention less predictable.

"Clinicians trigger the entire testing process, starting with imagining what the patient has, and ordering tests to either confirm or rule that out, or judge what the risk factor is, or find treatable targets," says Albornoz. "They do all the preanalytical judgments, and write that down in the charts, and then they justify the test and then we run it." The delivery of the intervention lacks the same rigor, often causing delays, he says.

"We move very fast in order to comply with our turnaround times [in the lab]," says Albornoz. "But if medical intervention is not done in a timely manner as well, then the patient loses. What we're lacking are good tools, like an indicator to measure medical intervention."

Addressing Data Quality, Privacy, Security, and Ownership

Data quality is a challenge that health care organizations must confront as data sharing becomes more prevalent.



LEADERS APPROACH THEIR SHIFT TO DATA-DRIVEN HEALTH CARE AS A REAL TRANSFORMATION THAT ENCOMPASSES MORE OF THE HEALTH CARE CONTINUUM AND BREAKS THROUGH OLD SILOS.

"Sometimes we go beyond the maturity of the marketplace," says Albornoz. "We end up being isolated in a little oasis of good-quality data and practice, but then we need to interact and be interoperable with others," including insurers and the national Ministry of Health.

Sometimes "quality" is not solely a matter of the quality of any given data or analysis, but of the ability of the diagnostic to inform decision making based on how it is applied. Tests taken in isolation can produce misleading results. Morice used the example of a test that looked for clonality (being genetically identical) of T cells to identify leukemia.

"It turns out the test itself didn't perform that well if it was ordered without a lot of other information around it," he says. "Because they hadn't done other tests to understand the significance, they actually had a lot of cases that were misidentified." This has led Morice to take a more expansive approach to using tests in decision making. "There are all sorts of opportunities here to guide people in how to make their decisions in a more programmatic way."

Providers increasingly factor in such data as patients' age, gender, and prior medical history before making a diagnosis and prescribing a course of treatment. With a wealth of data from previous patients and the right analytic tools, diagnoses are getting better. Now providers are seeking ways

66% OF RESPONDENTS NAMED DATA PRIVACY AND SECURITY A KEY CHARACTERISTIC WHEN SELECTING A CLOUD PROVIDER.

to access and make use of an even broader range of data with the so-called social determinants of health, such as education, income, housing, and more.

While the increased use of data in health care holds tremendous promise for both patient and organizational health, it also creates new exposures and risks. Three-quarters of respondents (74%) say that data-driven health care creates new risks for patient data privacy and security, and nearly the same percentage (69%) say that integrating hospital/lab operations creates new risks for the privacy and security of institutional and care data. FIGURE 9 This is a serious concern as more expansive data is collected on patients and shared more broadly.

Health care professionals expect their technology suppliers and partners to help them address these concerns, especially when it comes to the use of cloud resources. A full two-thirds (66%) of respondents named data privacy and security a key characteristic when selecting a cloud provider—significantly more than service reliability, the next highest at 51%, and cost at 37%.

The regulatory environment for the use of patient data is evolving in markets around the world as governments come to terms with the benefits and risks of greater sharing of such sensitive data. Nearly two-thirds (62%) of respondents say that government regulations for patient data will slow their transition to data-driven health care.

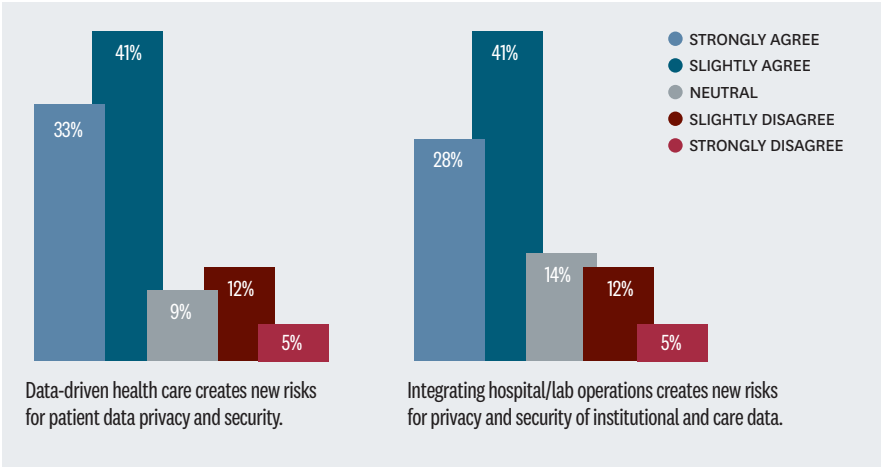
How regulations are developed and applied also depends on resolving questions about data ownership and governance. "The main challenge that we have [when it comes to data sharing] is about ownership of data and whether that's something that's owned by individual patients or by the organizations that care for them," says Oxford University Hospital's de Pennington. "Particularly in primary care, there is a sense of concern about sharing data incorrectly to organizations beyond their individual practice."

De Pennington sees this evolving in one of two ways: one in which the data is owned and managed by organizations that consent on behalf of their patients, and another in which patients manage their own records. The latter "almost certainly is going to be led by the large tech companies putting those platforms in place," he believes.

FIGURE 9

DATA PRIVACY AND SECURITY RISKS INCREASE

Health care organizations expect technology suppliers and partners to address these concerns



SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, APRIL 2019

What It Will Take to Transform Health Care: Innovation, Investment, Aligned Interests

The transformation of health care is a massive undertaking, so it's not surprising that organizations aren't further along. But findings from this research reveal a real sense of urgency. Half of respondents say the shift to data-driven health care will have a significant impact on both the culture of their organization and employees' roles over the next three years. Only around 10% expect to see little to no impact.

The leaders—organizations that are mature in their ability to access, integrate, and analyze data from diverse sources and to make informed decisions quickly—provide insight into what it will take to become truly data-driven.

First, these organizations approach the opportunity holistically and systemically, looking at how the entire health care value chain can best operate, not just their small part of it.

Those who approach becoming more data-driven as a collaborative digital transformation effort, not just the adoption of a set of tools, invest in programs to facilitate change. These include communication from top management about the importance of collaboration; redesigning processes to cross silos; formal training in new ways of working; change management programs, and investing in new collaboration tools. FIGURE 10

Becoming data-driven changes the way people throughout the health care system do their jobs, yet only 12% of respondents provide training for all professionals in the use of new digital tools, data analytics, and data-based decision making. Leaders are twice as likely to do so at 25%, compared with 13% of followers and only 5% of the least mature organizations. FIGURE 11 And leaders are three times as likely as the immature to have programs in place to facilitate and manage culture change (62% versus 29%).

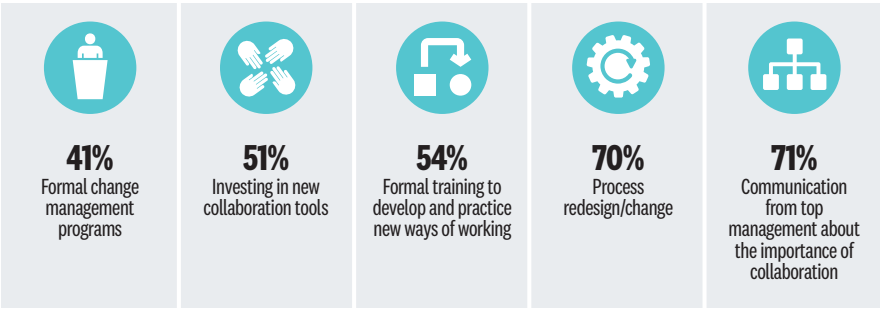
Transformations require innovation. Some, like Albornoz and the Institute for Health Improvement, approach this from a quality perspective, using data to improve everything from cost accounting to the disposal of lab waste. The IHI focuses on quality in the design, improvement, and control of health care processes, whether those changes are incremental or disruptive. "There are a lot of things that we do that are incremental process changes that result, cumulatively, in a more substantive difference," says Kedar Mate, IHI's chief innovation and education officer. "But at times you need a more systematic departure from the way the system is presently designed."

Patient-centered care is one area where health care leaders are looking for more radical change. They believe that the ability to tap into the wealth of data being generated about individuals can contribute to better health.

FIGURE 10

PRACTICES TO FACILITATE TRANSFORMATION

Responses from all who describe their approach as digital transformation



SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, APRIL 2019

"We know that social determinants of health account for 70% or more of health outcomes," says Oxford University Hospital's de Pennington. "So the most exciting source of data is insights about how individuals behave and interact."

But the challenge is that much of this data resides in people's personal social accounts, commercial databases, and other online sources. Sorting through the data ownership, governance, and ethical use issues will require care.

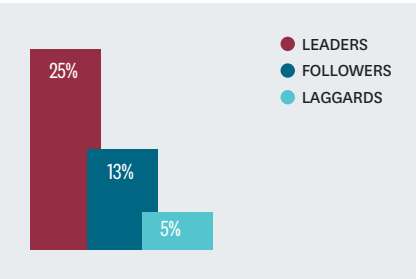
Cincinnati Children's Hospital Medical Center and the ImproveCareNow network are approaching the patient-centered care model from a different direction, connecting patients and their parents to a community where clinicians, researchers, parents, and patients can learn and collaborate to improve the health of young people with inflammatory bowel disease.

In one case, a young woman developed a colostomy care kit for teenagers who wanted to be able to go to the beach. "Your physician is going to be at a loss for how to help you do that," says IHI's Mate. "But there's a community of other kids who have been doing that for generations before you, and who can easily coach you or give you ideas. Networking patients to help coach one another on how to take care of one's chronic condition is a very powerful area for innovation in the future."

FIGURE 11

LEADERS ARE FAR MORE LIKELY TO TRAIN ALL PROFESSIONALS

Training in the use of digital tools, analytics, and data-based decision making



SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, APRIL 2019

HEALTH CARE LEADERS MUST INVEST IN TOOLS, DATA, AND SKILLS, AND EFFECTIVELY MANAGE THE CULTURE CHANGE TO LEAD THEIR ORGANIZATIONS INTO THE FUTURE.

ImproveCareNow is showing impressive results—including verification of two therapeutics by commercial companies. Mate believes that's due to the power of its three interlocking networks—clinicians to share best practices; researchers using the same datasets to create new diagnostics and therapeutics to improve outcomes for that particular disease community; and patients who are empowered to co-manage their conditions and inform the research.

Most providers wrestle with how to pay for innovation in data-driven health care. Insufficient funding was the third most-often cited inhibitor by survey respondents. Duke Health's Roman is taking a "pay as you go" approach to developing the platform and assets for his digital library. "These platforms by themselves do nothing except add cost to the portfolio," he says. It's the cumulative impact of the assets that justify the investment and make it possible to add new assets in the future.

Some health care leaders struggle with "the wrong pockets" problem as health care evolves. "If you think about the system as a whole organism, stakeholder growth needs equity to keep the whole system healthy," says Piana de Andrade at AC Camargo. "Providers, payers, and the drug industry have a common enemy: cancer. They should concentrate efforts to converge on patient needs and avoid conflicts of interest that will delay achieving a better balance to the system."

That raises the question of who is willing to invest in each part of the health chain, and who is getting the ROI. "Treating cancer is very complex and expensive," says Piana de Andrade. "Prevention can save lives and money, but benefits from prevention traditionally are seen in the long term and may not reach the same current players that are struggling with treatment expenses. So who should be investing at the beginning of this trail?" Resolving this could lead to new business models and truly transform health care.

Conclusion

Health care leaders in diverse markets around the world believe the advanced use of data has tremendous potential to improve both health outcomes and the efficiency of health operations. But a lot still has to happen to unlock the full potential of data. The vast majority of survey respondents (95%) say it is very important to the future of health care to manage clinical data across care settings, but only around a fifth (19%) claim that their organization is very successful at this today. Similarly, while 84% say managing operational data across settings is essential, only 16% rate themselves highly.

Some believe the data discipline doesn't get enough attention from the organizations that are working on health care improvement, whether that's governments, academic institutions, or think tanks. At a recent meeting at the Harvard School of Public Health, for example, experts gathered to discuss how to eliminate a particular disease. "You've got all the medical experts and some advocacy experts, as well as a chemical expert sitting in the room," says the CEO of the regional health organization in Africa. "But there's been no data experts that have been in that same room." Given the scope of the challenge to transform health care, little will happen unless senior leaders make this a priority.

The EMR was an important first step in digitizing health data to improve care. But to really benefit from being more data-driven, care providers must do more. This includes aggregating, analyzing, and sharing data using a variety of new tools and platforms. Health care executives and professionals will have to shift their mindset and behaviors, breaking down silos of data and systems as well as organizational silos between functions and across organizational boundaries. Even as they master these hurdles, concerns around data privacy and security will plague these organizations for some time to come.

Big change is ahead, and few organizations are on top of this change today. Health care leaders must invest in tools, data, and skills, and effectively manage the culture change to lead their organizations into the future. Those at the forefront are taking a broad view of their improvement goals, looking beyond their own area of responsibility to reimagine roles, relationships, and data flows among various parts of the health system. Putting the patient at the center, this approach can lead to faster, more effective delivery of better outcomes while creating a more supportive, less stressful experience for patients as they navigate their own health journey.

METHODOLOGY AND PARTICIPANT PROFILE

A total of 742 respondents drawn from the HBR audience of readers (magazine/ enewsletter readers, customers, HBR.org users) completed the survey.

SIZE OF ORGANIZATION

32% 1-500 EMPLOYEES

7% 500-999 EMPLOYEES

19% 1,000-4,999 EMPLOYEES

12% 5,000-9,999 EMPLOYEES

30% 10,000 OR MORE EMPLOYEES

SENIORITY

28% EXECUTIVE MANAGEMENT/ BOARD MEMBERS

32% SENIOR MANAGEMENT

20% MIDDLE MANAGEMENT

21% OTHER GRADES

JOB FUNCTION

15% PROFESSIONAL (HEALTH CARE/LEGAL)

13% ADMINISTRATION

12% GENERAL/ EXECUTIVE MANAGEMENT

10% CONSULTING

5% ACADEMIA

4% BUSINESS DEVELOPMENT

Other functions are less than 4% each.

REGIONS

64% NORTH AMERICA

17% EUROPE

10% ASIA/PACIFIC

5% LATIN AMERICA

4% MIDDLE EAST/ AFRICA

1% OTHER

INDUSTRY (HEALTH CARE OR HEALTH CARE-RELATED INDUSTRY)

27% HOSPITAL/PRACTICE

10% ACADEMIC/RESEARCH/ MEDICAL TRAINING

7% NOT-FOR-PROFIT HEALTH CARE INSTITUTION/ PROFESSIONAL BODY

5% GOVERNMENT HEALTH CARE BODY

2% DIAGNOSTICS LABORATORY

12% INTEGRATED HEALTH CARE DELIVERY SYSTEM

7% MEDICAL EQUIPMENT MANUFACTURER

7% HEALTH INSURANCE

4% BIOTECHNOLOGY/ LIFE SCIENCES

1% SOCIAL SERVICES/CARE

Figures may not add up to 100% due to rounding.

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