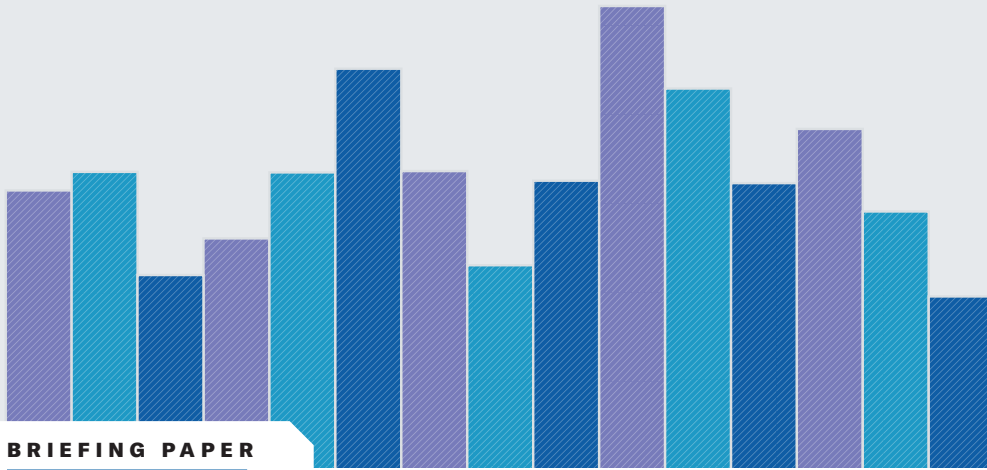




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ANALYTIC SERVICES



BRIEFING PAPER

Ensuring Agility and Connectivity in Today's Health Care Landscape



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Around the world, health care providers want to improve population health and care for patients in new, more holistic ways. And they want to do so with more impact, in a more cost-effective manner, while ensuring greater resilience.

This Harvard Business Review Analytic Services report describes how innovative service models and digital transformation can help leaders do just that. It includes findings from our [Future Health Index 2021](#) report and the experiences of C-level health care leaders from Indonesia, Germany, and the United States, who detail their approach to ensuring agility, connectivity, and scalability in the delivery of care.

The report concludes a four-part series sponsored by Philips, which highlights how health care challenges can be addressed through joint innovation, with health systems and technology companies partnering to achieve better health outcomes and operational effectiveness at lower cost. In particular, the report presents peer insights and actionable guidance on how digital technology, supported by real-time data, can help leaders move from a reactive to a proactive approach in areas such as clinical decision support and enterprise monitoring as a service.

I invite you to read the other reports in the series, including:


- [Driving Innovation in Health Care through Strategic Partnerships](#)
- [Addressing the Efficiency Imperative in Health Care](#)
- [Increasing Care Capacity and Clinical Confidence](#)

Supported by strategic partners and new service models, health care leaders can achieve far greater value over time, allowing them to focus resources where they can have the most meaningful impact.



Frans van Houten
CEO
Philips

Ensuring Agility and Connectivity in Today's Health Care Landscape



“Disruptive change is happening in health care, and we no longer have the luxury of taking many weeks to make a decision,” says Dr. David Zambrana, executive vice president and chief operating officer at Jackson Health System, in Miami-Dade County, Fla. Zambrana’s remark captures a global trend: around the world, health care leaders are calling for technological systems that are easily adaptable to changing conditions, including the sudden expansion of health care needs. That demand may result in more innovative health care models—think subscription-based operations to expand and contract capacity as necessary—as well as digital transformation. In short, it is now imperative for health care technology to be agile and scalable.

Integrated digital health platforms can provide a detailed, multifaceted picture of the patient journey, revealing insights that may not be apparent from a narrower perspective. Such platforms can also raise cybersecurity risks—threats that health care executives watch closely, given breaches in health IT around the world. But strategic partnerships with experts who can design secure environments, and detect and respond to breaches, are certainly within reach.

Executives must also confront a long-standing challenge for health care facilities: ensuring that separate IT systems work smoothly together. By working with health care technology partners, health care leaders can ensure their systems are interoperable.

Leaders in health care are planning significant investments in areas relating to data integration and analysis, interoperability, and security.

HIGHLIGHTS

Health care leaders are finding new opportunities to ensure that all **salient data is integrated and preserved across diverse care settings** so that clinicians can make well-informed and accurate decisions rapidly.

By working with health care technology partners **whose core expertise involves developing and maintaining a set of integrated hardware and software services**, health care leaders can reduce their interoperability concerns.

Health care leaders can make use of health care partners’ **cutting-edge hardware and software without incurring capital expenditure costs**; such an approach enables end-to-end organizational system optimization and holistic visibility that drive organizational change.



When asked about the areas in which their facilities most need to invest in the future, 40% of survey respondents referred to analytic and predictive technologies such as artificial intelligence and machine learning, and 24% mentioned tools to improve workflow efficiency, such as automated patient outreach.

Almost 3,000 health care leaders in 14 countries were surveyed for the Future Health Index 2021 report, which features proprietary research by Philips. Asked about the areas in which their facilities most need to invest in the future, survey respondents cited an array of initiatives. Forty percent referred to analytic and predictive technologies such as artificial intelligence and machine learning, and 24% mentioned tools to improve workflow efficiency, such as automated patient outreach. Other responses included improving operational efficiency by means of integration and optimization (16%) and implementing security and privacy systems and protocols (15%). With such a broad range of possibilities, prioritizing investments can be a challenge—one that strategic partnerships can help meet.

Drawing from interviews with health care leaders and experts, this Harvard Business Review Analytic Services report highlights the impetus for tech-enabled agility and scalability among health care facilities. It discusses ways in which health care leaders can thrive as they work with strategic partners. The report also describes innovative and highly advantageous means of using technological and process refinements to integrate components of the patient journey, as well as other features of health care systems. And it reflects on how leaders can maintain security and manage costs as they integrate their systems and stay agile.

Staying Agile amid Disruption

The Covid-19 pandemic has been a catalyst for lasting change in health care. Zambrana notes that the sudden and unexpected demands of the pandemic motivated rapid operational changes at Jackson Health, a nonprofit academic medical system consisting of a group of hospitals (anchored by Jackson Memorial Hospital) and other health care facilities. “We learned that hospital teams are very skilled at running their own business clinically and operationally,” he says. Jackson Health’s leaders therefore empowered the hospital teams to run their business units and make decentralized decisions very quickly. To support the teams on system-wide matters, like protective equipment protocols and educational support, the leaders set up a command structure with daily check-ins, he adds.

Jackson Health prioritized collaboration among managers and employees to handle the influx of patients amid the pandemic. “When there was a request for support by a team, the organization rose up to understand how we could fulfill it. We had continual communication and collaboration,” says Zambrana. “As a result, during our Covid-19 response, we achieved alignment, executed quickly, and kept our teams safe. And we scaled to administer 350,000 Covid-19 vaccine doses for our health system in our community.”

Zambrana notes that as the pandemic continued, Jackson Health enjoyed technological support for its agile practices via strategic partnerships with global health tech companies. “We worked with dashboards and visual information to show how we were functioning as a health system. We asked ourselves, ‘What did we learn from yesterday that worked or didn’t work, and how could the answer inform what we did next?’” Zambrana’s tech-enabled process illustrates how health leaders can proactively use continuous, real-time improvement to enhance the quality of care and meet business success metrics.

At Indonesia’s Mandaya Hospital Group, which consists of a flagship hospital in Jakarta—Mandaya Royal Puri—and a multi-specialty hospital in Karawang, the pandemic brought urgent needs for agility and scalability. “We had to ensure the safety of our health care professionals and patients,” says Dr. Ben Widaja, president director of Mandaya Hospital Group. “For instance, we needed to renovate the ventilation system, and to change the entire layout, while a hospital was still running. Normally, a change of this scale would require long-term planning and budgeting. But in one of our hospitals, we did the whole renovation within one week.” For the Mandaya Hospital Group, flexibility and agility are also driven by an ambition to be at the forefront of health care. “As a health care leader,” Widaja says, “you ask yourself, ‘Do you want to stay the same and do things ‘normally’? Or do you want to be the pioneer, the leader in introducing services to adapt to new patient needs?’”

Mandaya Hospital Group’s appetite for innovation reveals itself in many new tech-enabled processes introduced during the pandemic, which help the organization offer high-quality, flexible care. For example, Widaja says, “Patients are still worried about Covid-19, and the number of patients going

to clinics has gone down. Children have missed routine vaccinations, and elderly patients are worried about going to the hospital. So now we have a new service: a drive-through clinic. Our doctors have the equipment they need to examine the patient in the car itself.” Increasingly, the capacity to meet patients’ dynamic circumstances with flexible solutions is essential to the future of health care.

Connecting the Patient Journey

A detailed, accessible view of the patient journey provides clinicians with crucial insights, and some of these tech-enabled patient journeys begin at home. “Recently we installed, as a pilot product, the capacity for patients to select services from home,” says Dr. Jürgen Graf, CEO and medical director of University Hospital Frankfurt, one of Germany’s leading academic hospitals. “They are kept informed via their smartphones, and can draw up the paperwork for when they arrive at the hospital.”

In an emergency, though, a patient journey may begin in an ambulance on the way to the hospital, where technology can increase efficiency and prepare clinicians for treatment. “In the state of Hessen [a German state containing the city of Frankfurt],” Graf says, “all emergency services are linked together on an IT platform that identifies which hospital is capable of accepting patients for trauma, stroke, myocardial infarction, and so on, so that paramedics can see whether a hospital can accept the patient. Hospitals also receive information from paramedics so that they can prepare themselves for the needs of the patient,” he explains. “This is how we speed up the workflow—and we do so by working with partners in European health care technology.” Workflow refinements help address what has been described as “a long-standing imperative: the need for clinical and operational efficiency,” a recent report by Harvard Business Review Analytic Services found.¹

Mandaya’s Widaja offers a high-stakes cardiology-related example of effective communication during transitions of care between an ambulance and the hospital. “We have smart cardiac ambulances, including a teleconferencing system, a mini lab, and an EKG [electrocardiogram] machine. All this is connected to the hospital, so a cardiac consultant can see what’s going on. If someone is having a heart attack, needing PCI [percutaneous coronary intervention], then speed is crucial.” According to Widaja, based on remote real-time information, the cardiac care consultant can make the decision for the care team to bypass the emergency ward and go straight to catheterization to save time.

Health care leaders are finding new opportunities to ensure that all salient data is integrated and preserved across diverse care settings so that clinicians can make well-informed and accurate decisions rapidly. In particular, once a patient is



“We asked ourselves, ‘What did we learn from yesterday that worked or didn’t work, and how could the answer inform what we did next?’” says Dr. David Zambrana, executive vice president and chief operating officer at Jackson Health System.

in the hospital, technology can enable real-time, highly connected, and interoperable digital access to information by clinical teams to support their decision making. “We are focused on assuring that all the data in our monitoring system, such as patient ventilators, flows into our EHR [electronic health record],” Jackson Health’s Zambrana says.

One of Jackson Health’s innovative data systems is an electronic trauma flowsheet created by its informatics team. The interprofessional team worked to ensure that data is displayed in a way that facilitates medical and treatment insights and improves the overall quality of care for patients. “Our trauma center said in the past that it was difficult to follow our fluid and blood product interventions on acutely ill patients in a chronological manner. We want to paint the picture clearly, and when we do so, it can help show us that *here’s* where we missed some data on resuscitation. Or, *oh, look*, the patient responded well to resuscitation or administration of medications.”

A fully connected patient journey can ensure that no significant data is lost to caregivers between stages of the journey while reducing administrative work. “With so many people engaged in the patient process, you need a system to pass information from one caregiver to another,” University Hospital Frankfurt’s Graf points out. “We’ve just installed a messenger system on a secured platform, with the help of a technology partner. When our specialists discuss cases, their entire communication enters the patient’s chart. A doctor who arrives in the morning might see, in the patient chart, nighttime communication between the surgical resident and a medical consultant.”

In a messaging service, data is transferred between devices. But in other cases, integrating the patient journey calls for transferring a physical device itself. “In the past, when caregivers had to take a patient off a bedside monitor and transfer them to a transport monitor, the data from the



“Integration is the most difficult thing. Many partners will focus on doing what they do best: their own technology. But our partners in various time zones have to work together, for instance, to ensure that all the data is consistent,” says Dr. Ben Widaja, president director of Mandaya Hospital Group.

bedside monitor was lost if it wasn’t documented,” says Zambrana. “Now, we will literally pull off a segment of the monitor. It becomes a transport device, completely tracking the patient’s monitoring data from the time they arrive all the way through their care.”

When a patient journey is integrated with technological support, new end-to-end efficiencies can arise. “We used to document the patient’s rhythm with an EKG rhythm strip,” Zambrana says. “It was a paper process. We would print the strips, place them on adhesive paper, and bring the paper to the nurses’ station. Now it all happens remotely, through a monitoring-as-a-service relationship with a partner.”

For hospitals in the Jackson Health system that have gone live with smart room technology, communication is being streamlined to remove inessential steps. “In the past, a patient might need to call a caregiver,” Zambrana explains. “It rang at the desk, someone would answer, and then they would find a caregiver to come to the room. Now, when a patient presses that call bell, the line may go right to their nurse. We’re streamlining communication and taking out steps that incur waiting, so that the issue is resolved by the person who is best able to deal with it as soon as possible. This is a work in progress; we are learning as we bring more units online.”

Technology-enabled integration of data for inpatients can automate crucial alerts, for example, when a patient’s vital signs deteriorate. “All results from the vital sign monitor are stored in the EHR automatically so the nurse doesn’t need to write it down,” says Widaja, describing procedures at the Mandaya Hospital Group. “These vital signs are scored automatically, so that we have an early warning system. If someone is unwell in the ward at three in the morning, the nurse is alerted on a mobile application. The nurse can alert the doctor, who can access the results from anywhere in the hospital or from home on a secure network. Compared to the old system, in which the nurse would have to read results into the phone or take a picture for the doctor, there’s a great improvement in speed and accuracy.”

Recent tech innovations can also help patients and their families receive full and timely medical results. “It’s important for us to make sure that the patient and their family can experience our technology; it’s not just for the caregivers,” says Widaja. “For example, we have a patient portal that

allows patients to see data including lab results and radiology images. Every emergency patient has their own room with a TV, where we can show the lab results and scans as soon as they’re published—no more printed copies. We’re also developing our portal as a mobile application. And we have a family consultation room in the hospital with a large screen where we can show the results and involve the family in deciding next steps.”

Health care leaders continue to look for additional ways of making the patient journey more connected, including increasing the use of artificial intelligence. “I would love to have us install a system that uses our organizational resources even more efficiently,” says Graf. “For example, suppose we have a patient who needs a specific EKG and an MRI [magnetic resonance imaging] scan. While the patient is waiting in the cardiology department for the EKG, suppose there’s unexpectedly a free slot for the MRI. Then we would like to schedule the patient to use their waiting time to take the MRI scan during that free slot. Here’s an area where artificial intelligence could increase the speed of our services—and could save money without interfering with quality.”

Maintaining Interoperable and Secure Systems

For health care organizations with multiple strategic partners across a complex range of functions, interoperability can be a challenge. “When we opened Mandaya Royal Hospital Puri, we launched software with partners in multiple locations globally, including Malaysia, Singapore, and the United States,” says Widaja. “Integration is the most difficult thing. Many partners will focus on doing what they do best: their own technology. But our partners in various time zones have to work together, for instance, to ensure that all the data is consistent.”

Some health care leaders hope that ultimately a global standard will be implemented to ensure compatibility across different health tech partners’ products. “We have a range of technology across our 45 departments. Our challenge is to ensure that interoperability issues do not interfere with quality and patient safety,” says Graf. “I would like to see an industry alliance to create a common standard among all the industry players, like the airline booking system.”

By working with health care technology partners whose core expertise involves developing and maintaining a set of integrated hardware and software services, health care leaders can reduce their interoperability concerns.² The Mandaya Hospital Group takes a supplementary approach. “We have long-term contracts with partners to maintain and update software, and we also have a very strong internal IT team,” Widaja notes. “The team makes sure that all of the software is integrated, that it conforms to our own hospital processes, and that to the patient, it looks like one system.” He offers a simple, patient-centric example of software integration—“Every patient orders their meals from a tablet. That application is linked to their electronic health record so that the menu is adjusted to their needs—for instance, they might receive the diabetic menu. And from the patient’s point of view, all the software is a single, unified system.” Personalized menus, with dietary needs mapped to the patient’s EHR, are important to well-being and can be seamlessly maintained over transitions of care.

As the patient journey calls for ever-greater data integration and data sharing, health systems may become more exposed to security concerns. It is not enough for data to move where it is needed; data must also be protected from increased vulnerabilities, especially on public networks.

Cybersecurity is one area of expertise for Niki O’Brien, policy fellow in global health at the Centre for Health Policy, Institute of Global Health Innovation (IGHI), at Imperial College, London. O’Brien underscores the importance of cybersecurity in health care. “Cybersecurity is a fundamental aspect of patient safety in the 21st century, and we’re seeing increasing threats to that safety,” she says. “In recent research we’ve undertaken within the U.K.’s National Health Service and 17 international health care organizations, we found a huge variation in terms of organizational maturity on cyber. But the universal consensus was a major and growing concern with security. Nearly everyone we spoke to across those international organizations had seen an increase in attempted cyberattacks over the past few years.”

Many health care leaders are alert to the security risks of maintaining an intricate network of software and hardware. Some emphasize the importance of protecting the most crucial components of the network, checking for breaches, keeping passwords secure, and holding strategic partners to high security standards. Enhancing security *after* an attack, though, as many leaders have explained to O’Brien was their approach, often comes too late.

Jackson Health focuses on prioritizing assets for protection, maintaining tight access control, and establishing expectations with strategic partners. “We prioritize securing critical devices, which may be lifesaving, such as a bedside cardiac monitor, or may contain protected health information,” Zambrana says. “And we’re constantly surveilling the network



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and surveying our teams to ensure security around passwords. We’ve appropriately restricted key websites to avoid risk to our network and systems.” Referring to the diverse network of health care devices linked to online IT systems, Zambrana says, “We aim for security in the internet of medical things and ensure multifactor authentication. From the beginning, when we source our relationship with our partners, we check that our purchase of devices includes all the patches and upgrades that are required to ensure that the devices maintain their security.”

Inappropriate user behavior can make a system vulnerable, as Widaja emphasizes. “We have to give suitable access levels to each person, making sure that the patient’s private data cannot be accessed by someone who is not involved in their care,” he notes. “There’s no point in the firewall and other defenses to keep the system super safe from external breach if, for instance, users can share their username with one another.”

Imperial College’s O’Brien confirms the importance of focusing on reducing human mistakes by improving education and reducing blame culture within organizations. “In health care in general, there’s a lot of discussion around how to make complex technologies secure. In reality, most attacks come from simple human error. The majority come from phishing emails that let hackers into systems [by fraudulently inducing users to reveal confidential information]. So staff need training on basic cyber hygiene.”

When health care leaders entrust patient data to partners, they must also allay patients’ concerns about breaches of confidentiality. “Patients get very, very nervous when they don’t know what’s going to happen to their data,” says O’Brien. “Our team at IGHI did a study in northwest London on patient



“You have to understand your partner’s goals as well as your own. And you have to create a business model that works,” says Dr. Jürgen Graf, CEO and medical director at University Hospital Frankfurt.

perspectives on remote care during the pandemic. Though patients were very enthusiastic about remote care, they were also extremely concerned about the threat of data being stolen and falling into the wrong hands.” As a solution, O’Brien recommends that health care leaders “listen to patients, listen to the general consensus around safety and security of data, develop good governance, and work across the organization and with third parties, including their technology suppliers, to make sure the security of that data is fundamental.”

INDUSTRY INSIGHT

Selecting the Right Partnership Model

Managed services from health care technology partners can help support agility and scalability—and keep sensitive data secure. To reap these benefits and achieve greater economies of scale, leaders might choose one or more of the following approaches.

Adopt an as-a-service model. Health care leaders can make use of health tech partners’ cutting-edge hardware and software without incurring capital expenditure costs; such an approach enables end-to-end organizational system optimization and holistic visibility that drive organizational change.

Maximize value of investments. Health care leaders can leverage partnerships not only to maintain and upgrade existing technology but also to assist with ongoing process and workflow optimization. Such workflow improvements drive greater efficiencies, reduce costs, and improve standards of care.

Take up additional services for financing, optimization, and building design. Such services ensure full organizational alignment with new technology and maximum benefit from partners’ breadth of expertise.

Choosing a Partnership Model and Justifying Expenses


To maintain strong, sustainable relationships with partners, health leaders must select the right partnership model. “You need to trust each other,” says Graf. “You have to understand your partner’s goals as well as your own. And you have to create a business model that works. It might be an as-a-service model, for example, or an exploration partnership for research and development. The right choice will depend on the goals of the institution and of the technology partner.”

Reflecting on Mandaya’s favored partnership approach, Widaja notes that the company values “pricing models such as subscriptions. Still, the investment to keep up with hardware, software, and maintenance is not small. When I need to explain why the expense is justified, one thing I point out is that we can sell our patients on the technology,” he explains. “Patients who are used to the latest technology in cars or online banks will look for a similar level of technology in their health care. And we want to be among the first to offer it.”

For the C-suite, adopting flexible business models can enable a redirection of funds into other revenue-producing areas or innovation initiatives. Zambrana describes how Jackson Health has enjoyed such a benefit. “The cost of monitoring as a service is part of our operations budget. It allows us to stabilize the cash flow, redirecting capital dollars to things that are going to be more revenue-producing. For example, a \$40 million capital investment could be redirected to an MRI scan, a CT [computerized tomography] scan, a robotic surgical system, or other equipment that could generate additional revenue.”

Some health leaders work in financial circumstances that call for other approaches to financing strategic partnerships. “One challenge [in the German public health system] is that we do not produce earnings,” Graf says. “We always require investment and support from stakeholders. Our initiatives include academic and industry partnerships. We might receive scanning facilities for lower costs, for example, and in exchange we help to develop and refine the equipment further. The MRI technology we’re using for cardiac imaging was made possible with such partnerships.”

Graf advises measuring the difference made by a technological initiative as a way for organizations and their partners to refine innovations in an informed way. “We believe that when you introduce technology, it is important to get



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data on the difference it makes. Get parallel systems running, and over a given period—six months or a year—compare the performance of a system with technology and a similar one without. Then you can see whether the technology is better for patients, staff, quality, costs, reducing length of stay, and so on.”

Leaders get the most out of their relationships with partners by ensuring that they stay closely connected. “We ask our partners to be in lockstep with us, ensuring that they pivot to meet our needs,” Zambrana remarks. “We have regular business-operation reviews with our partners to ask how we are meeting each other’s needs, where it is working well, and where it is not. There are always opportunities for improvement.”

Conclusion

As C-suite leaders transform their digital capabilities to ensure agility and connectivity, many are drawing on the health tech expertise of strategic partners. Selecting an appropriate business model, as well as the right partner, is essential. For Zambrana, health care organizations should make their intentions clear from the start by laying out their vision in the request for proposal. “When we make a request for proposal, we take a detailed, proactive approach to ensuring strategic alignment,” he says. “If you’re going to do business with us, it’s not just in a transactional manner. Right away, there’s a self-selection out of vendors that are unable to align with our overarching mission and strategic direction.”

Bolstered by deep partnerships, health leaders are working in an agile way to meet the new requirements of their patients—as well as staff and other stakeholders—in many areas. In such a flexible and responsive environment, health facilities acquire a real-time understanding of their patients’ needs as they strive for new levels of patient satisfaction and quality of care.

A number of leaders in health care are inspired by other highly consumer-focused industries. Graf, for instance, believes that health care, like other innovative sectors—including airlines and the automotive industry—can marshal the latest technical knowledge effectively. To meet novel challenges and deliver high-quality care, leading health care organizations, working with their strategic partners, are reimagining their processes and technology through business model innovation.

DISCLAIMER

The Future Health Index 2021 examines the experiences of almost 3,000 health care leaders and their expectations for the future. The research for the Future Health Index 2021 report was conducted in 14 countries (Australia, Brazil, China, France, Germany, India, Italy, the Netherlands, Poland, Russia, Saudi Arabia, Singapore, South Africa, and the United States). The study combines a quantitative survey and qualitative interviews conducted from December 2020 to March 2021.

Endnotes

- 1 Harvard Business Review Analytic Services, “Addressing the Efficiency Imperative in Health Care,” August 2021. <https://hbr.org/sponsored/2021/08/addressing-the-efficiency-imperative-in-health-care>.
- 2 Harvard Business Review Analytic Services, “Increasing Care Capacity and Clinical Confidence,” October 2021. <https://hbr.org/sponsored/2021/10/increasing-care-capacity-and-clinical-confidence>.



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