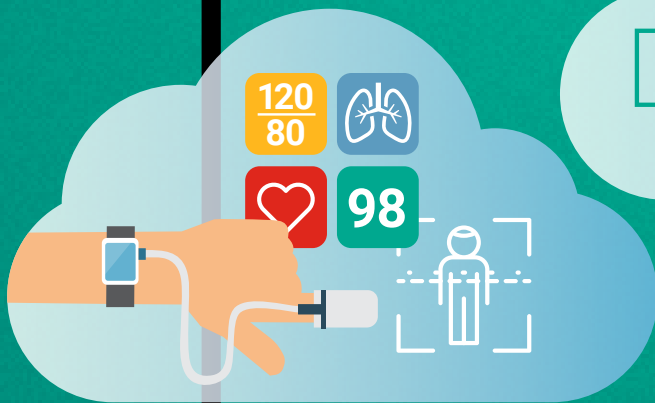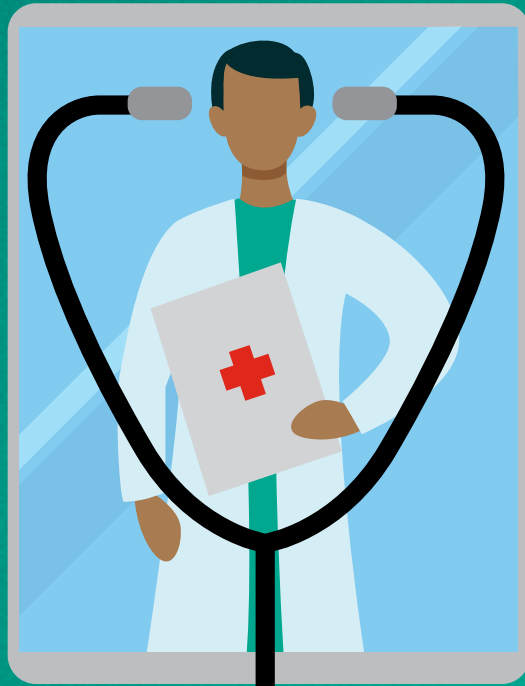# Digital Technology's Promise for Better Health Care Delivery

How emerging technologies will drive the transformation

Digital technology has long been thought of as a game-changer for many aspects of health care delivery.

The Covid-19 pandemic provided a glimpse into the potential of digital tech, with telehealth and remote monitoring helping to cover the gap in in-person care. A majority of NEJM Catalyst Insights Council members expect digital technologies to transform health care across multiple dimensions, including quality, access, patient experience, and profitability. Even so, when asked to characterize their approach to tech adoption, a majority of Council members say their organizations are rarely early adopters, with many waiting for tech to mature and benefits to be proven. To improve the value of care delivery, then analytics, artificial intelligence/machine learning, mobile apps, wearable devices, portals, and other technologies will have to gain greater traction.

In this eBook, we marry a year of Insights Council survey results about digital technologies with in-depth Council member interviews to provide you with a unique perspective about the state of digital technology in health care delivery. We examine how digital technology is impacting quality and outcomes, communication, and job satisfaction today, as well as the expectations that executives, clinical leaders, and clinicians have for the future. We also offer real-world advice for how to garner more support for digital technology in your own organization.

More than half of Council members believe that, within the next two years, emerging digital technologies will have a positive impact on the profitability of health care service delivery (51%), access to care (75%), quality of care (56%), and patient experience (66%).
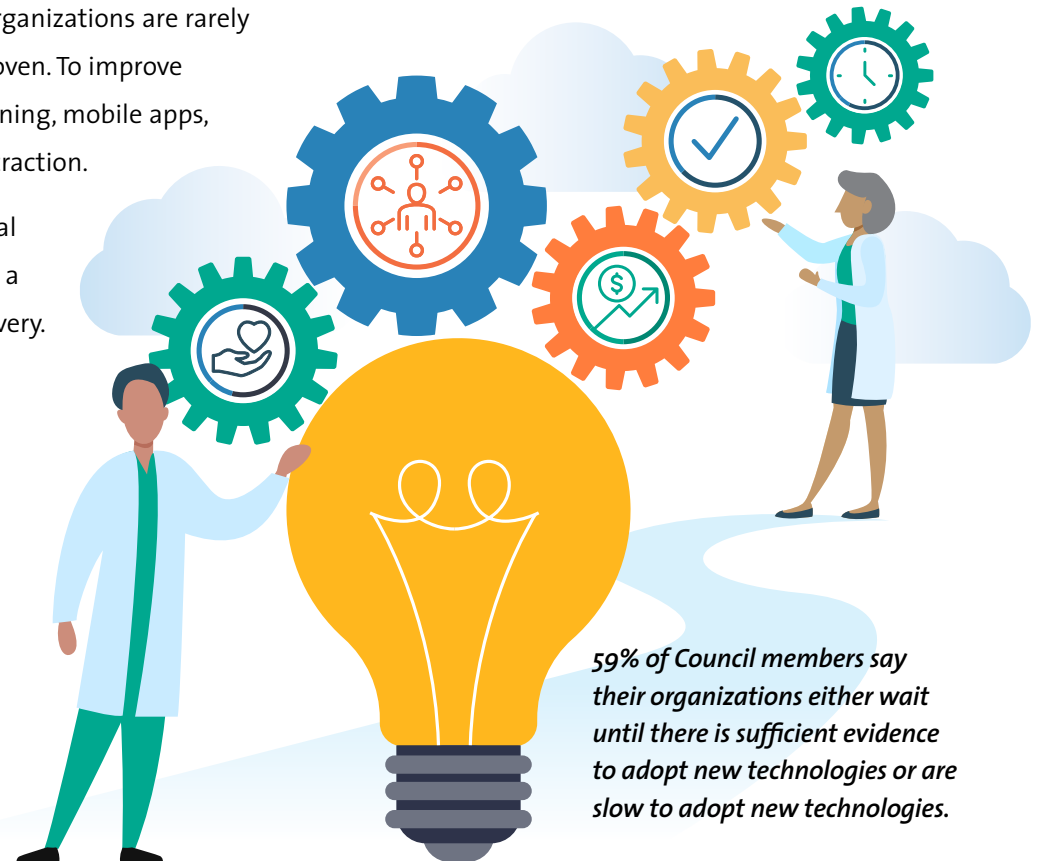
59% of Council members say their organizations either wait until there is sufficient evidence to adopt new technologies or are slow to adopt new technologies.

NEJM Catalyst

PADMAJA PATEL, MD, FACLM, DIPABLM

Medical Director for Lifestyle Medicine Program at Midland Health

"We learned a good lesson: There are no technology barriers when people are motivated to make change."

The Covid-19 pandemic and its digital tech lessons

When the Covid-19 pandemic lockdown began in early 2020, many providers turned to telehealth and remote monitoring tools to ensure they could continue to care for their patients. Padmaja Patel, MD, FACLM, DipABLM, Medical Director for Lifestyle Medicine Program at Midland (Texas) Health, had just kicked off a 10-week, in-person program focused on therapeutic lifestyle change. The goal of the program is to help diabetic patients improve their lifestyle behaviors to begin to reverse the progression of their chronic disease. The pandemic forced the program to go virtual, a move that initially worried Patel because she didn't think it would be as effective as in-person.

"Interestingly, we saw that the in-person program and the virtual program had the exact same outcomes in terms of weight, blood pressure, and A1C blood glucose [the marker of diabetes]. I was blown away by that. None of us knew the power of what we could deliver via telehealth. We learned a good lesson: There are no technology barriers when people are motivated to make change," she says.

Patel's experience was not unique, according to our survey. Just over half of Council members, 52%, say telehealth and other changes in care delivery driven by the Covid-19 pandemic either greatly improved or somewhat improved access to mental and behavioral

health services. And, like an overwhelming majority of Council members, 87%, who believe that video virtual visits for mental and behavioral health are likely to persist post-pandemic, Patel plans to continue her program with a virtual option post-pandemic.

52% *of Council members say telehealth and other changes to care delivery driven by the Covid-19 pandemic either greatly improved or somewhat improved access to mental and behavioral health services.*

JONATHAN D. LEFFERT, MD, FACP, FACE, ECNU

Managing Partner and Clinical Endocrinologist at North Texas Endocrine Center

Beyond the pandemic, Leffert believes there is significant value in telehealth and remote monitoring tools.

While many clinicians around the world have adjusted to virtual care, the initial transition at the start of the Covid-19 pandemic was not always easy. Jonathan D. Leffert, MD, FACP, FACE, ECNU, Managing Partner and Clinical Endocrinologist at North Texas Endocrine Center in Dallas, recalls those first few months of 2020 as a struggle. His office didn't have telehealth in place at the start of the pandemic, so they had to quickly implement Zoom's videoconferencing platform. Some patients had trouble using Zoom, so his team had to be ready to switch to FaceTime or a phone call.

Even more perplexing, he says, was getting his staff and patients up to speed on how to remotely extract critical data from the array of glucose meters and other remote monitoring tools his diabetic patients use. "From a logistical point of view, it was a nightmare from the beginning. Downloading data from digital meters worked some of the time, but not all of the time," he says. "We were booking appointments back-to-back, so the time it took to download patient data was not really efficient. We tried to get patients to upload that information ahead of appointments, but that didn't work either. We were making do in a crisis situation."

87%, *a strong majority of Council members, believe that video virtual visits for mental and behavioral health are likely to persist post-pandemic.*

Leffert adopted home-based care program practices during the strictest months of the lockdown, such as virtual visits and remote monitoring to ensure his patients could stay safe at home. According to our survey results, 87% of home-based care programs currently use telehealth/virtual care and 53% currently use smartphone apps. However, there is still an opportunity for better adoption of active and passive remote monitoring devices, which are only used by 27% and 36% of organizations, respectively.

Beyond the pandemic, Leffert believes there is significant value in telehealth and remote monitoring tools, especially for his elderly patients and those with gestational diabetes and unmanaged diabetes, for whom coming to the office on a regular basis is difficult. "If we can train the staff and the patients how to use the technology, there would be a lot of benefit to it, including helping people with blood sugar excursions (where numbers go up and down) to learn how to adjust their behaviors and insulin," he says.

"If we can train the staff and the patients how to use the technology, there would be a lot of benefit to it."

JONATHAN D. LEFFERT, MD, FACP, FACE, ECNU

87% *of home-based care programs currently use telehealth/virtual care and 53% currently use smartphone apps, but there is still opportunity for better adoption of active and passive remote monitoring devices, which are only used by 27% and 36% of organizations, respectively.*

The challenges of digital transformation
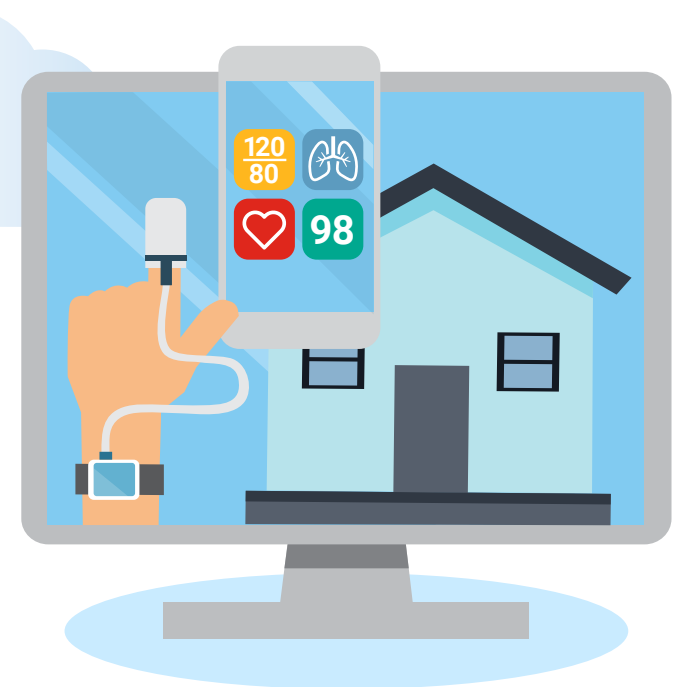
ANJALI MAHONEY, MD, MPH

Associate Professor and the Vice Chair of Clinical Affairs in the Department of Family Medicine at Keck Medicine at University of Southern California

"Telemedicine has created three times as many inbox messages and 'pajama time' [i.e., working after hours] has gone up dramatically for many clinicians."

While technology is advancing rapidly in other industries, health care lags far behind, with its progress hamstrung by the following issues:

- complex and costly EHR systems that continue to exhaust health care professionals;
- lack of interoperability between EHRs and apps;
- inadequate reimbursement for digital solutions such as virtual visits and remote monitoring;
- poor infrastructure in rural areas; and
- equity issues.

"We have definitely experienced burnout from the perspective of dealing with the stress of patients and being overwhelmed on such a consistent basis," Leffert says. "Being on Zoom calls day in and day out was tiresome and overwhelmingly difficult. By the end of those days, I was completely beat." The financial pressure was enormous, leading him to try to keep up the same volume of visits.

Anjali Mahoney, MD, MPH, Associate Professor and the Vice Chair of Clinical Affairs in the Department of Family Medicine at Keck Medicine at University of Southern California, says that telehealth has been a lifesaver for many patients and providers during the pandemic but for all its positives, it also has serious drawbacks. "Telemedicine has created three times as

many inbox messages and 'pajama time' [i.e., working after hours] has gone up dramatically for many clinicians. Some payers will not reimburse for telemedicine visits and for others telemedicine is reimbursed at a much lower rate and receives much lower RVUs," she says.

Clinicians also aren't reimbursed for the time they spend gathering data from patients' remote monitoring devices and recording it in the EHR, which makes the situation even more untenable, Mahoney says. "If organizations are going to ramp up the amount of information that comes in to clinicians, they should consider building a team of support staff around clinicians."
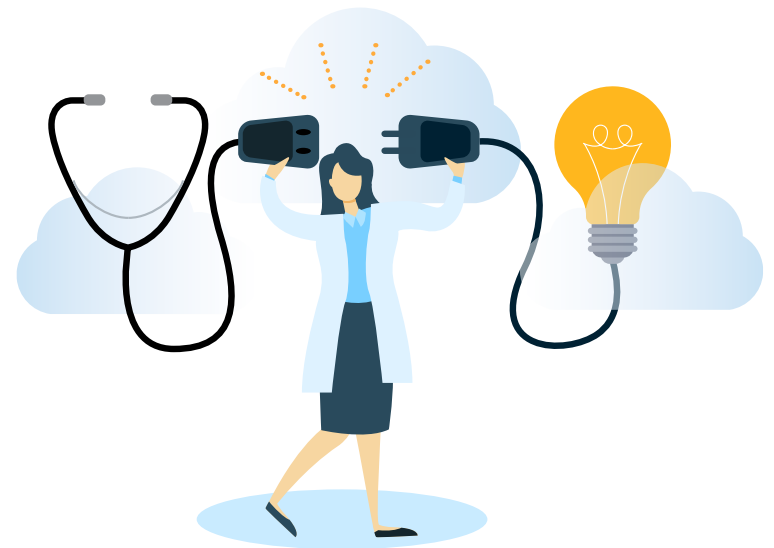
TEELE ORGSE, MD

*Chief Quality Officer at
Pärnu Hospital*

"IT solutions are making
health care professionals
change their way of work."

Mahoney says although many systems have Dragon or other means of dictation, AI platforms that offer automated dictation tools during the visit that enter everything directly into the EMR would be beneficial and save time. But even though that technology exists, it often does not work with the dozens of EMR products on the market. More than 40% of Council members say their organization's EHR makes it harder to adopt new technologies.

Teele Orgse, MD, Chief Quality Officer at Pärnu Hospital in Pärnu, Estonia, believes that clinician burnout is arising from the fact that "IT solutions are making health care professionals change their way of work." Like Mahoney, Orgse has seen an overflow of data and too many responsibilities for providers around that data, which, until corrected, is creating waste. "Too much information is actually leading to too little information because we aren't able to use that data efficiently," she says. Technology's pace of change, where new solutions are released faster than processes can be developed to integrate them into the workflow, makes this challenge even more difficult. "If you develop an IT solution, it will soon need to be updated and continuously updating old things makes it hard to bring new things in," she says.

More than **40%** *of Council members say their organization's EHR makes it harder to adopt new technologies.*

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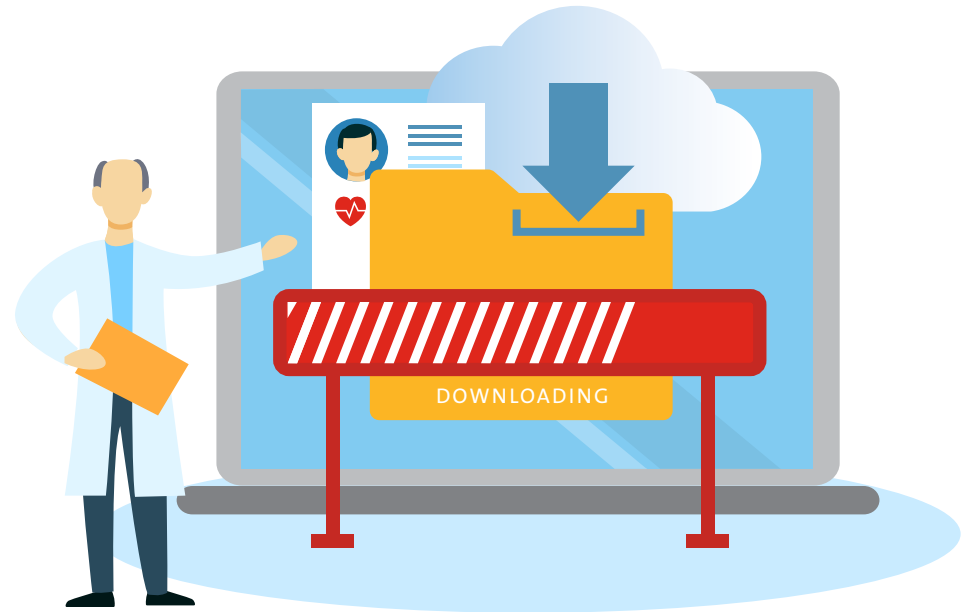
ZIAD F. GELLAD, MD, MPH, AGAF

Associate Professor of Medicine and Associate Vice Chair for Ambulatory Services in the Department of Medicine at Duke University Medical Center and co-founder of digital health startup Higgs Boson Health

"Lack of interoperability is one of the biggest challenges to technology implementation and it causes far more work."

Solving the EHR interoperability issue would go a long way to helping avoid clinician burnout as well. Nearly a third of Council members, 31%, say infrastructure (e.g., IT) is a top contributor to provider burnout. Infrastructure requirements, including IT, are listed by 38% of Council members as one of the biggest barriers to value-based reimbursement models.

"Lack of interoperability is one of the biggest challenges to technology implementation and it causes far more work. No nurse or clinician wants to manually enter data," says Ziad F. Gellad, MD, MPH, AGAF, Associate Professor of Medicine and Associate Vice Chair for Ambulatory Services in the Department of Medicine at Duke University Medical Center and co-founder of digital health startup Higgs Boson Health.

One of the benefits of the quick switch to telehealth was that the Centers for Medicare and Medicaid Services temporarily changed reimbursement policies and waived cumbersome rules around interstate licensing, and many private insurance companies followed suit, according to Gellad. "We saw from that that technology is not what's standing in our way in moving to the future of care delivery; regulatory and reimbursement issues are holding us back," he says.

Orgse says that when the pandemic hit Estonia, the national health insurance fund pushed providers more toward video visits and brought in extra money to support them.

31% *of Council members, say infrastructure (e.g., IT) is a top contributor to provider burnout. And infrastructure requirements, including IT, are listed by 38% of Council members as one of the biggest barriers to value-based reimbursement models.*

RAFAEL CARDOSO ARIAS, MD

Medical Director at Medicina y Asistencia Social

"We are delayed in our technology exposure because a large number of our patients don't have access to the Internet. If we saw improvement in Internet service, maybe through satellite, we might be able to leapfrog and access more digital technologies."

Rafael Cardoso Arias, MD, Medical Director at Medicina y Asistencia Social in Guerrero, Mexico, says that even if his country had funded telehealth and other digital technologies, like Estonia did, the infrastructure to reach rural areas is inadequate or missing altogether. "We are delayed in our technology exposure because a large number of our patients don't have access to the Internet. If we saw improvement in Internet service, maybe through satellite, we might be able to leapfrog and access more digital technologies," he says.

But infrastructure is just one part of the problem; language barriers are another. "The indigenous communities we serve, some of whom don't even speak Spanish, are going to have a hard time understanding apps if they are not properly translated," Cardoso Arias says.

Mahoney has encountered the same issue with diverse populations around Los Angeles. "I have not seen portals, wearable technology, or remote monitoring devices bridge the language divide. Portals tend to be in English and Spanish, but I have Arabic, Chinese, Vietnamese, and other non-English speaking patient populations that aren't being served," she says.

Equity isn't just about language. Elderly patients who have difficulty using technology or housing-insecure patients who don't have steady access to the Internet make digital progress potentially inequitable, Mahoney says.

R. Brent Wright, MD, MMM, Associate Dean for Rural Health Innovation at University of Louisville School of Medicine and Professor & Vice Chair for Rural Health at University of Louisville Department of Family & Geriatric Medicine, believes health care delivery is in a period of transition. "A lot of people are resistant right now, but when we go forward 20 years and look back, we are going to think of this as a clumsy, awkward time in our digital growth. As millennials age, they will drive digital transformation and derive its value."

## The benefits of wearable technology, remote monitoring devices, and digital apps

Digital technology is helping providers work with patients to overcome or manage chronic conditions such as obesity, diabetes, hypertension, and dementia, as well as mental and behavioral health issues.

Despite the obstacles to using digital technology, many health care organizations are finding ways to integrate virtual care, wearables, remote monitoring, and other technologies into their day-to-day care models. Digital technology is helping providers work with patients to overcome or manage chronic conditions such as obesity, diabetes, hypertension, and dementia, as well as mental and behavioral health issues.

Most health care organizations, 70%, use technology such as screening apps, mindfulness and meditation apps, and chat-based psychotherapy for mental and behavioral health, according to our survey. More than half of Council members, 62%, say their organizations use digital tools to care for dementia patients. Nearly half of organizations, 47%, use or plan to adopt digital chronic disease management technologies within the next two years for remote patient monitoring and data analytics tools.

Mahoney has been intrigued by studies about the impact these apps can have on soldiers suffering from PTSD. At the USC Center for Body Computing, they have developed apps that check in on how

soldiers are feeling and monitor certain vital signs such as heart rate. If an app senses the onset of stress or anxiety, it presents the soldier with a video that addresses the symptoms. Expanding these types of modalities to other populations could be very beneficial.
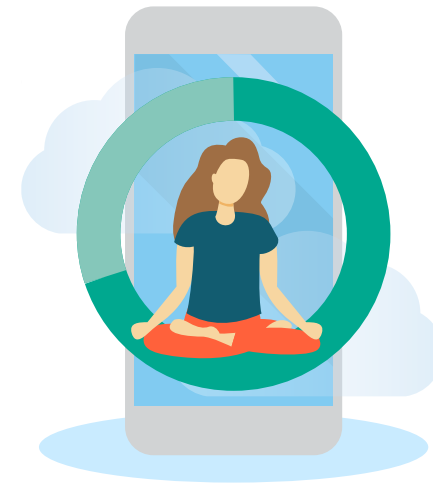
70% *of health care organizations use technology such as screening apps, mindfulness and meditation apps, and chat-based psychotherapy for mental and behavioral health.*

TRICIA BAIRD, MD, FAAFP, MBA

*Vice President of Care
Coordination at Spectrum Health*

"Embracing wearable technology allows the health system to own the trusted patient relationship from the beginning instead of only during acute episodes and specialty care."

Wearable technology also enables providers like Mahoney to get more accurate and effective readings for important metrics such as blood pressure. "Patients are often worried and anxious when they come to the office, so their readings could be wrong," she says, adding they are better read from home. Also, when patients, such as those with hypertension, learn how to read their own numbers, they are able to better understand the relationship between their health and certain behaviors.

Patel says, "These tools promote education, support, and counseling and provide really good real-time data and biofeedback to patients to make healthier choices. They can identify the root causes of their chronic disease, such as congestive heart failure or obesity, and help create a care plan where they take charge of their health."

At Orgse's organization in Estonia, sleep study centers provide wearable technology that is fully integrated with the EHR and seamlessly captures, stores, and analyzes patient data. But she says that type of full integration is the exception, not the norm. "To make it so that everyone can do that across the health system is cost-prohibitive."

The growth of digital technologies is one step further in the consumerization of health care. Many users can access such apps on their Apple watches, smartphones, and tablets, notes Wright. "I've resisted using the term 'consumer' to describe patients in the

past, but digital transformation is going to have to be consumer-driven and consumers are going to have to be well-informed and highly engaged," he says.

Tricia Baird, MD, FAAFP, MBA, Vice President of Care Coordination at Spectrum Health in Grand Rapids, Michigan, says that embracing apps, medical exam devices, wearables such as FitBits, remote monitoring devices such as smart scales, and other digital technology opens the door for younger, healthier people to self-serve and scale a health system's services in a way that is convenient to them. "This allows the health system to own the trusted patient relationship from the beginning instead of only during acute episodes and specialty care."

**62%** *of Council members, say their organizations use digital tools to care for dementia patients.*
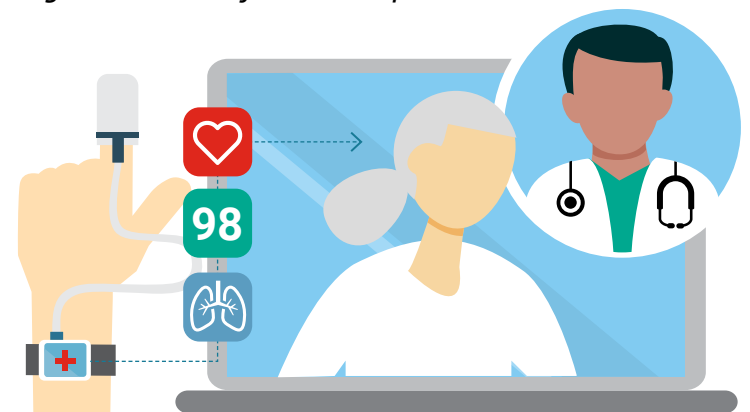
MICHAEL KOBERNICK, MD, MS, CPE

Senior Medical Director at Blue Cross Blue Shield of Michigan

"Once you abandon the traditional thinking about health care and everything we do, then you can apply some amazing technology."

Health care systems will need to be willing to break down barriers to get the most out of this digital technology. "Once you abandon the traditional thinking about health care and everything we do, then you can apply some amazing technology," says Michael Kobernick, MD, MS, CPE, Senior Medical Director at Blue Cross Blue Shield of Michigan. He believes technology, coupled with free-flowing information, will lead to the meticulous management of patients across the care continuum.

47%
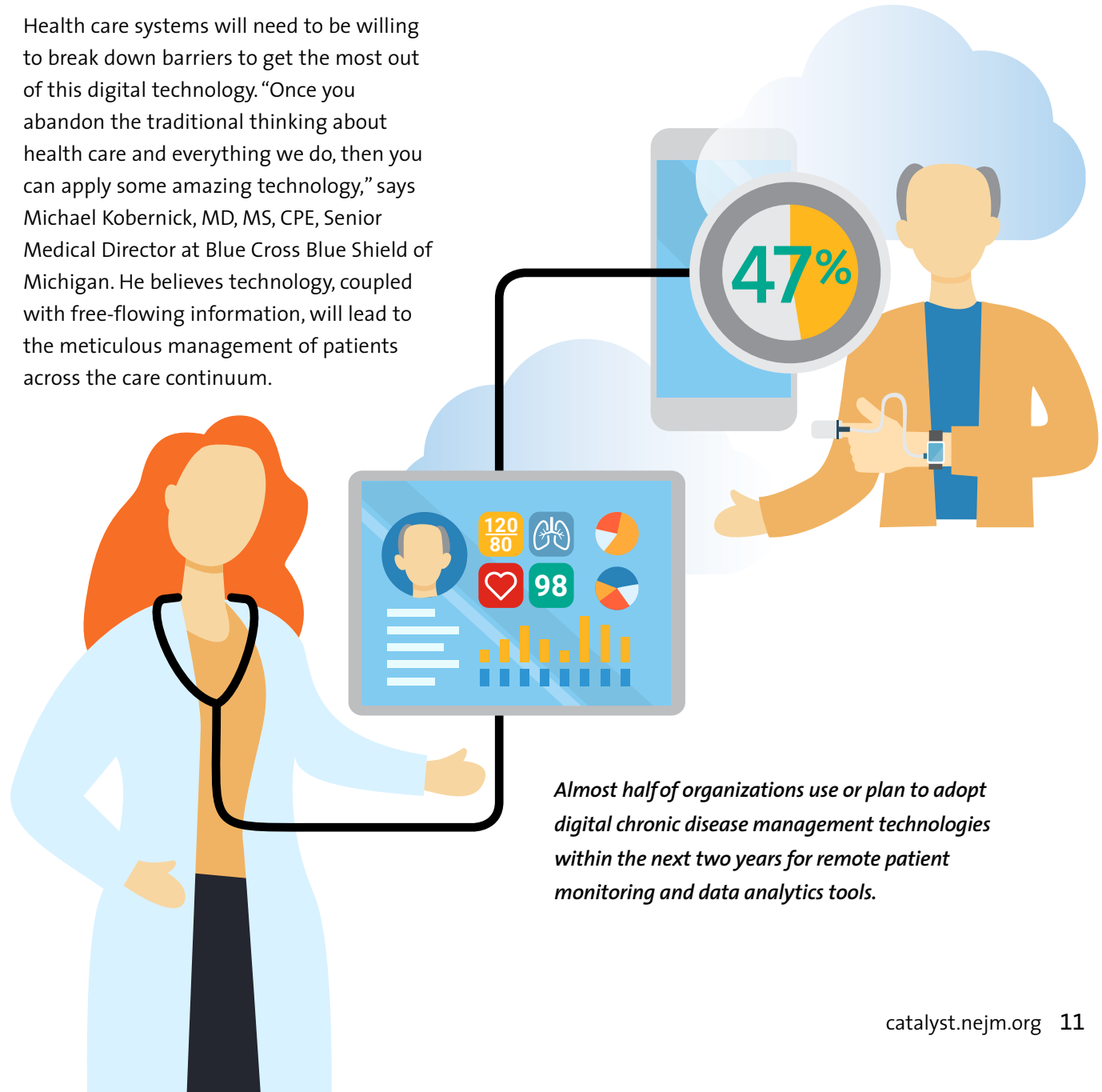
Almost half of organizations use or plan to adopt digital chronic disease management technologies within the next two years for remote patient monitoring and data analytics tools.

How AI leads to better communication and better quality and outcomes

"Digital technology or digital health can help get back to that more one-to-one relationship between patient and provider.

ZIAD F. GELLAD, MD, MPH, AGAF

The next generation of digital technology, including chatbots, analytics, and AI, has the potential to alleviate burnout, improve quality and outcomes, and make communication between providers and patients far more efficient and effective.

Today, patient portals (55%) and telehealth (53%) are the two most popular digital technologies that organizations use to communicate with unpaid caregivers, which can be time-consuming for clinicians. EHRs (94%) and analytics (81%) are by far the technologies most used to track quality and outcomes.

"Digital technology or digital health can help get back to that more one-to-one relationship between patient and provider. Maybe that's what the EHR set out to do, but not in the way they were implemented. That's not what followed," Gellad says.

Spectrum Health is all-in on AI, deploying it in numerous areas of the health system, according to Baird. "We are using AI to isolate the one in five of our daily hospital discharges that are highly likely to struggle with a transition plan, and then deploying a care team to support them," she says. For instance, AI would flag that a dementia patient with Covid pneumonia who discharges to home with family support rather than a sub-acute rehab would benefit

Patient portals (55%) and telehealth (53%) are the two most popular digital technologies that organizations use to communicate with unpaid caregivers, according to Council members.

from nurse care manager follow-up. The nurse care manager would investigate important questions such as whether the patient was able to access prescriptions, needs a virtual follow-up visit scheduled, is feeling depression or anxiety about the loss of independence and function, or needs help with food and utilities. "The nurse's ability to focus on the needs of that specific patient would increase the odds of a successful recovery," Baird says.

"Patients are more honest with the chatbot because if they are honest, it gives them a relevant response to help them and doesn't chastise them."

TRICIA BAIRD, MD, FAAFP, MBA

Artificial intelligence tools are most likely to be adopted or are already adopted for imaging diagnostics tools (28%) and virtual care clinicians/chatbots (27%).
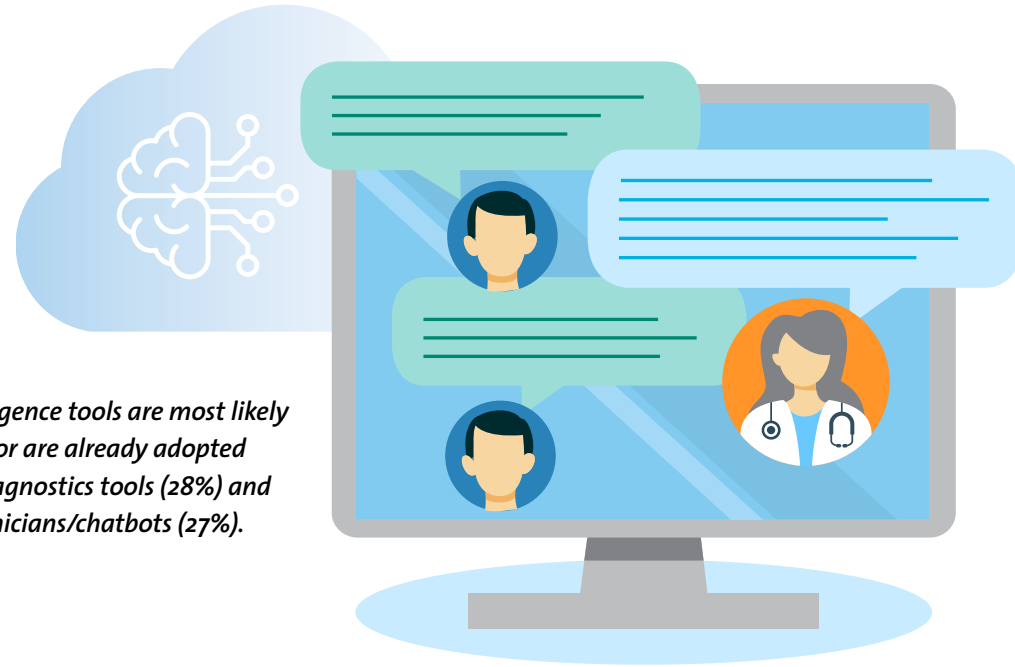
Our survey finds that AI tools are most likely to be adopted or are already adopted for imaging diagnostics tools (28%) and virtual care clinicians/chatbots (27%). Spectrum Health rolled out a chatbot that texts patients after discharge from the emergency department. The chatbot asks patients if they are feeling better than when they came to the ED, if they were able to get the equipment they need, and if they were able to get their medication. "These are natural-language chats that alert staff if a human needs to follow up," Baird says.

The program has had such positive results that Spectrum Health hospitals now use the chatbot for inpatient discharges. "Users like interacting with the chatbot because it is patient and will repeat the same thing over and over until the information is understood. Patients also are more honest with the chatbot because if they are honest, it gives them a relevant response to help them and doesn't chastise them," she says. Both outcomes lead to better clinical outcomes.

R. BRENT WRIGHT, MD, MMM

Associate Dean for Rural Health Innovation at University of Louisville School of Medicine and Professor & Vice Chair for Rural Health at University of Louisville Department of Family & Geriatric Medicine

"I've resisted using the term 'consumer' to describe patients in the past, but digital transformation is going to have to be consumer-driven and consumers are going to have to be well-informed and highly engaged."

Wright is a proponent of wearable telemedicine in the form of smart glasses, which allow providers to quickly assemble interdisciplinary teams for complex cases. "My challenge is to reduce the time that it takes a patient to receive care with the best result and least friction. Smart glasses support that goal," he says. A pilot program at the University of Louisville enabled providers concerned about a patient's condition to don the glasses and then conference in an expert to do an immediate consult and help develop a treatment plan. "Not every expert needs 30 to 45 minutes with a patient," he says. Wright says that new forms of wearable technology will eventually be available, making the cost of this type of care easily attainable.

"People need to know that AI is a tool, not a replacement for clinical expertise. Some physicians think of AI as a futuristic, uncaring environment, but instead AI would be better to be thought of as augmented intelligence," he says.

What has yet to be settled with this type of advanced application is compensation for the consulting physician. "You'll have to incentivize physicians and clinicians if you want them to participate," Wright says, adding that the rapid adoption and reimbursement for telehealth during the pandemic might help move the needle on these types of virtual consultations as well.

EHRs (94%) and analytics (81%) are by far the technologies most used to track quality and outcomes.
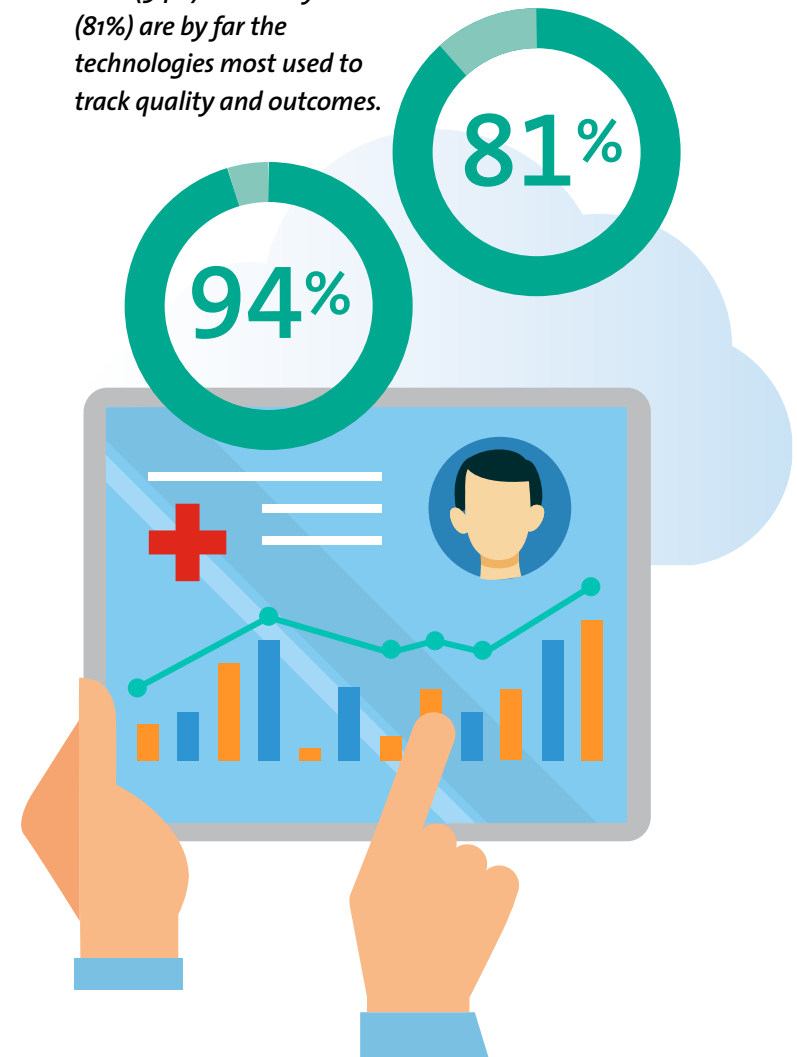
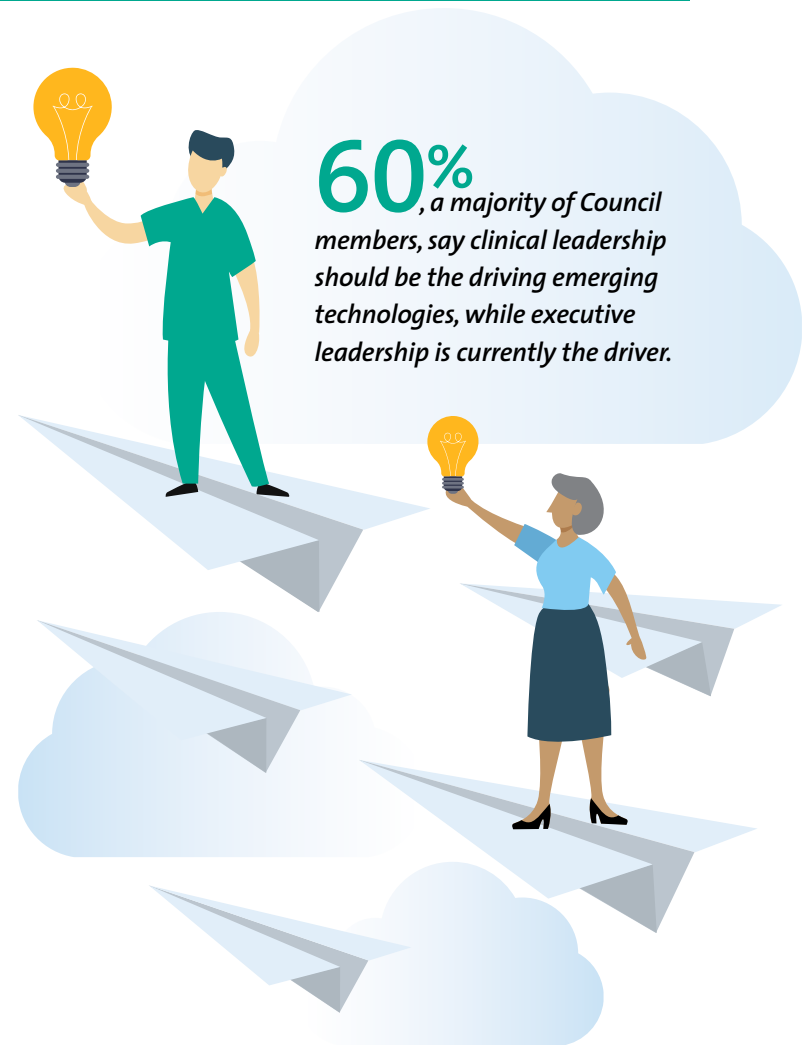## Leading digital transformation in your own organization

To find success with digital technology, leaders need to be prepared for it at every level of their organization. It can't be solely a top-down initiative. While executive leadership is currently the driver for emerging technologies, a majority of Council members (60%) say clinical leadership should be driving the effort.

Gellad believes digital transformation will require the kind of investment and innovation that has pushed social determinants of health to the forefront of care delivery. "The things that organizations do to address social determinants of health, such as providing housing and food, don't have an immediate return, but they will over time, and the same is true for investments in digital technology."

But Baird warns that health care organizations should not move too fast to deploy next-generation digital technology, such as analytics and AI, if they haven't first created the building blocks of strong infrastructure and patient trust. "If your app keeps crashing due to back-end issues, the patient is not going to use it. And if the patient doesn't have a trusting relationship with the organization, he is not going to respond to the chatbot or the care team," she says.

60%, *a majority of Council members, say clinical leadership should be the driving emerging technologies, while executive leadership is currently the driver.*

"Health systems now employ more and more physicians, so if the health system embraces the digital transformation idea, providers will have no choice but to accept it."

PADMAJA PATEL, MD, FACLM, DIPABLM

Cardoso Arias feels similarly. "While I am excited about the capacity to use machine learning technologies, they are still dependent on the interoperability of data," he says, "and what is the point of having machine learning software if the data input is no good?"

The safety of newer digital approaches is top of mind for Orgse, who is concerned that chatbots and other automated tools could leave health systems vulnerable to attacks.

Another hurdle is adoption, according to Patel. "Health systems now employ more and more physicians, so if the health system embraces the digital transformation idea, providers will have no choice but to accept it," she says. Getting health systems onboard might be trickier, she concedes, and might require a tie to incentives for improved patient outcomes.

A new model of care

> "Hopefully, [a new model of care] will lead to a decreased incidence of conditions like obesity and diabetes, better immunization rates, and earlier detection of illnesses that will reduce catastrophic care costs for the individual."

MICHAEL KOBERNICK, MD, MS, CPE

Kobernick muses that true digital transformation might be paired with a disintermediation of the health care delivery system into acute care, aka sick care, and well care, where acute care stays with the hospitals and physicians while well care, including chronic disease management and health screenings, is handed off to retail health or consumer space. "Payers and providers will need to change to accommodate that new structure," he says. He believes that in the future some consumers will pay for a well care policy – or cover it themselves – and a sick care (or catastrophic) policy separately. This will result in more services related to prevention and lifestyle modification available directly to consumers in convenient, digital formats and at retail centers like drug stores. "Hopefully, this will lead to a decreased incidence of conditions like obesity and diabetes, better immunization rates, and earlier detection of illnesses that will reduce catastrophic care costs for the individual."

Already, employer-funded digital technology programs like Livongo are taking on the burden of chronic disease management, including diabetes and hypertension, and independent apps are being developed for mental and behavioral health. Gellad says these companies are ahead of the curve in their use of AI and digital engagement to help change behavior.

The integration of transformational digital technology and introduction of new models of care will not happen overnight. Leaders must carefully consider the impact of tech throughout organizations and among patient populations. **If you are ready to start this journey and add your insights to those of executives, clinical leaders, and clinicians around the world, join the NEJM Catalyst Insights Council today.**

Additional NEJM Catalyst Resources

Explore related content from our peer-reviewed journal, *NEJM Catalyst Innovations in Care Delivery*. These resources provide an added view into how emerging digital technologies are changing the potential for transforming care delivery.

🌐 <u>**Technology Platforms Are Revolutionizing Health Care Service Delivery in China**</u>

🌐 <u>**The Virtual Future of Health Care Delivery in Rural America**</u>

🌐 <u>**Disruptive and Sustaining Innovation in Telemedicine: A Strategic Roadmap**</u>

🌐 <u>**Patients Like You: How Machine Learning Can Be Used as a Shared Decision-Making Tool to Improve Care**</u>

🌐 <u>**Nonprofit Health Plans Launch Telehealth-First Options to Increase Access and Affordability**</u>

🌐 <u>**Telehealth: The Right Care, at the Right Time, via the Right Medium**</u>
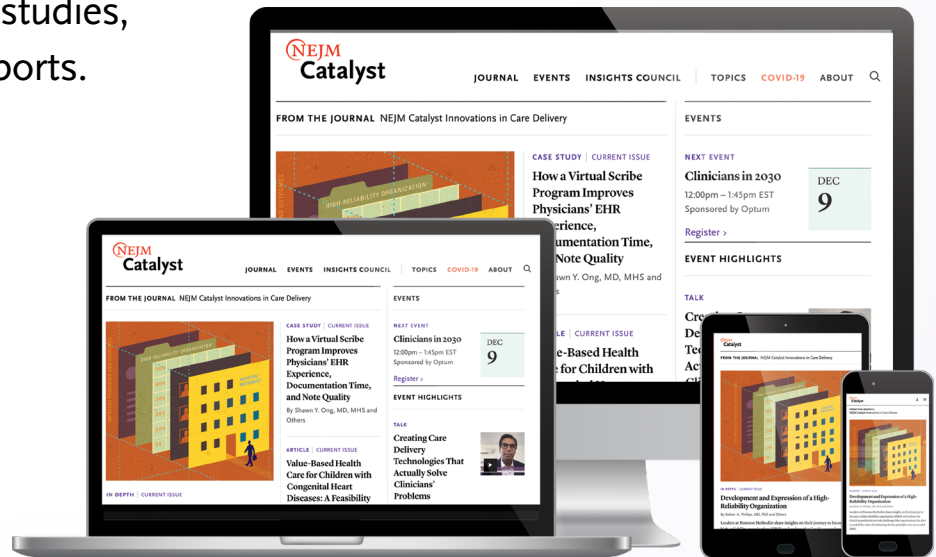
We'd like to acknowledge the members of the NEJM Catalyst Insights Council. It is through their voice and commitment to the transformation of health care delivery that we are able to provide actionable data that convenes a collaborative dialogue about moving the industry forward in a positive direction. Insights Council members participate in monthly surveys and the results are published as NEJM Catalyst Insights Reports, including summary findings, expert analysis, and commentary from NEJM Catalyst leaders.

To join your peers in the conversation, apply to the Council today.

About NEJM Catalyst

NEJM Catalyst brings health care executives, clinical leaders, and clinicians together to share innovative ideas and practical applications for enhancing the value of health care delivery. From a network of top experts and advisors, our digital peer-reviewed journal, live-streamed events, and qualified Insights Council provide real-life examples and actionable solutions to help organizations address urgent challenges affecting health care.

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