MIT Technology Review Insights

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How integrated data ecosystems can power smarter health care.

Scaling integrated digital health

Preface

"Scaling integrated digital health" is an MIT Technology Review Insights report sponsored by Roche, a global health care organization. As part of the research for this report, MIT Technology Review Insights conducted a survey of leaders at health care organizations around the world and a series of in-depth interviews with health care executives, academic experts, and industry analysts.

Adam Green was the author of the report, Laurel Ruma was the editor, and Nicola Crepaldi was the producer. The research is editorially independent, and the views expressed are those of MIT Technology Review Insights.

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Methodology

The survey forming the basis of this report was conducted by MIT Technology Review Insights in January and February of 2025. The survey consisted of 300 global respondents holding senior roles across health care industries, including health care providers, diagnostic laboratories, and agencies focused on health care infrastructure, regulation, and digital health innovation.

Foreword

Rapid technological advances and an ever-increasing demand for efficient, effective health care delivery represents a transformative opportunity for societies to redefine the landscape of diagnostic medicine and improve patient care. Still, a key challenge remains: how to best use the latest digital solutions, including artificial intelligence (AI) technologies, to integrate siloed health care systems so as to enable secure, appropriate, ethical use of data to gain operational and clinical insights.

This report was sponsored to help spark new conversations and collaboration on these topics with health, tech, patient group leaders, and others across society as we seek to find solutions to these vital topics including the potential and appropriate use of the latest digital technologies to improve health care.

Health care systems worldwide continue to grapple with many challenges, including escalating costs, resource constraints, and the imperative to deliver timely, accurate diagnostic results to patients. Traditionally, diagnostic processes have often involved time-consuming, yet necessary steps and processes to deliver a diagnosis to patients and their physicians. This can lead to delays and inefficiencies in patient management, as well as additional strains on health care professionals and resources. It is within this context that digitally connected health care systems present a beacon of promise, offering the potential to further streamline processes, optimize time and resource allocation, as well as provide new data-based insights that can ultimately help improve patient and health care management.

At Roche, we have always been deeply committed to advancing medical science and patient care through innovative solutions and today this also includes the use of digital solutions and technologies in health care. By connecting and integrating the data within and across diagnostic instruments and systems, we see a significant opportunity to improve time and cost efficiencies in delivering diagnostic results as well as offering clinicians new insights into the health status of an individual person and/or a community. This includes opportunities to ensure that patients receive timely and accurate diagnoses, enabling swift initiation of appropriate treatments, interventions, and in some cases, even disease prevention.

One of the most compelling aspects of connecting and integrating health care systems is the ability to share and combine data in secure, compliant and ethical ways that enhance the knowledge available to health care professionals for making operational and clinical decisions. By design, diagnostics have often limited the scope of data available, relying on isolated test results. Once connected, health care systems can potentially enable the aggregation and integration of diverse data sources, from laboratory results to clinical records, imaging data, and even patient-generated health data. This rich repository of information promises to empower physicians with a comprehensive, up-to-date view of a patient or community's health status, facilitating more informed decision-making. Moreover, the advent of advanced analytics and artificial intelligence within these systems unlocks the potential for predictive insights to enable operational time and cost efficiencies, clinical decision-making and care at the community level. By analyzing vast datasets, AI algorithms can be used to help identify patterns, predict disease progression, and recommend prevention or tailored treatment pathways. This data-driven approach can help enhance diagnostic accuracy and ensure that treatment plans align with the latest clinical guidelines, with the goal of improving patient outcomes and adherence to evidence-based practices.

As we explore the promise of integrating and connecting health care systems using digital technologies, we are guided by our mission to improve lives through medical innovation and maintain the highest levels of security and privacy around patient and clinical data. To that end, Roche has established a repository of information about its approach to digital trust in health care at **https://navify.roche.com/digital-trust**. Roche also follows regulations and guidelines and has **established AI Ethics Principles** to guide our scientists and engineers as they develop new solutions.

As we aim to deliver innovations that bring value to patients and society, we collaborate with other leaders in health care who share our values and the pursuit of excellence. Together, we can help shape the future of diagnostic medicine and work to help improve patient care.

Corinne Dive-Reclus, Head of Digital Diagnostics, Roche Diagnostics

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01 Executive summary

Around the world, countries are facing the challenges of ageing populations, growing rates of chronic disease, and workforce shortages, leading to a growing burden on health care systems. From diagnosis to treatment, AI and other digital solutions can enhance the efficiency and effectiveness of health care, easing the burden on straining systems. According to the World Health Organization (WHO), spending an additional $0.24 per patient per year on digital health interventions could save more than 2 million lives from non-communicable diseases over the next decade.[1]

To work most effectively, digital solutions need to be scaled and embedded in an ecosystem that ensures a high degree of interoperability, data security, and governance.[2] If not, the proliferation of point solutions – where specialized software or tools focus on just one specific area or function – could lead to silos and digital canyons, complicating rather than easing the workloads of health care professionals, and potentially impacting patient treatment. Importantly, technologies that enhance workforce productivity should keep humans in the loop, aiming to augment their capabilities, rather than replace them.

Through a survey of 300 health care executives and a program of interviews with industry experts, startup leaders, and academic researchers, this report explores the best practices for success when implementing integrated digital solutions into health care, and how these can support decision-makers in a range of settings, including laboratories and hospitals.

Key findings include:

Health care is primed for digital adoption. The global pandemic underscored the benefits of value-based care and accelerated the adoption of digital and AI-powered technologies in health care. Overwhelmingly, 96% of the survey respondents say they are "ready and resourced" to use digital health, while one in four say they are "very ready." However, 91% of executives agree interoperability is a challenge, with a majority (59%) saying it will be "tough" to solve. Two in five leaders say balancing security with usability is the biggest challenge for digital health. With the adoption of cloud solutions, organizations can enjoy the benefits of modernized IT infrastructure: 36% of the survey respondents believe scalability is the main benefit, followed by improved security (28%).

Digital healthcare can help healthcare institutions transform patient outcomes – if built on the right foundations. Solutions like AI-powered diagnostics, telemedicine, and remote monitoring can offer measurable impact across the patient journey, from improving early disease detection to reducing hospital readmission rates. However, these technologies can only support fully connected health care when scaled up and embedded in ecosystems with robust data governance, interoperability, and security.

Health care data has immense potential – but fragmentation and poor interoperability hinder impact. Health care systems generate vast quantities of data, yet much of it remains siloed or unusable due to inconsistent formats and incompatible IT systems, limiting scalability.

Digital tools must augment, not overload, the workforce. With global health care workforce shortages worsening, digital solutions like clinical decision support tools, patient prediction, and remote monitoring can be seen as essential aids rather than threats to the workforce. Successful deployment depends on usability, clinician engagement, and training.

Regulatory evolution, open data policies, and economic sustainability are key to scaling digital health. Even the best digital tools struggle to scale without reimbursement frameworks, regulatory support, and viable business models. Open data ecosystems are needed to unleash the clinical and economic value of innovation. Regulatory and reimbursement innovation is also critical to transitioning from pilot projects to high-impact, system-wide adoption.

02 Digital dividends

The global population is aging, pressuring already-stretched health systems with a rising and costly chronic disease burden. According to the World Health Organization (WHO), accelerated efforts are needed if we are to achieve sustainable development targets to reduce maternal mortality and infectious diseases like AIDS, tuberculosis, and malaria by 2030. At the same time, the health sector is primed for digital transformation and innovation. The sector produces an estimated one-third of the world's data.[4] And this data can be leveraged to help organizations make better clinical and operational decisions.[5]

The covid-19 pandemic provided a powerful example of how quickly health systems can deploy digital solutions when prompted.[6] In China, technology companies created AI-based chatbots that allowed consultations with rural patients, while Singapore launched a digital application called Trace Together, which collected data on exposure to covid-19 based on data from Bluetooth-enabled devices.[7]

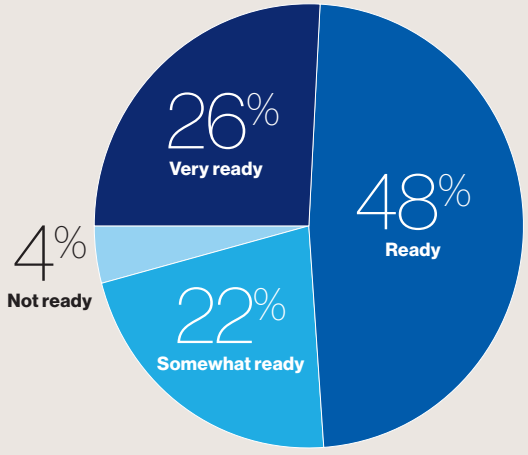
Accelerated by the pandemic, digital technologies are expanding rapidly transforming patient-centered care,[8] enabling enhanced patient experiences and streamlined processes. Reflecting this momentum, the digital health market is projected to reach $109 billion by 2027, up from $64 billion in 2022.[9]

Developments in AI have enabled powerful tools for patient care, offering predictive capabilities, personalized insights, and adaptive recommendations.[10] These advances are powered by algorithms; the crucial human-designed component that allow machines to operate independently[11] and replicate human cognitive functions. Algorithms can now create text, visuals, music and audio,[12] turning vast amounts of data into actionable insights.

In medicine, algorithms have advanced to the point where they are classified as software as a medical device (SaMD), which means that the software itself is the device, rather than merely a component of physical medical hardware.[13] These tools assist health care professionals in clinical decision-making, acting as co-pilots to reduce errors, enhance accuracy, and personalize care.

Figure 1: Nearly all health care organizations are ready for digital health

Is your organization ready and resourced to implement and use digital health solutions effectively?



Source: MIT Technology Review Insights survey, 2025

Digital diagnosis

AI is rapidly transforming health care, but its ethical deployment requires careful attention to core principles that safeguard human rights and promote equity. "We are dedicating ourselves to using ethical AI, making sure the tools are safe, unbiased, trustworthy, and adhere to ethical principles," notes Jeffrey Ferranti, senior vice president and chief digital officer at Duke Health.

Ethical deployment demands a multidimensional approach that considers not just the technology itself, but also how it is developed and used. This includes preserving human autonomy in clinical settings, ensuring privacy and confidentiality, and complying with legal standards like informed consent. When using personal data, developers must apply strong safeguards such as anonymization and encryption to protect identities. Trustworthy AI systems require security by design and transparent documentation of their functions, assumptions, and risks. Users, especially clinicians, must be able to understand and meaningfully control these tools. To prevent harm and meet safety regulations, systems must be robust and tested. Building fair and inclusive technologies also means using diverse, community-informed datasets and continuously monitoring for bias, with openness about limitations.[14]

These considerations are captured by the WHO's framework for the responsible use of AI in health care, which outlines six guiding principles[15]:

- **Protecting human autonomy**
- **Promoting human well-being, safety, and the public interest**
- **Ensuring transparency and explainability**
- **Fostering accountability**
- **Advancing inclusiveness and equity**
- **Supporting sustainability**

The vast majority (96%) of our survey respondents say they are ready to leverage digital health solutions (see Figure 1).

Resource optimization

In laboratories, AI and advanced analytics give scientists the ability to make sense of vast data sets, extract valuable insights, and make recommendations for next steps more efficiently and effectively than ever. "With AI, we finally have the tools and concepts that enable us to handle really large data sets and make something intelligent out of them," says Dr. Anthony Killeen, president of the Association for Diagnostics and Laboratory Medicine (ADLM) in the US. This allows medical laboratories to graduate from a "purely transactional model to [give] a more useful service where we integrate data and suggest additional tests or reduce unnecessary tests."

In hospitals, which represent a large portion of health care costs, digital health solutions can streamline processes and enhance logistics. In the UK, the Institute for Public Policy and Research estimated that the National Health Service (NHS), which operates the country's hospitals, could save £12.5 billion annually by using AI and automation.[16] According to the NHS, AI helps medical staff save one minute per patient, which equates to around 400,000 hours of emergency department consultation time and 5.7 million hours of time spent by family medicine doctors.[17]

Hospitals are reporting efficiency gains from digital health and analytics tools that connect different data and IT systems against logistical requirements to optimize space, equipment, staffing, and patient management. In the US, Duke Health, a hospital in Durham, North Carolina,

> It was not until covid-19 that digital health solutions like telehealth, testing, and tracking became familiar to patients. Now, digital technologies are proving integral to delivering patient-centered care.

> "With AI, we finally have the tools and concepts that enable us to handle really large data sets and make something intelligent out of them."
>
> **Dr. Anthony Killeen**, President, Association for Diagnostics and Laboratory Medicine

is beginning to use AI and cameras to spot patients at risk of falling. This is allowing the hospital to transition from having two monitoring staff per room (each working 12-hour shifts) to one member of staff monitoring 10 rooms. The hospital plans to re-train and re-credential the remaining staff to become nurse assistants, says Jeffrey Ferranti, senior vice president and chief digital officer at Duke Health. This shows how automation, far from replacing health care workers, allows them to be deployed in smarter ways.

Analytics platforms can also be used to manage the logistical challenge of forecasting admissions and discharges to coordinate bedspace in hospitals. The Accelerated Capability Environment in the UK worked with managers at Kettering General Hospital to apply AI to allocation decisions, using historic admissions data to plot immediate demand against predicted inflows, generating bed suggestions for patients coming from the emergency department, and explaining recommendations. This has contributed to more efficient scheduling, a reduction in bed moves, improved patient outcomes, and cost reductions.[18]

Augmented workforce

Digital tools can ease the pressure on a burned out and over-stretched workforce too. The WHO predicts a shortfall of 11 million workers by 2030.[19] Ferranti at Duke Health says that transcription tools, for instance, are helping physicians spend more time with patients and less time taking notes. "Now a doctor goes into the room, puts their cell phone on the table, asks the patients if they mind the recording, and a program transcribes it. Most of our physicians are able to get their notes done before the end of their day so they are not working at 11 at night," says Ferranti.

Algorithms can also review genetic profiles to personalize treatment plans, and machine learning can detect risk and assist in early, targeted interventions.[20] When remote infrastructure is integrated with digital care, more patients can be treated at home, further alleviating the pressure on physicians and hospitals.[21]

03 Delivering digital health at scale

Delivering transformative improvements to health care as a whole requires an ecosystem that allows data to be safely and efficiently shared at scale, without compromising security. But data governance is more challenging than ever, says Ferranti of Duke Health, as the accelerating advancement of digital health solutions makes it hard to keep up. "In 2025, there is no playbook, as technology is moving really fast." Ferranti advises against being swayed by "shiny objects" – the newest gadgets or quick-fix solutions – and recommends investing in platforms that offer scalable, cross-functional capabilities.

Connectivity and interoperability are essential to these systems, says Rafael Freixo, managing director of health care practice at L.E.K. Consulting in São Paulo, Brazil. More connected systems allow for the seamless retrieval of patient data.

A robust IT infrastructure and legal liability frameworks are also critical to support technology adoption.[22] As is the right training to ensure that technology can easily be used to balance workloads and enhance the quality of care that workers deliver.[23]

AI offers significant potential to address workforce shortages – a critical barrier to delivering health care at scale and achieving the United Nations Sustainable Development Goal of universal health coverage.[24]

Current estimates indicate that an additional 480,000 to 576,000 staff are needed to support the diagnostic workforce alone.[25] AI can ease the burden on health care professionals by relieving them of time-consuming tasks through solutions like digital scribes and automated billing,[26] and can speed up processes like medical image analysis.[27]

Although the growing role of AI may raise concerns about job security, it also creates new opportunities for collaboration. Machines struggle to replicate the social and relational aspects of clinical care, and AI should be seen as a tool to enhance, not replace, human health care delivery.[28]

"The health care industry is a prolific generator of data. But most is trapped in incompatible EHR systems and only some is properly used for physician or population health administrators's use."

Ali Ustun, Partner, McKinsey and Company

Data quality and interoperability

Essential to the effectiveness of digital health systems is the ability to exchange, interpret, and use data, like electronic medical records (EMR), effectively.[29] But health care organizations frequently struggle with a lack of data interoperability, frustrating integrations with other data sources, and platforms falling short of expectations. Nearly half of health care leaders are largely dissatisfied with their EMR systems, according to research by consultancy Sage Growth (see Figure 2).[30]

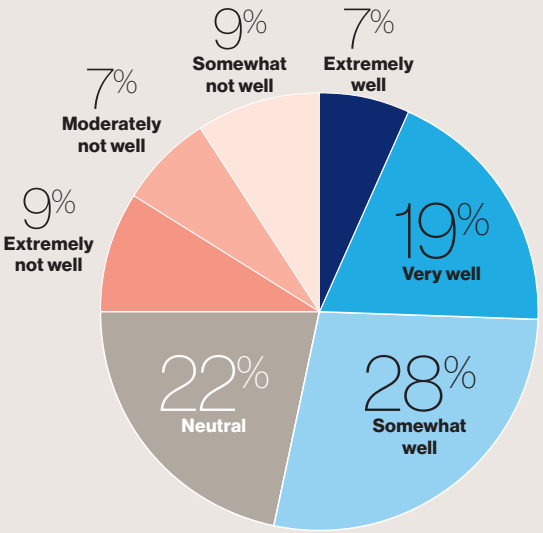
Our survey found that 98% of respondents agree that interoperability is a challenge, with 6% saying it is a major challenge they cannot overcome, 59% saying it is tough but manageable, and 32% saying it is a minor challenge that they are overcoming. Despite the obstacle, overall, the vast majority (92%) agree that interoperability is not an insurmountable challenge, indicating that progress is already being made in this area with further solutions predicted for the future (see Figure 3).

One scaling challenge for health systems is handling the wide variety of types of data. Formats can range from structured EMRs to unstructured doctors' notes, low-quality or irrelevant data, unrepresentative samples, omissions, or invalid data. Diagnostic laboratories may have different conventions in test naming, measurement units, and data fields. And payers and providers often use different health information platforms.[31] All this can lead to fragmented data, which can result in incomplete patient health records, unnecessary tests, diagnosis errors, late intervention, and poor care planning. It can also have financial implications, where organizations require additional support to run and manage multiple operating systems. And poor data quality or inconsistent formats across platforms can amplify operational costs, with the provisioning of inappropriate medications, for example.[32]

To deliver meaningful results in areas like diagnostics or predictive analytics, hospitals need to accelerate the modernization of their IT infrastructure and EMR systems,

Figure 2: Only half of health care executives are satisfied with their EMR systems

How well does your vendor live up the promises it makes about the EMR?



Source: Compiled by MIT Technology Review Insights based on data from Sage Growth, 2025

Figure 3: Most health care leaders say interoperability is a challenge, but still manageable

How significant a challenge is interoperability in your organization's digital transformation process?

Source: MIT Technology Review Insights survey, 2025

"In 2025, there is no playbook for data governance. The technology is moving really fast."

Jeffrey Ferranti, Senior Vice President and Chief Digital Officer, Duke Health

"Success in digital health means having a business model that solves a very real economic problem as well as a clinical problem at the same time."

Brownyn Le Grice, CEO and Managing Director, ANDHealth

putting interoperability at their core, says Ali Ustun, a partner at McKinsey and Company. While the health care industry is a prolific generator of data, "most is trapped in incompatible EMR systems and only some of that data is properly used for physician or population health administrator's use," Ustun says. This limits the ability of health systems to deliver connected care.

A number of organizations are developing standards for global health data interoperability, including Health Level Seven International (HL7) and Fast Health care Interoperability Resources (FHIR), which create a common language for data exchange. And the Trusted Exchange Framework and Common Agreement (TEFCA), which provides a nationwide framework for interoperability in the US.[33]

When the Mayo Clinic installed an interoperable EMR, giving patients and providers access to all required information regardless of where patients are seen, it streamlined medical information processes and billing practices for practitioners and patients.[34] Malaffi, one of the first operational platforms for data-sharing in the UAE, links public and private providers in Abu Dhabi to enable real-time data sharing, enhancing health care delivery, and reducing inefficiencies.[35] Similar platforms in Asia include the National Electronic Health Record in China and the Satusehat in Indonesia, which enable improved health care with enhanced interoperability. Malaysia launched a pilot program for adopting electronic medical records, with expected completion of the rollout in 2026. This suggests that even countries with historically lower levels of digitalization are adopting the technologies.[36]

Large countries face greater challenges. Brazil's health system, for instance, is fragmented across its roughly 5,000 cities, with technological divergences between its most advanced clinics in high income areas and public facilities in poorer regions that may lack reliable internet

A vibrant commercial ecosystem

Data is not only benefiting frontline health services, it is helping address economic burdens too. "Success in digital health means having a business model that solves a very real economic problem as well as a clinical problem at the same time," says Brownyn Le Grice, CEO and managing director of ANDHealth, an agency supporting commercialization of digital health in Australia. "There are an infinite number of clinical needs that can be solved through technology. There is a much smaller proportion that has any incentive for a customer to pay".

In Latin America, some of the largest digital health investments to date are in cost reduction measures like optimizing health insurance or medical fraud tracking rather than delivering health services directly to patients. "Because cost is such a big issue, that's what these companies are trying to solve," says Rafael Freixo of L.E.K. Consulting. "A lot of companies are saying they have invested in digital and are now collecting valuable data," said Maurício Franca, São Paulo-based head of the South America healthcare practice at L.E.K. Consulting. "If you are a health care provider, data might not drive a lot of revenue compared to carrying out treatments, but the [commercial] impact could be bigger – the challenge is how to collect and optimize the data."

and EMRs, notes Freixo of L.E.K. Consulting. In contrast, Uruguay, a far smaller country, has aligned EMRs across its hospitals. And Chile and Colombia too are also making significant strides towards interoperability, explains Freixo. Interoperability and data integration functionalities need to align with every country's specific regulatory governance.[37]

The security imperative

Interoperability requires data sharing, but providing access to third parties brings privacy and security challenges. When safeguards fail, the consequences can be far-reaching. Notable examples include a data breach affecting 8.9 million patients at a US health care provider and the theft of 78.8 million records from a major health insurance company.[38] In the US, the lack of a universal health identifier, due to privacy worries, has hampered data sharing between institutions, says Ferranti of Duke Health. Dr. Anthony Killeen at ADLM concurs that privacy concerns can constrain large-scale data aggregation efforts.

Balancing security with usability for patients is the primary challenge for survey respondents (38% agree). Their second biggest challenge is complying to regulations (26% agree) (see Figure 4).

But some countries and organizations are finding ways forward to share data safely. Governments in Asia and the Middle East have put security measures in place that allow data aggregation but retain patient anonymity. South Korea's national platform, My HealthWay, combines health records from multiple sources.[39] The Abu Dhabi Investment office does the same in partnership with a health cloud company that creates unified patient records.

Emerging technologies offer promising ways to strengthen data governance. Blockchain, for example, can enhance the security of medical data by enabling decentralized storage and sharing.[41] Homomorphic encryption, which allows computations on encrypted data without decryption, also helps preserve privacy when third-party access is needed.[42] However, integrating new technologies into existing systems requires a careful balance between innovation and regulatory compliance.[43]

Digital health companies are increasingly building privacy into their products from the start. "Privacy and security are a big part of health care. We have matured enough now to do this well. Companies tend to implement privacy by design, and, as they grow, they increase their resources for privacy," says Alwashmi of AmplifAI Health.

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>
> **Meshari Alwashmi**, CEO, AmplifAI Health

Figure 4: 2 in 5 leaders say balancing security with usability is the biggest challenge for secure digital health solutions

Ensuring compliance with privacy regulations, such as GDPR and HIPAA, is also key.

Balancing security with system performance and usability	38%
Ensuring compliance with regulations (e.g., GDPR, HIPAA)	26%
Integrating security into legacy systems	17%
Managing third-party risks	16%
Other	3%

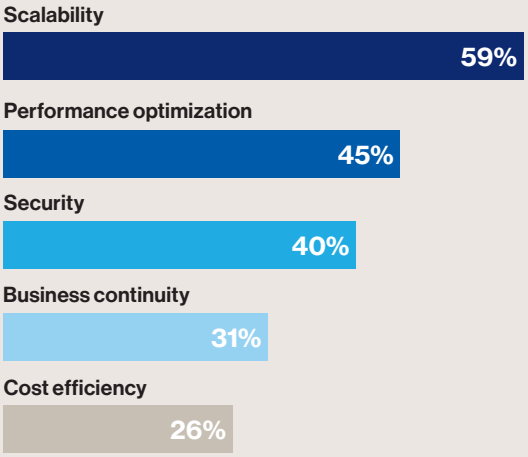
Source: MIT Technology Review Insights survey, 2025

Cloud for secure scaling

According to our survey, scalability is the number one benefit that cloud solutions provide to digital health systems – 59% of executives selected this as a main benefit of migrating to or adopting cloud solutions. Performance optimization (45%) and security (40%) round out the top three. Safe cloud environments can help to strengthen governance and security, says Ferranti of Duke Health, by providing reassuring guardrails for hospitals.

Legislation can support cloud adoption by strengthening trust and governance.[44] In Malaysia, data must be anonymized and encrypted prior to being uploaded to the cloud.[45] But in the Asia Pacific region as a whole, regulatory fragmentation or approach to cloud security is impacting adoption.[46]

Figure 5: 3 in 5 health care leaders say scalability is the top benefit of cloud systems
Nearly half say performance optimization is also one of the top benefits.



Source: MIT Technology Review Insights survey, 2025

Workforce engagement and ecosystem partnerships

While digital technologies offer powerful automation capabilities, the success of digital transformation ultimately depends on an engaged, skilled, and healthy workforce. Numerous workforce challenges are emerging globally. In Europe, the most pressing issue is the accelerated ageing of the workforce – 40% of doctors in 13 of 44 countries are aged 55 or older.[47]

Globally, human resource shortages are especially acute in pathology and laboratory medicine, leading to underused technology and suboptimal patient care and outcomes.[48]

Technology could enable multiple solutions to human resource challenges. Clinical decision support using AI could change the roles of professionals and increase the effective use of today's scarce workforce capacity.[49] Innovative technologies like digital pathology could expand access to diagnostics.[50] Rather than relying on recruiting health care workers from low- and middle-income countries – contributing to medical brain drain – higher-income countries could leverage technology to improve efficiency and strengthen their own health systems.[51] The aim is for technology to enhance, not replace, human roles – boosting efficiency while relying on human oversight and expertise.

Barriers to adopting these technologies include difficulty understanding new technologies, varied education levels and digital literacy, and differing professional experience. Some health care professionals may even question the value of digital technologies and perceive them as obstructive. Some lack the time to engage or else find new systems overwhelming.[52]

Organizations need to provide workers with tools and capabilities that do not overwhelm them in a digitally-enabled environment, since most digital change programs fail due to lack of support for those using them.[53] Digital transformation requires a systemic approach that puts the workforce at the center.

Health care service providers may need to deepen partnerships where they lack the right expertise. Duke Health, for instance, partnered with a health data provider to digitize and de-identify clinical assets beyond EMR data including multi-modal data such as images, omics, digital pathology, and pre-text notes. They are scanning nearly 10 million pathology slides, creating a comprehensive, AI-ready dataset.

Improving regulatory processes

Health care systems struggle to adopt and scale digital health because regulations are often unclear – leaving developers and providers uncertain about compliance requirements – reimbursement is inconsistent, meaning providers may not get paid for using new tools, and funding is frequently limited, making it hard to invest in and sustain innovation.[54]

To scale digital health, providers need to be clearly reimbursed for using new tools, and liability rules must be well defined – so it's clear who is responsible if something goes wrong. Without this clarity, clinicians may hesitate to adopt digital tools, and companies may struggle to manage legal risk.[55] In short, well-defined regulatory frameworks are essential for building viable and sustainable business models.

A clear understanding of the regulatory frameworks governing digital health and AI is essential for safe and effective integration into medical settings. Regulatory bodies are beginning to address this need by designing approaches that minimize harm without stifling innovation.

For example, the EU AI Act (2024) aims to support innovation in AI,[56] while the FDA's Predetermined Change Control Plan (PCCP) allows minor updates to evolving AI systems without the need for repeated regulatory applications. The focus here is on monitoring and adjusting systems based on real-world data.[57] Both regulations offer more flexible regulation, but transparency and real-world monitoring remain critical for safe AI integration.

Even when regulatory barriers are addressed, a key challenge remains: evaluating the value and safety of AI technologies. Current health technology assessment (HTA) frameworks, which rely on static evidence and linear evaluation processes, are poorly suited to assessing AI-based technologies that evolve over time and often lack transparency. There is no shared consensus on how to define or measure the value of AI in health care, creating uncertainty for decision-makers. As a result, there is growing recognition of the need for a dedicated HTA approach tailored to the unique characteristics of AI.[58]

> "People with a background in biochemistry or chemistry probably have not had any formal education in machine learning or AI tools. We have to offer training not just to students but to people who have worked in these industries for decades."
>
> **Dr. Anthony Killeen**, President, Association for Diagnostics and Laboratory Medicine

04 Conclusion: Connecting health

From diagnostics to hospital logistics, health care services industries are turning to digital to improve efficiency and productivity, lower costs, and deliver patient-centric care at a time of rising need. But success depends not just on the quality of individual solutions but the degree to which overall health IT systems can balance data innovation, interoperability, usability, and security. Experts outline a range of best practices:

Focus on augmentation and value for patient health, not automation. In specific domains, automation can replace the majority of tasks for some roles, freeing the workforce's time for complex cases and patient-centered work. Duke Health, for instance, experimented with virtual nurses that provide discharge and medication instructions to patients, freeing time for in-person nurses, who had experienced burnout during the pandemic. But simply instructing those nurses to see more patients adds more load back on. Instead, Duke took a holistic perspective that assessed a wider range of productivity metrics including lower readmission rates, because patients better understood their medications, and lower nursing staff turnover which saved onboarding and training costs. "You get these additional axes of value that justify your program without having to go to draconian things that are going to lead to more burnout," says Ferranti of Duke Health.

Building health care technology with clinician input. Digital tools need to be aligned with the skills and training of the health care workforce. Interfaces and tools should be accessible to all, including those with impairments and across generations, with tailoring to link to familiar ecosystems.[59] Ferranti also emphasizes the importance of engaging clinicians to identify actual pain points to ensure technology addresses real-world challenges without adding complexity. Even those in technical functions like laboratories may need training and support. "People with a background in biochemistry or chemistry probably have not had any formal education in machine learning or AI tools. We have to offer training not just to students but to people who have worked in these industries for decades," says Killeen.

Regulatory evolution can support new entrants – without hindering the private sector. Regulators are understandably cautious because of the consequences of error, but may need to develop more flexible pathways and review metrics. At the same time, innovators should not look at regulation as simply an obstacle, according to Brownyn Le Grice, CEO and managing director of

Success will depend on choosing the right platforms that can enable secure, interoperable, and outcome-focused health care systems while maintaining the highest standards of data protection and patient care.

ANDHealth. Health care purchasers are highly informed and highly risk averse. The higher the regulatory clearance you have, the safer a bet you are from a purchaser perspective. Those regulatory clearances are part of your competitive defensibility."

Regulators can play a productive role by promoting open data. "You need the government because health care organizations have all this data but they won't want to give it up," notes Franca. They have little incentive to share data since patients could then more easily go to other providers. "We have seen governments say to companies: 'you don't have an option, you have to share it.'" This open data philosophy draws from open finance where banks are obliged to let customers share data with other financial service providers. Open data initiatives in Latin America include RDNS[60] orchestrated in the Brazilian Ministry of Health. Colombia and Chile have also set initiatives for connected EMRs and the underlying data lake infrastructure to make it usable. The European Health Data Space (2025) promotes open data in the EU region, giving individuals increased access to and control of their electronic health data.[61]

Digital technologies have become an integral part of life, improving health care delivery, lowering costs and supporting personalized approaches. The majority of health care organizations are ready to embrace digital, but integrating tools with existing infrastructure, and frustrations about interoperability, are continued obstacles to delivering secure connected health at scale. While the majority of respondents see these issues as significant, most think that they can be overcome. As health care organizations continue to digitize and connect their operations, the focus should be on building resilient, secure, and scalable infrastructure that can support current needs and future innovations. Success will depend on choosing the right platforms that can enable secure, interoperable, and outcome-focused health care systems while maintaining the highest standards of data protection and patient care.

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