



Hospitals in the future 'without' walls
What does this mean for health care
delivery systems in the future?

What will the hospital of the future look like? How will it operate? Health care leaders agree that hospitals of the future will be...More digital. More innovative. More efficient. More accessible. More integrated. More sustainable. More personalized. The hospital of the future will be a hospital without walls.

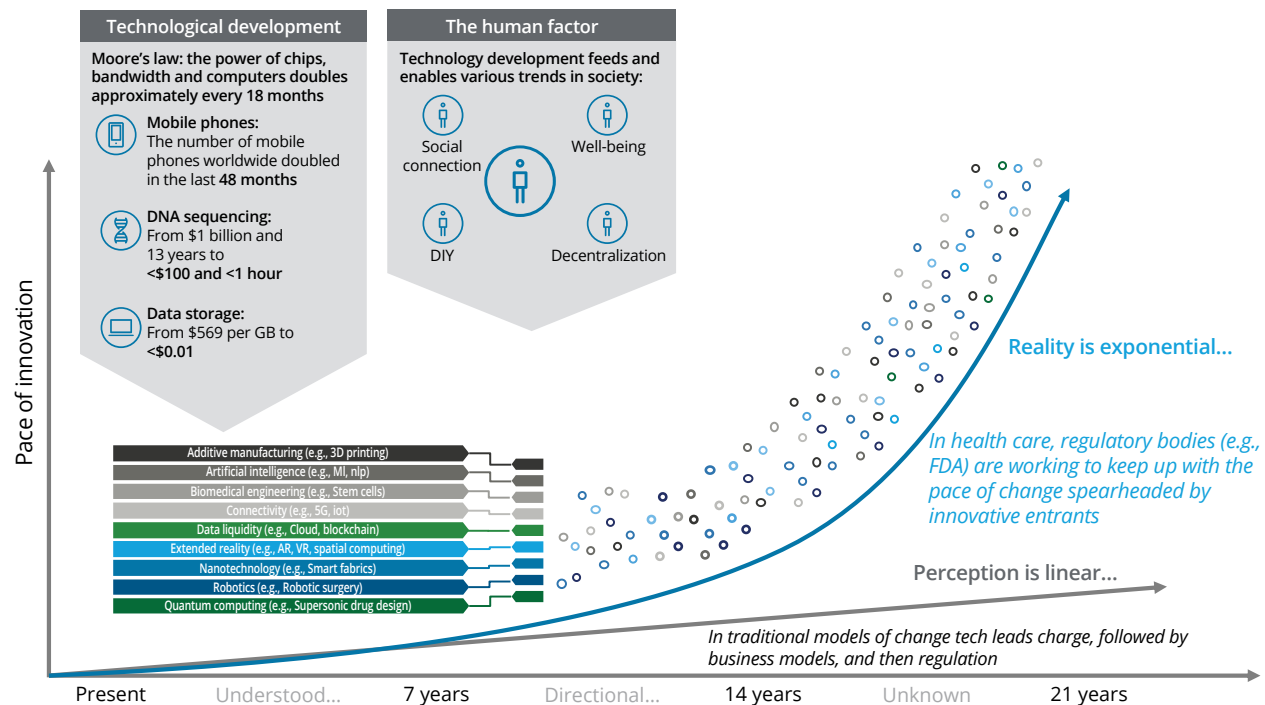
The global health care sector was already using new technologies and processes to extend care delivery outside the hospital setting when COVID-19 forced providers to transform operations overnight and dramatically adopt virtual visits and remote patient monitoring. Uptake has been supported and sustained by changes in regulation, funding, technology, clinical adoption, and patient acceptance.

While the envisioned future still calls for brick-and-mortar hospitals, all but the highest acuity care and procedures will shift away from this setting. This move will be enabled through interoperable/joined-up data, digital technologies, remote patient monitoring, value-based payments, scientific discoveries, and consumer demands.¹

Four key developments are driving the accelerated adoption of a "care without walls" strategy for health systems. One, significant investments in electronic health record (EHR) systems provide the clinical data foundation necessary to understand the health of populations and the ability to deliver digital care for a growing number of use cases. Two, the recent pandemic forced regulatory, compliance, and cultural changes where virtual health delivered access to care without lowering the quality of care. Three, traditional medical service models under fee-based arrangements are reaching an unsustainable cost point, moving more payers and providers toward payments based on "value" and risk contracting. Four, growth in case studies for digital care services is demonstrating evidence-based results, improving outcomes and access while lowering cost.

Technological advancements accompanied by lower costs will combine with these factors, resulting in the adoption of "care without walls" to be more exponential than linear (figure 1). Business care models shifting to risk-based allow for greater flexibility in the development and deployment of technology from providers seeking more efficient and effective means of improving outcomes while lowering overall cost.

Figure 1. What's Accelerating "Care Without Walls"



Physical hospitals of the future will primarily house emergency care, critical care units, and procedure suites. They will be places where complex 'things' get done (e.g., organ transplantation) in a controlled setting.

All other care will be delivered in the community; whether it's stepped-up/-down clinics, retail locations, schools or community facilities, workplaces, or, most often, a patient's home.

Hospitals and health systems will adapt their business and operating models to reflect a narrower range of physical site offerings focused on high-acuity, complex cases, and a wider range of virtual offerings.² This shift will also impact the health workforce and reshape what, how, and where work is performed and by whom.

Virtual care delivery also has the potential to address some seemingly intractable issues faced by the health care sector:

- Equity of care—by providing equal access and treatment to diagnosis and care for disadvantaged and vulnerable groups
- Escalating costs of care—by appropriately utilizing less expensive care settings and enabling a focus on prevention and early intervention through remote monitoring³
- Impact of health care on the environment—by reducing the carbon footprint (i.e., decreasing the extensive utilization of single-use products while maintaining proper sanitation)
- Better utilization of the limited supply of clinical workforces

However, designing a hospital of the future that incorporates a virtual care operating model is far more complex than simply enabling telehealth video consults. Not only do you need to design a virtual care operating model that has many of the same features as in-person care (such as rostering, data flows, and clinical governance arrangements) you also need to integrate this seamlessly with the physical experience. The hospital of the future will augment physical and virtual care in a meaningful and integrated way that delivers a superior patient experience and better clinical outcomes.



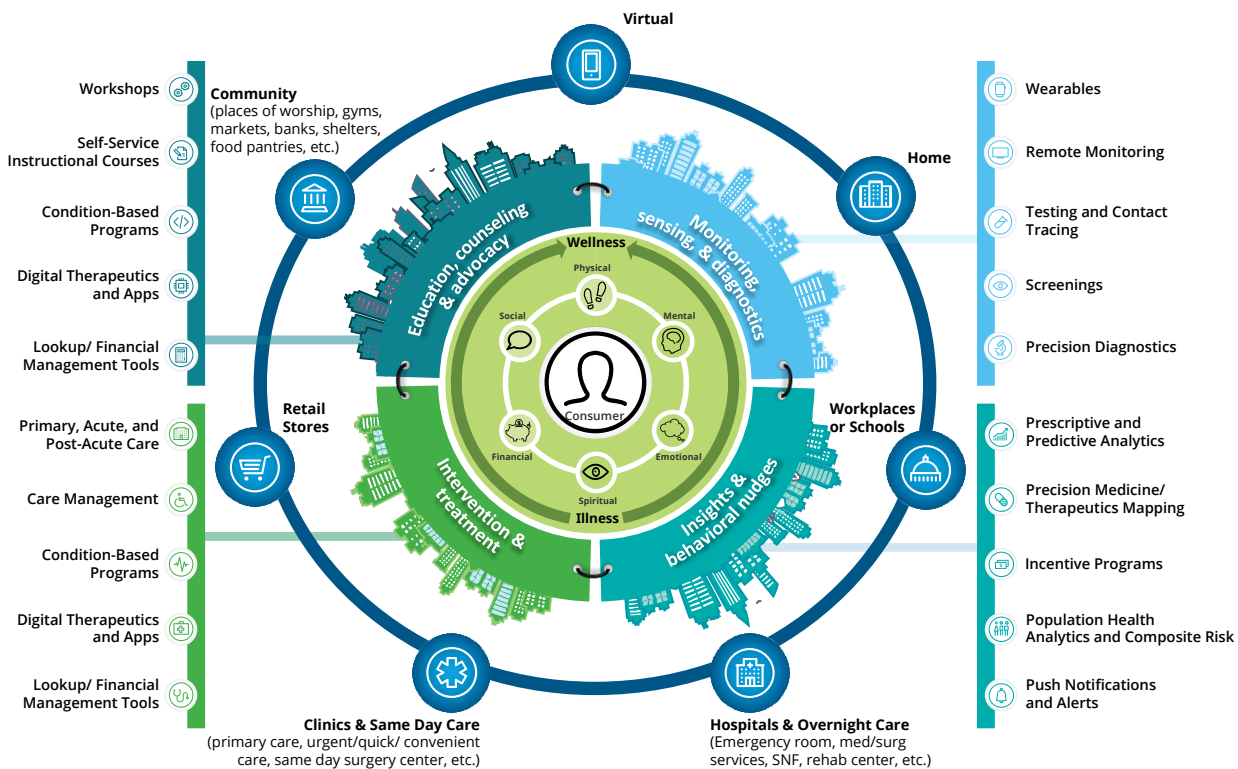
The Future of Health will be a radical frame shift

To better understand the hospital of the future, it is important to understand the megatrends affecting the health care sector and see how they will shape and define care settings.

There are several such megatrends. The Future of Health in 2040 will be radically different from what we see today:

- Health will be defined holistically as an overall state of well-being encompassing mental, social, emotional, physical, financial, and spiritual health.
- Care will be organized around the needs of the consumer rather than for the convenience of clinicians and care providers (figure 2).
- Empowered consumers will have access to detailed information about their health, own their health data, and share in health-related decision making. They will demand accessible, affordable, and personalized health care products and services.
- Care delivery and digital transformation—enabled by robust, real-time, and radically interoperable data; open, secure platforms; and artificial intelligence (AI), virtual health, and other digital technologies—will promote closer collaboration among industry stakeholders and deliver the right care in the right place at the right time.
- Innovative interventions and treatments from existing and new health care providers will be more precise, less complex, less invasive, and less expensive.

Figure 2. Future health delivery models must be designed to address consumers' unique needs and preferences



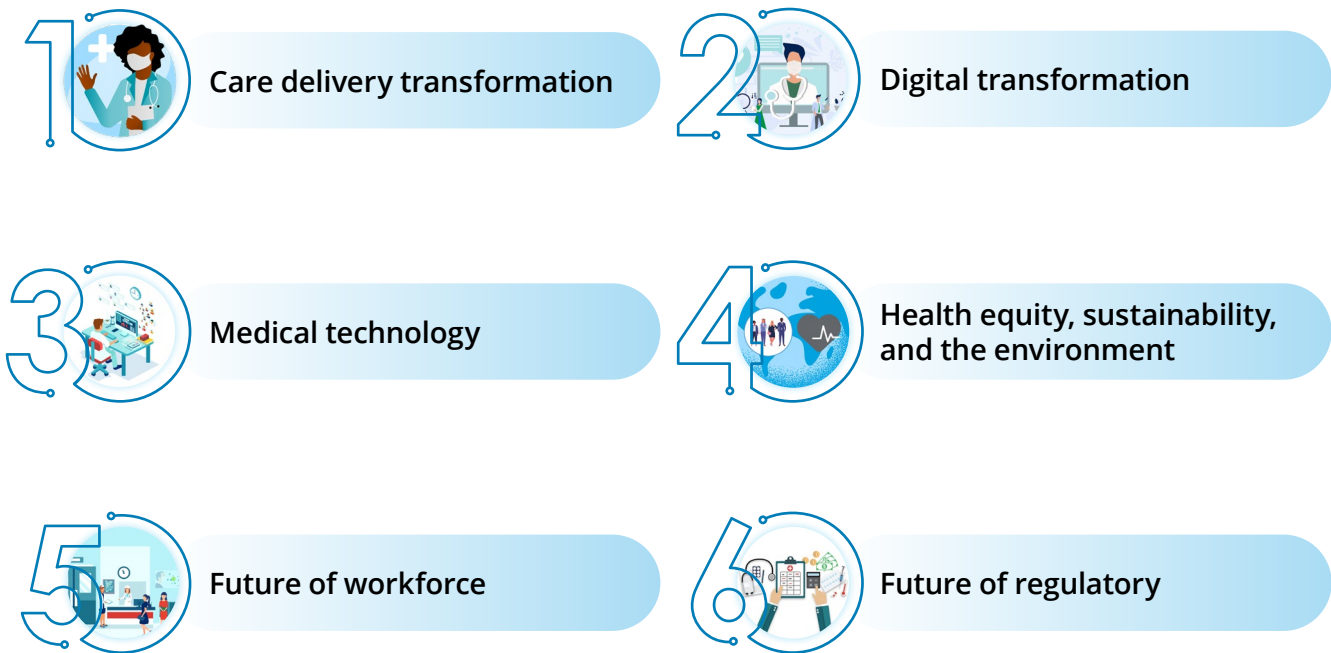
But that's 2040. Where are we today? And what progress are we making toward that future state?

What we have experienced over the last couple of years is a collision of forces that accelerated changes within the health industry. A global pandemic of historic proportions; collaboration among government, health care, and life sciences organizations that we have never before witnessed, generating exponential advances in medical science – especially of genomics; an explosion of digital technologies, data access, and analytics; informed and empowered consumers who are globally connected through social media; and a movement away from fee-for-service, activity-based, disease care to value-based, population health models focusing on prevention and well-being. These forces deliver the long-promised transformation of clinical, financial, and operational health care delivery and will importantly shape the hospital of the future.

Most advanced health systems today are combining clinical data with nontraditional, “social determinants of health,” and other data captured in customer relationship management (CRM) tools to: 1) tailor communication to individual patients; 2) help deliver hybrid care models to target patient populations and individuals; 3) improve staffing resource allocation; 4) generate alerts for potential adverse events; and 5) enable earlier interventions. Patients are beginning to feel the impact of this digital care revolution as health systems and providers begin taking on greater risk for patient outcomes, seeking to lower costs and differentiate themselves from new market entrants.

We have identified six key clinical and operational areas that will be impacted by these forces (figure 3). For each we have added examples to illustrate how the most pioneering health care organizations are moving toward the hospital of the future; the hospital without walls.

Figure 3. Six areas of impact in the move to a hospital without walls





Care delivery transformation

It's time for health care to meet consumers where they are.

The pandemic has changed the way consumers want to receive care.⁴ They want more convenient care, often delivered to them at home, in local pharmacies, in retail stores, or at their workplace. They want convenience but also demand the utmost safety and security and a seamless engagement experience.

These stated preferences and providers' responses are creating new dynamics in the market: Competitors are creating nontraditional and public-private partnerships to better serve the community; struggling small or boutique health organizations are merging with/being acquired by large providers with greater scale; and retail and technology giants are aggressively making moves to enter or expand in the health care space.

Best Buy Health: "Best Buy Ventures Into Health Care, Paying \$400 Million For Current Health"

Forbes, Nov 30, 2021 - "Late last month, famed consumer electronics company Best Buy announced a revolutionary move: investing in health care. The press release detailed Best Buy's decision to acquire Current Health, "a leading care-at-home technology platform that brings together remote patient monitoring, telehealth, and patient engagement into a single solution for health care organizations."⁵

Mayo Clinic and Kaiser Permanente: "Mayo Clinic And Kaiser Permanente Invest \$100 Million In 'Hospital Care At Home' Venture"

Forbes, May 13, 2021 - "The Mayo Clinic and Kaiser Permanente are investing about \$100 million into the technology company Medically Home Group to advance a new health care delivery model that delivers 'advanced care' typically available inside a hospital into patient homes.

Kaiser Permanente and Mayo confirmed a combined investment of about \$100 million that will be used to 'expand access to this unique model and encourage health systems and care providers to adopt it.'

Executives involved have said Boston-based Medically Home is providing 'technology infrastructure' while Mayo, which made an undisclosed investment in Medically Home in 2019, and Kaiser Permanente have been providing the medical care or directing those that do provide the treatment for 'high acuity patients.'⁶

Social distancing measures during the pandemic forced many providers to employ virtual care technology for scheduled outpatient appointments. Hospitals and health systems are turning to cloud computing, 5G telecommunications, artificial intelligence (AI), and interoperable data and analytics to address current challenges and build digitally powered care delivery models. However, we are still only at the beginning of this journey. Deloitte has formed a strategic alliance with Vodafone to create the "Vodafone Centre for Health with Deloitte." A virtual hub will combine Vodafone's connected health care solutions with Deloitte's health care consulting experience to enable many more people to access health care when and where they need it.

Advanced wireless technologies such as 5/6G will be a defining enabler for the hospital of the future. These technologies will support continuous monitoring of a patient and their environment in real time. They will ensure that the care delivered outside of the hospital is just as safe and reliable, if not more so, than that delivered in person. They will also provide a platform to enable personalized and timely behavioral nudges to increase compliance with medication and care management. The importance of effectively managing, storing, and seamlessly integrating this data into the blended model of inpatient, home-, and community-based care cannot be underestimated.⁷

Innovation in action: Development of internet health care platforms in China

As part of the 2030 Health China Planning Outline, the nation's medical industry is transforming from offering "health care" to "health services" (broadening the definition of health care to also include wellness and the related services) and moving toward future smart health care.⁸

To accommodate the increasing demand for service due to the COVID-19 pandemic, the Chinese government accelerated policies to support the rapid deployment of internet hospitals. This included virtual consultation, diagnosis, treatment, follow-up treatment, and health management.⁹

Policies have been introduced across the care value chain to make it easier for people to access health care. This included the introduction of medical insurance claims/payouts for care delivered by virtual hospitals, online consultations, online prescriptions, online payment, and delivery of medicines directly to people's homes.

According to China's National Health Commission, online consultations increased 20-fold year-on-year during the pandemic. Virtual hospital care is now a key national strategy. As the governance and regulation requirements for internet hospitals are becoming clearer, local governments are also starting to embrace them.¹⁰

The age range of internet hospital users is wide, and the number of middle-aged and elderly users is increasing.¹¹ Ping An Good Doctor, one of the representative internet hospitals, had 300 million registered users as of October 2019—equivalent to one in every three Chinese netizens—and the number of visitors exceeded 1.1 billion from January to April 2020. Ping An Good Doctor provides services including 24/7 online consultation, referral, registration, online drug purchase, and one-hour drug delivery. Ping An also provides medical regulators and service providers with a smart integrated platform covering all the steps before, during, and after medical services.¹²



Digital transformation

Consumerism is driving health care digital technology use.

The pandemic's economic recession and health systems' increasing costs have forced many systems to change their care delivery models to continue to meet quality and access targets from a reduced cost base. As health systems move to consumer-centered care and care without walls, providers and the wider health ecosystem will position virtual health care as an integral delivery channel—one that increases access and convenience while reducing the total cost of care.

Digital transformation will require health systems to embed virtual health within the fabric of their delivery model. Forward-thinking organizations are assessing and investing in this infrastructure today to align and enhance core capabilities across the organization to create the hospital of the future:

- Engaged leadership and dedicated owners drive rapid decision-making around virtual health programs
- Redesigned care models combine virtual and in-person services in a seamless delivery process with coordinated, team-based care across services and settings.
- Adjusted operating models and staffing integrated virtual health workflows and policies into traditional operations and promote customer-centricity, care quality, safety, and clinical outcomes.
- Structures and processes enable virtual health financial viability, regulatory compliance, organizational advancement, reimbursement strategy, and asset efficiency
- Cognitive technologies and analytics generate meaningful insights on virtual health usage and outcomes,
- Aligned clinical and operational staff advance offerings and improve quality, experience, and cost-effectiveness
- Differentiated customer experience, supported by education and marketing of a clear value proposition, promotes utilization of virtual services, feedback, retention, and improved outcomes for members, patients, and their families.

While many health system executives would say that they have been able to overcome the reluctance of consumers and physicians to adopt virtual health, interoperability, platform integration, and data vulnerabilities continue to be a challenge.¹³ Solving for this will require thinking about virtual care and the hospital of the future as an essential part of the core business, alongside inpatient care, and not merely a discretionary add-on.

Innovation in action: Digital CM for multimorbidity patients

The use of digital technology to improve clinical processes through the use of cloud computing, mobile computing, internet-connected devices, and machine learning is increasing and has become known as Digital Health. A payor demonstrated in a randomized controlled trial (RCT) a 9% reduction in emergency room (ER) utilization, a 17% reduction in inpatient admissions, and a 29% increase in the utilization of preventive medicine services with an estimated savings of \$641 per member per month.





Medical technology

Sensors and devices connect hospitals and homes, providers, and patients.

The future of hospitals without walls will be underpinned by digital transformation that is enabled by radically interoperable data and open, secure platforms. Providers, health plans, and other stakeholders are turning to digital solutions to meet consumers' evolving health care needs and expectations, improve patient engagement and experience, and drive loyalty. Understanding how these trends have played out in other industries,¹⁴ as well as those starting to emerge in health care, will be important.¹⁵

Capabilities that support remote or non-brick-and-mortar care are exploding in the health care market. Wearable, ingestible, and environmental sensors and AI that can passively monitor and collect clinically relevant data—a drop in blood glucose level, a heart arrhythmia, a lack of movement for example and alert contact center staff for follow-up—is expected to grow \$23 billion between 2020 and 2024.¹⁶ More than 90,000 new health apps were released in 2021¹⁷ and investors pumped nearly \$30 billion into digital health care deals.¹⁸

In the future, health systems will map digital care capabilities to individual patients based on their clinical, drivers of health (DoH) factors and care needs. Applying targeted digital health capabilities will be based on population health segmentation:

- 1. Healthy and Wellness Care Patients–Activity Tracking.** Non-clinical consumer devices like a Fit-Bit, Apple Watch^{®19} or Oura may provide useful information for clinicians about activity, lifestyle, and health factors; tracking may be tied to incentive and reward programs for wellness. It remains unlikely such devices will be “digitally prescribed” by providers and health systems for Rising-Risk or High-Risk patients.
- 2. Healthy, Non-Acute Episodic Patients–SMS/Text/App & Virtual Assistant.** These digital care capabilities, including tailored “Care Pathways,” can monitor patient-reported outcome measures (PROM). This digital care service applies to most segments of the population for communication, engagement, access, and education, and for providing early warning of potential adverse events. While this low-cost application will be easy to adopt, new care design processes and workflow in care will be needed to accommodate monitoring and interventions.
- 3. Non-Acute Episodic to Poly-Chronic and Acute Patients–Video Visit Consults.** Online video consults is digital care delivery that applies to most patient segments and clinician/care team delivery. Though the technology cost to provide this service remains relatively low, the clinical staffing costs will be high.
- 4. Rising Risk and Chronic, Acute Episodic Patients–Deviceless AI Remote Patient Monitoring.** More advanced, low-cost monitoring programs with AI and rules-enabled clinical care protocols will be useful in managing Rising Risk and Chronic, Acute Episodic patients (e.g., high-risk discharges over 30-90 days). These smart care pathways and chat bot technologies will be integrated within the patient electronic record and care plans, enabling a “one-to-many monitoring” on a set of patients prescribed a digital, deviceless protocol.
- 5. Rising-Risk, High-Risk, Poly-Chronic and Acute–RPM Clinical Grade Devices.** Physicians and clinicians will prescribe digital devices with clinical grade-quality, integrated with supply chain partners and EHR systems for this higher-cost higher-complexity patient segment. Monitoring this segment will require data from devices physicians and clinicians can rely on. Accurate, high-quality, and frequent data feeds, required when making clinical decisions, will help patients avoid adverse events when data from these digital care devices falls outside reference ranges. The high cost of this patient segment will support the digital prescriptions and monitoring required for this service.
- 6. High-Risk, Acute Patients—Hospital@Home.** Patient care at home will require continuous monitoring with streaming and/or high-frequency data feeds delivered from clinical care devices 24/7 via a care team. Other in-home devices, coupled with AI, will be used to track issues like fall-risk for elderly patients or physical activity required for a patient's at-home recovery. This is a high-touch, operationally intensive, digitally enabled care system for the smallest but highest-cost population segment.

Innovation in action: Virtual support for COVID-19 patients

Lifesprk, a home-based care provider, partnered with St. Louis Park, Minnesota-based North Memorial Health Hospital to create a hospital-at-home model during COVID-19. The model gives patients access to non-stop virtual support from Lifesprk's team and an in-home monitoring kit that includes pulse oximeters, scales, and video-calling capabilities.²⁰

Virtual Reality/Augmented Reality

Clinicians are leveraging virtual reality/augmented reality (VR/AR), customer relationship management systems (CRM) and data analytics to provide a 360-degree view of patients with personalized, omni-channel engagement.²¹

One of the most interesting examples of this is the deployment of AR & VR to provide a 360/virtual consultation room that enables the physician to observe the full patient (not just their head and chest) and utilize all of the non-verbal communication in their diagnosis. This includes, for example, a patient's gait as they walk, the speed and balance as they sit, whether they display any anxious behaviors such as wringing of the hands, etc. This comprehensive view enables the clinician to make a more accurate diagnosis and enhance the [virtual-patient experience](#), improve safety, and strengthen the connection between clinicians and patients.²²

Other examples include the use of an integrated platform connected by a digital control tower with proactive AI capabilities which can optimize the flow of patient data and increase clinician and resource efficiency to enable care delivery across physical boundaries.²³ This level of proactive monitoring provides reassurance to the patient and their family that they can remain in their own home and will be cared for with the same level of surveillance as that offered by an inpatient stay.

One U.S. health system has utilized its Hypertension Digital Medicine program to improve clinical outcomes for patients with uncontrolled hypertension; reduce avoidable emergency department (ED) and inpatient utilization by improving hypertension control; and improve primary care capacity with savings of \$77pmpm.

These technologies and others provide the capabilities and flexibility health systems need to deliver the right care at the right place at the right time. However, they also produce extraordinary amounts of new data that can only be managed effectively in the cloud. This is pushing many organizations to accelerate long-planned digital transformations.

The majority of health system executives are now turning to cloud—Platform as a Service (PaaS), Infrastructure as a Service (IaaS), and Software as a Service (SaaS)—to act as a catalyst for these changes and to strengthen data security and cyber controls, which will be imperative in delivering the hospital of the future.²⁴

Innovation in action: Closing the digital health gap

Japan established a "digital agency" in an effort to update an outdated IT infrastructure that has hampered data collection. With the support of Deloitte's proprietary GovConnect²⁵ platform, the Japanese Ministry of Health, Labor and Welfare is digitizing its entire health care ecosystem which, until the last few years, was entirely on paper. For example, previously paper insurance cards and prescriptions are expected to be all electronic by mid-2022. In addition, the country's health ministry has implemented an online system that will allow citizens to access their personal health records.²⁶

Germany's federal parliament passed the Hospital Future Act (KHZG), which will provide significant funding to close the digital gap in its health system. Potential projects include patient portals, digital medication management, IT security measures, telemedicine, robotics, and cross-sector telemedical network structures.²⁷

Sensors and devices connect hospitals and homes; providers and patients

The pandemic helped underscore the importance of virtual health and alternative sites of care, and we have noted a shift in locations where medical devices and remote diagnostics are used to support these shifts. This is opening the door to new innovative medical technologies that can assist in testing, monitoring, and tertiary-level patient care occurring outside hospital walls.

Today, wearable devices that track our steps, sleep patterns, and even heart rate have been integrated into our everyday lives in ways we couldn't have imagined just a few years ago. We expect this trend to accelerate: Advances in sensors and AI are helping millions detect and manage chronic health conditions and avoid serious illness on devices small enough to be worn on a wrist or penny-sized patch. Deloitte predicts that 320 million consumer health and wellness wearable devices will ship worldwide in 2022. By 2024, that figure will likely reach nearly 440 million units as new offerings hit the market and more health care providers become comfortable with using them.²⁸

Many medtech companies are already beginning to incorporate always-on biosensors and software into devices that can generate, gather, and share data. Soon, advanced cognitive technologies could be developed to analyze a significantly large set of parameters and create personalized insights into a consumer's health. The availability of data and personalized AI can enable precision well-being and real-time microinterventions that allow us to get ahead of sickness and far ahead of catastrophic disease.

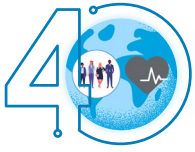
Medtech companies that have historically targeted specific therapeutic areas defined by a procedure (e.g., implanted devices) are adding products and solutions to their portfolios to help address the full patient journey, from diagnosis to treatment, to rehabilitation. Nearly half of startups (46%) have a focus on prevention and/or wellness or detection/diagnosis;²⁹ ambulatory clinics, at-home care, self-administered diagnostics, and always-on remote monitoring are also growing areas of interest. Seventy percent of startup companies in the diagnostics sector have a product applicable to the point-of-care³⁰ which, increasingly, will be the home or community. Monitoring and real time data, analytics and insights are the cornerstone of the future hospital without walls.

Innovation in action: Medtech-consumer tech alliances

Partnerships and collaborations are an active lever to advance diagnostics and medical devices that support hospitals without walls.

Zimmer Biomet partnered with Apple³¹ to create a consumer-friendly way for patients to track their recovery from knee or hip replacement surgery. The Zimmer Biomet mymobility app uses the Apple Watch® to facilitate a new level of connection between patients and their surgical care teams.³² More recently, Zimmer Biomet collaborated with Canary Medical on a smart-knee device that sits inside the non-weightbearing part of a knee replacement and uses sensors, 3D gyroscopes, and 3D accelerometers to track and measure physiologic metrics of post-operative patient activity such as steps, walking speed, stride length, cadence, and distance walked. The device, called Persona IQ, combines Zimmer Biomet's Persona Knee System with Canary Medical's new Canturio tibial extension.³³





Health equity, sustainability, and the environment

Environmental, social, and governance (ESG) will help drive health equity and increase interest in planetary health.

The hospital of the future will be forced to consider how it will contribute to the ESG agenda. ESG considerations will be as important in the design, build and operate model of the future hospital as the current quadruple aims of cost, quality, access, and patient centricity.³⁴ In short, ESG will be the fifth dimension on the “balanced scorecard” for health care in the future.³⁵

Health care is on the front lines of addressing ESG. Some argue that it is a moral imperative that the health care industry urgently addresses how it contributes to inequity (through lack of access and disparate care outcomes) and produces a significant carbon footprint while espousing equal access to all and being in the business of saving lives and reducing the burden of disease.

Health care is also the largest global industry, employing approximately 59 million people.³⁶ This influence extends far and wide—across the people it employs, the people and their families it serves, and the communities in which we work, live, and play.

Health equity

Health equity is more than equitable access to care. It’s an opportunity to achieve an overall state of well-being encompassing clinical, mental, social, emotional, physical, and spiritual health. It is influenced by not just health care, but also social, economic, and environmental factors.³⁷

Structural flaws in the health system, systemic and unintentional bias, and inequities in the drivers of health (DOH; also known as the social determinants of health) have contributed to health inequities in communities across the globe and over centuries in complex and systemic ways.

While health care alone cannot solve for poor outcomes resulting from social determinants of health, we do know that insufficient and outdated health system infrastructure remains, for many, a major hurdle to achieving optimal health status. As the transformation of health care occurs, we must carefully consider the role that the hospital—the most costly site of care—can and should play. In addition, leaders from governments, health systems, life sciences/medical device companies, health insurers, academic institutions, community services agencies, and advocacy groups must join forces to design and build systems that advance health for all.³⁸

Innovation in action: The Sanjeevani Pariyojana project

In spring 2021, as COVID-19’s Delta variant surged in India, Deloitte and northern India’s Haryana Karnal district launched a collaborative effort to reduce the strain on hospitals and “extend the hospital ward” by developing a supervised, virtual, in-home care program for people in rural areas with mild or moderate COVID-19 symptoms.

Sanjeevani Pariyojana (In Hindi, this translates to The Life Project) mobilized local health care practitioners to help provide early detection (through home test kits), and essential care for home-isolated COVID-19 patients. The program took advantage of Haryana’s existing technology infrastructure by adding or enhancing command-center capabilities, and augmenting the availability of telemedicine, virtual triage, and advanced life-support transportation services when patients required higher acuity care.³⁹

Sustainability and the environment

The increased frequency, intensity, and variability of natural disasters and their downstream effects are already challenging health care systems' infrastructure, supply chain, and workforce. Health workers are on the front line of natural disasters and will remain so. Ensuring that the hospital of the future can adequately fulfill this role is crucial.

We know that with climate change, the patterns and prevalence of disease will also adapt. For example, we will experience an increase in respiratory conditions due to lower air quality. Patterns and prevalence of disease will also change as "vectors," such as the mosquito, alter their distribution across the world as average temperatures rise.⁴⁰ This will impact the demand and distribution of health care services required.

The hospital of the future holds the promise of being able to flex and quickly adapt to these changing circumstances without being constricted to a brick-and-mortar location with limited space to expand, an outdated design configuration, and a workforce drawn only from the local surrounding area.

Mitigating and adapting to climate change presents a global opportunity to remake the foundations of health care and introduce new operational models—including virtual care and hospitals without walls—providing greater flexibility, agility, resilience, and sustainability.

To deliver on these promises, an organization's response to climate change should not be an "add-on" initiative; it should be integrated into a transparent, comprehensive planning and decision-making process as choices and compromise will be an inevitable part of this transition and ongoing journey.⁴¹

Innovation in action: Western Australia's "green" health facilities

Pingelly & Cunderdin Health Centre's two facilities were designed to reduce their environmental impact. Examples of design features include the use of airlocks (to improve climate control and avoid wind tunnels); natural light, laminated safety glass windows and treatments to reduce heat transfer; grey water systems, water wise gardens and landscaping to reduce water consumption; and installation of solar panels to produce electricity. Both new health centers received a 4 Star Green Star rating.⁴²

St Vincent's nonslip matting

St Vincent's public hospital in Sydney is recycling single-use plastic syringe caps into nonslip matting that is being sold commercially, creating a circular economy to ensure on-going sustainability.





Future of workforce

Changing conditions are changing roles.

COVID-19 has become the catalyst to a future of work and talent in health care that might otherwise have taken years to attain.

After nearly two years of lockdowns, quarantines, and remote work, many people are reevaluating their professional lives. The resulting “great resignation” is making it challenging for virtually every industry to attract, motivate, and retain high-quality employees; perhaps more so for hospitals and health systems where clinicians and staff are stressed, overworked, and burned out. A recent survey of 6,000 critical-care nurses found that 66% have considered quitting.⁴³ Sixty-one percent of U.S. physicians report often experiencing feelings of burnout.⁴⁴ Some physicians are so dissatisfied with their profession that they plan to retire early or exit the field.⁴⁵

Hospital leaders are trying to retain talent while also navigating changing workplace dynamics and workforce roles. Few people will return to the workplace they knew pre-COVID-19. Even frontline clinicians—who never left their physical workplaces—have watched their jobs change in countless ways. With people unable or unwilling to leave their homes for health or safety reasons, health care organizations and their workforces have had to adapt to accommodate their customers'/patients' new preferences for in-home virtual care delivery.⁴⁶ Introducing digitally enabled agile ways of working—such as using remote clinical and nonclinical staff—to address capacity and demand challenges is becoming increasingly commonplace.⁴⁷

The shift in how and where people work has prompted health care organizations to innovate, and this mindset should serve them well as they prepare for the hospital of the future.

Prior to COVID-19, only 9% of employees said their employer was introducing new ways of working. Since virtual work has become the norm, 78% of employees reported their employer was planning to, or has already introduced new ways of working. Our research indicates that health care leaders are learning that virtual work is not about replicating in-person work online; rather, it is leveraging new technologies to rethink work, teams, and culture⁴⁸ to reflect changing conditions and changing roles. The challenge in implementing virtual health is not a technology challenge, it is a workflow redesign challenge.

The skills and talent required by the health care system is also changing. Increasingly, skills such as coding, behavioral science, and data management, analysis, and visualization are needed. Health system and hospital executives are having to rethink their job specifications, where they attract talent from, and understand the competitive environment for that talent. This, in turn, is driving new models of organization and structuring of work as providers experiment with contingent workforces, associate models, partner ecosystems, and the sharing of scarce human skills and capabilities.⁴⁹

Health care organizations should continue harnessing the changing landscape to consider new ways of working—in person, virtually, or some combination of the two. The good news is that the competition for talent and shift to virtual work offer organizations abundant opportunities to examine their tools, strategies, and processes around building camaraderie, connectivity, and culture; improving employee well-being; and enabling employees to communicate and collaborate in meaningful, intentional, and thoughtful ways.⁵⁰

Innovation in action: Powering up primary care

An emerging care model, known as the advanced team care with in-room support, has the potential to “power up” primary care and increase physician, staff, and patient satisfaction. In this model, each clinician teams with two or three medical assistants or nurses; that is, care team coordinators (CTCs). Together they conduct in-person patient visits, sharing responsibilities to optimally utilize clinician resources. Evidence from early demonstration sites suggests that this model improves clinical quality; is more satisfying to clinicians, staff, and patients; and appears to be financially sustainable under both fee-for-service and value-based payment.⁵¹ Dentists have utilized this model for several decades. You go to see the dentist, but you are really seeing a dental technician or hygienist, with the dentist involved only to address problems or close out the encounter.





Future of regulatory

New technologies, business models can help regulators keep pace with health care innovation.

Against the backdrop of a rapidly changing health industry regulators are looking to utilize emerging technologies and new business models to reduce the burden of compliance and drive better efficiencies and regulatory outcomes.⁵²

Regulators around the world are faced with major, intersecting challenges including costs to business, public expectations of stronger protection, demands for greater equity, accelerating technological change, resource constraints, organizational culture and talent issues and the need to regulate software as it continues to be utilized in more and more aspects of health care delivery.^{53,54}

As the pandemic took hold, regulators themselves had to pivot from conducting traditional face-to-face inspections and registration checks to deploying remote technologies and new ways of working to ensure key activities could be completed to keep patients and clinicians as safe as possible. For some regulators, this even meant moving into new areas of operations—such as vaccination monitoring.⁵⁵

Increasingly, regulators are incorporating emerging technologies into their new toolkit. Globally, we have seen the use of robotics and AI-driven smart cameras, the combining of data and behavioral science to “nudge” compliance, and the use of augmented reality in training and technological advances in virtual inspections. We have also seen a shift to innovative business models that focus on human-centered service design, organization culture, and future skillsets needed to regulate in an era of shifting expectations from citizens and authorizing environments.⁵⁶

As the health regulatory landscape continues to evolve, it is vital for stakeholders to have clarity on next steps to help them prepare their people, processes, and systems for the challenges and opportunities that lie ahead.

Regulatory frameworks will be very important as we move to next-level digitization that enables hospitals without walls. Transitioning health systems' electronic health records (EHRs) to the cloud provides not only flexibility and cost/operating efficiencies, it also can create data ownership and security challenges: Who controls which data can be shared? Where is the data physically housed?

The answer to these questions is that it depends. In the United States, for example, it doesn't matter where the data resides as long as the cloud provider has the proper amount of latency and responsiveness. By contrast, in other countries, like Australia, health data cannot reside outside the sovereign border, which means the cloud provider has to be either a local data center, an on-premises operator, or a hybrid, in-country, public-private icloud.⁵⁷

Properly developed and administered, regulation provides a wealth of benefits to society, from consumer protection and risk reduction, to stimulating trade through innovation and acting as a lever for governments to achieve policy outcomes.⁵⁸ Health regulators are being driven to become increasingly agile, innovative, supportive, customer-centric, and digitally savvy. Whatever they're responsible for doing and wherever their primary challenges lie, regulators can benefit from strong governance, modern engagement and feedback methods, and the lessons of behavioral insights and human-centered design.⁵⁹

Innovation in action: Fast-tracking vaccine approval

The European Medicines Agency (EMA) supports the development of medicines that address unmet medical needs. In the interests of public health, applicants may be granted a conditional marketing authorization (CMA) for such medicines on less comprehensive clinical data than normally required when the benefit of immediate availability outweighs the risk inherent in the fact that additional data is still required. CMAs can be granted for medicines for human use if they are intended for treating, preventing, or diagnosing seriously debilitating or life-threatening diseases.

These approvals are also granted during public health emergencies, when less comprehensive and non-clinical data may be accepted. Approvals may be combined with rolling reviews of data during the development of a promising medicine to further expedite the evaluation.⁶⁰ As of 2022, five COVID-19 vaccines have received conditional marketing authorization in the EU/EEA, following evaluation by the EMA, and are part of the EU Coronavirus Vaccines Strategy Portfolio.⁶¹

Innovation in action: Streamlining approval for digital health products

As part of its Digital Health Innovation Action Plan, the U.S. Food and Drug Administration (FDA) launched the Software Precertification (Pre-Cert) Pilot Program test phase in 2019, to assess the proposed new regulatory framework and approach as described in FDA's Pre-Cert Working Model v1.0 (<https://www.fda.gov/media/119722/download>). The proposed approach aims to look first at the software developer or digital health technology developer, rather than primarily at the product, which is what FDA currently does for traditional medical devices. The Pre-Cert Pilot Program will help inform the development of a future regulatory model/process that will provide a more streamlined and efficient regulatory oversight of software-based medical devices from manufacturers who have demonstrated a robust culture of quality and organizational excellence (CQOE) (i.e., excelling in software design, development, and testing) and are committed to monitoring real-world performance. The vision is to allow the FDA to accelerate time to market for lower-risk health products and focus its resources on those posing greater potential risks to patients. As the FDA continues to identify, evaluate, and improve on the Pre-Cert Pilot Program approaches to assure safety and effectiveness of products that require marketing authorization, the FDA's marketing authorizations for these products will continue under the FDA's existing regulatory pathways.⁶²

If not now, then when? A call to action

The transition to hospitals without walls is happening. It is no longer a choice but a future reality. Virtual health is augmenting and extending care delivery outside traditional hospital buildings into the community, including patients' homes. Clinicians and patients are demanding it; funders and regulators are supporting it. This transition is absolutely integral to creating a more sustainable and equitable public and private health system in the future.

This transition doesn't mean we're no longer going to have the physical buildings we know as "hospitals." Rather, the role of these will change and most care delivery will take place outside of these walls – in the home, at work, and in our communities.

Our recent pivot to virtual tele-consults is the forerunner of what the future holds. We need to reimagine the hospital of the future with all the features that we have spent centuries developing for our physical hospitals. This includes consideration and changes to the broader landscape in which they operate, such as appropriate reimbursement and funding models and regulatory frameworks, alongside training and education for the future health workforce. During this time of experimentation and discovery it will be important to stay connected. Those countries that have the least developed physical infrastructure may well take the leading role and leapfrog the more established health systems that have a greater change ahead.

To support executives on their journey, Deloitte has built an easy-to-use assessment tool that measures your current progress against the six dimensions outlined in this paper that we believe are essential to delivering the hospital of the future. Importantly, this assessment tool provides comparative data from similar hospitals/networks and the ability to join a global community of practice—to share, learn, and collaborate with like-minded leaders who are all facing the same challenges and opportunities. If you would like to learn more, please contact Deloitte Global's Health Care Chief of Staff, Michael Hood, at mihood@deloitte.com for further information.



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Additional case studies/ Patient journeys

Congestive Heart Failure – A Patient Journey

If a virtual health program is executed properly for a patient with congestive heart failure, improved clinical outcomes, financial value drivers and an enhanced patient experience can be expected.

Figure 4. Congestive Heart Failure Patient Journey

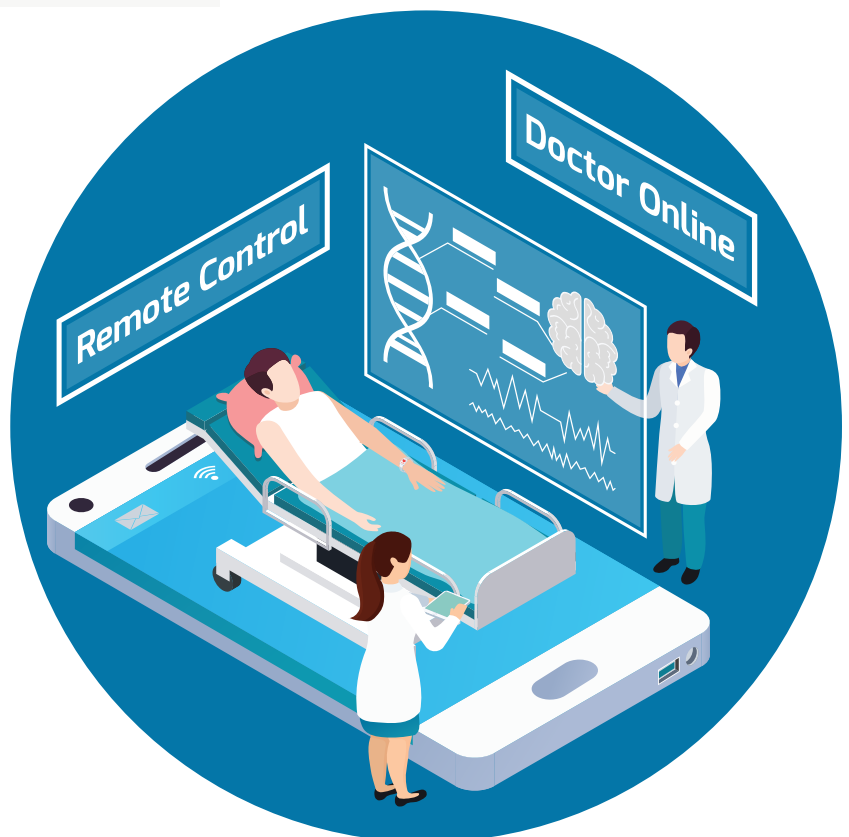


Improved Clinical Outcomes	Financial Value Drivers	Enhanced Experience
<ul style="list-style-type: none"> Enhanced patient heart health monitoring Improved exercise and cardiac rehabilitation compliance Improved pain management and medication adherence 	<ul style="list-style-type: none"> Reduced post-operative readmission rates Reduced number of in-person visits 	<ul style="list-style-type: none"> Improved patient satisfaction and greater sense of support enabled by connected care team Better care team decision-making through proactive, actionable insights enabled by continuous RPM data

Virtual Care for Diabetes

A virtual care company's data science team analyzed medical claims of 3,474 of their members against 12,065 people with diabetes not enrolled in their care, comparing years before and after enrolling launched. This virtual care company saved the two large, self-insured employers \$83.06 per member per month in health care costs.

Figure 5. Reduction in A1c at Virtual Care Co.



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