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Overview and outlook

The adage, “What goes up, must come down,” isn’t likely to apply to the global health care sector in 2019. Aging and growing populations, greater prevalence of chronic diseases, exponential advances in innovative, but costly, digital technologies—these and other developments continue to increase health care demand and expenditures.



Snapshot: Global health care by the numbers



Global health care spending is projected to increase at an annual rate of **5.4%** in 2018–2022, a considerable rise from **2.9%** in 2013–2017. This increase reflects the strengthening of the dollar against the euro and other currencies, the expansion of health care coverage in developing markets, the growing care needs of elderly populations, advances in treatments and health technologies, and rising health care labor costs.¹



Per-person health care spending is expected to continue to vary widely, ranging from **\$11,674** in the United States to just **\$54** in Pakistan in 2022. Efforts to close this gap will be constrained by higher population growth in developing economies.²



Higher per-person spending does not always equate to higher-quality health care. When compared to 10 developed countries, the United States ranks last in overall health care performance, highlighted by per capita spending that is **50%** greater than the next country and last place rankings in efficiency, equity, and healthy lives.³



Life expectancy appears to continue to climb. It is projected to increase from **73.5** years in 2018 to **74.4** in 2022—bringing the number of people aged over 65 globally to more than 668 million, or 11.6% of the total global population. Increasing life expectancy and years of productive life is a major achievement for health care, because increased output per worker is associated with increased real GDP per capita. The effect is expected to be most noticeable in Japan, where this share will likely reach almost **29%**; in Western Europe it is estimated near **22%**. Even some developing countries, such as Argentina, Thailand, and China, are starting to experience similar situations.⁴



The fight against communicable diseases—through better sanitation, improved living conditions, and wider access to health care—is making notable gains. The number of AIDS-related deaths dropped from **2.3 million** in 2005 to an estimated **940,000** in 2017, largely due to the successful rollout of treatment.⁵ Infections from tuberculosis are falling by around **2%** a year.⁶ The estimated number of malaria deaths worldwide fell to **445,000** in 2016, down from nearly **one** million in 2000. New vaccines and wider use of treated nets have cut infection and death rates for all mosquito-borne diseases.⁷



Non-communicable diseases (NCDs)—most prominently, cancer, heart disease, and diabetes—accounted for **71%** of the 56.9 million deaths reported worldwide in 2016; that share increases to over **80%** in the most developed markets. NCDs' rise in both developed and developing markets is fueled by urbanization, sedentary lifestyles, changing diets, and rising obesity levels.⁸



Ambient pollution contributed to **4.2** million deaths worldwide in 2016, with the Western Pacific region among the worst affected.⁹ In China, the effort to fight pollution is a focus of the government's health care policy due, in part, to its negative impact on GDP (e.g., decreased worker productivity and the cost burden of disease). One culprit drawing increased attention: diesel-powered vehicles, which are now known to emit more pollution than previously thought.¹⁰



Health care stakeholders—providers, governments, payers, consumers, and other companies/organizations—struggling to manage clinical, operational, and financial challenges envision a future in which new business and care delivery models, aided by digital technologies, may help to solve today's problems and to build a sustainable foundation for affordable, accessible, high-quality health care.

This vision may have a greater probability of becoming a reality if all stakeholders actively participate in shaping the future—

which requires a philosophical shift in focus away from a system of sick care, in which we treat patients after they fall ill, to one of health care,¹¹ which supports well-being, prevention, and early intervention. It is unlikely, however, that today's health care system and players will be able to make this shift alone. They likely will need to partner with other traditional sectors such as employment, housing, education, and transportation to address the social determinants of health, and with new sectors such as retail, banking, and technology giants to improve data and

platform interoperability.

It's expected that health care's evolution will have far-reaching impacts as new business models emerge that blur boundaries and drive cross-sector and cross-industry convergence. The resulting "superclusters" of public-private providers, payers, and market disruptors could then use a smart health community approach (figure 1) to collectively drive innovation, increase access and affordability, improve quality, and lower costs through more efficient delivery models.

Figure 1: Characteristics of a smart health community

- Appropriate treatments are delivered at the appropriate time, in the appropriate place, for the appropriate patient
- Clinicians use technology to more accurately diagnose and treat illness and deliver care
- All care delivery stakeholders across the ecosystem effectively and efficiently communicate and use information
- The correct individuals do the correct work (e.g., nurses handle patient care, not administrative tasks)
- Patients are informed and actively involved in their treatment plan
- New, cost-effective delivery models bring health care to places and people that don't have it
- Efficiency improves; waste declines¹²



Standing at the epicenter of the new health care value system will likely be informed and empowered consumers—change agents and active caretakers of their health who have high expectations of their health care ecosystem. These consumers will likely be “pulling” solutions rather than being “pushed” services, flipping the current

health care delivery model from business-to-consumer (B2C) to consumer-to-business (C2B). In response, stakeholders are expected to use innovative technologies and personalized programs to engage with consumers and improve the patient experience. Data interoperability, security, and ownership should move to the forefront

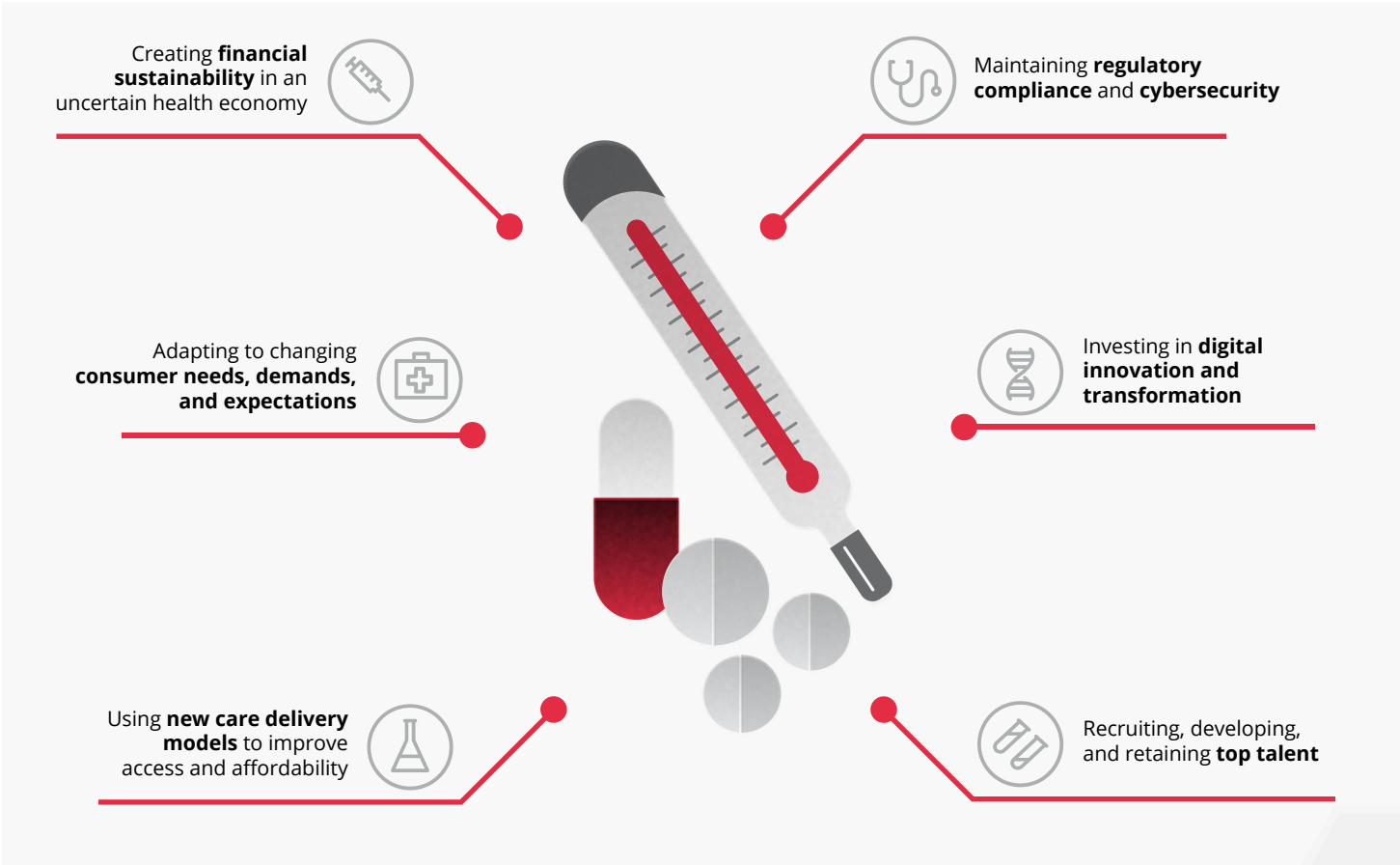
as consumers join other stakeholders in accessing, analyzing, and sharing information. In addition, disruptive trends in health care delivery and mobility may radically alter everything from the site of care to who delivers care and how.¹³

Is there a road map to this future state? Are there directions to guide stakeholders' steps along the path to an accessible, affordable, high-quality, and sustainable health

care system? It's highly likely that every organization's journey will be unique; they may be traveling with companions at times and alone at others; paths may converge

and diverge. There is, however, a common departure point: Responding to the issues impacting the global health care community in 2019 (figure 2).

Figure 2: Global health care sector issues in 2019



This outlook reviews the current state of the global health care sector; explores trends and issues in 2019 impacting health care providers, governments, other payers,

patients, and other stakeholders; and suggests considerations for them as they seek to shape the future of health care.



Global health care sector issues in 2019

Creating financial sustainability in an uncertain health economy

The emergence of personalized medicine, exponential technologies, disruptive competitors, expanded delivery sites, and revamped payment models is injecting uncertainty into the global health economy and increasing the urgency for organizations to plan when and how to make future moves—as a market leader, fast follower,

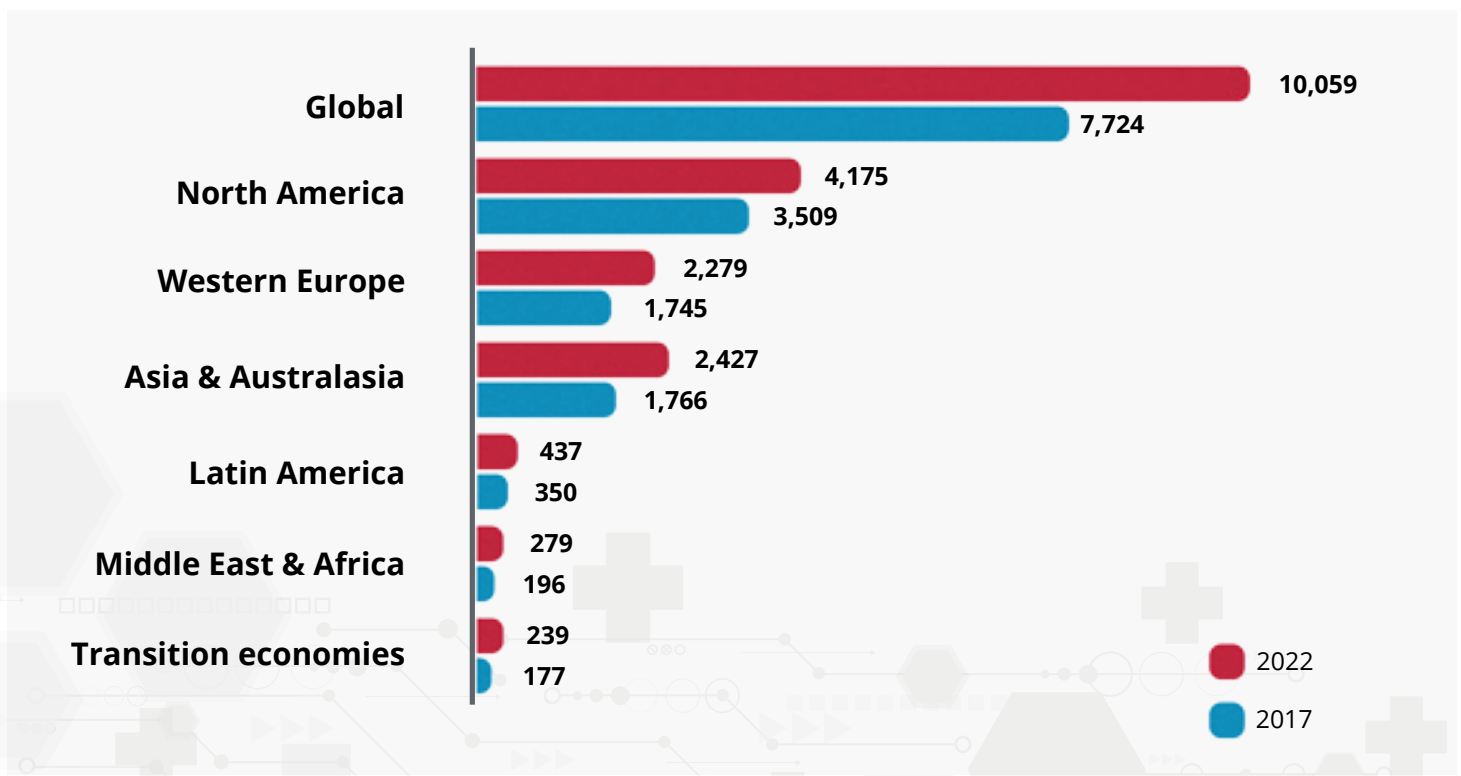
or niche player—to remain relevant and financially viable.

Battling health system cost pressures

Global health care expenditures continue to escalate, shining a light on health systems' need to reduce costs and increase efficiency. Spending is projected to increase at an

annual rate of 5.4 percent in 2017–2022, from USD \$7.724 trillion to USD \$10.059 trillion (figure 3), although cost-containment efforts combined with faster economic growth should maintain the share of GDP devoted to health care at around 10.4 percent over the five-year period to 2022.¹⁴

Figure 3: Health care spending (USD billion), and CAGR 2017 - 2022



Source: The Economic Intelligence Unit, Data Tool accessed on 16 August 2018

Similar with recent years, health care spending in 2019 will likely be driven by the shared factors of aging and growing populations, developing market expansion, clinical and technology advances, and rising labor costs. In addition, the trend toward universal health care is expected to continue, with more countries expanding or deepening their public health care systems to reduce out-of-pocket (OOP) expenses.¹⁵ Still, the short-term outlook for health care spending is expected to vary by region/ country:

- Population aging, rising wealth, and the expansion of China's health care system will likely drive increased spending in that country, as will the rollout of a new health insurance program in India.¹⁶
- A recovery in global commodity prices appears to be helping to repair public finances and boost health care spending in many resource-dependent countries; notably, in the Middle East, Latin America, and the former Soviet Union.¹⁷
- The United Kingdom's economy and health care spending could be dampened by its decision to leave the European Union (EU) in 2019. Other EU health economies also may be negatively affected by "Brexit," as well as the long-running migration crisis.¹⁸
- Tax reform and health policy changes in the United States will likely continue to undercut the Affordable Care Act's (ACA) programs to expand health care access and affordability. The end of the individual mandate in January 2019 should allow companies to offer their employees cheaper, less comprehensive policies. While these changes will expand choice, they are likely to reduce coverage.¹⁹

Despite funding increases in numerous countries, public health systems' budgets

appear to be falling short of what is needed to counter persistent challenges in accessibility (imbalanced distribution, including a rural-urban divide), affordability (especially for patients with low economic status), awareness (of lifestyle diseases, risk factors, vaccinations), absent or inadequate infrastructure, and skilled human resources. Australian states, for example, appear to be struggling with increasing public health care costs. Australia's federal government and state-based treasury departments are putting pressure on state-based health systems and public health networks (PHNs) to drive innovation that can lead to sustainable cost-bending.

The UK's National Health Service (NHS) is illustrative of the public health system cost and funding conundrum: For example, in 2010–2011, just 5 percent of NHS providers in England overspent their annual budgets. By 2015–2016, two-thirds of trusts (66 percent) were in deficit as a slowdown in NHS funding took its toll. The 2015 Spending Review provided additional funding for the NHS, which contributed to a fall in deficits, but 44 percent of trusts still overspent their budgets in 2017–2018. The NHS provider sector in total ended the year with a deficit of £960 million.²⁰ The situation is exacerbated by the UK's continuing and unrelenting increase in demand for hospital care despite initiatives to reduce over-reliance on hospitals. Concurrently, there is an increase in the number of people unable to get an appointment with a general practitioner (GP) and a lack of community and district services that limits NHS capacity to respond to the growing demand. To address these challenges, England has embarked on longer-term transformational changes with the creation of 44 geographically focused NHS Sustainable Transformation Plans

in 2016 and the subsequent creation of Integrated Sustainability and Transformation Partnerships comprising both health and social care services, aimed at helping to improve care quality and efficiency of services, develop new models of care, and prioritize prevention and public health.²¹

Cost pressures aren't confined to the public health care sector. As an example, private hospitals in India appear to be caught in a pricing squeeze; as a result, many are emphasizing financial management and operational efficiency by closely watching costs, using technology to become more efficient, and testing different channel and product mix strategies to maximize per-bed metrics. In Australia, a drop in the number of people holding private health insurance is challenging private hospitals and insurers already dealing with the systemic cost increases. The decline in private insurance policies is especially prevalent among younger, healthier individuals who, in response to increasing out-of-pocket expenses and lack of transparency in product coverage, are choosing to invest their income in well-being: sports, recreational activities, nutritional supplements and the like. Looking ahead, Australia is expected to see consolidation in the private hospital sector to retain scale and drive efficiencies, along with potential purchases by Asian hospital groups. Private insurers, meanwhile, are looking to offset decreasing policyholder numbers with claims reduction programs with a focus on prevention and early intervention, organizational redesign, and new revenue streams (e.g., stepping into the provider space, running dental practices that aren't covered by public insurance, buying optometry clinics and home health care services providers).

Competing with disruptive market entrants

Health care profits have been eroding over time and, in parallel, new entrants are threatening to redefine fundamental aspects of the health care business. The health technology sector is expected to reach USD \$280.25 billion by 2021, at a CAGR of 15.9 percent between 2016 and 2021.²² Among initiatives by top technology companies to disrupt the health care sector:

- Apple²³ is working with startup Health Gorilla to add diagnostic data to the iPhone, including blood work, by integrating with hospitals, lab-testing companies, and imaging centers. The offering is primarily geared to physicians and serves as a marketplace for them to place orders and share medical records. But it also has a free offering for patients that promises to gather medical information in 10 minutes. The goal is to give iPhone users the tools to review, store, and share their medical information, including lab results, allergy lists, and more.²⁴
- Alphabet’s Google unit has acquired application program interface (API) management company Apigee to help it create data pipes that will enhance interoperability among hospitals, physicians, and patients.²⁵ The company is also applying artificial intelligence (AI) to tackle disease, from monitoring, to detection, to lifestyle management.²⁶
- Alphabet’s health care unit, Verily, is working on detecting diabetic retinopathy via a partnership with Nikon’s subsidiary Optos, which makes the machines for retinal imaging tests and eye disease detection.²⁷

- Verily is also looking for opportunities to enter the health insurance market through partnerships; initially, in the population health market. Alphabet planned to invest USD \$375 million in 2018 in the health insurance start-up, Oscar Health.²⁸
- Philips’ “Connected Care Solutions” is an intelligent health care service that collects patient data (generally related to chronic diseases) and allows providers to monitor and deliver round-the-clock solutions by linking patient data with hospitals.²⁹

Pursuing mergers, acquisitions, and partnering

Some health care organizations looking to optimize financial and operational performance continue to turn to mergers, acquisitions, and partnering to add capabilities and build scale. While horizontal integration in the United States has somewhat slowed—government regulators with a “big-is-big-enough” mind-set have denied some mergers—activity is brisk in other regions of the world. For example, Malaysia’s IHH Healthcare Berhad acquired India’s second-largest provider, Fortis Healthcare, which operates a network of 34 hospitals. The four-month-long bidding war saw interest from both domestic and international suitors.³⁰ Additional deals have included Life Healthcare, one of South Africa’s largest private health care providers, selling its 49.7 percent stake in Max Healthcare Institute Limited to KKR.³¹

In other deals, Singapore-based Luye Medical Group, which owns 53 health care facilities across 26 cities in Singapore, Australia, South Korea, and China, completed a majority equity investment in Singapore’s Novena Heart Centre

(NHC), which will enable Luye to cater to the rising demand for cardiovascular treatment.³² Fullerton Health China became a major shareholder in Shanghai Redleaf International Women’s & Children’s Hospital, its first investment in the specialty hospital sector.³³ Ramsay Générale de Santé, the largest operator of private hospitals in France, announced in July 2018 its acquisition of Capio AB, a Sweden-based health care provider. The combined group would become a leading pan-European private health care services operator spanning six countries.³⁴

The search for alternative revenue sources is propelling vertical industry integration as well. Grab, the leading ride-hailing app in Southeast Asia, recently ventured into health care by partnering with Ping An Good Doctor, an e-health platform in China, aiming to deliver transformative online health care services in Southeast Asia. The duo will provide an array of integrated medical services, such as AI-assisted online medical consultations, medicine delivery, and appointment bookings through an online platform.³⁵ Similarly, Indonesian ride-hailing giant Go-Jek announced the integration of its medicine delivery service Go-Med into the HaloDoc app, a platform that enables online consultation with doctors.³⁶

The United States is seeing mergers between health care insurance companies and pharmacy chains—especially those with retail clinics. The combined company could provide direct care to the insurers’ members and offer its workers one-stop shopping for health insurance. In one 2018 example, health insurer giant Cigna agreed to acquire Express Scripts, the nation’s

largest pharmacy benefit manager (PBM), for \$52 billion.³⁷

Acquisitions by the world's largest e-retailers have the potential to dramatically disrupt health care product and service delivery: Amazon's 2018 purchase of online US pharmacy PillPack, which lets users buy medications in pre-made doses,³⁸ is being echoed by Alibaba Group's investments in pharmaceutical companies. In August 2018, subsidiary Alibaba Health Information Technology acquired a stake in local pharmaceutical company Guizhou Ensure Chain Pharmacy Company Limited. Ali Health engages in pharmaceutical e-commerce, intelligent medicine, and product tracking platform businesses in China, operating in the B2C pharmacy business. Guizhou Ensure Chain, along with its subsidiaries, is principally engaged in pharmaceutical retail chain business.³⁹

We also see continued convergence between the health care and life sciences sectors (often in cross-border deals) as both seek new business models and revenue sources. For example, the purchase of NxStage Medical, Inc., by Germany's Fresenius Medical Care, the world's largest provider of dialysis products and services, establishes Fresenius's presence in the US critical care space and positions the company as a global leader in home dialysis.⁴⁰ These transactions reflect the increasingly blurred lines between traditionally separate spheres of the rapidly changing health care ecosystem.

Some organizations are sidestepping the "bigger-is-better" path to sustainability in favor of single-specialty, niche areas: centers of excellence; low-cost/high-quality elective

care; community- and home-based care. In India, for instance, private clinics and start-ups are targeting select clientele by offering high-end diagnostics, maternity care, oncology care, senior day care, and other specialties. The UK's Moorfields Eye Hospital is a specialist NHS eye hospital and a center of excellence for ophthalmic research and education. Moorfields' 2,300 staff treat people at over 30 sites in and around London.⁴¹

Stakeholder considerations

Shrinking margins and rising costs are driving public and private health systems to use technology innovations, M&A, and other partnering arrangements to improve operational efficiencies and reduce expenses; however, doing so can be complicated by price controls, misaligned incentives, and disruptive market entrants. Yet there are ways to shape a more positive fiscal future.

Governments that leverage private sector strengths in cost-efficient operations, through public-private partnerships and other collaborations, could help bolster underfunded and/or underperforming public health systems. Also, positioning requested investments in prevention and well-being as providing benefits in terms of economically active citizens and improved GDP may register more favorably with government treasury departments.

Health care providers that stress rigorous financial management, efficient operational performance, outcomes-based care, and innovative solutions development (e.g., moving certain procedures to outpatient settings) could improve care provision, reduce costs, counter declining margins, and

align their cost structure and care models with reimbursement trends and payment models, respectively.

Health plans that focus on affordability and create differentiation through innovation (i.e., member-focused digital service offerings) could reduce the cost of care provided to members and maintain strong margins.

Providers and payers that embrace new business, care delivery, and risk models could offset the disruptive potential of powerful market entrants and emerge as leaders in the new ecosystem of affordable health care solutions. One suggestion is to learn from industries outside of health care, where we see technological and business process innovations that are applicable in a health care setting. For example, the use of robotic process automation to improve claims time without overtime or increased staffing is growing. Also, some offshore vendors handling health care providers' revenue cycle processes are replacing full-time equivalent (FTEs) employees with bots.⁴² While some leaders may be reluctant to change the status quo, assessing and taking risks will be an important part of shaping a more sustainable global health care system.

Using new care delivery models to improve access and affordability

Focusing on value- and outcomes-based reimbursement

Health care systems will likely need to innovate and embrace new business, care delivery, and risk models to potentially shape affordable, high-quality health care solutions for the future. And while

change is never easy, a very important one is already underway: the transition from volume-based/fee-for-service (FFS) models to value-based care (VBC). Emerging VBC reimbursement models are edging out FFS arrangements and creating a new paradigm in which health care services are delivered by a coordinated care community sharing in the responsibility—and risk—of outcomes and costs.⁴³

Building an outcomes-based financial model and data infrastructure to maximize VBC reimbursement pathways will likely be fundamental to many health systems' sustainable growth. It's expected that one key to prospering in this volume-to-value shift will be business integration and data aggregation—both inside and outside of an organization, and across sectors and models of care. Transformative actions could include adopting a coordinated care model, improving clinician engagement and alignment, and building the technology infrastructure for sophisticated data analytics and financial modeling. While the level of investment is likely to be substantial, the market shift toward VBC is anticipated to present unprecedented financial and clinical opportunities.⁴⁴

The shift to value-based care appears to be most active in the United States, where a visible example is the Medicare Access and CHIP Reauthorization Act of 2015 (MACRA), which created two new Medicare Part B payment tracks for clinicians participating in its Quality Payment Program (QPP):

- The merit-based incentive payment system (MIPS), which provides positive or negative payment adjustments for clinicians whose practices are more closely tied to FFS reimbursement; and

- The advanced alternative payment model (AAPM) for Qualifying Participants (QPs), which allows clinicians who have significant percentages of their practices in risk-bearing, coordinated care models to receive temporary financial bonuses and higher payment updates in the long term.

MIPS is budget-neutral; it produces savings in comparison to the baseline through minimal annual increases in the standard rates under the Medicare Physician Fee Schedule through 2026. AAPMs are more wide-reaching and may involve both commercial and government payers, with potential to generate significant savings both to Medicare and to the American health system at large. The AAPM's risk-bearing coordinated care models are largely products of the Accountable Care Organization (ACO) movement, where providers that exceed quality and cost benchmarks receive financial incentives such as retaining a portion of any savings or receiving quality bonuses. In order to qualify as an AAPM, an ACO needs to assume risk, meaning that failure to meet benchmarks results in penalties or losses. Recent changes mean that a greater percentage of ACOs will be required to take on risk over the next two years, and therefore qualify as AAPMs under MACRA. While little information is currently available on AAPMs' specific savings to date, ACOs in general were found to have saved Medicare \$314 million in 2017.⁴⁵ MACRA's incentives for greater ACO participation may accelerate this trend across all US payers.

It's expected that 2019 will mark an important milestone for MACRA: It is the first year that payment adjustments under MIPS will be applied to Medicare Part B payments to participating clinicians and the

first year that other clinicians will receive QP incentive payments based on their participation in AAPMs. Additionally, for the first time, performance information for clinicians participating in MIPS will be publicly available via the Medicare Physician Compare website.⁴⁶

Across Europe there is growing recognition of the need to adopt a more value-based approach to health care; although adoption of VBC appears to be currently low, it seems to be increasing.⁴⁷ Likewise, local governments in Asia appear to be shifting their focus from volume-based to value-based care, although uptake is still slow.⁴⁸ Australia's public health system appears to be embracing the idea of a value- and outcomes-based payment model but the country is likely a couple of years away from getting real traction; efforts to date have been confined to pilots and discrete groups of patients. One example is the HealthLinks chronic care initiative in Victoria, which aims to improve care for patients at high risk of multiple unplanned hospital admissions. HealthLinks is testing whether a flexible funding model can remove some of the barriers that inhibit effective and integrated models of care, and promote innovative models that produce better outcomes for patients at no additional cost to the public health system.⁴⁹

A successful value-based payments strategy likely requires payer/provider collaboration, sharing of patients' health data, and IT and analytical support. Given the interdependencies of public and private sector stakeholders operating in a VBC ecosystem, it is logical to expect that coming years will likely see new and novel public-private partnership models emerge that promote risk-sharing, allow

for blended financing of critical health care infrastructures and programs, and maintain system sustainability.⁵⁰

Shifting health focus

Aging populations and the rise of non-communicable diseases are driving an industry shift away from curing disease in the short term toward preventing and managing disease and promoting overall well-being in the long term. Emphasizing these proactive measures, generally grouped under the umbrella of population health, will likely require a corresponding shift in the way governments, providers, payers, and other community partners interact: Instead of operating in silos that create structural and cultural barriers to care, they should work together to coordinate care and services for the most vulnerable people in the population. This may only be achieved, however, if there is a supportive financial incentive structure and rebalanced professional power across caregiving groups.

An important part of this approach is addressing the social determinants of health—the conditions in which people are born, grow, live, work, and age—because they often have a greater impact on health outcomes than does health care.⁵¹ Health inequalities resulting from negative socioeconomic circumstances have a substantial economic impact, hitting labor productivity and accounting for an estimated 20 percent of European health care costs (€177bn).⁵² They also take a social toll, having a cumulative effect throughout a person's life. Unemployment and financial disadvantages pass between generations, as vulnerable children become vulnerable adults.⁵³

Social determinants of health include factors like socioeconomic status, education, neighborhood and physical environment, employment, and social support networks, as well as access to health care, including income, education, and housing conditions. Addressing social determinants of health is important for improving health and reducing longstanding disparities in health and health care that are often rooted in social and economic disadvantages.⁵⁴

Coordinating efforts across government, societal, and health care institutions and programs can be essential to solving problems arising from the social determinants of health. This can be challenging, however, for the following reasons:

- There can be inadequate leadership capacity and a lack of sustainable funding mechanisms for health improvement efforts. Current funding processes often fragment the distribution of resources, discourage the coordination of funds, and can potentially limit the ability to jointly address common risk and protective factors.
- Health care, public health, social services, and other sectors typically function and are funded in silos, with different funding requirements and often-incompatible data collection and information systems. This can make it difficult to coordinate efforts, integrate data, and assess shared impact.
- Although investments in one sector can affect outcomes and generate cost savings in another, individual sectors generally consider only their own investments and benefits.
- The multiple sectors that affect health—often driven by a variety of stakeholder and interest groups—may have different cultures, values, and vocabularies and generally lack experience working together. This can likely impede partnership and collaboration.⁵⁵

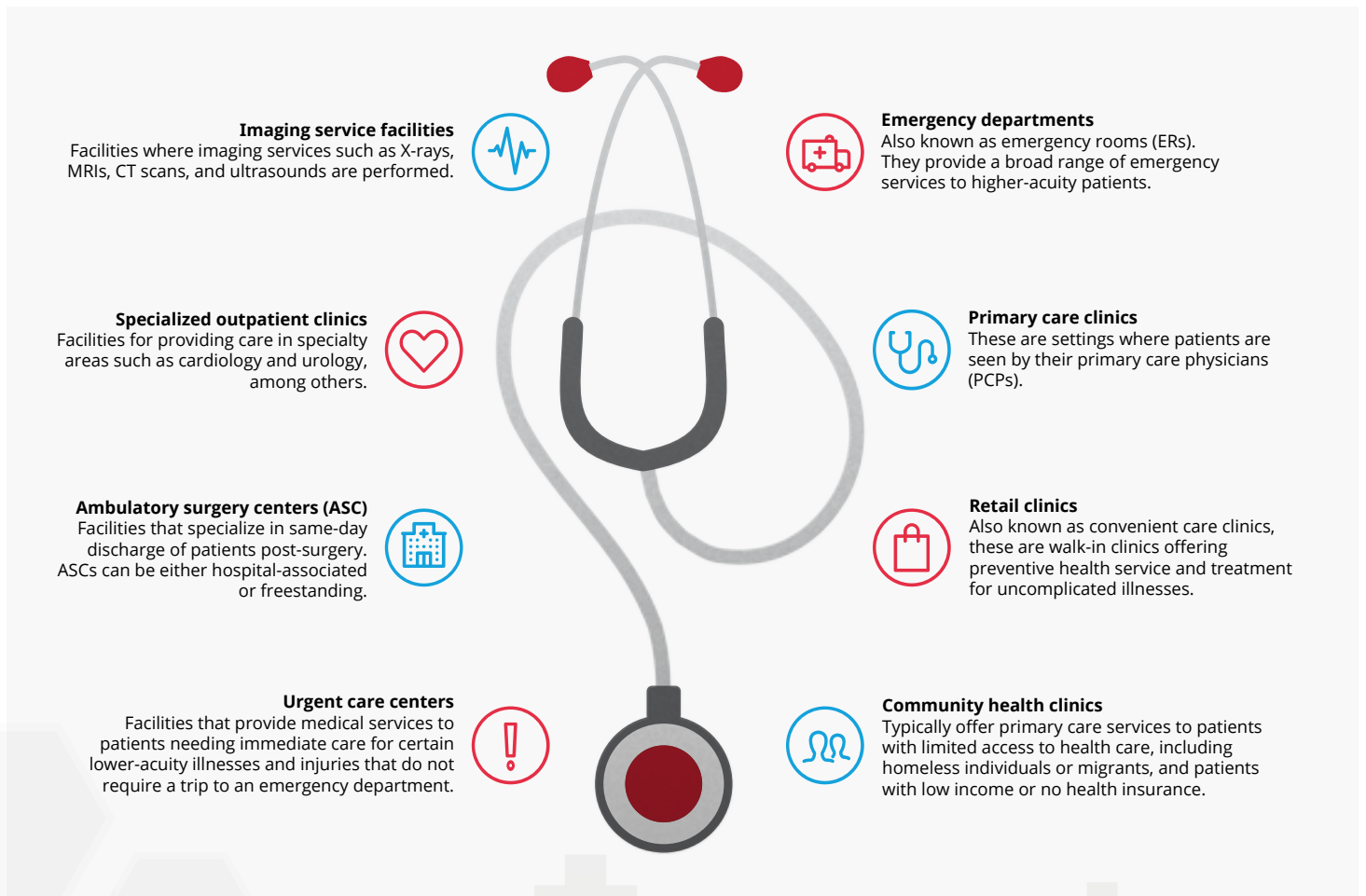
Moving health care outside hospital walls

Clinical innovations, patient preferences, and financial incentives are prompting hospitals and health systems to move certain inpatient services to lower-acuity/outpatient

settings. Many surgeries and medical and diagnostic procedures that once required an inpatient stay can now be performed safely in an outpatient setting, thanks to improvements including minimally invasive surgical procedures—such as laparoscopy

and robotic surgery—and new anesthesia techniques that reduce complications and allow patients to return home sooner.⁵⁶ Figure 4 describes the primary types of hospital-based outpatient facilities.⁵⁷

Figure 4: Types of outpatient care



Source: Deloitte Center for Health Solutions research.

Patients appear to be embracing treatment in outpatient facilities, as they tend to cost less—and be more convenient—than inpatient services. Health plans and government program payment policies are also supportive of lower-cost outpatient surgical facilities⁵⁸ and community- and home-based care. Factors critical to the future growth of these care delivery options are scale and responsivity: Scale often helps providers secure a lower cost-per-activity/service from other partners. Responsivity builds patients’ confidence in the quality and timeliness of the services they receive in outpatient settings.

Investing in **virtual health/telehealth** could expand outpatient services while also helping hospitals bend the cost curve and boost revenue.⁵⁹ Virtual health is the use of teleconferencing, mobile apps, and other digital technologies to enable continuous, connected health care. Virtual health goes beyond simply enabling video visits; it can act as a complement, or even a complete

substitute, for care based on the needs of the patient population, capabilities of the organization, and availability of resources. The overall goal is to improve access to critical services and reduce cost constraints across the continuum of care.⁶⁰ Common applications of virtual health include:

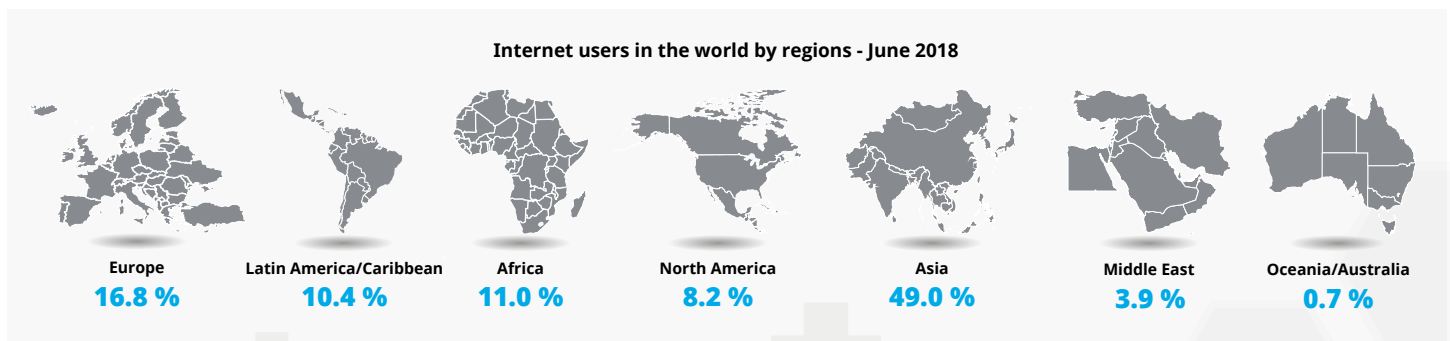
- Synchronous care to improve patients’ ease of access to providers
- Physician-to-physician communication to improve patient care through information sharing
- Chronic disease management to improve monitoring and alerts for chronic disease patients
- Virtual social work to improve communication and care for underserved populations
- Telehealth care to improve patient monitoring (e.g., eICU, telepsychology, telestroke)
- Remote patient monitoring to improve

providers’ understanding of patients’ health and medical data

- Care management process to improve patients’ understanding of and engagement with their treatment plans
- Patient adherence to improve medication adherence, health tracking, and patient accountability
- Care coordination to improve payer/provider relationships⁶¹

Several key factors appear to be elevating consumer and provider interest in implementing virtual health programs: expected physician shortages, increased patient demand, and the evolving policy landscape. One big game-changer: Internet access and connectivity, which has increased 1,066 percent since 2000.⁶² As of June 30, 2018, there were 4,208,571,287 Internet users around the globe—55.1 percent of the total population.⁶³ Asia dominates the world’s regions in Internet usage (figure 5).

Figure 5:



Source: Internet World Stats - <https://www.internetworldstats.com/stats.htm>.

Also spurring provider uptake of virtual health is continued growth in advanced technologies. For example, an AI-powered nurse avatar by Sensely is being piloted at Mayo Clinic. It interacts with patients by asking questions and collecting data from wearables, sensors, and biometric devices; assesses the symptoms and medical history; and analyzes the combined data for the physician to consider before the in-person patient examination.⁶⁴ In South Australia, Clevertar’s intelligent virtual agents (IVAs) offer personalized health care coaching and support for patients with type 2 diabetes and individuals suffering from mild to moderate depression and anxiety.⁶⁵ Consumers using the Hefie app can take a picture of any spot, mole, or mark on their skin and get it checked by a doctor instantly.⁶⁶ Singapore AI start-up KroniKare has developed a mobile app that assesses chronic wounds and presents a preliminary assessment to nurses or other health care workers.⁶⁷

Importantly, virtual health has an ability to expand access to care for patients in rural and underserved areas that may lack medical facilities. Telehealth, often considered the heart of the “smart hospital” model, has five main elements: remote registration, remote diagnosis, remote consultation, remote medical treatment, and telecare. Regions including the Americas, Europe, and Africa are implementing telehealth backed by technologies like AI and analytics—in the United States, for example, 3,000 rural sites are connected to 200 telehealth networks for specialty consultations, continuing medical education (CME), and other services.⁶⁸ Meanwhile, the Middle East and parts of Asia appear to still be in the initial stages of implementing basic tele-consulting for health care accessibility.

In China, remote registration appears to be the only telehealth element that is fully developed.

The [Deloitte 2018 Surveys of US Health Care Consumers and Physicians](#) have found that both stakeholder groups agree on the benefits of virtual health. Consumers point to convenience and access (64 percent) as important benefits.⁶⁹ Physicians agree that virtual care supports the goals of patient-centricity. The top three benefits from physicians’ perspective are improved patient access to care (66 percent); improved patient satisfaction (52 percent); and staying connected with patients and their caregivers (45 percent).⁷⁰

Despite seeing eye to eye on the benefits, consumers and physicians diverge in their intent to use virtual care. While only 23 percent of consumers have had video visits, 57 percent of those who have not used them yet are willing to try them in the future. The interest from physicians is much lower: 14 percent of physicians have video visit capability today and only 18 percent of the rest plan to add this capability in the next year or two.⁷¹ Lack of reimbursement, complex licensing requirements,⁷² and the high cost of the technologies⁷³ have contributed to slow adoption. Reliability and security are also issues: The survey found that physicians are concerned about medical errors (36 percent) and data security and privacy (33 percent).⁷⁴ An implication is that health systems likely will need to work on overcoming physician-related barriers as a strategy for wider adoption. Developing an appropriate infrastructure and operating model along with the technology is likely to be a key differentiator.

Stakeholder considerations

It appears that it’s time to hit “refresh” on health care financing and operational models if we intend for the system to be sustainable for future generations. Clinging to fee-for-service as the basis for provider reimbursement could burn a deep hole in any country’s budget, as the cumulative costs of managing elderly and chronic disease patients are simply too high for individuals, governments, and payers to bear. Similarly, continuing to use hospital facilities to conduct low-risk, routine surgeries drives up costs for payers and patients.

As they look beyond hospital walls to shape a more cost-efficient future, public and private health systems—especially those that receive a large portion of their revenue from value-based contracts—will likely need to expand outpatient services. Doing so may require investments in facilities, staff, and technology to grow capacity and infrastructure for outpatient services. A good place to start is partnering with or acquiring health care organizations and physician networks that already have the capacity (e.g., ambulatory surgery centers, outpatient clinics, and retail centers) and people to support care in outpatient settings and grow the volume of services performed there.⁷⁵ Upgrading health information technology (HIT) also may enhance outpatient capabilities: Health systems can use case management, supported by analytics, to help decide which care setting is the most effective, safe, and efficient for a patient’s procedure.

Adopting a whole-system, whole-life approach to funding and delivering health care likely increases the potential to reduce costs, boost quality, and improve access and

affordability—if all members of the health care ecosystem unite behind the common goal of long-term sustainability. Each stakeholder group has an important role to play in this effort:

- **Governments**—Position preventive health care, wellness, and social care funding as an essential driver for broader economic growth; leverage public- and private-sector strengths in cost-efficient partnerships and programs that could reduce health care inequalities.
- **Providers**—Complete the transition to value- and outcomes-based business models; also, move certain services outside hospital walls using less-costly care delivery options.
- **Payers**—Make effective use of increasingly available population health data to measure the return on investment offered by interventions and suggest process improvements that could potentially lower costs of insurance coverage.
- **Patients**—Improve health literacy and actively contribute to the design of local and national programs that support prevention, care management, and wellness.
- **All stakeholders**—Embrace analytics and digital technology to provide more efficient and cost-effective health care.⁷⁶

Adapting to changing consumer needs, demands, and expectations

Providing consumer-centric care

Not only are regulatory policy and payment reform driving some of the transformation to value- and outcomes-based health care, patients and caregivers appear to be demanding change.⁷⁷ Dissatisfied with poor service and lack of transparency around price, quality, and safety, today's health care

consumers are expecting solutions that are coordinated, convenient, customized, and accessible⁷⁸—and they are making their opinions known. Numerous factors are contributing to this shift:

- The increasing prevalence of chronic diseases that require long-term patient-provider engagement and management
- Financial scrutiny due to high-deductible insurance plans and other cost-sharing models that push more costs onto the patient
- An explosion of digital tools to inform, educate, and empower patients with the ability to actively manage their well-being and their costs
- Customers' product and service experiences in other industries, leading to a rise in classic consumerism
- Emerging competition from consumer-centric, technology-savvy companies that bring a nontraditional mind-set to health care delivery.

As patients' role and influence in their health care increase, providers and payers must likely shift accordingly and take advantage of emerging opportunities to establish more direct, personal relationships with the consumer.⁷⁹ Digital technologies can improve engagement, enable convenience-driven access to care, and nurture a two-way relationship for the long term. Organizations that understand and act on how consumers would like to use digital health, telehealth, wearable monitoring and fitness devices, online resources, social media, and other technologies will likely be well-positioned to develop patient engagement strategies that help individuals make informed health care decisions.⁸⁰ These engagement strategies, in turn, could help health care organizations improve effectiveness, efficiency, and value in service delivery;

As patients increasingly “shop” for health care services, enhancing patient experience is regarded as a potential driver of hospital performance, since it may strengthen customer loyalty, build reputation and brand, and boost utilization of hospital services through increased referrals to family and friends. Deloitte research shows that good patient experience is associated with higher hospital profitability.⁸³

excel on quality measures that reflect the patient experience; and outperform their competition by attracting and retaining actively engaged customers.

A challenge is developing engagement strategies, products, and services that could bridge gaps between providers, payers, and patients and work across myriad consumer segments.⁸¹ In some cases, consumers are taking matters into their own hands by subscribing to tools such as b.well, a personal health app that allows individuals to safely and securely store, manage, and share their medical records and family health history in one place; view financial information about their benefit plan, co-pays, deductibles, and prescription costs; integrate and sync wearables and other self-reported data to track sleep, fitness, nutrition, and more; and take a personalized health assessment and use genomic screening to learn how to make healthy decisions.⁸²

Adding another wrinkle to patient engagement—and introducing a major disruptor into the health care value chain—is the well-funded market entry of non-traditional companies from the consumer, retail, and technology sectors, as well as increased activity in the retail pharmacy space.⁸⁴ The rise of these alternatives to traditional providers and payers was particularly notable in 2018:

- Apple⁸⁵ announced it is entering the personal health record (PHR) space with Apple Health,⁸⁶ a new platform that will interface with electronic health records (EHRs) at 12 US hospitals.⁸⁷
- Amazon joined with J.P. Morgan Chase and Berkshire Hathaway to establish an independent, not-for-profit health care company for their one million US employees. The trio's goal is to improve health care services and cost efficiency for their employees. With these corporations being closely monitored in the market, their success could act as a model that other businesses can embrace.⁸⁸
- Walmart signed a deal with Anthem, one of the United States' largest insurers, to entice more Medicare enrollees to buy over-the-counter medications and health supplies at its stores.⁸⁹
- Amazon rolled out a line of private label over-the-counter medicines, the Basic Care line, and is building a business selling a wide array of medical supplies to doctors, dentists, and hospitals.⁹⁰

Beyond guiding health care purchases, patient engagement strategies may positively influence patient behavior, one of the key components of disease management amid an increasing prevalence of chronic conditions. There is emerging support for moving away from a reactive approach to chronic care management, in

which coordination between stakeholders, therapy, and care is limited or ad hoc, to a proactive model in which engagement tools and support bolster both patients and health care providers.⁹¹ Effective patient engagement could improve self-care and help achieve better outcomes; many health care stakeholders are investing in solutions to address this issue. In addition, some researchers are trying to understand what motivates individual patients and are working on developing tailored solutions that incorporate individualized goals.⁹² For example, women typically are the drivers of health care spending—not only for their own health but for that of their spouses, children, and aging parents. Yet most traditional engagement practices have not been designed with women in mind.

Even with a wealth of new digital tools and buy-in from governments, providers, and payers, establishing and sustaining consumer relationships remain a challenge. Among hurdles to overcome: providers and payers will need to boost the currently low levels of health literacy and find more effective ways to motivate or “nudge” consumers to take ownership of their health (see sidebar, next page). Unlike many employer-provided health plans, the current US Medicare and Medicaid health systems, for example, have no financial penalty for consumers who make lifestyle choices that negatively impact their health (e.g., smoking, overeating, excessive alcohol consumption).



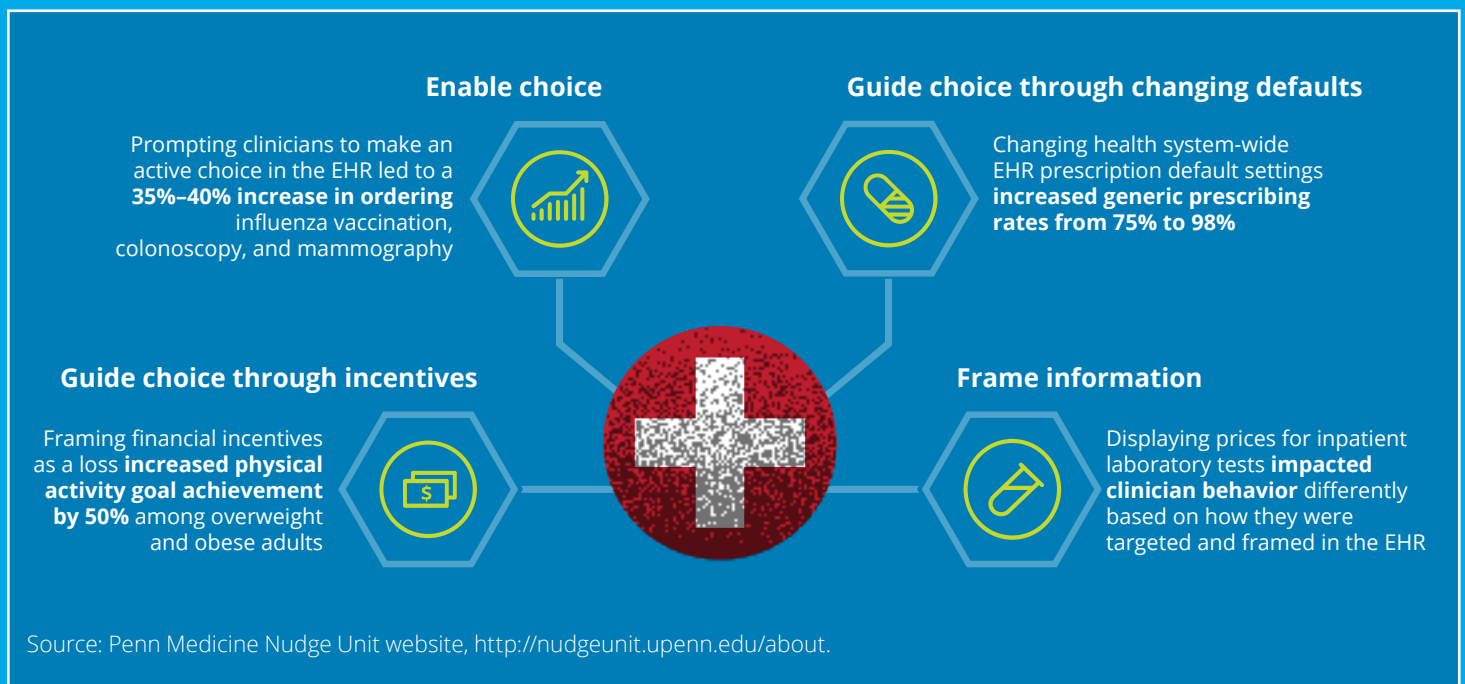
“Nudging” toward better health⁹³

No matter how effective a medication, protective a vaccine, or beneficial a lifestyle modification, clinicians must recommend a treatment and patients must follow through on it to achieve desired health improvements. But both traditional and precision medicine have a “last mile problem” involving patient behavior change. The annual cost of medication nonadherence in the United States is estimated at more than \$250 billion, and most post-surgical hospital readmissions are due to patient nonadherence to discharge protocols.⁹⁴

Sometimes this engagement requires a little “nudge,” a change in the way choices are presented or information is framed that alters people’s behavior in a predictable way without restricting choice. For example, small changes within an EHR can lead to significant differences in the way clinicians order tests and treatments. Similarly, social networks can give subtle nudges that influence how individuals eat and exercise.

The Penn Medicine Nudge Unit, created in 2016, is the world’s first behavioral design

team embedded within a health system. Led by Dr. Mitesh Patel, professor of Medicine and Health Care Management at the Perelman School of Medicine at the University of Pennsylvania, the Nudge Unit uses behavioral economics and psychology to design and test approaches to steer medical decision-making and behaviors toward higher-value and improved patient outcomes.⁹⁵ Among the Nudge Unit’s projects:



Effective nudge projects need buy-in. Physicians want to have autonomy over how they practice medicine, so they should be part of the process and have input on the design of the intervention.

The design also needs to be scalable to a large population, not just a handful of patients; that calls for top health system leadership at the table, as well as the IT team.

Stakeholder considerations

As health care becomes more “shoppable” and consumers increasingly pay a larger percentage of their care with their own money, enhancing patient experience is regarded as a potential driver of hospital performance. Hospitals’ reimbursements are increasingly tied to quality performance metrics that capture patient experience as well as clinical outcomes, and many public and private payers have begun to recognize patient experience as a core element of quality.⁹⁶

Being patient-centered and taking steps to engage patients in their own health care is not simple, but it is seen as an industry imperative. Organizations should understand how consumer behaviors and expectations are transforming care delivery and adopt a more consumer-driven, retail mind-set and approach—with a focus on greater convenience, service, and support. Again, women use their family and social networks to recommend services and physicians, yet health systems don’t routinely take this into consideration when planning their engagement strategies.

Both providers and payers may need to re-orient themselves around greater transparency—of costs, quality, processes, and services. Organizations also should more effectively communicate the value of products and services in a way that

helps consumers compare cost and quality information and enables them to make confident decisions about health care in a manner that more closely mimics alternative purchasing and customer service models like retail.

Given the new emphasis on patient experience as a core element of care quality and value, health systems should consider investing in the tools and technologies to better engage patients and enhance patient experience. Also important is delivering educational insights to inform patient decision-making and behaviors. Possible solutions include medical information and pharmacovigilance, nursing educational support, and between-visit care.⁹⁷

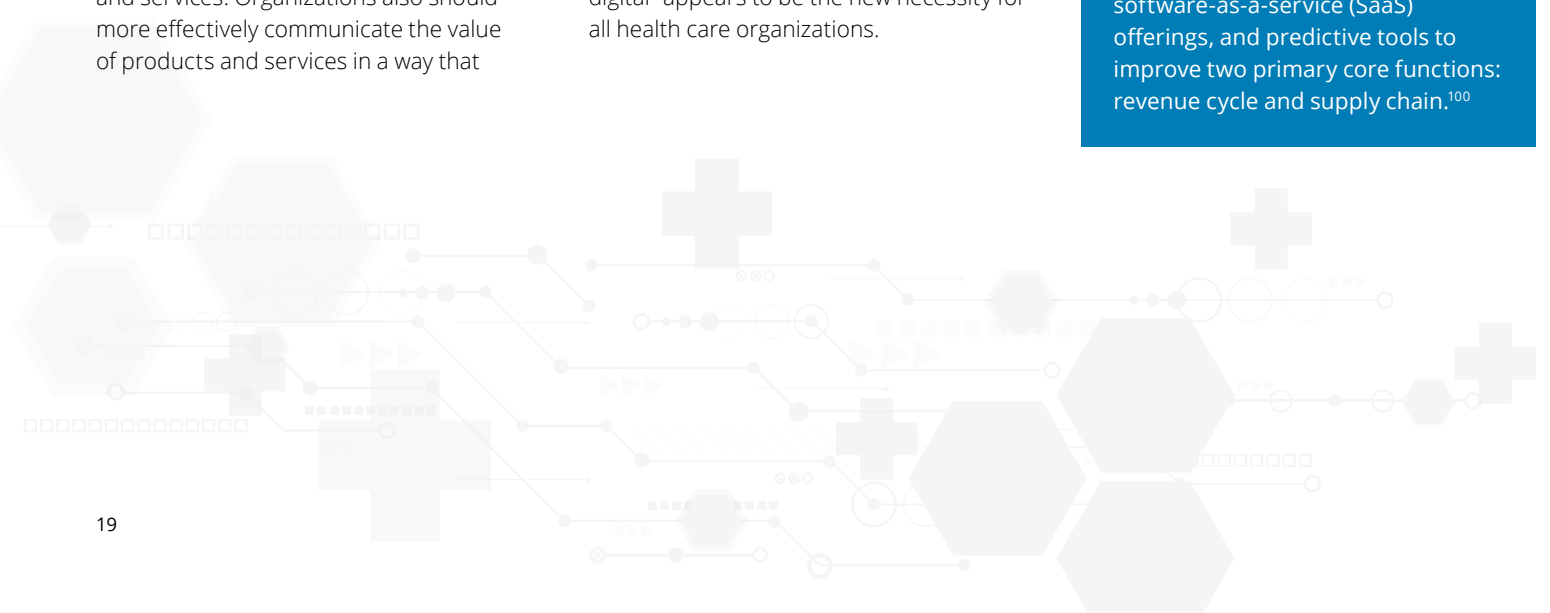
Investing in digital innovation and transformation

“Being digital”

Major advances in wireless technology, miniaturization, and computing power are fueling an exponential increase in the pace and scale with which digital health care innovations are emerging⁹⁸ and impacting both clinical and business operations (see sidebar). These advances are also driving an increase in the expectations of consumers that “going digital” is not enough—“being digital” appears to be the new necessity for all health care organizations.

Digital’s potential in “heart of the business” operations

Technology that lives out front—where patients, members, and customers can see it—can help a health care organization shine. But the technology at the core—which most people never see—makes an organization work. Back-office systems, and the quality of their connections with front-end enterprise functions, are the critical infrastructure that make pricing, product availability, logistics, quality, financials, and other “heart of the business” information available where it is needed. Although health care organizations are approaching the digital mandate from numerous angles, one issue remains consistently important: harnessing emerging technologies to enable core systems and back-office processes to reinvent how daily work gets done.⁹⁹ Some provider organizations are already taking steps toward using machine learning and robotic process automation (RPA), cloud-based software-as-a-service (SaaS) offerings, and predictive tools to improve two primary core functions: revenue cycle and supply chain.¹⁰⁰

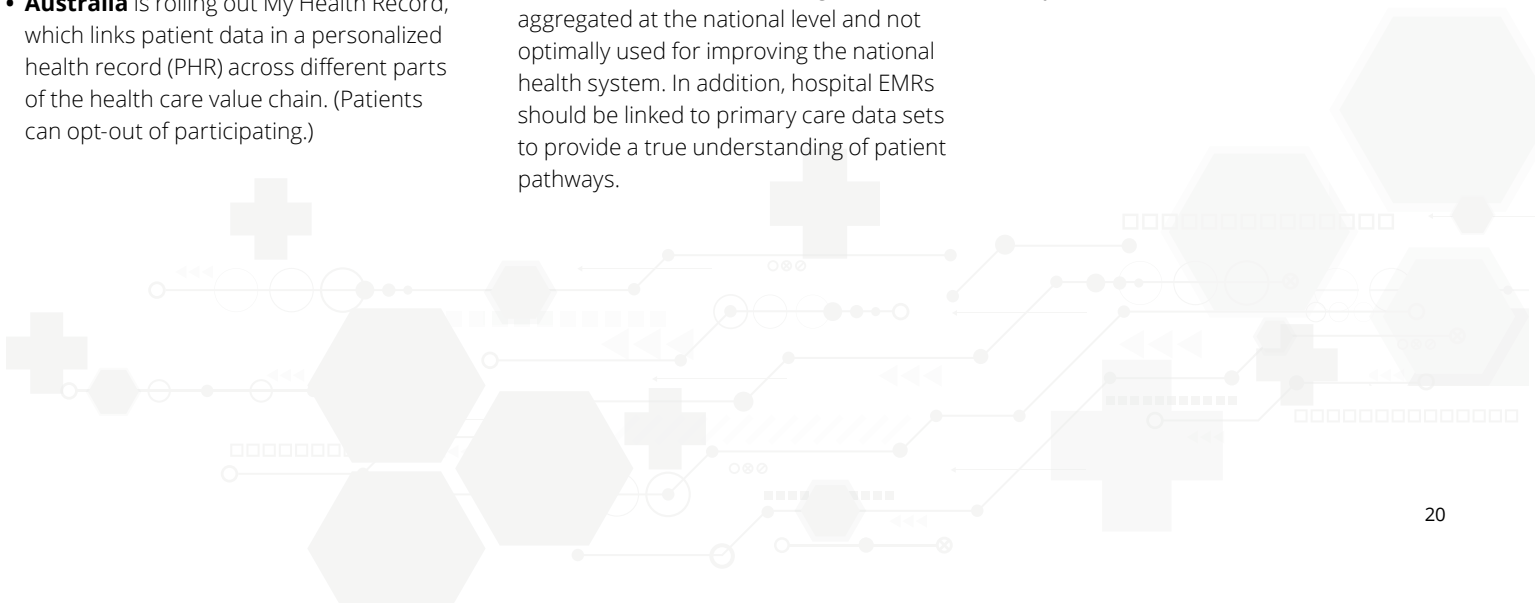


Digital innovations such as blockchain, cloud-based computing, virtual health, AI and robotics, digital reality, the Internet of Medical Things (IoMT), and others are helping reshape the future by making health care delivery more efficient and more accessible. Already, increased data access and data sharing via digital solutions are improving personalization, self-service, and patient experience. And more benefits may be just over the horizon: Blockchain, for example, has the potential to enhance collaboration, trust, interoperability, traceability, and auditability across a range of functions such as clinical trials, supply chain management, financial transactions, credentialing, and claims processing. The shift from blockchain to blockchains—to networks of networks—is particularly compelling in life sciences and health care, where the distinct sectors work together in one broadly interdependent ecosystem.¹⁰¹ Industry adoption of blockchain is still in its infancy, but in a Deloitte survey, the number of life sciences and health care organizations that said they planned to deploy blockchain in 2017 (35 percent) outpaced similar outlooks from other industries.¹⁰²

Health systems around the world are investing in digital technologies with varying degrees of enthusiasm and success:

- **Australia** is rolling out My Health Record, which links patient data in a personalized health record (PHR) across different parts of the health care value chain. (Patients can opt-out of participating.)
- The **United Kingdom** recently announced a £37.5 million investment in Digital Innovation Hubs to tackle Britain's biggest health challenges.¹⁰³ In other digital developments, the country is seeing increasing uptake of the disrupter Babylon Health as a way of accessing primary care; new entrants are entering the EHR market, potentially driving down the overall costs of implementations; and there are pockets of activity in automated AI-assisted diagnostics, telehealth, and consolidated health records.
- In 2017, **China's** central government issued the 13th Five Year National Science and Technology Innovation Plan, which aims to develop technologies for precision medicine, integrate them into a multi-level knowledge database, and create a national platform to share biomedical big data.¹⁰⁴ Over time, with the support of evidence-based technologies, patients who are about to receive or are under treatment will benefit from better quality and personalized care.
- A new law in **Japan** is expected to significantly increase shared use of Electronic Medical Records (EMR) data. Almost all hospitals in Japan have EMRs; the problem is that each hospital implements slightly different systems and, therefore, the data is not designed to be aggregated at the national level and not optimally used for improving the national health system. In addition, hospital EMRs should be linked to primary care data sets to provide a true understanding of patient pathways.
- Patient-centered health care enabled by e-health solutions is on top of the agenda within hospitals and care organizations in the **Netherlands**. The health system's struggle, however, is to get beyond pilots and move to mainstream adoption.
- Some company human resources (HR) departments in **Brazil** are using gamification to improve employees' engagement in wellness and chronic care programs.
- **India's** health system is seeing a lot of ideating and cutting-edge, small-scale pilot programs around mobile health (m-health), telemedicine, and IoMT, although few are being taken to scale. Numerous public and private hospitals are moving to online patient registration and service delivery systems, and digital marketing is becoming more common via mobile apps for appointment booking, paying online, downloading test reports, sharing health tips, and more.

The list of digital technologies that can help health care providers, payers, and governments achieve the triple aim—improving care, improving health, and reducing spending—continues to expand and evolve. Let's take a closer look at three of these innovations: AI and robotics, digital reality, and IoMT.



Spotlight on digital health innovations

AI and robotics—Artificial intelligence, the theory and development of computer systems able to perform tasks that normally require human intelligence, is anticipated to transform health care by performing clinical and business tasks currently performed by humans with greater speed and accuracy, and by using fewer resources.¹⁰⁵

AI can provide decision support and practitioner assistance for tasks such as diagnosing patients and spotting disease outbreaks earlier; accelerating the development of new drugs and devices;¹⁰⁶ and streamlining middle- and back-office functions such as making physician referrals, coding patient pathways, and approving claims.¹⁰⁷ An example of AI-assisted workflow management is DeloitteASSIST, a patient communication solution that combines the capabilities of speech recognition, natural language processing, and AI to enable patients to request assistance without the need to press a button. Simply by speaking their request, nurses are alerted to their need, with AI prioritizing and smart-routing requests to the right resource (orderlies, patient support assistants, volunteers) to meet the patient's needs.¹⁰⁸

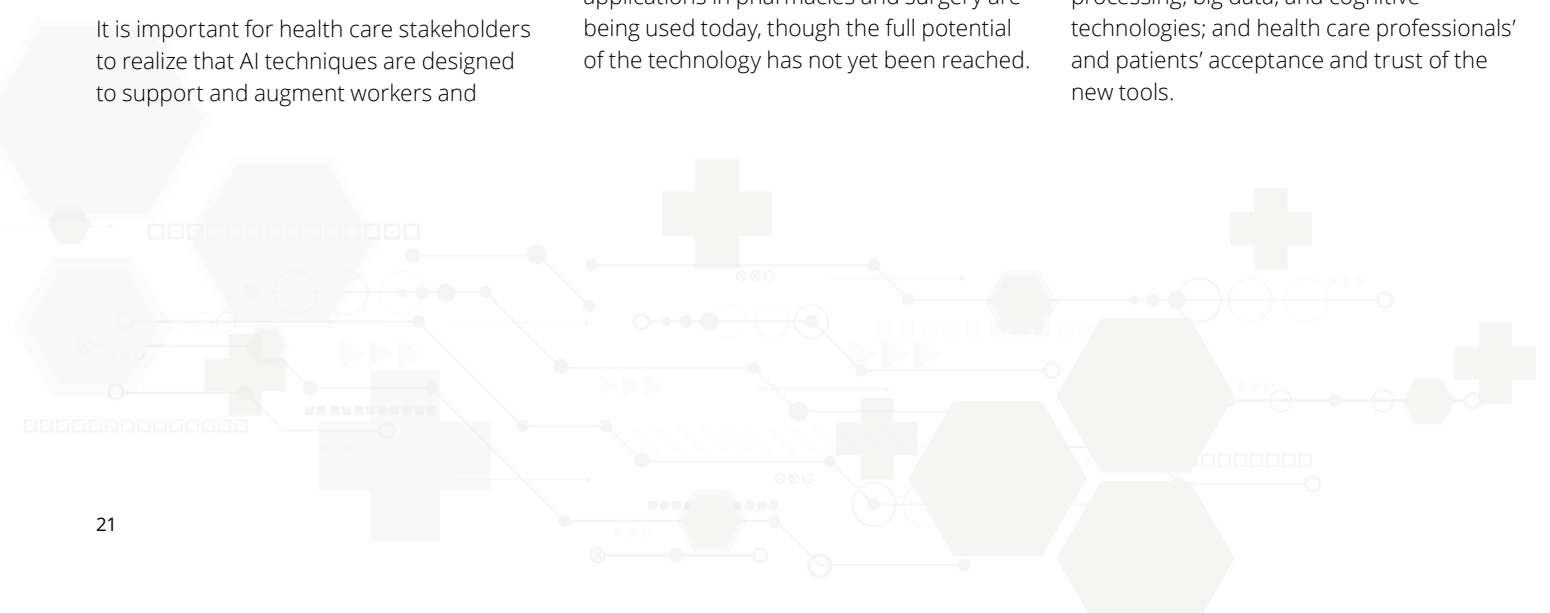
It is important for health care stakeholders to realize that AI techniques are designed to support and augment workers and

AliveCor, maker of the KardiaMobile electrocardiogram monitor for iPhone and the KardiaBand EKG recorder for the Apple Watch,¹⁰⁹ is gathering data from its devices that could someday feed a machine-learning system to help physicians spot disease. In one potential application, a “bloodless blood test” would look at a subtle shift in the EKG that’s characteristic of a potential potassium blood-level elevation, which the AI is uniquely skilled at identifying. Measuring this marker in real time, from the convenience of a phone or smartwatch, could transform how clinicians treat people after a heart attack or while on certain medications.¹¹⁰

not replace them, allowing highly trained resources to focus on more valuable, patient-facing activities.¹¹¹ For instance, robotics could improve drug compounding preparation, decontaminate and sterilize medical equipment, and reallocate personnel resources to more high-value areas (e.g., allow nurses to spend more time directly with patients). Driverless cars could take patients to their appointments, improving continuity of care. Drones could pick up medication that an elderly patient may have dropped on the floor. Robotic applications in pharmacies and surgery are being used today, though the full potential of the technology has not yet been reached.

The cost of these technologies remains a challenge in some applications, such as surgery, and it is unclear if leveraging robotics will improve efficiencies and outcomes enough to justify the additional cost.¹¹²

AI and robotics applications are still at the early-adoption stage among health care stakeholders and patients. Increased uptake may depend on innovators’ ability to reduce cost and improve accuracy of technologies such as natural language processing, big data, and cognitive technologies; and health care professionals’ and patients’ acceptance and trust of the new tools.



Digital reality (DR) is the umbrella term for augmented reality (AR), virtual reality (VR), mixed reality (MR), 360-degree, and immersive technologies. “Immersive” describes the deeply engaging, multisensory, digital experiences that can be delivered using DR. As with many new digital capabilities, these technologies made their first inroads in the consumer world as forms of gaming and entertainment. Now they’re reaching a tipping point at which enterprise and organizational adoption is beginning to outpace entertainment uses. Initial barriers in technology, cost, and content are beginning to fall, and early adopters are already hard at work creating solutions to help transform health care.¹¹³

Deloitte and McLaren are working together to build data-driven solutions that combine specialist hardware and software with sophisticated algorithms to improve performance across functions and organizations. A health care application could include creating a digital copy of a hospital process, such as patient flow, then applying advanced analytics and running millions of potential scenarios to identify root cause and test different interventions before applying them.¹¹⁴

In the life sciences and health care fields, the market for virtual patient simulations is expected to grow almost 20 percent a year to become a billion-and-a-half-dollar industry by 2025.¹¹⁵

Among providers, the use of AR and VR is currently focused in several discrete areas. For patients, these technologies can speed education about conditions or treatment plans. They can even be therapies themselves when used in visualization and relaxation exercises. Applications in opioid addiction therapy, phantom limb treatment, phobia therapies, cancer therapy planning, peri-operative planning, post-traumatic stress disorder, and general pain management are some established examples. DR tools can be used to help maintain mental acuity through participation in situations that limitations such as physical mobility may otherwise make difficult, and some VR-based therapies are beginning to appear as ways to help Alzheimer’s disease patients improve their memory.¹¹⁶

In the clinical setting, AR and VR can help physicians and care teams at the point of care. For example, surgeons can use a heads-up display to provide a data overlay on the patient’s body during surgery, or to visualize the entire procedure during pre-surgical planning. Combined with medical imaging, AR is beginning to provide clinicians with the ability to project medical images, such as CT scans, directly onto the patient and in alignment with the patient’s body—even as the person moves—to provide clinicians with clearer lines of sight into internal anatomy.¹¹⁷ In the educational setting, curricula across undergraduate, graduate, and continuing medical education programs and institutions are increasingly incorporating AR and VR enablement¹¹⁸ (see sidebar).

VR training for physicians

Virtual reality technology is transforming the process of medical training with its immersive experience and realistic scenarios for physicians in surgeries and emergency care. Among recent developments in VR training:

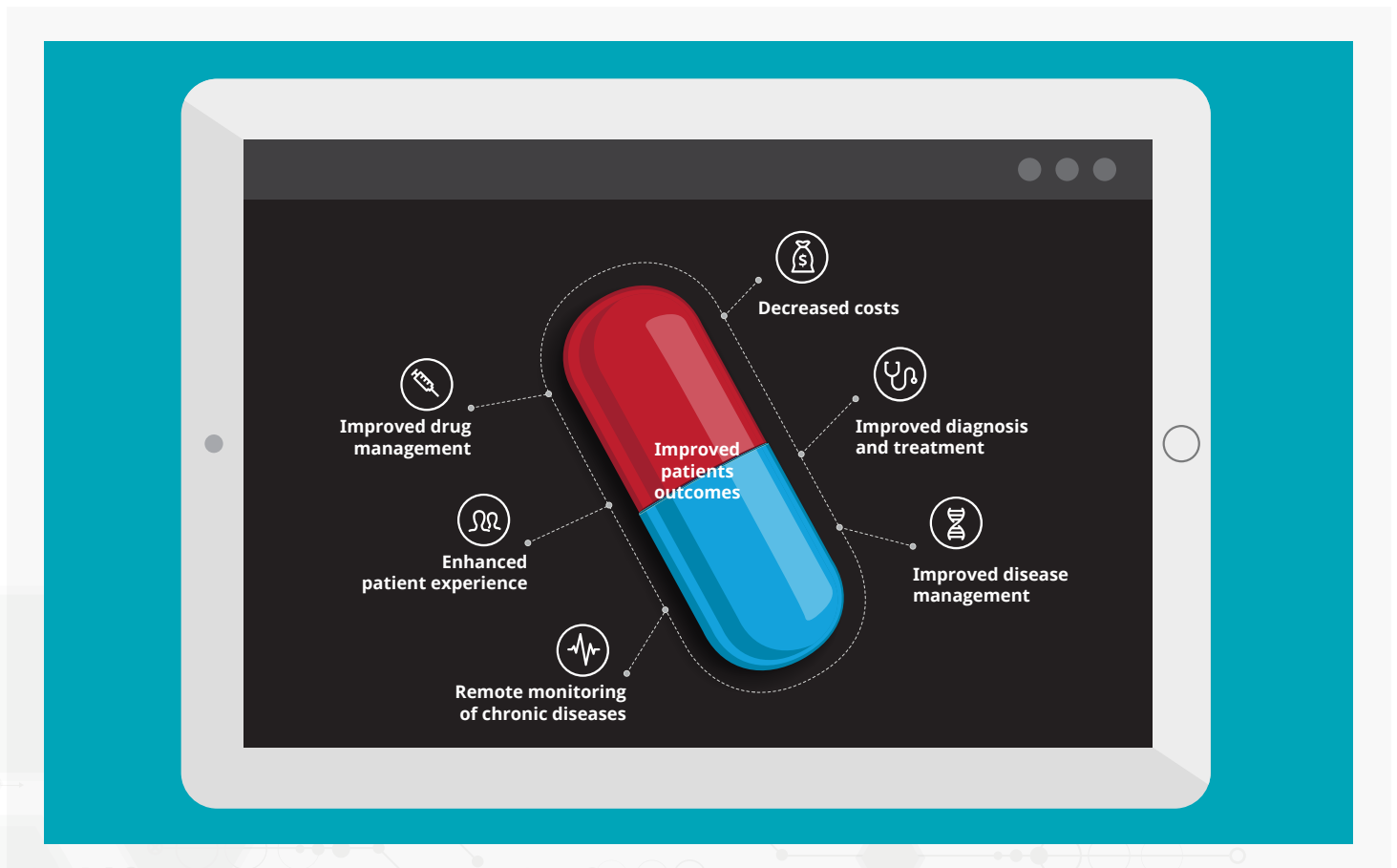
- Surgical Theater, a company specializing in VR, provides a pre-op rehearsal platform for complex surgeries.¹¹⁹
- The Johnson & Johnson Institute recently launched a VR training program to help prepare orthopedic surgeons and nurses on total knee replacement and hip fracture treatment procedures, with plans to further expand to other surgeries.¹²⁰
- Oculus VR is running a pilot to test VR simulation on emergency department (ED) staff in high-risk pediatric trauma situations.¹²¹
- London-based Fundamental VR developed a “Fundamental Surgery” VR application that mimics the environment as well as the physical sensations of an operation.¹²²
- Embodied Labs created a VR program called “We Are Alfred” in which Alfred is a 74-year old man with macular degeneration. The device puts the future nurse or doctor in the place of an extremely ill individual so that they can learn to empathize with their condition.¹²³
- An AR-enhanced smartphone can extend use of virtual cadavers in anatomy training practice sessions.¹²⁴

IoMT is a connected infrastructure of medical devices, software applications, and health systems and services. IoMT brings together people (patients, caregivers, and clinicians) data (patient or performance data) processes (care delivery and patient support), and enablers (sensors, connected medical devices—such as wrist bands and smart clothing—and mobile apps) to deliver improved patient outcomes more efficiently.

The rise of the IoMT is being fueled by an increase in the number of connected medical devices that can generate, collect, analyze, or transmit health data or images and connect to provider networks, transmitting data to either a cloud repository or internal servers.¹²⁵ Importantly, the IoMT generates intelligent and measurable information to help improve the speed and accuracy of diagnostics and target treatments more efficiently

and effectively. It enables remote clinical monitoring, chronic disease and medication management and preventive care, and it supports people who require assistance with daily living, like the elderly and disabled, to live independent lives for as long as possible (see figure 6). IoMT also has the potential to lower costs, improve efficiency, and deliver better patient outcomes.¹²⁶

Figure 6: The seven main ways the IoMT impacts health care



Source: *Medtech and the Internet of Medical Things: How connected medical devices are transforming health care*, Deloitte Centre for Health Solutions, July 2018. Adapted from "The Internet-of-Things: A revolutionary tool for the health care industry," *Inside Magazine*, Deloitte LLP, 2017.

Stakeholder considerations

Digital technologies are supporting health systems' efforts to transition to new models of patient-centered care and "smart health" approaches to drive innovation, increase access and affordability, improve quality, and lower costs. Digital solutions also have the potential to enable better use of health data in research and innovation to support personalized health care, better health interventions, and health and wellness services.¹²⁷

Increasing health system digitization does have some challenges to overcome—among them, solving interoperability issues and risks around connected devices; standardizing disparate systems and processes; and taking pilot models to scale to facilitate system-wide adoption. Health systems and payers also need to be careful not to hard-wire in (possibly erroneous) analytics-generated assumptions about data patterns that supposedly indicate how different populations should be treated in an integrated health care model.

Adopting many of these innovations requires capabilities that fall beyond the traditional purview of health care organizations. Health care leaders should consider building ecosystems that embrace non-traditional players and sources of knowledge outside their own four walls. Cross-sector and cross-industry partnerships and joint ventures can help minimize capabilities gaps (e.g., technology development, data capture, or patient engagement), achieve connectivity at scale, and ensure the effective transmission, aggregation, analysis, and management

of data from connected devices. Such collaborations could allow all stakeholders to improve their understanding of patient needs and deliver more proactive, cost-effective care.¹²⁸

Maintaining regulatory compliance and cybersecurity

Managing impacts from changing regulations

Health care—already one of the world's most heavily regulated industries—is likely to become even more so, as clinical innovations, digital interconnectivity, and market complexity heighten the need for new government policies, regulatory oversight, and risk management. Although certain regulatory issues are of universal concern—cybersecurity currently heads the list—others vary by country and/or region:

Australia—The Royal Commission into misconduct in the Australian financial services industry, a government inquiry into conduct, practices, behavior, and business activity that falls short of community standards and expectations,¹²⁹ may have ramifications for health care. After months of public hearings, the Commission issued an interim report on September 28, 2018, that was highly critical of financial services companies' focus on "profits before people" and of corporate, industry, and government regulators' insufficient response to pervasive misconduct.¹³⁰ The report also signals the need for more diligent enforcement of existing regulations via a culture of enforcement and a culture of compliance.¹³¹

The Royal Commission may produce strong markers around what is good conduct for health care and other industries in the corporate and public sectors. For example, acute care, elder care, and disability care facilities may have to prove that their conduct meets community standards and expectations in delivering those services.

China—The number of private hospitals in China doubled to a total of 18,759 in just six years, from 2011–2017; they now account for 60.4 percent of Chinese hospitals.¹³² However, it appears that quality concerns are also growing, and with it, the frequency of medical accidents. As a result, regulatory supervision of the private health care sector is a primary focus area. China's government also is trying to improve overall medical quality; in April 2018, the Ministry of Health released 18 policies to improve quality and safety in hospitals.¹³³

European Union—The General Data Protection Regulation (GDPR) is intended to strengthen and unify data protection for all individuals within the EU. As of May 25, 2018, GDPR is automatically applicable across all member states. It also applies to any company that does business with, or has customers in, EU member states. GDPR enactment is intended to ensure that citizens will now have secure access to a comprehensive electronic record of their health data, have control of the data, and are able to share their data securely with authorized parties for medical treatment, preventive services, research, or for any other purpose they deem appropriate.¹³⁴

Southeast Asia—The rapid growth of “consumptive” health services—medical cosmetology, medical tourism, assisted reproduction services, high-end birth delivery/prenatal and postpartum care services, and rehabilitation services—in lower-cost countries is increasing calls for stepped-up regulatory oversight to heighten quality standards and safeguard patients.

United Kingdom—Brexit has considerable regulatory implications for the health care sector. While terms of the United Kingdom’s exit are still being negotiated, there could be a risk of considerable disruption to staff recruitment and the supply of pharmaceuticals and other health care goods and services.¹³⁵ Brexit also has raised risks for economies and health care systems across the Western European region.¹³⁶

United States—US health care policies have changed considerably under the current administration that took office in January 2017. The administration has used piecemeal legislation to reverse some important provisions of the 2010 Patient Protection and Affordable Care Act (ACA). Most notably, tax reforms in December 2017 mean that, as of January 2019, Americans

will no longer face a penalty if they do not buy health insurance.¹³⁷ Eliminating the individual mandate will widen choice, but it will also weaken the risk-sharing assumptions that underpinned the ACA. As a result, private insurers are likely to focus on selling lower-cost policies for younger and healthier clients, leaving public sector plans (Medicare and Medicaid) struggling to cover costly care for the elderly and low-income families.¹³⁸

Prescription drug pricing is another area of US health care policy that has received significant attention.¹³⁹ US regulators have proposed or finalized regulation to reduce the costs of drugs in public programs through a variety of mechanisms, including increased price transparency, and clinically informed formulary restrictions. Other regulatory and legislative activity aims at changing the role of pharmacy benefits managers (PBMs), which negotiate prices on behalf of commercial payers. Most notably, the US government has proposed a policy to test pricing for certain drugs according to an international index of drug prices, showing a willingness to set prices more directly where other mechanisms remain unavailable.¹⁴⁰

Countering cyber crime

The legacy of the Wannacry attack continues to resonate across the health care landscape, as cyber criminals plan and execute increasingly sophisticated attacks at a growing rate. Unfortunately, the things that health care organizations do to innovate and to drive patient experience, care delivery, and performance improvements are the very things that tend to create cyber risk. Health care’s large volume of high-value data, growing demand for interconnected IT environments, and cybersecurity program immaturity make it an attractive target. IOT-enabled medical devices (implantables, wearables, pacemakers) are also exposed to data security issues—over the last 10 years, there have been numerous incidents revealing the security vulnerabilities of connected devices.¹⁴¹ Yet, despite increasing attention and investment, many organizations remain unprepared for cyber attacks and other crises (see sidebar, next page).



Crises are on the rise. Are organizations prepared?



Despite the perception that crises including cyberattacks are becoming more frequent, a 2018 Deloitte survey¹⁴² of more than 500 crisis management executives found that organizations' confidence exceeds crisis preparedness. The analysis of survey responses revealed five central insights of value to health care stakeholders working to safeguard their digital assets:

Experiencing a crisis teaches organizations to avoid them. Undergoing a crisis galvanizes organizations to prioritize detecting and preventing crises in addition to managing them.

Leaders need more development for crisis management. Helping leaders display their full range of competencies under the extreme pressures of a crisis can support effective decision-making and communication when they are most needed.

Confidence outstrips preparedness. An organization's confidence in its crisis management capabilities is not always commensurate with its level of preparedness.

Being at the ready significantly reduces the negative impact of a crisis. This is especially true if senior management and board members have been involved in creating a crisis plan and participate in crisis simulations.

Third parties are part of the problem—and the solution. Numerous companies are including partners and other outside organizations in crisis planning.

While acknowledging organizations' need for effective crisis management, focusing security efforts on cyber resilience—investing in protective technologies and cultivating workforce behaviors, including anticipating and monitoring potential threats—may be more important. Being vigilant may help prevent cyberattacks; or, if an attack occurs, a prepared workforce may better implement a fast, effective response to contain it and ensure measures are in place to help build resilience to future incursions.¹⁴³

Moreover, as health care data becomes increasingly valuable and accessible, there is an ever-present and growing debate around the right to data privacy (e.g., genomic sequencing) versus the right to data access to create higher-quality health care products and services. We appear to be witnessing a generational cultural change in how much people value their data privacy over more personalized health care, which indicates a need to implement security standards to protect against identity theft and deep-fake information-creation, and to establish corporate social responsibility/ethical decision-making around data use.

Although new technologies and government initiatives to improve cybersecurity are on the rise, the value of patient data is increasing as well, and with it, the amount of cybercrime. Recently, a number of large data breaches have occurred, with as many as 79 million people affected in one such health care breach.¹⁴⁴

With no single global agreement on data protection, regulators around the world are taking different positions on the issue.¹⁴⁵ Several countries have introduced new laws and ethical standards around data privacy and control. In May 2018 the Brazilian Senate approved a bill that creates a legal framework for the protection, processing, and use of personal data. Once the law is enacted, it will give citizens greater control over their personal information: it requires explicit consent for data collection and use by both public authorities and private companies, and options for individuals to view, correct, and delete such information.¹⁴⁶

The Government of India's use of biometrics, Aadhar cards (a 12-digit unique identification card for each Indian citizen), and DigiLocker (a service that enables citizens to store certain official documents—including detailed health records—in the cloud)¹⁴⁷ is showing considerable promise in changing the way public health programs are delivered. To address associated data safety and privacy concerns, the government has come out with a comprehensive data protection policy that sets standards for the collection, processing, and use of personal data of beneficiaries and other individuals as part of the national insurance scheme (PMJAY).

Stakeholder considerations

Managing the impact of new and changing health care regulations requires that organizations public and private, large and small, take a proactive, well-planned and collaborative approach to compliance. What is also critical—especially in the increasingly digitized and connected health care environment—is adopting a systematic approach to protect systems and data from cyber threats.

While government policies and regulations seek to strengthen health care security and safety on a macro level, individual organizations should focus executive attention on compliance, ethics, and risk—and drive awareness throughout the enterprise. Many cyber incidents can be avoided if health care organizations invest in crisis management capabilities that make their cyber-diligence stronger, fitter, and better, such as establishing real-time monitoring, cyber-threat modeling and analysis, and threat mitigation and remediation.¹⁴⁸ And since many hospital, health plan, and government employees may lack awareness of and training to manage financial, operational, compliance, and cyber risks, staff education should be an important part of every risk management program.



Recruiting, developing, and retaining top talent

Closing the talent supply-demand gap

Health care is a people business, and quality of care depends greatly on having the right professionals with the right skills in the right place at the right time.¹⁴⁹ However, an aging workforce, rising demand for health care services, and reduction in physician working hours are driving shortages of appropriately skilled staff in both developed countries (e.g., urban versus rural areas, specialists in some fields) and developing economies (global mobility).

Talent challenges at the United Kingdom's NHS illustrate the seriousness of the situation: The NHS spends nearly 65 percent of its operational budget on staff.¹⁵⁰ While almost all clinical professions in the NHS have grown in the last five years, they have failed to keep up with demand. For example, current total NHS vacancies for nurses, midwives, and allied health professionals (AHPs) are almost 42,000 (9.4 percent).¹⁵¹ While temporary employees can cover most vacant shifts, using these workers is typically expensive and may compromise continuity of care. Also, some vacant shifts (about

8 percent) remain uncovered, increasing pressure on existing staff and potentially impacting care quality¹⁵² and employee health, well-being, and retention.

Expanding the view of this issue geographically, the World Health Organization (WHO) predicts a shortfall of up to two million health professionals (or 15 percent of the workforce) across the European Union by 2020.¹⁵³ China is facing a serious deficiency of general practitioners (GPs): According to data from the Organisation for Economic Co-operation and Development (OECD) and the National Health and Family Planning Commission of the People's Republic of China (NHFPC), only 6 percent of Chinese doctors are GPs, which is much lower than other major countries. In Japan, hospital doctors in rural areas are working excessive hours due to staff shortages. Because Japan cannot import doctors due to the language and license limitations, the health system will need to develop alternative solutions. Indeed, many countries are battling excessive demands on their health care workforce, raising important questions about the sustainability of current staffing models (see sidebar, next page).



Time to care: Securing a future for the hospital workforce in Europe

Are current hospital workforce models sustainable? New research released by the Deloitte UK Centre for Health Solutions¹⁵⁴ explores the current state of hospital workforces across Europe and their key challenges; it also provides recommendations to transform the workforce to remain fit for the future.

Based on interviews with more than 50 senior stakeholders and a crowdsourced survey of over 1,350 doctors and nurses across 11 European countries, the report points to a workforce buckling under the strain of a heavy workload, poor work-life balance, and declining morale and well-being. Beyond pure numbers, respondents identified numerous common challenges (figure 7):

Figure 7.



Source: *Time to care: Securing a future for the hospital workforce in Europe*, Deloitte UK Centre for Health Solutions, 2018, <https://www2.deloitte.com/global/en/pages/life-sciences-and-healthcare/articles/time-to-care.html>.

Despite decades of health workforce planning, education, recruitment, and retention initiatives, most European countries are facing increasing challenges around the demands placed on the workforce. Maintaining high-quality care requires a focus on staff retention, including health and well-being, as well as support to develop new skills and competencies in response to advances in scientific knowledge.

The research findings suggest that future workforce shortages could be tackled more cost-effectively if the efficiency and productivity of clinical activities were addressed through innovative approaches to workforce planning, recruitment, skills development, and technology use—most of which may also require institutional reforms.

Since a hospital's workforce is a significant investment—clinical staff account for the biggest proportion of hospital costs, up to 70 percent¹⁵⁵—health care leaders who leverage technology-enabled opportunities to address talent challenges may both solve near-term staff shortfalls and create the building blocks for a sustainable future. Three dimensions that are shaping the future of work—the “what” (automation), “who” (the open talent continuum), and “where” (workplaces, location)—should aid health care organizations' attempts to close the talent demand-supply gap.

1. What work can be automated?

The nature of work is becoming more digital and automated, as technologies such as AI, cognitive computing, and robotics help health care professionals make better decisions, reduce errors, and increase productivity in both clinical and business settings. AI-based diagnosis for heart diseases has proved to be more accurate than doctors at least 80 percent of the time.¹⁵⁶ Robotics are automating many aspects of health care, from administrative processes (e.g., documentation, insurance processing, scheduling) to logistic tasks (e.g., delivering linens, meals, and medical supplies) to surgery.¹⁵⁷

In Japan, Panasonic has created a nursing care bed, Reysone, an assist robot that combines an electric nursing care bed and an electric full-reclining wheelchair, to help elderly patients and their caregivers. Reysone became the world's first product to receive the ISO13482 certification, the new global safety standard for personal care robots.¹⁵⁸

Using digital technology to augment and—in some cases—replace human workers frees health care professionals from repetitive, mundane tasks and enables them to focus on their core responsibilities; this can improve physician and staff productivity and result in higher-quality patient care and enhanced patient and visitor experiences.

2. Who can do the work?

Recognizing current and projected health care workforce shortages, many governments have acted to increase the supply of physicians and nurses. According to Deloitte research, between 2010 and 2015, the number of graduates leaving medical school, per 1,000 population, increased in eight out of 13 European countries.¹⁵⁹ Ireland introduced a new graduate-entry level into medical training in 2009, which contributed to a 38.8 percent increase in the number of doctors, per 1,000 population, by 2015.¹⁶⁰ In its 13th five-year plan, China's government intends to train 150,000 more general practitioners by 2020.

International recruitment continues as a method of supplementing countries' rosters of domestically trained clinicians; however, this practice's competitive approach is undergoing increasing scrutiny. Low-income countries are particularly vulnerable to large numbers of professionals exiting; those who remain are left with a larger share of the workload, increasing the potential for dissatisfaction, burnout, and further emigrations.¹⁶¹ Some countries likely will need to increase clinician training to match domestic needs and improve pay and working conditions to strengthen domestic retention.¹⁶²

The challenges of closing the demand-supply gap through traditional employment methods point to the need for a talent

continuum that includes full- and part-time employees, contractors and freelancers, and crowdsourced and automated labor;¹⁶³ and for redefined roles for health care practitioners, such as allowing nurses to prescribe certain drugs. Also likely needed will be technologies that enable more efficient care delivery models; for example, Australian community care provider Silver Chain Group recently introduced a Microsoft HoloLens-powered holographic doctor with Enhanced Medical Mixed Reality (EMMR) capabilities to empower nurses on home visits with hands-free data and access to specialist advice and assessment from remote specialist doctors.¹⁶⁴

3. Where is the work done?

Today, care is mainly provided in the hospital or clinic setting, which can be a detriment to speed and frequency of care and puts limitations on the number of patients a clinician is able to assist. Telehealth and digital medicine tools are enabling a “care anywhere” model. This new model enables organizations to build and deploy new staffing models, such as allowing nurses to work remotely, while still building strong patient relationships and having high-value interactions, thus reducing nurse burnout and potentially creating more workplace fulfillment. A notable example is the introduction of remote monitoring through voice-activated solutions (e.g., oral chemo at home). This could be relevant for chronic care and rehab patients.¹⁶⁵

This change to the proximity of where care can be provided—remotely, in a patient's home, or even over the phone—allows certain clinical roles to optimize their time to see more patients, provide care for even more complex patients, and serve populations in hard-to-reach locations.¹⁶⁶

Stakeholder considerations

In technological terms, the future of health care is already here. But for many providers, payers, and governments, the plan for working in that future is still on the drawing board.¹⁶⁷ How do organizations procure and sustain the new skills and capabilities they need? How do they recruit the right people, manage, and develop them? How do they support and guide the current workforce into the new reality of a digital world? All stakeholders should come together in an iterative process that integrates the views

of service users, the current workforce, and their employers about the resources and skills required in the rapidly evolving health care environment. New ways of working augmented by digital technologies can enable task-shifting and role enrichment to create a sustainable and flexible workforce that is able to respond efficiently and effectively to users' needs.¹⁶⁸

As each organization seeks to map out its own workforce strategy, it should adopt an exponential mind-set: Each part of the

workforce will evolve not along a single linear path, but in response to a collection of forces. Rather than fearing this wave of change as an overwhelming challenge, provider organizations should proactively seek out the opportunities for augmentation and automation in clinical workflows—and pinpoint where both clinicians and patients will benefit from an aligned financial reimbursement system, new technologies, innovative talent models, and expanded locations where care is delivered.¹⁶⁹



Parting thoughts

This outlook envisions a future in which the global health care system is organized to keep people well—not just cure when they are ill; where technology-enabled care is available when and where people need it; where drugs and devices are personalized and based on an individual’s needs and

situation; and where people understand the cost and impact of their options for care.

The opportunities to shape this future have never been more promising and abundant. But it will take participation, collaboration, and investment by all health

care stakeholders—providers, governments, payers, and consumers—in 2019 and years to come to turn opportunities into realities.



Appendix

Explore the latest health care sector research from Deloitte members or visit: www.deloitte.com/us/healthsolutions
www.deloitte.co.uk/centreforhealthsolutions
www.deloitte.com/healthcare

2018 Global health care outlook: The evolution of smart health care

With quality, outcomes, and value being the watchwords for health care in the 21st century, sector stakeholders around the globe are looking for innovative and cost-effective ways to deliver patient-centered, technology-enabled “smart” health care, both inside and outside hospital walls.

A life sciences and health care perspective: Tech Trends 2018

From “doing digital” to “being digital,” that’s where the life sciences and health care industry needs to go. To help your business navigate digital disruption, this series provides a life sciences and health care perspective on Deloitte’s 2018 Tech Trends report. From blockchain to digital reality to the no-collar workforce, explore the trends that are shaping strategic and operational transformations and redefining life sciences and health care.

Time to care: Securing a future for the hospital workforce in the UK

There is widespread recognition across Europe of the growing mismatch between demand for hospital care and the supply of staff and other resources to meet that demand. The quality of care is dependent on having the right professionals with the right skills in the right place at the right time; however, there are concerns that the current workforce model is unsustainable.

The future awakens: Life sciences and health care predictions 2022

The year is 2022. The quantified self is alive and well, digital technologies have transformed the culture of health care, and new entrants have disrupted delivery models. We offer some predictions that, if they come true, will shake up the life sciences and health care industry in the next five years.

The future is here: The future of work

The future of work is poised to bring better jobs and more fulfillment to the practice of health care—if provider organizations adapt fast enough

The digital hospital of the future

In 10 years, technology may change the face of global health care delivery. As the cost of care continues to rise, many hospitals are looking for long-term solutions to minimize inpatient services. Learn how technology and health care delivery will merge to influence the future of hospital design and the patient experience across the globe.

Breaking the dependency cycle: Tackling health inequalities of vulnerable families

Vulnerable families face significant health inequalities, despite rising life expectancy across Western Europe. While access to good health care is important, it only accounts for 15–25 percent of health inequalities. A range of social determinants crucially drive trends around mortality and ill-health, including quality of education, housing, employment, working conditions, and welfare.

Stronger, fitter, better: Crisis management for the resilient enterprise

Despite the perception that crises are becoming more frequent, a 2018 Deloitte study finds that organizations’ confidence exceeds crisis preparedness.

Supporting healthy communities

As health care shifts toward treating people before they get sick, community partners and government agencies are becoming involved, aiming to address social factors such as education and housing. More players, though, means more complications, particularly in funding. One possible solution: a hub model.

Addressing social determinants of health in hospitals: How are hospitals and health systems investing in social needs?

Our survey of 300 hospitals and health systems explores how factors outside the health care system—the social determinants of health—affect patients’ long-term well-being and what health care organizations can do to address these challenges.

Deloitte 2017 survey of US health system CEOs: Moving forward in an uncertain environment

CEOs at hospitals and health systems are faced with increasing headwinds as they look to move forward in an uncertain environment. So what are the key issues and trends CEOs are facing? While none of the key themes emerging from our interviews have really changed since we last spoke with health system CEOs in 2015, the urgency certainly has. Instead of thinking about these issues in a futuristic sense, CEOs are ready to address and tackle them now.

Can emerging technologies improve hospital performance? Strategies for healthier operating margins

Hospitals are anticipating tighter operating margins in 2017 and beyond, due to increasing financial pressure from policy, industry, and market changes. This report discusses innovative technologies and cost-reduction strategies that hospitals can consider to enhance revenue, increase efficiency, and achieve long-term financial stability.

The value of patient experience: Hospitals with better patient-reported experience perform better financially

Deloitte research shows good patient experience is associated with higher hospital profitability. This association is strongest for aspects of patient experience most closely associated with better care—in particular, nurse-patient engagement.

Value of patient experience: Hospitals with higher patient experience scores have higher clinical quality

Making investments in patient experience can be a tough call. But new Deloitte Center for Health Solutions research suggests executives may want to give this investment real consideration. Coupled with previous research that found hospitals with better patient-reported experience perform better financially, new findings give ammunition to the business case: There is a positive correlation between patient experience and clinical quality measures.

Hospital mergers and acquisitions: When done well, M&A can achieve valuable outcomes

With a rise in the number of mergers and acquisitions in the health care industry, we conducted a study with the Healthcare Financial Management Association to learn more about the factors that lead to increased value following a hospital merger or acquisition.

Cognitive health care in 2027: Harnessing a data-driven approach in personalized health care

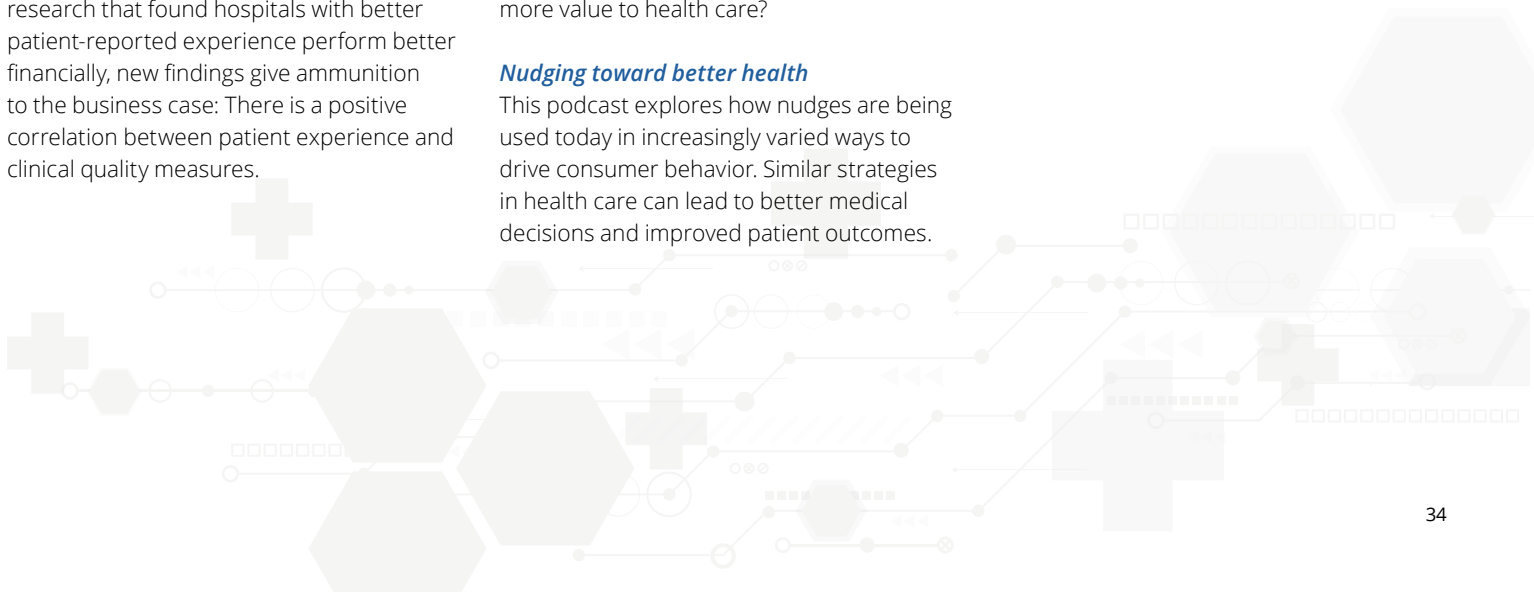
“Precision medicine” or care that is highly personalized for each person’s genome is likely to revolutionize health care of the future. And cognitive technologies will play a pivotal role, as handling the enormous amounts of data—one of the imperatives of cognitive health care—requires much more than just “artisanal” analytic capabilities.

Medtech and the Internet of Medical Things: How connected medical devices are transforming health care

With the Internet of Medical Things (IoMT) market estimated to be worth \$158.1 billion in 2022, how can medtech companies get IoMT right from a business perspective and how they can use the opportunity to deliver more value to health care?

Nudging toward better health

This podcast explores how nudges are being used today in increasingly varied ways to drive consumer behavior. Similar strategies in health care can lead to better medical decisions and improved patient outcomes.



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