



How do you care for today while building the health of tomorrow?

New horizons
Executive insights on the
future of health

October 2018 edition

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Contents

Article 01	Digital health engagement: Highlights from EY's global survey of health consumers and physicians	Page 3
Article 02	A dose of digital: What consumers and physicians want from new technologies.....	Page 11
Article 03	Performance: Optimized by and for the people	Page 19
Article 04	What's after EMR? A move outside of the hospital	Page 25
Article 05	Data fusion: Bringing the health consumer back into focus	Page 31
	Contributors and attribution	Page 37
	About EY Global Health	Page 41

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Welcome to the 2018 edition of *New horizons*, the EY annual collection of insights for executives that explores the trenchant health and wellness issues facing society today.



David
Roberts

EY Global
Health Leader

The theme this year is the duality of growth: we are all challenged to optimize the business of today and maximize outcomes for health consumers, while at the same time build a strategy for a wellness and prevention-focused future. This requires solid, core offerings, and bold steps that move away from the intractable to the possible.

Incumbents within the sector are responding to the growth challenge by experimenting with new models to compete across the value chain while delivering better outcomes and minimizing costs. Meanwhile, new entrants are stepping into health as technology, data and consumer demand reshape the market and how value is defined and captured. Almost daily announcements of new acquisitions, mergers or partnerships underscore the interconnectivity of this continuous drive to orchestrate change.

We begin with three articles that dive into building today's business. Two EY surveys, one in the US and one global, offer guidance on digital strategies that give consumers *and* their care providers what they want: more convenience and time to interact. This includes a look at differences in how people want to engage digitally with their health and clinicians. In *Performance: Optimized by and for the people*, we see how the methodical examination of processes, procedures, and patient interfaces within an organization can identify and eliminate waste and inefficiency.

Looking to the business of tomorrow, we explore the necessity of reducing the friction of data sharing and the radical shifts that democratizing data will bring. And finally, in *Data fusion: Bringing the health consumer back into focus* we discuss the new sources and combinations of data that will drive consumer engagement, lead to a better understanding of the drivers of health and disease, and change the way value is created and captured.

We are excited to discuss with you the evolving health ecosystem and explore how we may help you achieve your vision. In the meantime, please visit EY.com/health for more EY health sector insights.

I wish you much health and success,

A handwritten signature in black ink that reads "David Roberts". The signature is fluid and cursive, with the first name "David" and last name "Roberts" clearly legible.

David Roberts
EY Global Health Leader

Digital health engagement: Highlights from the EY global survey of health consumers and physicians

Digital health has now been around for quite some time. From the outset in the 1990s and ensuing global reach of the internet, the genie was undoubtedly let out of the bottle, unleashing a flurry of rapidly evolving health technologies. And ever since, clinicians, entrepreneurs and investors have all sought to capture the vast clinical and commercial promise of a digital and mobile health economy.

Innovation that combines the best of technological and scientific advances and subsequent diffusion across health systems is a mark of a modern health care system. As some note, this “remarkable array of transformative technology ... lays the groundwork for a new form of health care.”^{1,1} And, the impact of many technologies has been indeed transformative. Tools such as telehealth, clinical decision support tools, electronic health records, as well as electronic prescribing and referral systems have shaped the delivery of accessible, high quality health care.

EY has long been vitally interested in the evolving health care ecosystem and assisting the health sector to prepare for a consumer-centric and prevention-focused future. It is clear that solutions to sustainability, growth and delivering health care to the growing (and rapidly aging) population will be driven by key shifts around digital technologies, health care consumerism and the changing model of health. In recent EY research (see ey.com/health), it is signaled that participatory health, or the empowerment of consumers

(in part through disruptive digital health technologies) to make smarter choices and pursue responsible behaviors is a profoundly disruptive force for change in the health care system.

In mid-2018, EY conducted a health survey of over 6,000 consumers and over 500 physicians in Australia, England and the Netherlands to get a deeper appreciation of consumer and physician use of, and sentiment towards, digital technologies. In particular, EY was interested in understanding consumers’ and physicians’ perceptions about and willingness to engage with digital health technologies and whether these might deliver better outcomes. In this edition of *New Horizons*, a ‘sneak-peek’ of some preliminary findings (full results of the study will be available in late 2018) is shared.

EY found that both consumers and physicians believe that emerging health technologies will substantially reshape the consumer experience, support improved health and enhance the patient-provider relationship. Consumers and physicians both

agree that within the next decade, many technologies which might be considered transformative technological change today, will become commonplace in health care.

But, there is a long road to travel between now and the future promise of such technologies. Technology uptake in the health industry is notoriously slow. And, although they see it coming, the EY study finds that physicians and consumers are taking their time to adopt and adapt.

Health systems are well regarded, but slow to introduce digital health technologies

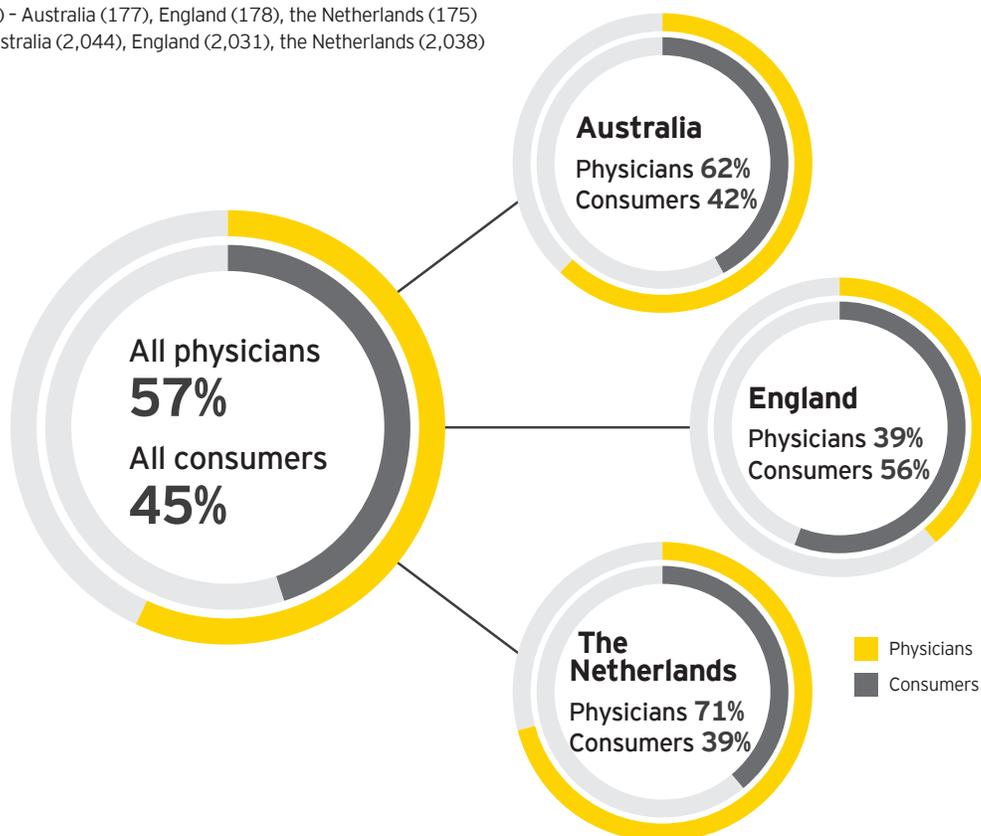
The EY survey results show that both consumers and physicians generally hold the health system of their respective countries in high regard. Combining the data from the three countries surveyed shows that overall, physicians were more favorable with 57 percent rating system performance as “excellent” or “very good,” compared with 45 percent of consumers. Opinions differed markedly between the countries as shown in Figure 1.

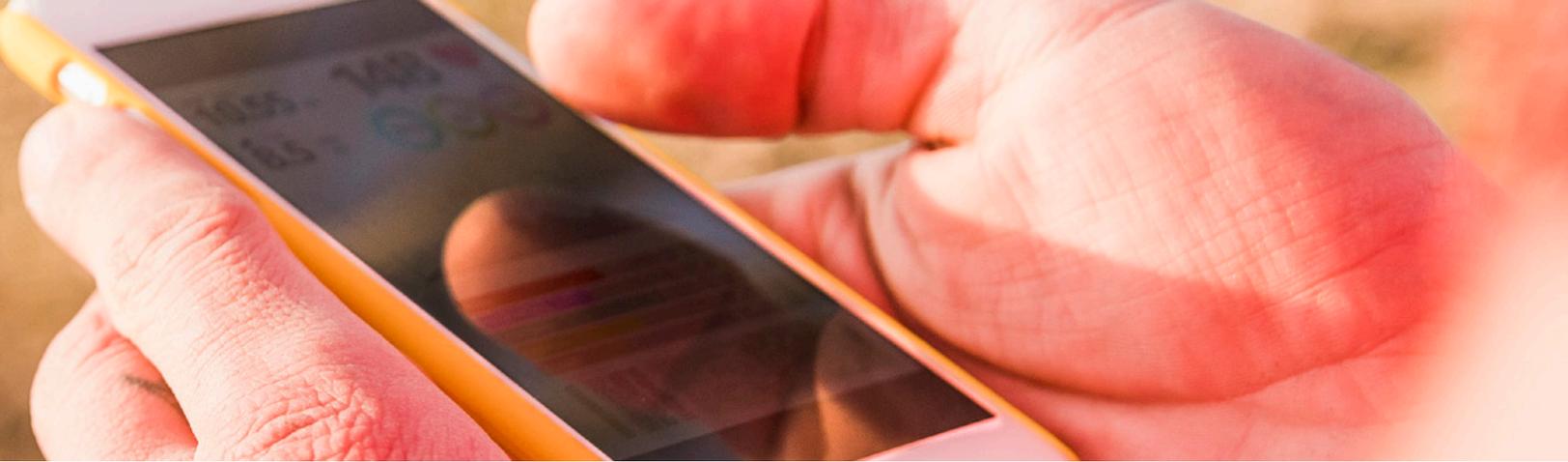
With growing health needs, is digital the best medicine?



Figure 1: Physician and consumer views on overall health care system performance - Australia, England and the Netherlands
How would you rate the overall performance of your country's health care system? Showing "Excellent" and "Very good"

Base N: Physicians (530) - Australia (177), England (178), the Netherlands (175)
Consumers (6,113) - Australia (2,044), England (2,031), the Netherlands (2,038)

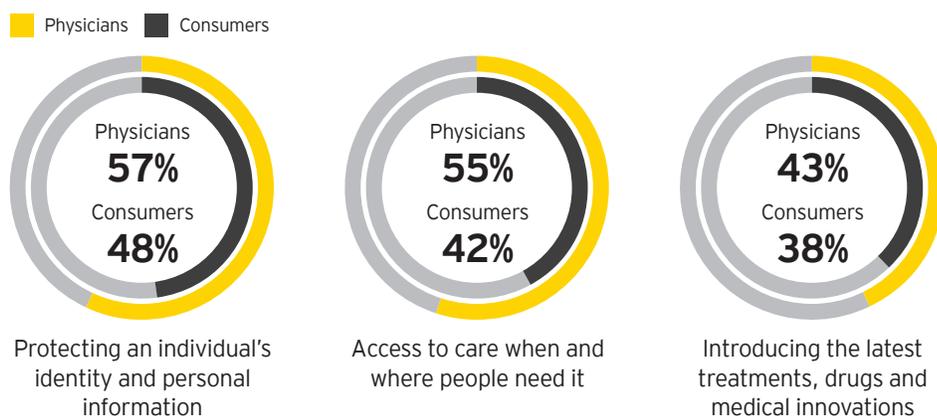




Overall, many believe that their health systems perform well in critical areas such as the security of personal information, access to care and being up-to-date with the latest treatments and innovations. Protection of identity and personal information was held in the highest regard, with 57 percent of physicians considering this to be 'excellent' or 'very good' and 48 percent of consumers indicating the same (see Figure 2); few consider their health system lacking in this regard (14 percent of physicians and 16 percent of consumers rated this as 'fair' or 'poor'). Views on access to care were mutual, with 24 percent of consumers and 20 percent of physicians considering their health system to be underperforming. Opinions diverged slightly with respect to keeping up with the latest trends, being ranked as 'fair' or 'poor' by 22 percent of consumers and 15 percent of physicians.

Figure 2: Three highly regarded areas of health care system performance

How would you rate your country's health care system's performance in the following areas? Showing "Excellent" and "Very good"

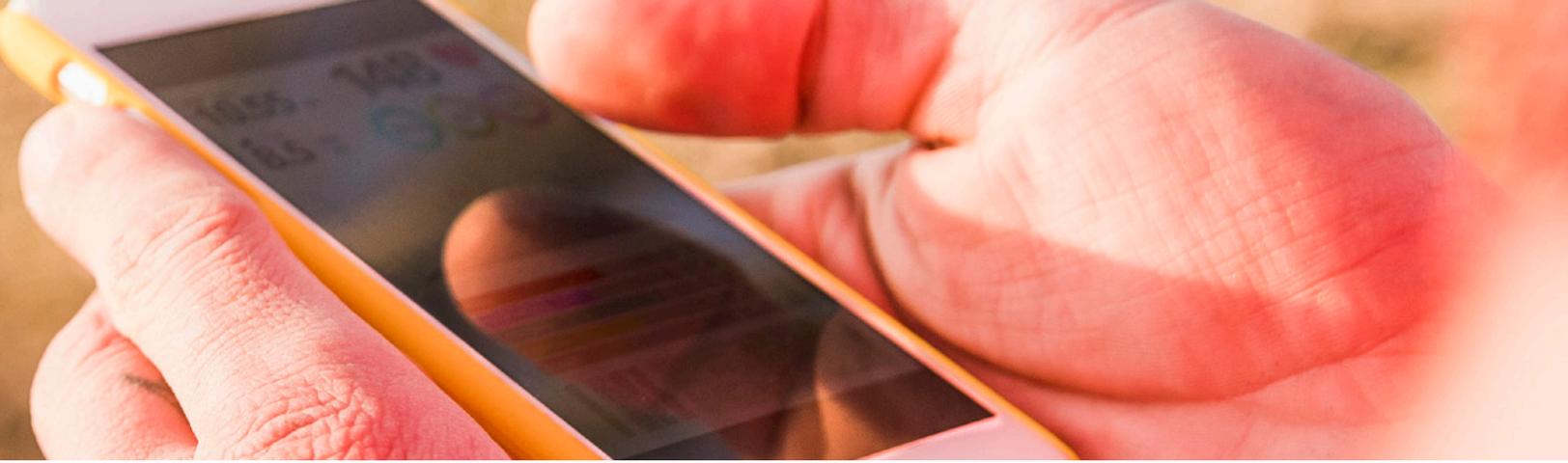


Base: All physicians (N = 530); all consumers (N = 6,113)

The least well-regarded aspect of health system performance was the introduction of digital health technologies. Overall, one-third of physicians (32 percent) considered health systems to be failing in this function. A considerable gap in perception of health system performance in this domain is evident between physicians and consumers in England - consumers view the introduction of digital health technologies in their health system far more favorably than do physicians. Similarly in Australia, opinions between consumers and physicians diverged markedly in the "fair" or "poor" dimension (Figure 3).

Figure 3: Physician and consumer views of health system performance introducing digital health technologies - Australia, England and the Netherlands

	Physicians	Consumers	Physicians	Consumers
	"Excellent" or "Very good"		"Fair" or "Poor"	
Australia	31%	35%	32%	20%
England	21%	42%	39%	18%
The Netherlands	27%	25%	24%	25%



For the time being ...

The internet is frequented by consumers as a resource for health information. Consumers are inclined to access information themselves through internet research including taking steps to acquire more knowledge about health and treatments. In the last year, half of surveyed consumers turned to online resources to research the symptoms and treatments for an illness, injury or health problem. Fewer sought healthy living information (38 percent) or information to self-diagnose (38 percent). Interestingly, of the consumers who did seek this type of information, the vast majority (70 percent) are infrequent users of the health care system, considering themselves generally healthy.

There was widespread agreement among physicians that certain technologies will improve outcomes. Eight in 10 physicians consider technologies that reduce

administrative burden such as making appointments online (84 percent) and completing paperwork online before a consultation (81 percent) will make care more efficient and be more convenient for patients. Tools that augment the patient-provider relationship and improve the consumer experience are seen as valuable. The use of virtual technologies for communication between physician and patient is viewed favorably by physicians (62 percent) and two-thirds see the benefit in patients using smartphones to capture and send biometric data (68 percent). Notably, consumers are highly willing to share with physicians their biometric data (75 percent) and patient-generated data (70 percent) and believe that sharing this definitely leads to improved health (72 percent).

Technologies that augment patient safety, clinical excellence and facilitate communications with consumers are

priorities for many physicians (Figure 4). Of those who do not currently use these capabilities, around half intend to implement them in their workplace within the next three years. Tools less used by physicians tend to be patient-oriented. For example, few currently use patient engagement tools such as apps that help patients reach health goals, or chronic disease management tools to deliver digital programs to assist with weight loss, or diabetes management. Virtual care such as video consultations and remote monitoring were also less likely to be in use. And, physicians don't plan to introduce these into their workplaces any time soon. Sixty-four percent of physicians surveyed have no plans to introduce virtual visits, remote monitoring at home with clinical grade devices that send information to physicians (65 percent) or to use voice powered digital assistants (74 percent).

Figure 4: Technologies that smooth processes and support quality clinical practices are currently used by many physicians

Do you currently use any of the following digital health technologies in your practice/workplace?

Clinical decision support



55%

Secure messaging



49%

Patient portals



39%



Is health care ready for the 21st century?

In the eyes of both consumers and physicians, health care in the future will be quite different than today. The survey asked respondents to think about health care 10 years from now. As the table “It’s not science fiction” shows, many of the technologies put forward in the survey are currently in use in health systems today.

Technologies that systematize care delivery systems and processes such as AI, case management and care delivery pathways resonate with both physicians and consumers. The management of clinical conditions such as chronic, complex

diseases will likely be underpinned by digital technologies that enable remote teams to care for people in their homes. This is readily anticipated by two in three physicians (64 percent) and echoed by consumers (53 percent) (Figure 5). And, clinically oriented technologies such as AI assisted diagnostics, imaging analysis and medication management and precision medicine are expected to become part of the core business of medicine.

The changing nature of the health industry is also well-recognized. Both physicians (60 percent) and consumers (43 percent) believe that new and non-traditional players will enter the health industry bringing

profoundly different ways of approaching the delivery of health and care. Virtual care, however, is not an expected innovation: only one-quarter and one-third of both consumers and physicians see virtual presence technologies (physicians 38 percent, consumers 36 percent) or virtual hospitals (physicians 25 percent, consumers 36 percent) being likely in the near future. These new care models may seem to be just a little too far over the horizon. However, they are in play now. In the face of incipient demand, this leaves open the question of introducing and scaling radically different care models in the years ahead.

Figure 5: Physicians and consumers expect health care to be notably different in the next decade

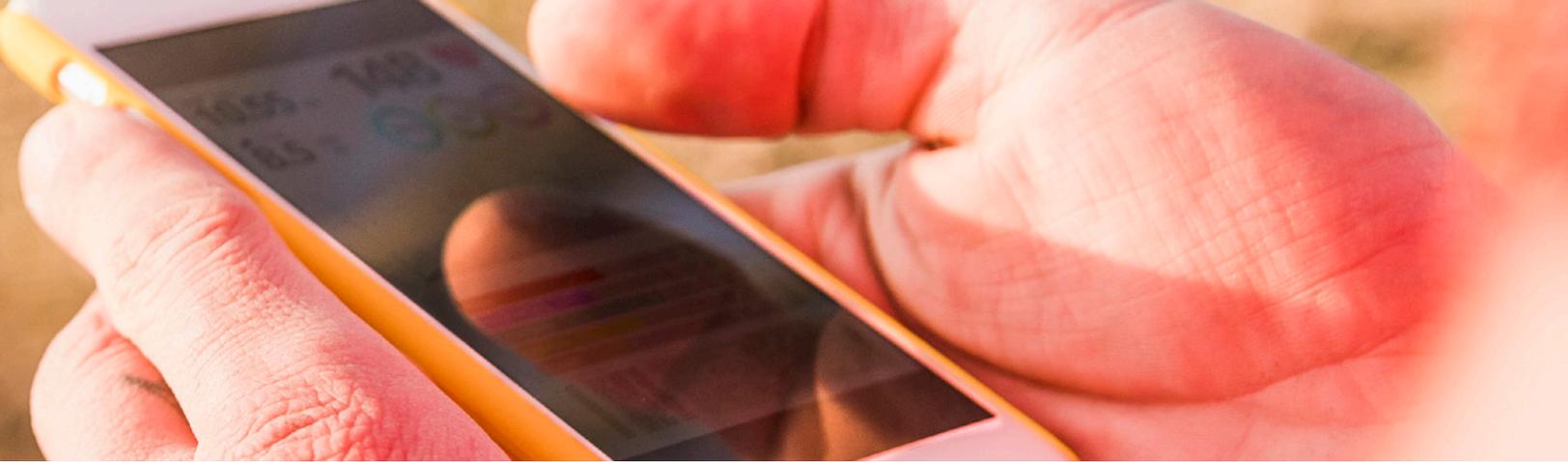
To what extent do you believe the following will likely occur in the health industry in your country in the next ten years ? (%)

“Very likely” + “Likely”	Physicians (Base – global physicians 530)		Consumers (Base – global consumers 6,113)	
	Physicians (%)	Consumers (%)	Physicians (%)	Consumers (%)
Digital technologies will enable care teams to remotely coordinate complex patient care	64%	53%	64%	53%
Companies from outside the health industry (e.g. retailers, electronics and technology companies) will enter the health industry with profoundly different approaches to health care	60%	43%	60%	43%
Artificial intelligence technologies will be commonly used for diagnosis, medical imaging analysis and medication management	57%	47%	57%	47%
Smartphones will become the primary interface in the health system, allowing people to manage and improve their health/wellness anywhere and at any time	54%	46%	54%	46%
Precision medicine technologies such as DNA sequencing will become a routine part of preventative primary care	50%	46%	50%	46%
Virtual presence (e.g. through a virtual reality headset) as a substitute for a health professional being physically present	38%	36%	38%	36%
Virtual hospitals with no beds that will deliver both basic and advanced medical care (e.g. stroke evaluation) through digital e-consultations and remote patient monitoring	25%	36%	25%	36%

It's not science fiction – the future is already here

The technologies of tomorrow are already in use today. Below are some cutting-edge examples of how technology is already reshaping the health ecosystem.

Remote management of complex care	<p>A telehealth program at Partners HealthCare in Boston has trialed an at home monitoring program for patients with congestive heart failure. More than 3,000 patients have received care through in-home monitoring of biometric signs including weight, heart rate, blood pressure and pulse oximetry. Decision-support software identified those in need of further attention and health outcomes of the program include a 44 percent decrease in hospital admissions as compared to usual care.^{1,2}</p>
Disruptive new entrants	<p>Consumer goods online retailer Amazon's recent \$1 billion acquisition of the online pharmacy start-up PillPack is thought by industry commentators to signal the retailer's intentions to enter the prescription drug space. The acquisition delivers access across a broad geographic area of the United States, a well-developed supply chain and scale, and potential to shift pharmaceutical sales to Amazon's e-commerce infrastructure.^{1,3}</p> <p>Recently appointed to spearhead the development of the Amazon-Berkshire Hathaway-JP Morgan joint health venture, health industry leader Atul Gawande has indicated that priority targets include greater cost efficiency through new care models that also drive better outcomes and increased satisfaction for the 1 million individuals who receive health insurance through the three companies.^{1,4}</p>
AI health care applications	<p>AI applications in health care are rapidly changing medical specialties including radiology, pathology, dermatology and ophthalmology. For example, screening and diagnosing ophthalmic cases for further evaluation by an ophthalmologist and accurately evaluating clinical images classifying skin cancer as accurately as dermatologists. Other applications drive clinical improvement such as the UCLA Medical Center's virtual interventional radiologist chatbot that automates physician inquiries. At an individual patient level, UK-based Babylon Health draws upon AI to triage, check symptoms, continuously monitor an individual's health and track medication intake.^{1,5}</p>
Smartphones as primary interface	<p>Smartphones increasingly form the basis for capturing and storing digitized personal health information and records. As health care becomes further digitalized, consumers can more actively engage in managing their health and care through apps and devices via their phones.</p> <ul style="list-style-type: none"> ▶ FDA approval has been secured for a growing number of mobile apps, such as: reSET® (Pear Therapeutics), the first FDA-cleared prescription digital therapeutic for treatment of patients with substance use disorder^{1,6} ▶ iSage Rx (Amalgam Rx), the First FDA-cleared application for titration of all brands of basal insulin for adults with Type 2 Diabetes^{1,7}
Precision medicine technologies	<p>Growing utility of precision medicine technologies such as genomic medicine and pharmacogenomics has led to an increasing interest in clinical- and consumer-based testing. For example, rapid growth in genetic testing has occurred alongside the growth of precision medicine. Phillips et al. (2018) report that in 2017, there were approximately 75,000 genetic tests (10,000 unique tests) on the market with 10 new tests entering the market daily. Spending on tests was primarily for prenatal carrier screening, hereditary cancer tests, oncology diagnostics and treatment.^{1,8}</p> <p>Primary care practitioners are considered key stakeholders in the uptake of precision medicine. Undergraduate, graduate and continuing education programs are emerging to ensure 21st century physicians are proficient in genomic medicine content expertise and capabilities to utilize such data and respond to patient inquiries.^{1,9}</p>
Virtual presence	<p>West Australian community health provider Silver Chain, in partnership with Microsoft, is conducting trials on holographic mixed reality technology. People at high risk of being admitted to a nursing home receive in-person care at home. A holographic headset worn by the nurse or at times by the client, enables real-time interaction, enabling a remotely located physician to come into the home, as well as access to clinical data through a holographic dashboard. Aiming to prevent avoidable hospital admissions, the program seeks to improve timely access to care and to enhance the patient experience and confidence to continue to live at home.^{1,10}</p>
Virtual hospitals	<p>Intermountain Healthcare's Connect Care Pro® is one of the largest virtual hospital services in the United States. Launched by Intermountain Healthcare in 2018, the program delivers basic and advanced medical care through 35 telehealth programs in all of Intermountain's hospitals and 9 hospitals outside the system. 24/7 care is delivered close to the patient's home and services include primary care as well as advanced services such as stroke evaluation, intensive care and neonatal critical care. The virtual service does not replace on-site caregiving, but rather, supplements existing services and provides access to specialized care where gaps exist, such as in rural and remote communities.^{1,11}</p>



With intense pressure for change, also comes opportunity

The great promise of digital technologies lies in the potential to transform and raise productivity in industries such as health care, but they also may render some care practices obsolete. Emerging digital health technologies have targeted ways to deliver the right care for the right people and at the right time. Concerted efforts are being made in many countries to advance digital health through agencies such as the Australian Digital Health Agency, the Office of the National Coordinator for Health Information technology in the United States, and the 'digital-first' recommendations of the 2018 Lord Darzi Review of Health and Care in the United Kingdom.^{1,12}

The EY survey results show that physicians and consumers both agree that the future of health care will be substantially re-shaped by digital health technologies that promise new and very different solutions to pressing health care issues. Some technologies are considered likely to deliver better care, do so more efficiently and improve engagement and the overall consumer health care experience. However, there appears to be a gap between future intent and current use.

Why this is so is unclear. The survey found that intention to use digital health technologies in the future certainly exists.

Beyond relevance and need, what inhibits or slows adoption of new technologies may be driven by:

- ▶ **The need to convince both physicians and consumers of validity and value and secure their buy-in.** This includes recognizing that adopting new ways of doing things requires letting go of the old. For physicians and health care organizations, this means openness to considering new approaches. For consumers, this means a willingness to gain the skills and confidence to manage their health and wellbeing.
- ▶ **A "last-mile" problem in the S-curve or classic new technology adoption curve.** Adoption of new technologies occurs in phases. A bell-shaped curve spreads between the early adopters through to laggards, with the majority only following suit when a critical mass is reached.^{1,13} Ensuring that innovative technologies reach such a dispersed, siloed and complex market as exists in health care is a substantial challenge. To engage the end user, the technologies must be able to deal with complex conditions and generate usable insights. Moreover, the right organizational conditions need to be in place - a readiness to innovate and

change, business models that underpin new ways of working and resolution of any regulatory and reimbursement barriers.

- ▶ **Decision-making priorities regarding the use of scarce resources.** A key question for health care organizations, policy makers, clinicians and consumers is whether benefits gained from new technologies (for whom and for what purpose) outweigh the costs and deliver outcomes better than care as usual. This also includes issues around scaling across systems and sustainability over time.

As digital health technologies relentlessly move forward, bridging the gap between the promise of these technologies and incorporation into the core business of health becomes pressing. As Steinhubl and Topol note, if the goal of accelerating the advancement of digital medicine is achieved, "then soon, we will just be calling it medicine."^{1,14}



About the study

In July 2018, EY surveyed 6,113 health care consumers and 530 physicians in three locations: Australia (177 physicians and 2,044 consumers), England (178 physicians and 2,031 consumers) and the Netherlands (175 physicians and 2,038 consumers). Physicians included GPs/primary care practitioners and specialists and respondents worked in a variety of practice settings including solo, group and hospitals.

The objective of the study was to examine consumer and physician attitudes and propensity to use digital health technologies for health and wellness; and, to explore willingness to engage with future health care technologies that are accelerating the changing face of health care. Specifically, the objective was to:

- ▶ Develop an understanding of consumer engagement with the health care sector and health-related technology adoption and usage
- ▶ Develop an understanding of physician attitudes towards and perceived benefits derived from health care technologies
- ▶ Explore perceptions about and willingness to engage with upcoming digital health technologies

Contributors and attribution

See contributors and attribution section.

A dose of digital: What consumers and physicians want from new technologies

The health ecosystem is changing

From the time when people visited the village shaman for their ailments to today, care providers and patients have shared a common goal: good health. Our understanding of health and disease, and the way care is delivered, has changed radically over the years. Today, we have a health ecosystem comprised of many stakeholders that is in the midst of unprecedented change.

The United States health sector has been “going digital” since fax machines were incorporated into day-to-day operations in the 1980s. We are at a unique point in history - at the cusp of reinvention. Driven partly by pressures to reduce costs and improve quality of care and partly by the advent of new technologies, cheap sensors, ubiquitous connectivity and cloud storage, the opportunities to invest in transformative digital infrastructure are almost limitless. But the road to the present day is littered with promising technologies that no one wanted to use. So, how are provider systems to choose where to invest in digital transformation?

In the first quarter of 2018, Ernst & Young LLP asked physicians and health consumers from around the US about their attitudes toward, and use of, digital technologies for managing health and health care. EY found that patients and physicians are willing to adopt or engage with digital health technologies that are more convenient and that preserve the patient-provider relationship.

1. The drivers of change

The ever-increasing demand for health services is fueled in the US by growth in aging populations and chronic disease prevalence. Health industry experts and executives are looking to digital solutions to address these challenges, while meeting demands for access and convenience.

1.1. Aging population

Rising life expectancies are driving the growth of aged populations, globally. The number of elderly in the US is expected to grow from 46m in 2015 to 98m by 2060. By 2030, the number of elderly with multiple chronic diseases will increase by 160 percent.^{2,1} Significant gaps exist in the market for health solutions to cater to these growing needs. Digital solutions such as telemedicine, telehealth, mHealth and AI powered applications, in particular, are a perceived means to address this growing need for health services among the elderly.



**Could a new
health ecosystem
catch diseases
before they
catch us?**

Growth in population over 60 years in the US (2015-2016)

2015
46 million



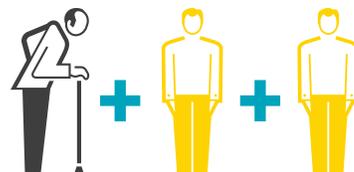
The number of people who were 65 and older in the United States on July 1, 2014 was 46.2m—14.5% of the total population.¹

2039
74 million



Aging of baby boomers (individuals born in the US between mid-1946 and mid-1964), began in 2011 and is now driving growth of the elderly population.²

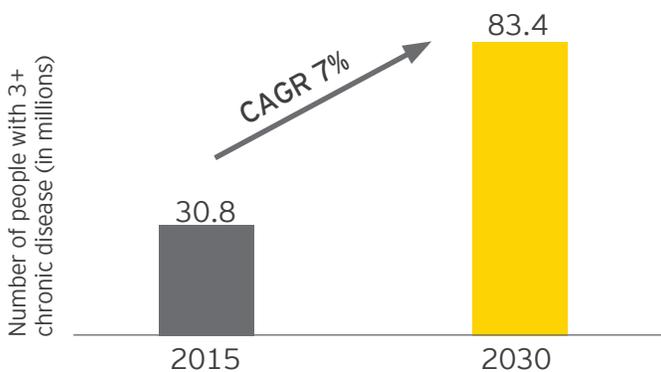
2060
98 million



Projected population of people 65+ in 2060 is 98.2m. People in this age group would comprise nearly one in four US residents. Of this number, 19.7m would be 85 and older.¹



Number of people with 3+ chronic diseases is growing



1.2. Rise in chronic diseases

In 2015, 59 percent of the US population was affected by one or more chronic diseases, while 30.8m people were affected by 3 or more. This number is set to rise to 83.4m by 2030. Chronic diseases are estimated to cost America US\$2t in medical costs - and an extra US\$794b annually in lost employee productivity.^{2,2}

The success of many health interventions relies on patient behavior, which is linked to how engaged people are with their care. Digital health offers a way to make monitoring and tracking easier. Physicians, for instance, can more easily prescribe multipart protocols including medications, dietary changes, and exercise and track performance against the plan together with their patients.

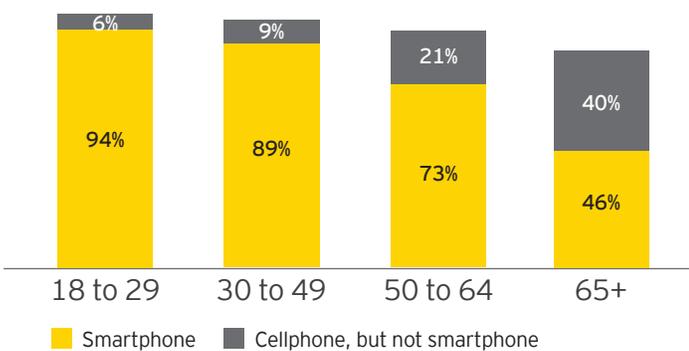
1.3. Increasing costs

CMS (Centers for Medicare and Medicaid Services) projects that health care spending will on average rise 5.5% annually between 2017 and 2026, at which point it will comprise an estimated 19.7 percent of the US economy, up from 17.9 percent in 2016. By 2026, US health spending is projected to reach US\$5.7t.^{2,3} A recent study on health spending concluded that the United States spent approximately twice as much as other high-income countries on medical care, yet utilization rates in the US were largely similar to those in other nations. Prices of labor and goods, including pharmaceuticals, and administrative costs account for the difference in overall cost between the United States and other high-income countries.^{2,4}

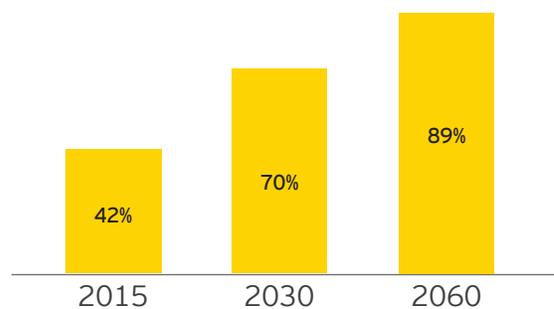
Digital tech solutions can cut administrative costs and help organizations manage the cost of labor and goods. That tech can enable cost containment has likely been a key factor motivating recent record-breaking investments in digital health. In 2017, there were 345 deals worth US\$5.8b - a 30 percent increase from 2016.^{2,5}



Percent of US adults using cellphones



Percent of smartphones used by elderly



2. Enablers

As health industry leaders and executives look to digital solutions to meet increasing demand and cost pressures, growth in digital technology and access to it has enabled the uptake and adoption of digital health solutions for payers, providers and patients.

2.1. Ubiquitous mobile connectivity

The vast majority of Americans now own a cell phone. In 2018, 77 percent of Americans own smartphones - twice as many as in 2011.^{2,6} The ubiquity of mobile connectivity means that most people are connected to the internet wherever they are. Those over 65 have the lowest adoption of smartphone use, but this is steadily changing. In 2018, 46 percent of people aged 65 and older owned smartphones: this is projected to reach 89 percent by 2060. With age-related attitudes towards digital solutions set to change over the coming years, the likelihood for mHealth solutions such as app-based chronic condition management to become mainstream is strong.

2.2. Inexpensive sensors and health IoE

Advances in the fields of smart materials, sensors, low power electronics and power harvesting has inspired the application of these technologies in medical and health care domains. The introduction of wearables and smart devices have made patient-generated health data collection possible. The health care industry is seeing the impacts of big data and the Internet of Everything (IoE), the "networked connection of people, data, process and things."^{2,7} Advances in sensor technology and the proliferation of IP-enabled smart health devices in hospital and remote care settings can enable a connected health universe where digital health can be delivered seamlessly.

2.3. Analytics and AI

The field of health data analytics encompasses analysis activities for data collected from claims and cost records, clinical data from EHRs, operational efficiency metrics of hospitals, and patient-generated health and wellness data. In

recent times, non health care data - such as data on consumer behaviors - have also piqued the interest of health care providers, with the promise of better understanding patient lifestyles and choices. With the availability of potentially limitless data that can be used to derive insight into the drivers of health and disease, the promise of precision medicine seems close at hand.

2.4. Volume, variety and velocity of data gathering

The proliferation of mobile tracking of health indicators and smart devices with inexpensive sensors have led to an explosion in health data gathering. Accurate and digital recordings of clinical and billing-related data have been made possible through the mandated adoption of EHRs in the US. The use of EHR data from providers in conjunction with claims data from payers is increasingly recognized as a valuable resource in health system planning at the country level. The confluence of clinical, patient-generated and payer data now provides health stakeholders with a holistic view of the patient and their care.



The volume, variety and velocity of health data gathering for analysis has far outpaced any guidelines or regulations. To this end, the Office of the National Coordinator for Health Information Technology (ONC) has tasked the National Committee on Vital and Health Statistics (NCVHS) to look at issues and opportunities related to expanded uses of health data.^{2,8} Health companies will have to work in conjunction with lawmakers, payers and the patients themselves to realize the value proposition of this data goldmine.

The need for effective, efficient and available health services - in the US and world over - is being driven by aging baby boomers, the rise in chronic diseases, and escalating health care costs. Industry experts and executives are turning to digital solutions to address these challenges.

A confluence of factors is enabling this transformation - including ubiquitous usage of smartphones, an explosion in health data gathering, near-universal connectivity, and enabling technologies such as AI. The health ecosystem will continue to evolve as digital technologies find innovative and ever-expanding application across all aspects of health care.

Digital implementation needs to be patient oriented, physician friendly, and useful

Digital health is transforming the way that health care is delivered, managed, and improved - while empowering individuals to more effectively manage their health and navigate an increasingly complex

health care system.^{2,9} The introduction of new technology over the years has required health care providers to upgrade or modernize their IT infrastructure as well as create solutions that are fit for purpose. Implementing custom solutions for health care organizations can take several years. With an increasing number of hospitals implementing digital solutions, digital offerings have improved to more rapidly meet their needs. However, when it comes to solutions, the requirements of health care organizations vary greatly. Organizations need to understand the needs of the populations they serve - as well as those of their employees - in order to identify and implement solutions that are simultaneously patient oriented, physician friendly, and useful to their overall organization.

3. EY study of physicians and consumer attitudes

In order to understand consumer, physician, and executives' attitudes towards digital health, Ernst & Young LLP in the US worked with Ernst & Young AB in Sweden to field a survey of health consumers and physicians. The survey was administered online and via Computer Assisted Telephone Interviewing (CATI). Respondents were aged 18 years or over. The surveys were conducted in the US across four regions and among a range of physicians at different stages of their careers. Physicians and executives were contacted online and over the phone. The results of the research survey revealed the following trends.

3.1. Attitudes towards digital tech

Engagement with digital technology in the health sector is gaining momentum, driven by a desire to improve wellness and underpinned by convenience. Consumers are moving beyond making online appointments to sending digital health information from diagnostic equipment and smartphones to their providers.

American attitudes towards digital technologies for health reflects the overarching trend of consumerism. People expect digital technologies in health care to enable greater and faster access to health care services at lower costs. American consumers are open to sharing health-related information such as their medical history with their physician digitally, but are less interested in sharing lifestyle-related data. However, reduced wait times and lower costs were found to be the most desired incentives for sharing information.

Of the options for digital engagement offered in the EY survey, online appointments were the most commonly used by patients and highly preferred by physicians. The use of patient portals to communicate with physicians was the most common online health care activity undertaken by consumers (30 percent) in the last 12 months. Americans across age groups indicated that they enjoy having unfettered access to physicians and health services through digital technologies. About 80 percent of all respondents were positively disposed towards contacting their physician digitally.



3.2 Willingness/receptivity to share consumer generated data

Americans are open to sharing a broad range of health-related information with physicians, including their medical history, with less interest in sharing lifestyle habits. Forty percent were very or extremely interested in allowing health care professionals to access their medical history for treatment planning (with just 8 percent not interested at all). In contrast, only a quarter (26 percent) were very or extremely interested in granting access to their lifestyle habits (with 19 percent not interested at all). While interest in sharing lifestyle information was low, there was openness to sharing such information if it would help physicians treat patients more comprehensively (74 percent were then willing to share).

3.3. Incentives for sharing

Reduced waiting time was the most appealing incentive to motivate consumers to increase digital engagement with their physicians (61 percent), followed by cost savings (55 percent). Taken in conjunction with the benefits anticipated by physicians of care coordination and cost savings, these results point to a high degree of alignment. As noted above, despite some hesitation in sharing lifestyle information such as dietary and exercise habits, over one-quarter (26 percent) indicate that the ability to receive tailored information such as diet and exercise plans would encourage engagement with digital technology. The benefit of conveying improvements to diagnostic accuracy will also motivate sharing of information in as many as one in

five (20 percent). If the use of technology could be made to feel more comfortable/appropriate than in-person interactions, this would help assure almost one in six (17 percent) residents.

3.4. Knowing your stakeholders

Since health care provision is a complex interplay of the requirements and the benefits it offers to different stakeholders in the industry, it is essential to understand the perspectives of physicians who play a vital role in the use of digital technology in health care. The 2016 Medscape survey of consumer and physician attitudes towards digital technology concluded that although patients and physicians agree that technology holds a great deal of promise for the delivery of medical care, there are important differences in what role exactly these technologies should play.^{2.10} Studies also find that consumers are more enthusiastic about adopting emerging medical technology and that attitudes of web-savvy consumers can shape the online activities and behavior of physicians.^{2.11, 2.12} In its 2018 Future of Health survey, Ernst & Young LLP also explores the digital attitudes of physicians based on their age in order to gain further insight into digital technology adoption and use by physicians.

3.4.1. Knowing you physician

The EY survey findings reveal that physicians for the most part prefer the use of technology for administrative purposes such as managing appointments, use of patient portals and gathering test

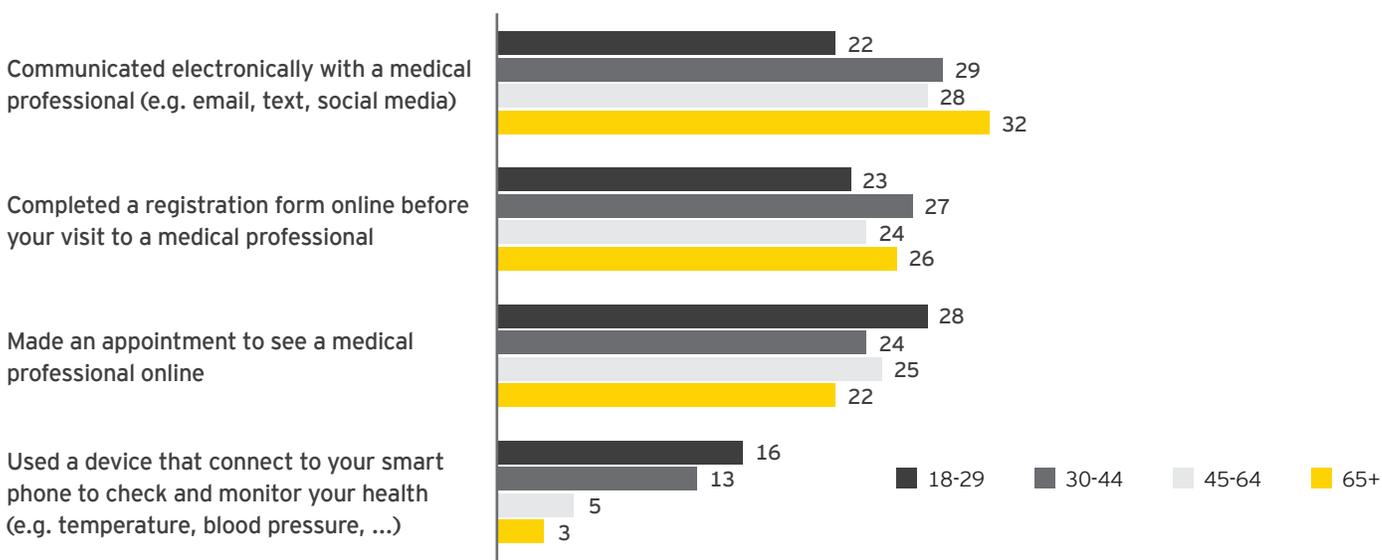


results. However, physicians show less affinity towards online communication and interaction with patients, particularly in the over 65 age group.

There is widespread agreement among physicians that digital technologies and data sharing will contribute effectively to the overall well-being of the population. More than four in five (83 percent) physicians believe that increased consumer and patient-generated data from connected devices would benefit the overall quality of care and enable more personalized care plans. Two-thirds (66 percent) also indicate that increased digital technologies would reduce the burden on the health care system and its associated costs, and 64 percent think it would help reduce the burden on doctors and nurses and have a positive impact on the critical issue of burnout.



Digital engagement by age group (%)



3.4.2. Knowing your consumer

Consumer attitudes vary by age group and manifest themselves in a varied set of expectations, usage, and adoption rates in each age group. In preparation for the *EY Engaged Aging Summit* in May 2017, Ernst & Young LLP conducted a survey of health consumers in 3 countries and found that people aged over 65 believe that technology will play an important role in improving their quality of life (70 percent) and that smartphone usage is higher for health management (61 percent) as opposed to disease management (57 percent). The Future of Health survey findings further add to our understanding of smartphone and digital technology usage among the elderly.

3.5 Age influences how consumers engage with technology

The youngest age group surveyed is the most likely to adopt health apps, use smartphone-based diagnostic kits, and engage with physicians digitally by sending photos and utilizing video consultations. Those under 45 are more likely to adopt electronic means to communicate with health care professionals including video calls, while a third of people over 65 use email, text, or social media. This suggests a familiarity among people aged over 65 with a desktop computer or laptop rather than a smartphone. Also, older groups are more likely to use digital tech for communication with medical professionals and to fill out forms, while millennials prefer booking online appointments and monitoring vitals.

About 30 percent of all patients surveyed use patient portals, the most used digital technology across age groups; usage is highest (38 percent) in those over 65.

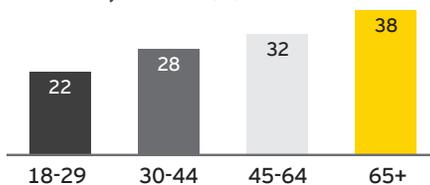
A significant majority of over 65s (82 percent) do not use health apps. Health apps are popular with individuals under 45, and nearly 45 percent of the 18-29 age group use health apps daily, weekly or monthly. Personal activity trackers are used by over one-third of the under 45s but rarely used by individuals over 65.

Health service providers and designers of digital health solutions need to be aware of the digital health attitudes of their target audience and design solutions accordingly. This includes points of contact that can be accessed both through smartphones and online portals.

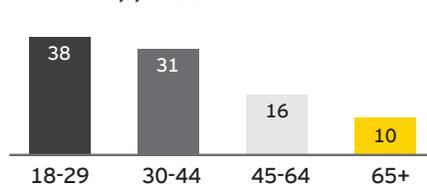


Daily or weekly use of health technologies

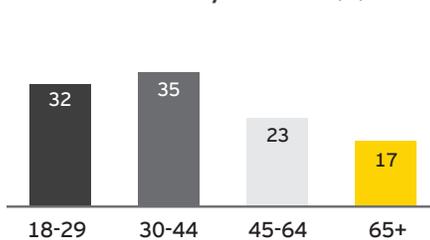
Patient portals (%)



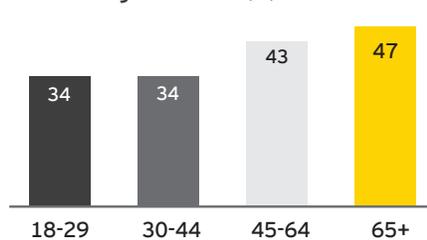
Health apps (%)



Personal activity tracker (%)



Other digital tech (%)



Those over age 65 were the least likely to be motivated to increase digital engagement, with most preferring an in-person interaction to share information with their physicians (66 percent). This indicates that digital technology adoption in health care still has great potential to reach these consumers and that more can be done to understand them and incentivize their digital engagement.

This finding resonates with other studies which report that smartphone usage among the elderly remains low as they have difficulties in using smartphones due to multiple reasons such as financial limitations, vision impairments, and lack of interest and knowledge in using technological devices and their advanced functionalities.^{2,13}

Conclusion

Physicians and consumers want to close the “health span gap”: the mismatch between how long we stay well and how long we live. At a time when costs are rising, physicians are under enormous time pressure, and health consumers are requiring more complex care, careful thought needs to be given to how to build services that are effective and efficient. Digital technologies, analytics and smart algorithms offer the chance to deliver high-touch care and control costs, and at the same time take advantage of the vast amounts of non-health data that can provide a more holistic view of health and disease. Health businesses should think about digital investments that bring the consumer and physician closer together, building on the trust of that special bond to encourage data sharing. At the same time,

health incumbents can look to consumer-savvy offerings from other sectors to take advantage of the rising tide of consumerism and to keep people engaged with their health.

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Performance: Optimized by and for the people

The twin trends of reducing costs and improving outcomes show no sign of receding, and new models for delivering health care are only adding pressure to traditional brick and mortar facilities. “Many providers are not looking for disruption or for a huge technology solution,” Jo Smith, EY Global Performance Optimization Implementation Lead, said. “They want to know, how do we get this right? How do we deliver health care that is effective, efficient, and better for patients?”

The latest success stories in the search for optimization are, unsurprisingly, about people. The first is the focus on motivating the behavior of health care professionals to actually adopt the best practices uncovered in cost reduction efforts - overcoming resistance to changes in workflow and the human tendency to continue doing things “the way we’ve always done them.” The second is to acknowledge and address the human impact of the increased speed and accuracy of data.

What is performance optimization?

Performance optimization is a systematic effort to methodically examine every process, procedure and patient interface within an organization with the goal of identifying and eliminating waste and inefficiency. The work is critically needed, as health funding will likely never meet demand - whether the health system is public or private - and demand grows ever larger due to aging and ailing populations, and, in some regions, a burgeoning middle class.

Traditional performance *improvement* is narrowly focused on cutting costs. A performance *optimization* project, on the other hand, seeks to eliminate unwarranted internal variation in financial, administrative and clinical activities; improve the efficiency of performing tasks; and maintain or improve care delivery. Optimization projects undertake a deep analysis of all activities - both in the back office and care delivery - to map and route the most optimal activity or workflow.

The objective of an optimization project is to uncover, for example, the most optimal patient route or paperwork trail, to reduce error and increase consistency and speed. A study of patient and employee movement through the hospital may show that patients need to move physically between three different hospital floors to complete a standard procedure. An examination of how records are kept may reveal that a patient file could flow through twice as many departments as is needed to keep it updated.

Recommendations often map out patients’ entire schedule or journey - and reduce the time of both individual steps in treatment and care, and the overall experience for patients and providers alike. Optimization projects also explore whether and how to leverage new technologies such as robotic process automation (RPA), artificial intelligence (AI), and blockchain. These technologies help streamline cumbersome processes in the mid-office, such as scheduling outpatient appointments, approving referrals, clinical coding, or invoicing.

Who benefits from performance optimization?

A performance optimization analysis helps organizations in almost every type of health care system around the globe. In mature economies, providers are focusing on technology and motivating behavior change. In emerging markets, countries are looking to leverage best practices as they build their health care organizations from top to bottom - looking to prevent mistakes from the start, building in the processes



How can you care for both patients and performance?

and behaviors to achieve sustainability. In the US alone, it is estimated health systems are wasting up to 25% of results - in people, supplies and equipment, real estate, and processes.^{3.1} The World Health Organization puts this estimate between 20% and 40% globally.^{3.2} According to Smith, the principles and operating models of a hospital are the same regardless of its home country or ownership model. Further, as industries converge to form new health care business models, the need for optimization remains strong: "There is no reason why every hospital should not be operating at 85% of capacity in terms of resources," Smith said. "Using traditional performance improvement approaches we are often only able to find, reduce or eliminate 10% to 14% of waste. True performance optimization will allow us to unlock up to 40% of this waste."

Large multinational providers are looking to create a global footprint, resulting in a collection of hospitals across national borders with varying states of performance and capabilities. These multinational organizations

seek to create a common, standardized set of benchmarks - and perhaps even actual workflows - to achieve optimal performance of clinical, administrative and financial activities across the globe. The performance optimization approach is well suited for this challenge. It takes a macro look at health systems within and across countries, helping address questions around the size and type of hospital or other facility needed in each geographic area, identifying and establishing a standard operating model, and articulating the preferred hospital footprint and benchmarks.

Behavioral change or reform

Standardizing any activity requires the acceptance and commitment to change from the people executing the activity. Performance optimization projects are beginning to tackle the human aspect of change in order to further improve performance. This is a profound shift from process and procedures toward a focus on change management and human resources. "Driving out costs through process is

Insight: The focus is shifting from process to people

An emerging approach to performance optimization addresses the behavioral changes needed to fully realize the value of process improvement. If successful, experts say this area of optimization could potentially unlock an additional 10%-14% of savings.



standard practice, and we know how to do this,” Smith said. “The next frontier for maximizing value is in the area of human behavior - which is often completely variable. Unlocking human potential is the next great challenge.”

In addition to adding costs, variance in behavior is likely to result in a negative or uncertain patient experience. This won't be a surprise to any hospital striving to become a High Reliability Organization (HRO)^{3,3}, which relies wholly on people changing their practices to achieve better results for patients. Designed for organizations operating in complex environments where there is a perpetual risk for failure, an HRO shifts focus from the *process* to the *outcome*, with the goal of eliminating error.

While procedures and checklists are important aspects of remediating medical errors, what is more impactful is changing the focus of the people doing the work from the task to the outcome, motivating everyone in the patient care chain to follow identified steps precisely. The barriers to affecting this type of change - affecting culture and process - are similar for any performance optimization effort, and often represent a profound shift in strategy and tactics for health care organizations. The challenge is clear and daunting: getting everyone involved to understand and embrace a potentially new way of operating is no small task. The diffuse and varying nature of the health business means any given process is likely performed differently depending on the region or health system.

Although organizations in all industries generally could do a better job with traditional change management, health care could benefit by adopting best practices in business merger and integration transactions:

- ▶ **Align on institutional core values** - Establishing a central, strategic vision and aligning everything
- ▶ **Activate culture ownership by leaders** - Identifying, enabling and engaging leaders
- ▶ **Address fundamental behavior mechanisms** - Motivating a change in behavior using your performance and reward systems to change behavior
- ▶ **Bringing the entire organization and broader community along for the journey** - Empowering people at every level^{3,4}

Leverage the leaders

One added change management challenge in health care is overcoming the almost ingrained perception and role of the physician being at the center. One way to overcome this challenge is to leverage it. “Using the ‘champions’ model is key in health care,” Sarah Chang, Senior Consultant, People Advisory Services, Ernst & Young LLP, said. “Leaders in the true sense of the word are people who set the tone even if these individuals are not technically in organizational leadership positions. Identify them, engage in a meaningful way, and tap into their social

capital. People will follow individuals they trust.” Engaging the right individuals to set the tone and champion the path forward will go a long way toward organization-wide adoption of change.

Walk the walk – and measure success

Aligning every action with the principles and values of the organization - such as patient centricity - is critical to success. “Harp on this and really carry it out,” Chang said. “Every change must be tangible and directly tied to the goal. People will rapidly disconnect if words do not support actions or vice versa.” Establishing a governing board at the start is key to assuring success. Typically comprised of leaders within the organization, this board monitors the implementation of any process change, ensuring the changes stay on course and are uniformly executed. “It is critical to establish a set of guiding principles at the onset,” Blair Bellamy, Senior Manager, US Health Advisory, Ernst & Young LLP, said. “The changes and cost savings won't be fully realized if no one ‘minds the store’ after we leave. More and more, organizations understand they must create an internal governing body to monitor the work, review the metrics, and follow up when there is a problem.”

It also pays to identify the measures of success in advance of any change or performance optimization initiative. With successful performance optimization projects, health organizations are establishing tangible measures over a specific period of time, and are tying



compensation to results. The trend toward a variable compensation package - base pay plus bonus dependent on a specific set of performance metrics - is becoming the norm for leaders, physicians and other health professionals. "This alone moves any transformative effort from cursory to significant," Bellamy said. "Motivate the desired change, measure the results, communicate them widely and clearly."

One example of a change management success is the introduction of Electronic Medical Records (EMRs). Two decades ago, there was widespread resistance within the health community to the extra work needed to build and maintain EMRs. Now, although health professionals still struggle to balance screen time with patient time, these tools are standards of care and are contributing to improved outcomes - even leading to fewer hospital deaths^{3,5}.

Insight: Even the advent of evidence-based outcomes relies on people

Another emerging approach to performance optimization leverages data to a degree not previously seen. In the United Kingdom, EY is using proprietary algorithms and process called "Precision" for performance optimization engagements, providing lightning-fast insight into an organization's operations and quickly uncovering areas for change. Precision is also quickly changing the way performance optimization projects begin, as the data findings are evoking an unexpected human reaction.

First, Precision changes the problem space that the team explores. "We found that the initial hypotheses were often insufficient to identify underlying problems, or had us looking at variables that did not matter. They often led us down the wrong path," Lauren Bevan, Senior Manager, Health Advisory, Ernst & Young LLP, said. Second, since Precision is compatible with most EMRs the data is gathered and processed extremely quickly, in two or three days versus two or three weeks. "Precision is truly a game-changer," Bevan said. "The algorithms and software are capable of processing a million rows of data per minute, blending and processing data across the whole organization. We usually have the validation and direction we need in less than a week."

Although still in the final test phase, EY has already begun using the Precision tool to help clients in the UK. Precision collects from two main data sets: the EMR and hospital human resources and operations records - and outpatient and workforce quality components are being added. Precision fills the gaps if there is missing data and also runs in cases where there is incomplete data, allowing organizations to leverage what they have.

The result is an astonishingly clear picture of opportunities for process improvement. The EMRs provide a comprehensive view of patient contact points, waiting times, time in hospital, success of surgical procedures and many other data. Hospital HR and operations records provide insight into job schedules for medics, nursing rosters, bed occupancy rates, activity data by person and a host of other outputs. "We run the algorithms, and review and vet the results with the doctors or hospital leaders," Bevan said. "The speed helps us rapidly get to the recommendations and implementations phase - and helps clients see results incredibly quickly."



“The biggest change we’ve made is to the way we approach a project at the very beginning. We work with clients at the start to agree about data inputs before we use the algorithm. This makes it easier to believe the outputs.”

Having “The Talk”

There is a real need to communicate with health organization employees in a way that enables them to absorb and accept the results. The robust, data-driven findings often challenge pre-existing beliefs or expectations about where the organization is strong or weak. The speed of the process also makes some organizations wary of the results. “Data grief is real, and we need to coach people through this,” Bevan said.

It also shifts the conversation. The issues are less about whether the results are right and more around how to implement change. It helps that the behavioral change recommended is fueled by national and global data. “Conversations at this level are more positive,” Bevan said. “The evidence often is validating to clinical directors, and it certainly empowers them to have tough conversations with peers or doctors.”

Conclusion

New health care business models are attempting to address the increasing complexity of managing care across a larger spectrum of a care continuum informed by new data sources. All stakeholders are still seeking answers to the basic question. How do we get this right? How do we deliver health care that is effective, efficient, and better for patients? Performance optimization puts the complex pieces together, helping make sense of the macro picture not readily visible to any one person or part in the chain of care.

Optimizing performance requires buy-in from health professionals at every level, so that they are an active part of the transformation. This means being a member of the decision team from outset, validating the data results with physicians and others, establishing a governing body to monitor the effort, and incentivizing change by tying compensation to results. It also means communicating throughout. “Two-way communication is key,” Chang said. “It’s the magic bullet needed to ensure the goals and principles behind the change are shared, and the entire team is pulling in the same direction.”

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Organizations are using innovative ways to overcome significant hurdles to achieve the desired patient experience

Challenge	What they tried
Lack of shared vision and end goal between physician and leadership around "patient centricity"	<ul style="list-style-type: none"> ▶ Created an "Access Governance Committee," led by two physicians and the Patient Access Department Director ▶ Established physician champions to advocate for the central scheduling system
Lack of systems-thinking approach in patient access	<ul style="list-style-type: none"> ▶ Communicated to every clinic how the central scheduling operates and interacts with the clinics ▶ Held several physician-only planning committees; Central themes from these visioning sessions were used when designing the new patient access model
Blurred definition and metrics of "patient experience and satisfaction"	<ul style="list-style-type: none"> ▶ Created basic utilization metrics that allowed physicians to visualize template utilization ▶ Discussed improvement metrics with administrators to demonstrate the effectiveness of the central scheduling team
Low physician involvement and functional silos	<ul style="list-style-type: none"> ▶ Held physician-specific template building sessions with representation from clinical leadership, in order to produce physician template standards and increase physician representation in the process ▶ Focused on a staggered implementation approach, in order to demonstrate a clinic's success in the centralized processes

Not feeling the burn: Digital health record and documentation strategies that promote physician satisfaction

The introduction of EMRs has contributed to physician burnout.^{3,6} Many report frustration with cumbersome user interfaces, the volume of data entry, and the time it takes away from direct patient interaction. Care staff are having to work longer hours to complete the clerical aspects of the job, often at home and on weekends. Additionally, the introduction of EHRs has enabled 24 hour access to patient data, and with it, expectations for (unreimbursed) all-hours care.

Yele Aluko, MD, Chief Medical Officer in EY Americas Health Advisory practices, recommends three physician-centric approaches to digital strategy that will increase physician efficiency, and physician and patient satisfaction:

1. Leveraging EHR technology to actually assist physicians in doing their job, rather than adding tasks to an already full and frenetic schedule. "Innovating EHR platforms to provide seamless workflows for physicians to efficiently retrieve and synthesize relevant data in real time during patient visits, allowing accurate documentation, diagnoses and formulate treatment plan formulation through decision support powered by artificial intelligence," says Dr. Aluko.
2. Assistive technology for health consumers ahead of routine or planned interactions with a health system. "No one wants to arrive at an office and fill out forms, particularly when many of the entries are duplicative," says Dr. Aluko. "Chatbots that gather or verify personal and administrative information required for medical records, and then begin the process of taking the medical history will allow physicians and patients to spend more time directly interacting."
3. Rethinking the physical environment in physician consulting rooms is essential to implementing a digital strategy. Sitting side by side and looking at the screen together, for instance, can allow the patient to see, interact with, and validate the document the physician is creating. "The co creation of a medical record prevents the seemingly disengaged sentiment created by physicians looking at the laptop and not the patient, and encourages a feeling of cooperation that strengthens the physician-patient relationship," advises Dr. Aluko.

What's after EMR?

A move outside of the hospital

The advent of electronic medical records (EMR) and electronic health records (EHR) a mere three decades ago promised to revolutionize the health sector. Instead of relying on handwritten, paper records - which could be easy to lose, or accidentally destroy, and hard to share - records would be kept in a secure digital format. This would result in improved accuracy, security, efficiencies, and a convenient way to track patient activity.

However, EMRs and EHRs - designed to make billing and record-keeping easier - have not delivered on the promise that digitizing health data would also make it easier to mine the data for ways to improve health outcomes. The prediction was that the accumulation of patient data would ultimately improve the efficacy of treatments at a population level, bettering patient safety and quality of care, and reducing health care costs. To date, while routinely collected patient health care data now approaches 2,300 exobytes^{4,1}, most of this information is not yet used in predictive statistical models to improve care delivery.^{4,2} Further, the EMR/EHR systems struggle to cover both the continuum of care - since acute episodes are not the full story - and the continuum of cost.

In the meantime, costs continue to rise. Aging populations and the growing prevalence of chronic diseases are adding more pressure to create fast, efficient, effective and affordable health care solutions.^{4,3} The demand for better outcomes and more convenient, patient-

centric health systems is growing, too. These forces are reshaping the health ecosystem, and are attracting data-savvy, tech-centric stakeholders from outside the sector who are responding to consumer demand for experiences in health similar to what they are used to having in other sectors.

All agree that getting at the social determinants of health is crucial for not only providing more complete care, but for helping people live healthier longer. What should organizations keep in mind as they look to incorporate data sources beyond the clinical records of today?

Three things come to mind:

1. Gather data from new sources such as health consumers, government organizations, and retailers
2. Invest in digital to maximize your organization's ability to validate and synthesize the data
3. Prepare for anywhere care, as health delivery moves further away from

a hospital setting - to a clinic, home care and, eventually, prevention or behavior change

This article briefly explores each of these trends and outlines the challenges ahead.

Insight: Data will come from non-traditional sources - in non-traditional ways

Traditionally, health history is captured in person with the physician or care provider interviewing the patient during an in-office visit. Although this method has benefits, it also has limits in the accuracy and thoroughness of the patient's story, and the need to re-tell it to each provider. Further, EHRs provide a timeline of patients' history only when sick or injured, typically episodic events. The move is toward a more panoramic view of the whole person, even when healthy. "The more you can add to that timeline, the more you can assess what's going on from an outcomes perspective [by identifying] socio-economic trends that may get the patient into



When data + sharing = insights, what value are you getting from the equation?

trouble, such as whether they are taking their meds,” Greg Strevig, Vice President, Enterprise Analytics at Geisinger, said in a recent article.^{4,4}

New sources are also emerging to add data points and reduce the story-telling burden associated with legacy EMR/EHR systems. Today, information is still sourced from the patient in a verbal or tangible way, usually collected in the hospital setting. In the near future, physicians will receive summary data from patient devices, and will use natural language processing enabled tools to parse and filter conversations and populate forms. We are on the brink of an explosion of data from highly accurate wearables, sensors, devices,^{4,5} fueled by mobile apps, which could use algorithms to alert physicians when there is something out of the norm (such as blood pressure or blood sugar). The data being captured includes elements such as behavior and environmental aspects; artificial intelligence (AI) will play a large role in separating a meaningful signal from the large and noisy data stream, furthering clinicians’ ability to

understand the subtle factors and patterns contributing to health - or illness.

Another source of health information is predicted to come even further afield, from retailers, employers and other organizations outside the health care ecosystem. “If the pinnacle of health care is about data and consumer behavior, the traditional health system is at the bottom of the cliff,” said Hadley Slade-Jones, Director, Health Advisory, Ernst & Young Australia. “Non clinical social and economic data from sources such as schools, supermarkets, employers, and retailers, married with a bit of health data, could give us the tools we need to fundamentally understand - and then influence - behavior.”

In this emerging scenario, large employer groups may play a unique role, as they have the motivation and the resources to redefine the way care (and associated patient data) is provided, delivered, paid for, and monitored. The key to unlocking new value is how the data are used. For example, an employer may want to better understand

These data can be used to change the health trajectory of entire populations. Moreover, they can provide a deep understanding, at a personal level, of what motivates people. That insight will enable an individual’s health journey to be tailored to them. They become, in essence, a market of one.



how to best spend their health care dollars to keep their employees healthy.^{4,6} Large employers are motivated by the prospect of a better, healthier workforce and by reducing costs - and their scale gives them the almost immediate benefit of buying power.

The way individuals make use of new data streams is likely to change as well. "In the longer term, we foresee patients and providers taking advantage of an in-home intelligence system such as Alexa or Google Home to convey even more information - with the ability to integrate information from a wide range of sensors capturing physiologic and other clinical data," Simon C. Mathews, MD, Johns Hopkins, Head of Clinical Innovation, Armstrong Institute for Patient Safety and Quality, said. "This vastly expands both the pool of data we will get and the ways these data are transmitted."

Once such expanded and easy-to-use data environment becomes a standard, it allows for more in-home or telemedicine health services. "Computer aided vision, camera sensors, and other devices would give us the flexibility to deliver more care outside of the traditional hospital or clinic setting," said Gary Comiskey, Director of Health and Government, Ernst & Young LLP in Ireland. "We could, for instance, treat the elderly in nursing homes or impaired people in their own homes, without requiring a trip to the doctor. This will truly shift the focus to the patient or person - versus the hospital."

With the right technology, in-home care

could offer continuous monitoring and preventive care, and reduce any barriers to access health care, such as waiting lists or prohibitively high costs. Airedale NHS Foundation Trust, for instance, provides a suite of digital health care solutions including tele-monitoring and tele-coaching, allowing health professionals to provide care remotely. In the first year alone, this innovative model of health delivery reduced acute admissions to the hospital by 35%.^{4,7}

Insight: leveraging new data will not be easy

With new opportunities come new challenges regarding how data is captured and stored, and ensuring data is valid, trustworthy and useful.

Challenge 1 – Getting health records to the patient

In the current environment the hospital essentially 'owns' the patient data, and the move toward people taking control and ownership of their own health history is likely to put providers in a tough place. "The current EMR/EHR structure is monolithic in nature, not designed for sharing or receiving data from other sources," Slade-Jones said. "There will be a high demand for new or emerging technology solutions to bridge the gap, offering mobile, 'take it with you - anywhere' solutions that retain reliability and security."

Health care organizations may benefit from looking to other industries for examples. Consumers have very strong relationships with banks and other financial services

institutions, which house but do not 'own' customers' financial data and are able to nimbly share the information with those customers digitally, securely and globally. Consumer-centric mobile apps with slick user interfaces concatenate all sorts of data to enable consumers to do everything from ordering a ride to booking a place to stay to scheduling pizza delivery. To succeed, health organizations need to figure out how to make the transition of data more seamless and similarly improve the consumer experience.

Challenge 2 – Integrating and synthesizing the data

Integrating and synthesizing new and old data will be a challenge, especially as the depth and volume of data grows significantly. When applied to health, the "internet of everything" will generate even more data, at incredibly rapid rates. Without use of open application programming interfaces (APIs) or clear interoperability standards, these data will be fragmented and hard to merge in a way that supports analysis. This is particularly true for clinical data which, in many countries, resides in proprietary EHR systems.

Moreover, careful thought will need to be given to guardrails on the system: identifying which applications require edge computing, ensuring the transparency of the artificial intelligence (AI) governing those algorithms, and understanding how it will all be regulated. Health can look to other industries, such as civil and military aviation, which long ago figured out how to make



data systems created by different vendors work seamlessly, and created intelligent, human-centric dashboards that summarize reams of complex data (in real time).

Rationalizing the data is a daunting task. It is widely held that 80% of the effort in an analytic model is preprocessing, merging, customizing, and cleaning datasets, not analyzing them for insights, a time-consuming task which profoundly limits the scalability of predictive models.^{4.8} Further, the potential variables added to the already very large numbers conveyed in an EHR may easily reach into the thousands, particularly if free-text notes from doctors, nurses, and other providers are included. No traditional modeling is currently set up to deal with this complexity.

It is also unclear how the resulting data product would translate into something actually informative and helpful for physicians. "We could easily envision a future where physicians receive large amounts of patient data on multiple conditions, ranging from weight loss to heart failure, all in incompatible streams," Mathews said. "How does a physician integrate the disparate information within the existing data infrastructure? Right now there is no way to do it in a meaningful and efficient way."

Challenge 3 – Trusting the data and determining whether it helps

The health industry's unique information exchange and compliance make interoperability - the fluid movement of

health information inside and outside the health care provider - an ongoing challenge and a strategic imperative. This imperative is accelerated and compounded by the expanding scope of the health ecosystem, requiring information to flow smoothly and frequently between providers, payers, patients and consumers - often between disparate, heterogeneous systems and across organizational boundaries.

Almost by definition, the vast range and depth of data requires the use of cloud-based software, as it is difficult and risky to share bulk data using the local storage devices. According to a Cisco-sponsored survey regarding the acceptance of cloud-based health care IT services, 74% of patients are comfortable having their health records available in the cloud.^{4.9} However, not only must the data be safe and be accurate, interfaces must be properly designed, tested and supported. Transformation of the health care industry will depend heavily on health organizations and clinical systems working together to share data to connect, communicate and collaborate better than they ever have in the past.^{4.10}

Further, more work must be done to ensure the technical validation of data captured by apps and conveyed over various platforms. Mobile apps are a largely untested data source, and providers will likely seek certainty around whether they actually capture the data as planned. Further still, although not the issue it once was, physicians are still likely to question whether having more data will actually

help change clinical outcomes, and seek evidence that knowing more about, for instance, a patient's glucose levels, actually prevents complications. Physicians need intelligence, not more data.

Insight: Moving from the hospital toward prevention or behavior change

According to Comiskey, the most profound impact of increased data transmitted in increasingly modular and mobile ways is the drive among health care providers to 'shift left, stay left.' "The progression 'left' from an acute hospital stay, to a clinic, to home care, to the eventual prevention of disease is a huge, hoped-for byproduct of technology," Comiskey said. "This move is made possible by truly gathering data for an entire population of people, to track and then prevent disease. Imagine a world where we are able to manage and then stop the occurrence of Type 2 Diabetes."

The motivation for achieving this goal is both economic and social. "First, we want a healthier, more productive population. Second, we simply will not be able to afford it if we continue on the current trend," Slade-Jones said. "The current path of care is not sustainable - anywhere in the world."^{4.11}

Comiskey sees an opportunity to test many of the technology solutions and data challenges in smaller countries such as Ireland or New Zealand, which have not yet fully adopted the EMR or EHR technologies.



“The population of Ireland, for instance, is a manageable 4.5 million people, and Dublin in particular has young, tech-savvy, well-educated residents,” he said. “All the pieces are in place for testing: we have a centralized national health system, a high density of technology, and a public will to change. The paper-based, low-tech current state of health care is in stark contrast with other industries, and a large leap forward is inevitable.”

Ping An, China’s largest insurance company, is exploring another testing ground in China. Founded 30 years ago by Peter Ma, one of China’s most well-respected entrepreneurs and CEOs, the company recently built a budding health ecosystem within their organization. The Ping An Good Doctor raised about 1.1 billion dollars and is now the largest telehealth platform in the world, with over 192 million registered users, engaging about 5 million visitors on health topics every day. According to Jonathan Larsen, Chief Innovation Officer of Ping An Group, about 500,000 users are actually seeking medical consultations on a daily basis.^{4.12} The group employs about 1,000 full time doctors, with another 8,000 serving as part-time participants in the program. The technology is filling a void, enabling patients to receive fast and accurate health advice in a convenient manner. Ping An is now looking for products and technologies to support its telemedicine platform.

Patient-driven services are part of the coming wave too. Technology-enabled data solutions are emerging to help patients manage - and even leverage their own health information. Launched in 2017, Savvy is a new platform designed to bridge the gap between patients and practitioners, helping medical practitioners looking for insights about or from a specific community of patients, and sometimes helping patients get compensated for their time and information.^{4.13} In China, heightened market competition is pushing firms to create innovative customer experiences in every field, including health care, shifting the power from businesses to customers. Organizations are focused on transforming their “customer experience” or CX, blurring the boundaries between digital and physical in an effort to realize economic benefits.^{4.14}

Insight: Challenges ahead

Although the opportunities and potential for change are exciting, the challenges ahead are real. What does payer reimbursement look like within a virtual, open care environment? How does the regulatory landscape change with a shift toward home care - around safety, privacy, data protection? Is a wary public ready for this shift?

Another challenge is how these changes might change the conversation around privacy and data responsibility as the current

health care system is fairly risk averse. There is also concern around how this will impact the day-to-day activities of physicians, who are typically already stressed and pressured for time. At least for now, the need to coordinate care, communications, and data outside the hospital is additive to the daily schedule of health care workers. This could contribute to the high burnout among physicians and other caregivers.^{4.15}

Insight: Getting ready will be messy

Dr. Mathews, who along with his colleagues, is publishing a study characterizing the top privately funded digital health companies, suggests the following: keep your eye on the big picture. “Resist the urge to get caught up in obstacles or nuances of individual point solutions, and instead consider the whole spectrum of care delivery for the organization,” Mathews said. “Pay more attention to how they come together to achieve the outcome you want.” To change the care model, he suggests that organizations work to integrate elements of culture, workflow and technology, and to pay attention to the people. “Bringing all the pieces together as patients move through a health care organization requires human beings. You cannot just focus on the technology,” Mathews said. “Although technology is an enabler, the human element is the real key to a more patient-centered experience. The workflow has to make sense, and the work culture must be consistent with the new objectives.”



Conclusion

It is clear the future of health care technology will include more data from new sources, paired with an imperative to integrate, validate, and synthesize these data. “Used in the right way, technology may be the key to unlocking better patient care delivery and outcomes, and enable a culture change for providers and patients alike,” Mathews said. “We are on the cusp of seeing the possible become the actual.” Along the way it will be messy, but the ultimate outcome is likely to deliver on the promise: digitizing health data *will* increase patient convenience and access to health care, improve patient outcomes, help accelerate the shift of patient care further away from a hospital setting, impact patient behavior toward prevention, and lead to true population health solutions.

Contributors and attribution

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Data fusion: Bringing the health consumer back into focus

It was not all that long ago that doctors made house calls. It was convenient sick care: when you were ill you called and the doctor came, you paid on the spot, and maybe got a prescription to take to the druggist. Advances in vaccination, sanitation and clinical care mean that we live longer and are now more likely to die from diseases of lifestyle than an infectious disease; care has necessarily become more complex.

To accommodate that complexity, care moved away from where people live to centers of care (offices, hospitals) with specialized equipment that constantly push the boundaries of how early life can begin and how long it can last. The intersection of rising costs and technological enablement, however, is reversing this trend: care is moving back to where people live, work, shop and recreate. Mobile connectivity, inexpensive cloud storage, wearable sensors and durable environmental sensors, and portable medical devices are making new varieties of data available, data that are growing at astonishing rates. These data, when combined with clinical information, offer the promise of a more holistic view of health and disease, and can give physicians and consumers more insight into each person's risks and strengths.

The sector is undergoing a profound shift: we are moving away from episodic sick care, toward participatory health: a focus on well-being and wellness, greater convenience,

flexibility, self-direction and personalized experiences for health consumers. The participatory health ecosystem will be built on frictionless data fusion that will drive precision engagement with lifelong health that is personalized, convenient, and outcomes driven. To be a full participant in the future of health will require businesses to rethink how they define and deliver value; at its core, this is a question of how to shape your strategy around data and the newly empowered consumer.

Diving into data fusion

As discussed in *What's after EMR/EHR? A move outside of the hospital* (this issue), the three v's (volume, variety and velocity) of data are rapidly increasing. The amount and variety of data available aren't suited for legacy electronic record systems. As many thought leaders have pointed out, medical care accounts for only a small part of how long we live and how healthy we are (see Figure 1). Data from the other determinants of health, generated largely

outside the medical system, do not need to be crammed into existing electronic health records. Today, these data are incompletely captured and, where they exist, are siloed. To create a holistic picture of health, one that encompasses the entire person, the environment in which they live, their attitudes, preferences and choices, requires frictionless, but permission-guided, data sharing. This democratized vision of data enables the data fusion required to fully manage disease and discover heretofore unknown drivers of health and disease.

On a population basis, using the best available estimates, the impacts of various domains on early deaths in the United States distribute roughly as follows: genetic predispositions, about 30 percent; social circumstances, 15 percent; environmental exposures, 5 percent; behavioral patterns, 40 percent; and shortfalls in medical care, 10 percent.^{5,1}

Data fusion is only possible when those data can be linked and, with permission, shared among different data owners. An



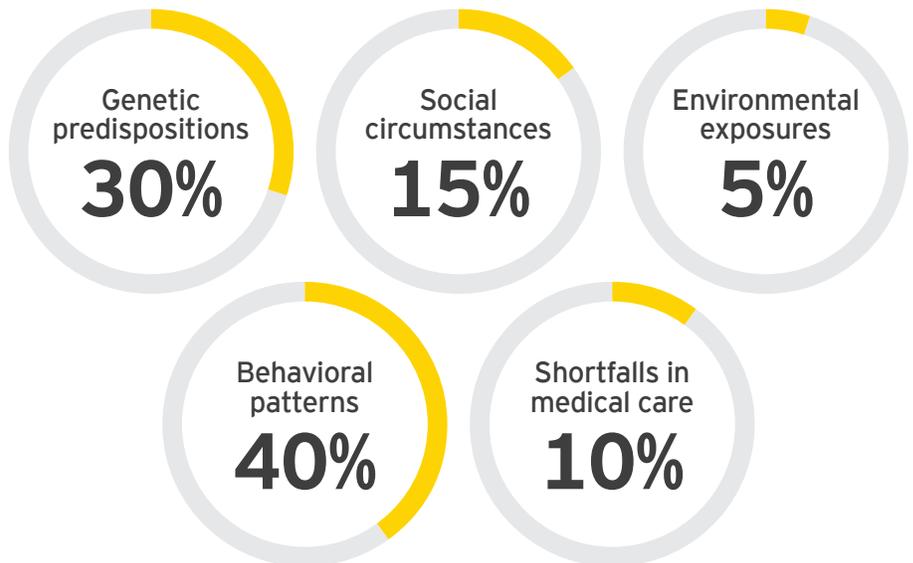
Can healthy collaboration help your organization expand in the new digital landscape?

architecture which allows for the storage and linking of structured and unstructured data, is sometimes referred to as a data lake. It allows the data to exist independently of the applications that generate it and the interface stakeholders use to access and visualize it. These data platforms are the glue which bind the various health stakeholders together. Through the platforms, users can access the vast universe of data, apply smart algorithms that combine data in novel ways to generate insights, connect with other stakeholders to share knowledge or explore opportunities, build interface capabilities for particular groups, and find new customers or suppliers.

Sources of health data^{5,2}

- ▶ Administrative and claims data
- ▶ Routine population statistics and major disease surveillance data
- ▶ Electronic medical records, medical imaging, and data from health examinations
- ▶ Research data, including biomarkers, and multi-omic information from clinical trials or cohort studies
- ▶ Registries (e.g., pharmaceuticals, devices, procedures, and diseases)

Figure 1. Most of what influences health happens outside of medical practice





- ▶ Medical devices
- ▶ Patient generated (sensors, wearables, mobile medical devices)
- ▶ IoT (Internet of Things)

The value for health companies will not be in just owning data, however, but rather in the algorithms and the ability to use the insights they generate to affect health outcomes in ways that matter to consumers, payers and other health stakeholders. “The value for connected devices is in the AI and machine learning/predictive analytics that will come out of the data stream,” says Don Jones, Chief Digital Officer at Scripps Research Translational Institute. Companies will learn that if they share data, creating larger data streams, they will discover more insights than by relying solely on their own data points, and by sharing, they will build a network effect with others, which will enhance rather than distract from their value propositions. Device/analytic packages, perhaps bundled with operational or workflow strategic planning, may be the first forays into delivering clinically relevant insights and likely built around particular disease states. “They’ll be developed on a condition by condition basis; no one system will look at all conditions and outcomes,” Mr. Jones said. This will mean care providers will have to be smart buyers, purchasing based on who can provide the best and most clinically relevant insights. It also means having a digital strategy that can make use of the data, and an operational model that can rapidly respond to the insights generated (see *Performance: optimized by and for the people*, this issue, for a discussion of getting the people part of analytics right).

Bring it home: responding to consumer demand for convenient care

The trend of moving care to lower cost centers is edging ever closer to anytime care. And bringing care to the consumer means new models and partnerships. In the United States, there has been a boom in retail health: the market value is expected to go from roughly US\$1.7b in 2017 to US\$7.5b by 2025.^{5.3}

As the retail model evolves to incorporate ongoing relationships and chronic condition management, consumer data capture and sharing will become important for health management and outcomes. Today these services exist mostly as a one-off, and consumers don’t have a way to capture and share the data they are generating. As clinics’ offerings grow in scope, moving to levels of care and integration beyond the occasional vaccination or sore throat to primary and preventive care, pediatrics and wellness, health screening and testing, chronic disease monitoring and management of these data will be an important part of individuals’ health journey and an important contributor to managing population health.

As populations around the world are aging, there is a greater need for technologies (and the data they will gather) that support aging in place. In the US, most people over the age of 65 want to spend their remaining years at home.^{5.4} The global market for home monitoring is expected to jump from US\$17b in 2016 to US\$48.5b by 2024.^{5.5}

Digital assistive devices for aged persons and the disabled is expected to surpass US\$26b globally by 2024.^{5.6} While the point solutions of today offer some functionality, it will be integrated platforms of care that will create the customized experience for individuals, and collect the data needed to power those solutions.

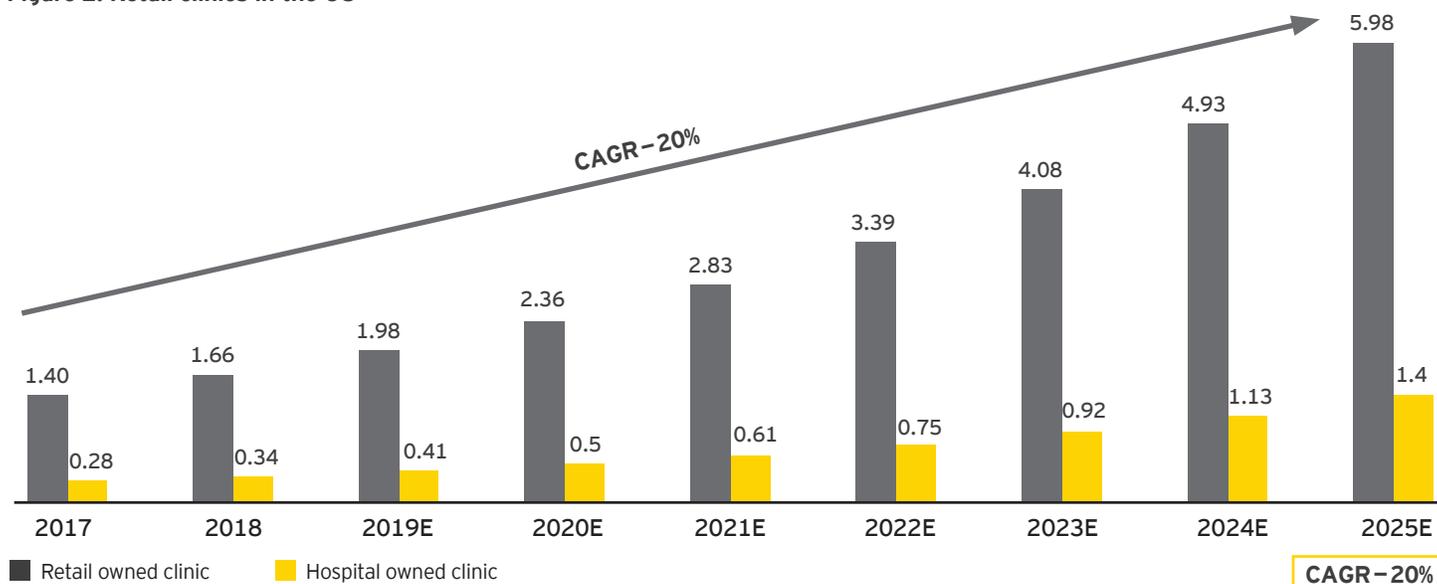
Becoming the digital wizard for consumers’ health quest

There is a big role to play for the “what comes next” in health care. Today, everyone acts as their own health manager, trying to take the information about a diagnosis and treatment plan from their doctor, figure out how to get and pay for medications, and implement lifestyle changes. This can be overwhelming, particularly when care is complex due to comorbidities or personal circumstances make any of these steps hard to do. Today care is fragmented, and it is easy for individuals to fall into the gaps. In order to have a better care experience, ensure greater compliance and adherence, and, ultimately better outcomes, a personal journey map and support at key decision points is needed. This kind of personal journey mapping requires the combination of data from multiple industries, as well as some level of permissioned access by those industry stakeholders.

Lifestyle and disease managers offer a chance to integrate information from multiple sources to create a clear picture to the ‘next steps.’ And this is where technology plays a key role in offering low cost, high touch care. “Teleconferencing will be a great way to help people with the



Figure 2. Retail clinics in the US^{5,7}



'what do I do next?' part of the care journey. Right now it isn't particularly useful because it isn't part of an integrated diagnostic and therapeutic solution," said Mr. Jones. "Once customer-savvy companies dive in, we'll see telemedicine combined with a host of other services that will really create value. You'll be able to have a consult and have your prescriptions, diagnostics or devices show up at your door two hours later with appropriate follow-up," Mr. Jones said. The ability to use data to create a convenient package of medicine, nutrition and wellness products built with your particular predilections and foibles in mind, delivered with just in time information on what to do next, can become a key part of health improvement and maintenance.

With chronic disease on the rise globally, more businesses are interested in the twin goals of disease management and prevention. Investment in digital solutions is high: in the first quarter of FY18, diagnosis and monitoring of diseases were the top funded value propositions in digital health (US\$279m and US\$270m, respectively).^{5,8} For example, Virta Health, which recently published results from the first year of its ongoing (non-randomized, open-label) clinical trial, recently raised US\$45m in Series B funding. Their combination of continuous remote monitoring via sensors, health coach and physician care lowered to modify diet has shown initially promising results for weight, HbA1c levels and insulin

use.^{5,9} They also project a cost savings of US\$9,600 per patient over a two-year period.^{5,10}

Investors have flagged wellness and lifestyle as valuable markets and a key part of the new health ecosystem, and are voting with their investments. Startups like Aaptiv, billed as the "Netflix of Health" are looking to bring the convenience and customization of the entertainment industry to fitness training. Peerfit, a US-based company, sees a way to connect employers, private insurers, and health consumers on a digital platform. They offer a convenient way to track, pay for, and incentivize fitness goals that matter to all stakeholders. Other



businesses focus on aspects of wellness like sleep. The company MeYou Health, which targets small- to medium-sized employers, has released a “digital program” called Better Sleep which offers a suite of tools to help users maximize their sleep quality over a period of six weeks.^{5,11} Mental health, too, is getting a digital makeover. Woebot, an app that uses cognitive behavioral therapy techniques (the gold standard of therapy) and artificial intelligence to improve mood. While revealing your emotional state to a chatbot “therapist” may sound daunting, users have described Woebot as a “friend” and a “fun little dude.”^{5,12} Moreover, a recent randomized control trial showed that interacting with Woebot did a better job of improving depression scores than giving people structured information about depression.^{5,13}

Value driven health care

Globally, the cost of health care is rising. In 2013, the world spent US\$7.8t; by 2040, that number is expected to rise to US\$18.2t.^{5,14} Greater numbers of us are reaching 80 years of age and beyond. At the same time, chronic disease rates are rising, and the number of people with multiple conditions is increasing. This means there are parts of many countries’ population that are living longer, are sicker earlier, and require more complex care. Our situation requires more than a fine-tuning of how we think about health and pay for care. We need to build reimbursement based on outcomes and value. At EY, value-driven care means delivering the best clinical outcomes with

optimized costs, while delivering a satisfying experience for patients and providers. This requires the right collaborations to connect, combine and share the data that will deliver a more holistic picture of risk, outcomes, and stakeholder value.

As mentioned earlier in this article, most of what determines how long we live and how healthy we are happens outside of a care center. That means the data that payers, providers and pharma most need are the data that they currently have little access to. Moreover, in order to adequately address the health disparities that exist in many countries, a more holistic view of vulnerable populations is needed. Data on the social determinants of health are a crucial and currently missing part of addressing this gap.

Mastering the alchemy of data fusion

Realign your model: Data silos create fences that keep out insights. Sharing information through common platforms will enable data fusion, with artificial intelligence and advanced decision-making algorithms generating more consumer-friendly capabilities. This requires an alignment of operations that support data integration in order to deliver on the promise of digital.

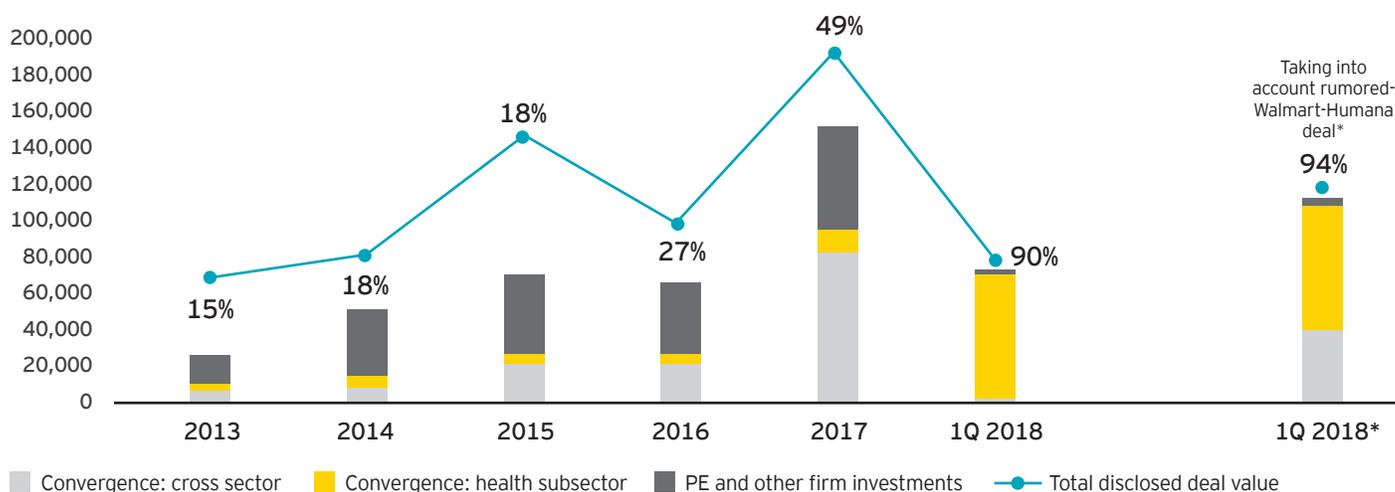
Harnessing convergence: The health ecosystem is changing. New entrants see opportunities to bring new technologies and lessons about consumer experience learned from other industries to the health sector. Know your strengths and your potential partners. In a rapidly shifting market, look

for a trusted ecosystem navigator who knows stakeholders from different sectors and can help you realize your national or global ambitions.

Get close to health consumers: With the experiences consumers are having in retail, banking and entertainment industries setting expectations, health needs to be prepared to satisfy the demand for easy-to-use tools, comprehensible insights built around a journey map tailored for the individual, and delivery of on-demand services. Today’s consumer leaves a breadcrumb trail rich in detail about who they are; it is up to health businesses to capture and integrate that information in ways that bring them closer to the needs of the populations they serve.



Figure 3. Consolidation and integration are near all-time highs



*The value of rumored Walmart-Humana deal was calculated by using EBITDA multiple for other deals. Percentage of 'convergence' deal value out of total disclosed value. Source: EY Analysis of data from Thompson One and Irving Levin

Convergence and consolidation

Everyone seems to want a part of the health sector. In fact, it might be easier to ask who doesn't see themselves as being a health business. Cross-sector convergence has picked up in recent years, as non-health businesses see opportunities to generate value using best practices from other markets: integration of new technologies, customer experience, and cost reduction through disintermediation. The race to the top also appears to be playing out as a race to be the most widespread: integration remains strong as companies look to compete by spreading themselves across the value chain (see Figure 3).

Retail health and payvider deals top the list, as businesses look to increase efficiencies and make better use of the ever-growing mountain of data in the struggle to contain costs and improve health outcomes. The elephant in the room is, of course, convenience. Providers and health consumers both complain of an ecosystem that has done little to bring them together, despite rising out-of-pocket costs and declining reimbursement rates. Deals like the Amazon- Berkshire Hathaway-JP Morgan seem to offer the promise of user-centered applications, for both sides of the doctor's desk. With acquisitions like that of PillPack, it is not hard to imagine a future where consumers and doctors will delight in the "care anywhere" experience available in so many other areas of life.

Contributors and attribution

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Digital health engagement: Highlights from the EY global survey of health consumers and physicians

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About EY Global Health

Around the world, the health sector is being reimagined in the face of aging populations, increased prevalence of chronic diseases, growth in emerging markets and shifting reimbursement models. Health care organizations must address these challenges while mastering the digital innovation that offers both opportunities and threats. Technology empowers patients, real-time analytics improves care and enables a mind shift towards prevention - but also opens the door to new non-traditional competitors. EY teams works with clients to reposition and improve their business models, people strategies and operational structures to address cost pressures while leveraging the potential of analytics and technologies to improve quality of care. In this way, we help health organizations stay competitive and deliver better patient outcomes both now and in the future.



David Roberts

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Leads global teams working for clients in health. Passionate about how consumers change the way health care is designed, delivered and funded. Long distance biker - metaphorically and actually.

As EY Global Health Sector Leader, David is responsible for driving the health industry growth and development strategy by focusing on clients, connecting people and building EY health services and knowledge. A seasoned strategy practitioner with deep experience in health and life sciences, David previously served as the EY Asia Pacific health services leader.

Prior to joining EY, he was the Secretary for Health and Human services in Australia and a member of the Australian Health Ministers Advisory Council.

David earned an MBA from University of Bath and was a fellow at the Australasian College of Health Service Management.

How David is building a better working world

"My global role enables me to rethink the future of health care, especially the increased role of consumers, technology and social media. Whether by default or design, citizens are taking a larger responsibility for their own health, and with this comes seismic change.

The purchasing power is shifting from payers and providers to people - which in turn will increase demand for more value-driven care, transparency around price, and of course digital and mobile technologies. This is the disrupter we will welcome and facilitate over the next 3 to 5 years."



Pamela Spence

EY Global Health Sciences and Wellness Industry Leader and EY Global Life Sciences Leader
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Having joined EY in 1998, Pamela leads a team of 20,000 multidisciplinary professionals in the health and life sciences industries to share insight and knowledge. Working across the ecosystem, they understand the implications of today's trends, proactively finding solutions to business issues and positioning clients to seize the upside of disruption in our transformative age.

Prior to her current role, she focused on cross-border transactions, providing deal advisory services including new commercial and risk and governance operating models. She has a background in organic chemistry.

How Pamela is building a better working world

Pamela is passionate about making health care affordable and accessible to all and helping to ensure we collectively maximize the opportunity to continually innovate in R&D. Critical to this is the industry to define, measure and design payment systems aligned to outcomes based performance rather the present 'input and activity based' systems. Increased computational power and AI, along with more demanding consumers, brings unparalleled opportunity for innovation and collaboration with disruptors to the traditional industry value chain.

"Strong data science and behavioral science as well as clinical and medicinal science capabilities will be critical for success."



David J. Copley

EY Global Health Assurance Leader
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Experienced in health care industry, including providers, payers, life sciences and pharmaceutical companies. Certified Public Accountant.

With over 33 years of experience serving a diversity of organizations in the health care, managed care, pharmaceutical and life sciences sectors, David is the EY Global Health Assurance Leader. He is also a Partner in Ernst & Young LLP Assurance practice.

Working closely with EY health professionals and their teams to bring valued services and leading health sector insights to EY's clients across the globe, David is responsible for leading all EY Assurance services in the global health services.

Having served a variety of organizations, including VC and private equity-owned companies, US Securities and Exchange Commission registrants, and tax-exempt health care organizations, David has helped numerous emerging health care companies through various transactions – initial public offerings, bond offerings, M&As and international expansions.

A CPA in California, Arizona and Hawaii, David earned his bachelor's degree in Business Administration from Eastern Washington University.

How David is building a better working world

In his role with EY, and with his passion for health care, David has endeavored to build not just a better working world, but a healthier working world.

Working with his teams and leading health care organizations, David considers himself fortunate to be part of a sector that is focused on caring for human health around the world.

It is this focus and meaning of the health care sector that continues to excite him in his work. The opportunity to work with talented professionals in the EY Health sector and EY clients continues to prove the impact that individuals can have in building a better – and healthier – working world.



Gregg Slager

EY Global Health Transaction Advisory Services Leader
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Seasoned transactions professional. Innovation leader using health data. Builder. Hockey player. Multi-talented musician. Father.

Gregg is EY Global Health Transaction Advisory Services Leader and a founder of the EY Global Health sector, focused on helping EY health care clients with global transactions and strategy.

He has advised on transactions for private equity investors and strategic acquirers over the last 26 years. He has been based in Chicago, London and New York City.

Previously, he led EY Americas Private Equity services. Since joining us in 1994, he has held leadership roles on a number of our largest global private equity accounts and high-profile health clients.

Gregg is a frequent speaker and published author on health care related subjects. He has a bachelor's degree in Accountancy from Western Michigan University.

How Gregg is building a better working world

"I am focused on finding ways to help clients reduce unsustainable costs while improving quality of care and increasing access to care across the globe to build a better - and healthier - working world.

We are actively using data and predictive analytics in the transaction work to help companies drive better capital allocation and deployment decisions, successfully supporting their growth agendas."

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