



Health care 2020

The dominant health care trend in 2020 is, quite simply, pervasiveness. Mobile health apps, telemedicine, remote monitoring, and ingestible sensors generate rich data streams, allowing doctors and patients themselves to track every heartbeat, sneeze, or symptom in real time. Bioinformatics and analytics allow for personalized risk assessments and tailor-made medicine. Breakthroughs in robotics, 3D printing, and stem-cell research make surgical procedures safer and improve outcomes. Health care systems shift their focus to wellness and prevention to compete against insurgent competitors.

Patient-powered health care

"Tailor-made" medicine

The use of bioinformatics in health care grows exponentially. Based on human genome sequencing and body composition, custom medicines and treatments are developed and prescribed to patients. This helps treat dreaded illnesses such as cancer and genetic disorders—where failure rates of medicines are historically high. Government closely oversees research, testing, and therapeutics; regulates accuracy and affordability; and plays a centralized role in determining best practices for treatment plans.

For a few hundred dollars and a tube of spit, genetic profiling start-up 23andMe looks at a million genetic variants in customers' DNA to trace their ancestry and predict risks of certain diseases. While 23andMe's testing kit is currently in the process of getting FDA approval, direct-to-consumer genetic tests could become common in the near future.

Personalized health risk assessment

Medical compliance rates increase seven-fold due to personalized health assessments. Personalized risk assessment increases patient compliance with medical treatments—patients with a genetic risk diagnosis, such as familial hypercholesterolemia, show nearly 50 percent higher compliance with treatment. Some governments make such assessments compulsory for some beneficiaries in order to achieve better health outcomes and reduce costs.

The mHealth revolution

Mobile technology proves to be a game-changer for health care. The ubiquity of mobile phones and growing health needs make “mHealth” an affordable and easily accessible alternative to traditional health care. Advanced mHealth applications include telemedicine, sophisticated diagnostics through attachments plugged into smartphones, personalized services, and self-monitoring. Governments address security and privacy risks arising from the growth of mHealth.

ReSound LiNX, a part of Apple’s Made for iPhone Hearing Aids program, is a smart hearing aid that lets users customize settings based on the places they visit (restaurant, home) and their associated noise levels and remembers the setting for the future.

Social media, the new health exchange

Health care organizations engage with patients through social media, regularly gauging their needs and driving them to appropriate products and services. Online patient communities grow exponentially and become rich databases of crowdsourced data. Advanced analytics on patient chatter in these communities gather health information and put it into context, providing a better understanding of which treatments deliver the best outcomes. Businesses and governments work with communities of patients, hospitals, payers, and experts to identify best practices and cost-effective treatments. New business models emerge with this rise in cross-organizational cooperation and collaboration, driving down costs and improving care. Privacy and security of data remain key considerations.

The quantified self

Thanks to digital and mobile health technologies, patients assume a bigger role in addressing their health care needs. Sensors, smartphone attachments, and sophisticated mobile applications begin to replace the traditional checkup, tracking everything from heart rate and calories burned to sleep patterns. Self-tracking data make individuals more receptive to behavioral nudges and are used by policymakers and insurance providers to reward healthy lifestyles.

Curious, a platform from the creators of 23andMe aggregates and analyzes self-tracking health data from users. The platform allows people to share questions about what’s going on in their lives, and use these questions to identify a solution or a next step. The platform is currently being beta tested on several communities with serious but rare diseases.

The data revolution

Social media analytics in health care

Anonymized data from social networks are used for biomedical research, personalized medicines, clinical trials, and the construction of predictive models. Advances in health-focused, natural-language data processing allow analysts to use big data to identify the decisions patients make and, more importantly, why they make them. Government uses social media analytics to gain insights into patients’ consumption patterns and health requirements.

Carolinas HealthCare, which runs more than 900 care centers, uses algorithms to analyze consumer data to identify high-risk patients so doctors can intervene before they get sick.

Health care analytics is a \$21 billion industry in 2020.

Evidence-based care

Doctors use high-end analytics to diagnose and treat patient conditions by mining massive clinical information from electronic medical records (EMRs). Analytical tools take into account patients' genetic profiles to suggest the best treatment options and explore alternate treatments based on the experiences of others with similar symptoms and genetic profiles. Sewage analysis is used to predict likely health conditions caused by pathogens and prepare in advance to prevent major outbreaks. 2020 sees the creation of warehouses of health data that use big-data analytics to identify patterns and inform public health decisions and research.

Real-time clinical information

Advanced data-sharing networks allow payers and providers to access real-time patient information. This allows health plans to assess the quality of care offered based on patient diagnosis and treatment. Government mandates and incentives promote the adoption of data sharing and allow government to serve as a centralized health information exchange.

Participatory medicine

Patients use their own health data to make better decisions. Patient-centered information networks, such as Crohnlology for Crohn's disease, help people better manage their health, share best practices with fellow patients, and lower medical costs by tapping into the knowledge of the crowd.

Next-generation care

Holography-assisted surgery

Specialized surgeons perform holography-assisted surgery to treat patients remotely and instruct other physicians on operating procedures. Holography makes surgery less invasive and potentially offers better outcomes for patients, while also freeing up surgeon time.

Philips and RealView Imaging have developed live 3D visualizations that can be touched and marked up to help doctors during surgeries. Israeli doctors have piloted a series of cardiac operations guided by live 3D holographic images of the patient's heart.

3D printing in health care

3D printing technology revolutionizes surgical practices, giving practitioners access to identical replicas of certain body structures—and eventually organs. It reduces surgical errors and improves rehabilitation in post-op. Joint replacement surgeries are cheaper and use customized prints of patient's joints. Medical education uses this technology to create cheaper prototypes for teaching, avoiding ethical issues associated with using cadavers.

Breakthroughs in stem cell research

Developments in stem cell research lead to the production of synthetic organs and smart drugs to improve physical and mental function. Breakthroughs such as induced pluripotent stem (iPS) cells short-circuit the long debate over the use of human embryos in research and speed up stem cell therapies to cure human disease. Government incentivizes research and development and introduces policy measures to navigate ethical issues hindering widespread market adoption of this tool.

Biopen, developed by Australian researchers, could allow surgeons to directly "draw" stem cell layers on an injury. The pen works like a mini-3D printer and offers surgeons more precision while reducing the time taken for the procedure.

Remote monitoring

Sensor-enabled remote monitoring devices transmit vital patient biometrics to physicians and other caregivers in real time. 2020 sees the use of ingestible “smart pills” with sensors to wirelessly relay information on health indicators within the body to a smartphone. Doctors can track health indicators more closely and receive precise information about which medications their patients actually took, and when.

The Proteus smart pill is equipped with sensors and can monitor body indicators from within the body. The company is collaborating with pharmaceutical companies to create pills with both sensors and medication.

Health care robotics

Robots sterilize surgical tools without human intervention, reducing the incidence of infection and freeing up hospital staff time. Robotic systems dispense drugs in pharmacies with zero errors while automated kiosks allow patients to enter medical symptoms and receive customized recommendations and information. Automation dramatically reduces errors and helps improve outcomes.

The global medical robotic systems market reaches \$13.6 billion in 2018.

Health care systems

An expanded definition of health

Health care systems evolve from “sick care” to wellness. Nutrition, behavioral, environmental, and social networks act as vital health foundations. Health care is defined not by care facilities but by the status of consumers’ health. 2020 sees the convergence of allopathic and alternative medicine, and of physical and behavioral medical management. Government promotes wellness care through incentives, requirements, and payment models, particularly in countries where it is the primary payer.

Integrated care

Accountable care organizations (ACOs), patient-centered medical homes (PCMHs), outcome-based payment models, providers, physicians, and payers join together to provide patients with bundled services, providing care at lower cost. Hospital-physician alignment allows prioritized treatment for patients requiring urgent attention. Electronic health records and e-prescriptions improve accountability and transparency. Government encourages integrated care to systematically raise health care standards.

Communities as health care providers

Aging populations and a growing disease burden raise the demand for skilled health care professionals, potentially creating a shortage across the globe. As a result, health care systems increasingly rely on community outreach, peer-support initiatives, and partnering with patients and families to supplement care. In developing nations, community health care workers with little training provide education, support treatment, use diagnostic devices, and deliver medicines, allowing specialists to handle more complex tasks.

Campaigns like One Million Community Health Workers aim to expand and scale community health worker programs in Africa and have 1 million CHWs by 2015.

Outcome-based payment

2020 sees the growth of value-based care models that link the price of care to the value of the performance or health outcome, holding medical practitioners accountable for the care they provide. The model is driven by performance metrics such as hospital re-admissions or patient ratings, and by linking doctor payments to patients’ health.

Rise of private health insurance exchanges

Private players form a significant part of health insurance exchanges in the United States and some other countries. New exchange products supported by technology open new avenues for these players, offering customers more options. Private exchanges match public ones in terms of volume and spread insurance products at competitive prices.

Health care in developing nations

“Frugal” health care

Universities, medical technology giants, and even mobile phone companies begin developing portable diagnostic tools that can be manufactured for just 1 percent of the cost of traditional medical devices. Developing countries pursue a “back to basics” approach to prevent disease, such as washing umbilical cords with antiseptic to reduce infections among newborns. No-frills models such as Aravind Eye clinics and Narayana Hrudalaya in India and franchise “clinic-in-a-box” models such as Unjani in South Africa provide affordable care and complement overstretched public health care systems.

Baby Bubble is a \$400 adaptation of \$6,000 respirators used to help babies in respiratory distress, while the \$50 Odon device helps with obstructed labor during childbirth.

“Nutrition transition” and disease paradox

Globalization, rising incomes, and a shift to sedentary work spur the growth of lifestyle diseases in developing countries, including obesity, certain types of cancer, diabetes, strokes, and heart attacks. As global fast-food chains expand and cheap, calorie-rich foods become widely available, countries undergo a “nutrition transition,” changes in health, diet, and exercise that accompany economic progress. This engenders a shift from curing disease to controlling and managing chronic conditions. Some nations suffer from the paradoxical double burden of inadequate nutrition and obesity.

Globally, over 1.5 billion adults are overweight; 500 million of them are obese. One in eight persons suffers from chronic undernourishment.

Drone-delivered vaccines

Unmanned aerial vehicles deliver vaccines, medical supplies, and essentials to remote or congested areas in developing nations via networks for “micro-transportation.” Health care workers deploy UAVs via cellphone to deliver vaccines to hard-to-reach locations. Developing nations explore policy measures and enact regulations governing the use of UAVs as the technology becomes mainstream.

Matternet hopes to build networks for “micro-transportation,” where tiny drones could deliver medical supplies to remote or highly congested areas in developing countries. In 2012, the Silicon Valley start-up conducted its first field trials in the Dominican Republic and Haiti.

Growth of telemedicine

As the communication infrastructure in developing nations improves, telemedicine extends health care—and particularly access to specialist care—to more citizens. Local clinics and practitioners can consult remote specialists via video-conferencing, mHealth applications, and remote diagnostic tools. Chinese and Indian companies continue to invest heavily in video-related health technology in parts of Africa. Existing mobile network operators may subsidize telemedicine programs.

Focus on preventive health care

Health care systems focus on long-term prevention and management rather than short-term treatment. This is achieved through education and awareness campaigns and behavioral nudges toward healthy habits. For example, public-private partnerships deliver vital health information through mobile phones to mothers in low- and middle-income countries in Africa and Asia. Messages are targeted to each stage of a woman's pregnancy so that the information reflects what she is experiencing, establishing an emotional connection and encouraging healthy behavioral changes.

MAMA is a public-private partnership that supports programs delivering vital health information through mobile phones to mothers in resource-constrained settings in low- and middle-income countries in Africa and Asia.

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