

# 5 TECHNOLOGY TRENDS IMPACTING HEALTHCARE

2018  
THE FUTURE STARTS NOW



**The rate of change in healthcare technology is unprecedented, as new innovations and discoveries are fomenting advances at an almost-daily pace. Technologies in the healthcare space shift from cutting edge to ubiquity more quickly today than in years past, as practitioners, facilities and insurance companies alike work to foster an environment that puts the patient first while focusing on efficiency, security and cost savings.**

Spending on healthcare technology continues to rise as digital transformation necessitates new technologies and services powering the network. In fact, one study projects clinical IT systems will garner \$14.5 billion in revenue in the United States by 2022, while medical imaging information systems will total \$5 billion by 2022.<sup>1</sup> These and other technologies increasingly are being used to streamline healthcare operations and ultimately ensure patient and practitioner satisfaction, while a slew of new generation of technologies promise to further advance patient care, better secure sensitive data and provide a more patient-centered experience.

Consider the idea of a robot that can draw a patient's blood with no mistakes and no pain, for example. Or a new doctor learning to remove an appendix using a special augmented reality program. Or even a printer creating a custom medication based on a patient's metabolism and genetic makeup.<sup>2</sup> These technologies are here today, and they are the basis for the future direction of health care.

## TECHNOLOGIES TO WATCH

The scope of technologies impacting the healthcare sector is wide and far-reaching, from robotic caregivers for geriatric patients<sup>3</sup> to now pills that alert us when we forget to take our medications.<sup>4</sup> Some technologies are more futuristic than others, but all have the power to advance health care as we know it, in both the short term and long term.

Five technologies in particular—artificial intelligence (AI) and robotics, blockchain technology, augmented reality, 3D printing and advances in the internet of things (IoT)—demonstrate their value in the healthcare sector.

## **THE IMPACT OF ROBOTICS IN HEALTH CARE IS BEING FELT IN A POSITIVE WAY: WESTCHESTER MEDICAL CENTER IN WHITE PLAINS, NEW YORK, EXPERIENCED A 70 PERCENT DECREASE IN ONE TYPE OF HOSPITAL-ACQUIRED INFECTION BY ITS PATIENTS AFTER IT EMPLOYED THE XENEX ROBOT DISINFECTING SYSTEM**

### ARTIFICIAL INTELLIGENCE AND ROBOTICS

AI in the healthcare setting is no longer the stuff of Star Trek fantasy. IBM's Watson cognitive computing platform paved the way for AI in medicine when it partnered with Memorial Sloan-Kettering Cancer Center's oncology department in 2012. Since then, artificial intelligence is being applied to quickly review and translate mammograms to reduce unnecessary biopsies, monitor early stage heart disease and enable faster, more accurate decision-making among medical practitioners.<sup>5</sup>

Robotics, too, are becoming an integral part of the healthcare toolkit, with systems such as the Da Vinci surgical machine performing tasks that are at best challenging for humans to complete, such as micro incisions in difficult-to-reach areas. Another example is the VascuLogic Venous-Pro, a robotic device that can draw a patient's blood quickly and precisely at the vein, reducing patient discomfort.

AI and robotics, it seems, are technologies being embraced by doctors, researchers and patients: A report by PwC on the use of artificial intelligence and robotics in health care found more than half of respondents would use advanced computer technology or robots with AI that could answer health questions, perform tests, make a diagnosis and recommend treatment. The report also found people were willing to use AI and robotics if it meant better access to health care and they could receive accurate diagnoses and treatment quickly.<sup>6</sup>

Robotics and AI also are being used post-hospital stays to help manage home visits, or as companions to patients with mental health issues or loneliness. These devices have touch sensors, cameras and microphones to enable interaction between patient and robot and reduce the feeling of isolation some patients may feel within—and outside of—the healthcare facility.<sup>7</sup>

The impact of robotics in health care is being felt in a positive way: Westchester Medical Center in White Plains, New York, experienced a 70 percent decrease in one type of hospital-acquired infection by its patients after it employed the Xenex Robot disinfecting system.<sup>8</sup> Riba, meanwhile, is helping hospital workers lift and move patients in and out of bed into a wheelchair, help patients stand and turn them to prevent bed sores, for example, saving them from having to carry out these strenuous tasks.

## BLOCKCHAIN TECHNOLOGY

Widely recognized as the technology behind bitcoin, blockchain is a distributed system of recording and storing transactional records which, by its nature, can increase the security, privacy and interoperability of data. With blockchain, transaction records are stored and distributed across all network participants rather than at a central location, creating an environment of immutability perfect for locking down healthcare records and sensitive patient data.

Deloitte describes blockchain as “a shared, immutable record of peer-to-peer transactions built from linked transaction blocks and stored in a digital ledger.”<sup>9</sup> IBM, meanwhile notes that “the capacity of a distributed ledger technology for ensuring data integrity while sharing between parties can ensure collaboration between rising trends in healthcare, which are vital to the improvement of health in communities worldwide.”<sup>10</sup>

Healthcare facilities are waking up to the opportunities blockchain can bring. One IBM survey of healthcare executives found that 16 percent expect to have a commercial blockchain solution at scale in 2017, with 60 percent of those looking to blockchain to help them access new markets

as well as new and trusted information they can keep secure. Seventy percent of those respondents believe the benefits of blockchain in health care will be in clinical trial records, regulatory compliance and medical/health records.<sup>11</sup>

Because blockchain is a distributed data model that promotes data sharing, the technology can help doctors and other healthcare providers make better and more accurate diagnoses and prescribe

more effective treatments. Together, these benefits can help drive down the cost of health care while increasing patient satisfaction. In addition, blockchain technology enables practitioners to share their data without fear of compromising data security, as the blockchain data is immutable and any changes made to the data can be tracked.

Blockchain has myriad uses in health care beyond diagnosing and treatment, from keeping track of patient medication to securing digital signatures in electronic health records. Each has the potential to disrupt traditional technologies, with better outcomes for data security and access.

## AUGMENTED REALITY

ABI Research believes the healthcare space will be one of the top verticals benefitting from augmented reality, a technology it projects will grow at a CAGR of 227 percent between 2018 and 2021 as organizations learn more about the technology and understand how it can help.

The mixed environment of virtual overlays on real objects has potentially game-changing implications for health care. Surgical students can use virtual overlays of the circulatory system, for example, to help direct them during procedures, providing a level of interactivity not available in a traditional learning environment.<sup>12</sup> And, with the use of “smart” glasses, physicians and caregivers can see patient information such as vital statistics, medications prescribed, symptoms and more without having to consult a chart.<sup>13</sup>

# **ABI RESEARCH BELIEVES THE HEALTHCARE SPACE WILL BE ONE OF THE TOP VERTICALS BENEFITTING FROM AUGMENTED REALITY, A TECHNOLOGY IT PROJECTS WILL GROW AT A CAGR OF 227 PERCENT BETWEEN 2018 AND 2021**

## **HEALTHCARE FACILITIES MANAGERS, TOO, CAN BENEFIT FROM AUGMENTED REALITY, USING THE TECHNOLOGY TO DESIGN PATIENT ROOMS, SURGICAL SUITES AND EVEN CAFETERIA LAYOUTS**

Healthcare facilities managers, too, can benefit from augmented reality, using the technology to design patient rooms, surgical suites and even cafeteria layouts. In the billing office, agents can see patient insurance and billing information even when they are away from their computers via the use of smart glasses.<sup>14</sup>

### **3D PRINTING**

The benefits of using 3D printing in health care is well-known, with physicians and others creating artificial limbs, custom medical devices and even human organs using the technology. This phenomenon will only increase as more healthcare providers embrace 3D printing as an enabler of new treatments and technologies to treat disease and illness and improve patient quality of life.

At Shriners Hospital in Houston, doctors are using 3D printing to produce lightweight and customizable yet inexpensive prosthetic hands for children.<sup>15</sup> And VA hospitals across the country are being equipped with 3D printers so doctors and practitioners can create customized orthotics and prostheses quickly, providing veterans with the help they need to resume a normal lifestyle.<sup>16</sup>

The idea of bioprinting, or printing laboratory-grown cells in order to form living structures using 3D printers, is coming closer to reality, as scientists move closer to being able to bioprint reproducible organic materials. The practice could help in myriad ways, from printing skin to help burn victims heal more quickly with little scarring<sup>17</sup> to creating implants that could encapsulate and control the release of drugs or small molecules to promote tissue regeneration or assist diseased organs.<sup>18</sup>

### **ADVANCES IN IOT**

The concept of using IoT in health care is not a new one—the machine-to-machine interaction used by pacemakers in heart patients or glucose monitoring systems in patients with diabetes, both of which provide telemetry data back to the physician or caregiver, are two examples of how technology is helping healthcare workers improve patient care. Even more mundane examples, such as back-office systems that automatically feed data to insurance companies to streamline billing and treatments authorization, have benefitted health care in multiple ways.

The next wave of IoT technology promises even more benefits. Miniaturization and implants are examples of IoT that healthcare providers can use to manage pain in patients with chronic conditions, detect disease by monitoring the body's immune system or even help paralyzed patients walk by “decoding” signals from the brain to different parts of the body.<sup>19</sup>

One company, Openwater, is developing a device that can provide an MRI-level view into the wearer's brain and body so healthcare providers can better diagnose and treat medical conditions. The company believes such a system has the potential to help practitioners improve patient care, as they envision future iterations will be able to:

*“... ultimately both read (image) and write (perform surgery, ablate, provide targeted therapy, accelerate drug testing, etc) to specific areas of the body or scan the entire body. And beyond. The very same systems can be used to read thoughts and pull the images that you are thinking of, the words that you are about to say, and whether you are really listening to what I'm saying or not ...”<sup>20</sup>*

Beyond patient care, IoT advances are helping healthcare organizations better control their costs through predictive maintenance, remote monitoring and smart building technologies, to name a few. Enabling disparate systems to communicate and work independent of human interaction can help companies reduce overhead, which goes straight to their financial bottom line.

**HEALTHCARE ORGANIZATIONS NEED TO ENSURE THEY HAVE THE RIGHT FOUNDATION FOR BOTH PATIENT-FOCUSED AND BACK-OFFICE OPERATIONS, AS WELL AS NEW OPPORTUNITIES YET TO BE IMAGINED**

**HOW THE NETWORK MATTERS WITH NEW-GENERATION TECHNOLOGIES**

A growing number of healthcare organizations comprehend the necessity of adopting new technologies to increase their efficiency and effectiveness. Indeed, these organizations depend heavily on technology to provide the best in patient care.

In embracing the next generation of healthcare technologies, organizations first must prepare their networks to ensure they are able to handle the increase in demand. Artificial intelligence, blockchain, augmented reality and other technologies can stress the bandwidth of traditional networks and impact performance.

Healthcare organizations need to ensure they have the right foundation for both patient-focused and back-office operations, as well as new opportunities yet to be imagined.

In building a network for the next generation of healthcare services, organizations should consider an environment that includes software-defined wide area networks (SD-WAN) that can more effectively support and manage multiple connection types and a growing number of cloud-based workloads across an organization. And networking components such as WiFi and unified communications can ensure users of the network—practitioners, employees and patients alike—can interact with each other using their preferred method of communication.

Working with a network service provider can help ease the burden associated with building and maintaining a network capable of handling the bandwidth-intensive needs of the next generation of healthcare services. Healthcare organizations can leverage Ethernet connections to ensure critical applications perform as expected. They also can receive all or some of their most critical connectivity functions as a managed service, including managed connectivity, WiFi, and security.

**CONCLUSION**

New technologies loom on the horizon to help healthcare facilities provide higher quality patient care at a lower cost. A modern IT infrastructure is needed to handle new business applications and the associated bandwidth requirements today and in the future.

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