The Digital Health Revolution

How technology is transforming the healthcare system.

By **Marnie Hayutin**

» THE INTERNET HAS CHANGED THE WAY WE SEARCH FOR INFORMATION, purchase products and interact with our friends. Now it's about to change the way we take care of ourselves.

The next wave of the digital revolution is hitting healthcare. And just as it has completely altered the banking and communications landscapes, medicine will never be the same.

The intersection of healthcare and technology is now known as digital health, and it has grown exponentially just in the last couple of years. Nearly $2 billion was poured into digital health ventures in 2013, according to healthcare venture capital firm Rock Health, and that represents 100 percent growth just since 2011.

Many of those same technologies that have become part of our lives in other realms are now being harnessed to transform healthcare. The result is an unprecedented amount of data—available not only to our doctors but also to us. It's moving us, experts say, from a healthcare

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system that treats us when we get sick to a system that's designed to keep us healthy.

What follows is a sampling of the innovation that's happening around the world and around the corner. Are you ready?

WEARABLES

While Fitbit was the first mass-market personal tracking device to hit the scene, big players like Apple and Google are raising the stakes. Initially considered to be consumer-only devices to track fitness stats like heart rate and activity levels, wearables are now being evaluated to see if they could have real clinical benefits.

Physicians at the CS Mott Children's Hospital at the University of Michigan, for example, are using wearable devices as part of a program to help reduce childhood obesity. Uploads from devices will provide clinicians with vital stats such as blood pressure, blood glucose, exercise data and weight.

In London, doctors are testing an Apple Watch app that promises to streamline care for cancer patients. The new app incorporates medication reminders to improve compliance with treatment regimens, and it allows patients to submit data about symptoms so doctors can adjust medications immediately.

Although pilot programs are being launched around the world, doctors say it's still too early to know exactly how accurate the devices are and how well patients will stick to using them.

TELEMEDICINE

Nearly every hospital system in the Greater Cincinnati area is exploring telemedicine options, which have tremendous potential to reach thousands of underserved patients. E-consults and virtual visits are allowing patients the benefit of medical care without having to travel to an office.

Certainly, illnesses like strep throat that require a lab test for definitive diagnosis may not be suitable options for telemedicine. However, doctors say there are lots of cases where a video consultation would suffice. A doctor may be able to look at your swollen wrist, for example, and tell you whether you should proceed to the emergency room for X-rays or whether you just need to apply an ice pack.

For patients with chronic conditions, such as diabetes or high blood pressure, other types of telemedicine tools are serving as a bridge between the clinical setting and home. Using data that's uploaded to the office from wearables and other home devices, nurses can monitor patients' vital stats remotely and intervene with timely reminders and guidance. Doctors believe this kind of at-home contact will help reduce patient readmissions to the hospital.

Telemedicine may also have the potential to reign in our skyrocketing healthcare costs. To use the swollen wrist example above, imagine the cost savings if all the non-emergency cases never made it to the ER. Also, Venture Beat recently reported that 38 percent of employers in a Towers Watson survey are now offering telemedicine benefits to their employees in an effort to encourage lower-cost care options. That number is expected to hit 81 percent by 2018.

EHRS AND INTEROPERABILITY

In order to maintain Medicare and Medicaid reimbursement levels and to qualify for certain financial incentives, healthcare providers are now required to have demonstrated "meaningful use" of electronic health records (EHRs).

The industry's vision is that patients will one day be able to be treated in any hospital in the country, and that every hospital will have online access to all patients' complete medical histories. It's an excellent idea in theory, and one that some estimates say if integrated fully could cut medical costs by as much as $30 billion a year. In practice, however, this has not been easy.

Why? In large part because healthcare systems are all on different platforms, and those platforms often can't communicate with one another. To explain what that means for patient care, one doctor in Arizona described what happens when his office has to send records over to another healthcare system. Forget e-mail, he says; they actually have to print out a paper copy and fax it over.

Now "interoperability" has become an industry buzzword as healthcare IT experts search for ways to solve the problem.

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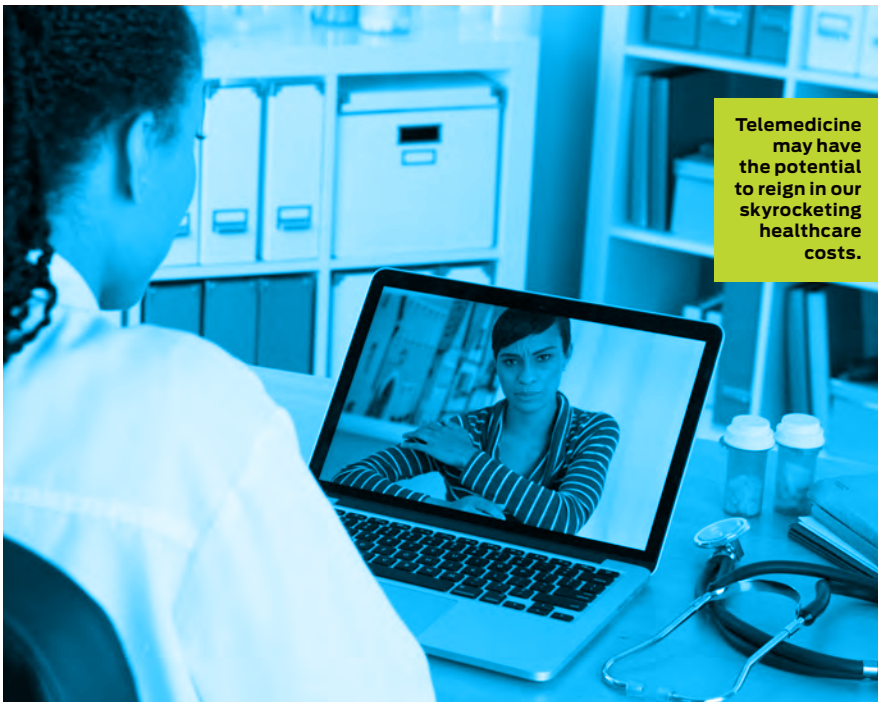

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HIPAA COMPLIANCE AND SECURE COMMUNICATION

You're already familiar with the HIPAA privacy rule that protects patient information—you've probably signed more HIPAA forms in recent years than you'd care to count. In the digital age, however, HIPAA compliance has gotten more complicated.

For one thing, mobile and electronic communication has made it a lot harder to lock down patient data. What happens when physicians send each other text messages to communicate about a patient? Several technology companies, including Doc Halo in Cincinnati, are designing secure mobile health platforms that allow providers to communicate with each other—and with patients—without putting personal health information at risk.

Recent highly publicized large-scale hacking incidents have revealed a bigger danger with electronic health information: the risk of identity theft when social security numbers and other personal information fall into the wrong hands. Hospital systems and healthcare IT experts are extremely focused now on designing technologies and processes that will prevent breaches from happening in the future.

BIG DATA

Retailers have been harnessing big data as they've embraced customized sales approaches. Using our search patterns and buying behavior, they can send us ads for products they already know we like to buy.

Now big data is coming to healthcare. Wearables, telemedicine devices and EHRs are giving us vast amounts of health statistics that can be used by researchers, hospitals and even patients themselves.

A global electronic heart study at UC San Francisco, recently featured in the KQED QUEST television documentary *Future of You,* illustrates how big data has the potential to transform research. As part of the study, researchers gave out 1,000 portable EKG trackers that attached like a case around the back of a smartphone. Within three weeks, more than 20,000 EKG results had been sent to the researchers via the Internet. The documentary noted that it could take years in a normal study to collect thousands of EKGs for review because each one would have required an office visit.

Hospitals can use big data to identify at-risk patients and flag them for timely interventions. They can also track patient and population health trends to discover patterns and improve well-care efforts. And, they can analyze in-hospital data to determine best practices for triage and critical care.

But perhaps the most interesting implication is what big data may mean for us as patients. Just as we no longer need bank tellers to access our money, digital health insiders are wondering how much of our health data we'll someday be able to access without doctors. And when we do see our doctors, they'll have huge amounts of highly individualized information about us. We're moving in the direction of what's known as "personalized medicine." The vision is that someday treatment plans can be completely customized to the individual patient rather than to the disease.

PROGRESS VS. PRIVACY

All this understandably raises some big questions about privacy. How much of our personal health data should we be sharing? And with whom?

In April, Cedars-Sinai Medical Center in Los Angeles enabled support for Apple's HealthKit in its patient records system. With a user's permission, HealthKit (the app that collects Apple Watch data such as heart rate and activity levels) can communicate with third-party systems like the one at Cedars-Sinai. These metrics can add a day-to-day perspective on a person's health. When paired with traditional medical tests, they can help provide doctors with a more comprehensive picture. In terms of privacy, users have the ability to control which third-party apps have access to their HealthKit data. But, with all such devices, users need to be educated about how to use privacy settings.

There are also social media considerations. Many fitness-tracking apps include a sharing component where activity levels and other stats can be uploaded to an online support group. Sharing adds an important level of accountability that helps people stay on track to achieve their goals. However, consumers wonder who else might be able to access all of this data. There are rumblings that insurance companies may someday use metrics like heart rate and stress data to set premiums.

In some ways, issues like these are nothing new. For decades, technology has remained a step ahead of both the law and our social systems. It's too soon to tell where all this will shake out, but industry experts agree that we're headed for a whole new world of healthcare.

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