AN INTERVIEW WITH ERIC TOPOL, MD

COMING SOON TO A HEALTH SYSTEM NEAR YOU:
DIGITIZED, DEMOCRATIZED MEDICINE

The decorated physician and author says the “high-def” individual will replace the medical establishment as the focus of the future.

By Lauren Phillips

You could be forgiven for thinking that everyone in health care is betting on population health management as the way forward—but you would be wrong. Eric Topol, MD, thinks that direction represents a serious misstep.

Topol, a practicing cardiologist at Scripps in La Jolla, Calif., where he specializes in genomics and wireless digital technologies, sees population health as mass medicine, characterized by imprecision and controlled by the medical profession. He believes the future is individualized medicine: using the genome and digital technologies as a basis for understanding—and tailoring treatment to—each person’s unique biologic, physiologic, and anatomic makeup. And all of that data will be owned and controlled by that person.

He also believes this future is not as far away as you might think.

Some in the industry may scoff at the notion that these changes could start to take effect within a few years. But there’s no arguing with Topol’s credentials. He is a professor of genomics and the Scripps endowed chair in innovative medicine, chief academic officer of Scripps Health, and director of Scripps Translational Science Institute.

Previously, he led the Cleveland Clinic to the No. 1 spot in the U.S. News hospital rankings in heart care, started a new medical school, and spearheaded key discoveries in heart disease, including the drugs tPA and Plavix and multiple genes that increase susceptibility for heart attacks. He was named Doctor of the Decade by the Institute for Scientific Information for being one of the most cited U.S. medical researchers, and was voted the most influential physician executive in the United States in a national poll by Modern Healthcare.

THE GUTENBERG MOMENT

As he explains in his most recent book, The Patient Will See You Now: The Future of Medicine is in Your Hands, Topol sees this as medicine’s “Gutenberg moment.”

“Much as the printing press took learning out of the hands of the priestly class, the mobile Internet is doing the same for medicine, giving us unprecedented control over our health care,” he writes. “Medicine has been digitized, now it will be democratized.”

And democratization, he says, will lead to new cost structures, transparency, and progressive reduction of waste.

Topol is not talking about patient empowerment so much as patient emancipation. Technology such as wearable sensors, personal genome sequencing, better digital imaging tools, and ubiquitous electronic records, along with support from computer algorithms and machine learning, will allow patients to not only generate much of their own medical data but also track their health status and the treatments prescribed by their doctors.

For example, using a wearable glucose sensor and their smartphone, individuals who are at risk for diabetes will learn, for the first time, what particular foods or activities lead to better or worse glucose regulation. (See the sidebar on page 8 for more examples of how digitization can impact health care.)

GETTING FROM HERE TO THERE

This paradigm shift will not happen from the inside. Instead, it will come from one of three outside forces:

• Big employers tired of paying billions of dollars for care and hoping to downshift by enabling employees to track their own conditions using inexpensive chips instead of expensive alternatives that rely completely on physicians.

Live Session
See Dr. Topol’s keynote presentation at HFMA’s National Institute, June 26-29 in Las Vegas. For more information: hfma.org/ANI/Home/
Insurers wanting to become more competitive and more attractive to those big employers
Consumers of all ages harnessing the power of controlling their own data, peer-to-peer social media support, and technology to upend and flip the traditional doctor-patient relationship

“One of these will eventually get moving. I don’t know which or exactly when, but over the next few years we will see this really take hold,” Topol says. “The economy itself will likely be the driving factor. We’re currently spending more than $3 trillion a year on health care, and more than a third of that is waste—the wrong screening for the wrong person, the wrong medication.”

Of course, there will have to be a way to process and integrate the vast quantity of personal health data and superimpose it onto a global digital infrastructure. The healthcare industry’s ability to generate big medical data has outstripped its ability to manage that data, according to Topol. But, he says, data scientists—who can write algorithms, separate signals from noise, and actualize the full potential of computers to perform deep learning—are becoming an increasingly significant presence in medicine.

He points to a “few little pockets” in the world that are beginning to capitalize on new IT to create infrastructure and give people access to, if not yet control of, their own data. For example, Switzerland’s HealthBank, the world’s first citizen-owned health data exchange platform, allows people to collect their own data from any source or format and share it with whomever they choose—physicians, care teams, or loved ones.

And then there’s the Estonian Health Insurance Fund, which receives all billing data electronically and showcases the potential to connect all patients, providers, and insurers. The nationwide system has made it possible to create a single medical record for each patient, including test results and prescription history.

“If they can do it, we can do it,” Topol says.

Of course, the likelihood of cybersecurity breaches is enhanced with so many people having their own wireless devices and potentially accessing the health system’s “secure” inner network. As Topol writes in The Patient Will See You Now, “By having our medical selves digitized, we’re making ourselves highly vulnerable” to medical identify theft.

The larger the information resource, the more vulnerable the information. With a personal cloud with appropriate firewalls, the chances of “data escape are diminished.” But Topol is adamant about the need for a new act that transcends HIPAA and HITECH to protect privacy while at the same time promoting medical research.

“Curating medical information, with the right amalgam of security and openness, might someday be the foundation of curing, or at least preserving, health,” he writes. “I’m assuming that the right balance will eventually be struck.”

For that to happen, Topol says in an email, the “federal government

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**ERIC TOPOL’S TOP TARGETS FOR WIRELESS MEDICINE**

**Alzheimer’s disease** (5 million Americans). Wireless devices can track the vital signs of patients as well as their location, activity, and balance; smartphone apps can track specific eye function; and other apps can perform cognitive tests for screening, diagnosing, and monitoring the condition.

**Asthma** (20 million). Wireless devices can track respiratory rate, peak flow, lung function, air quality, pollen count, and other triggers so patients can preempt attacks before the onset of symptoms.

**Chronic obstructive pulmonary disease** (10 million). Wireless devices can monitor FEV1 (forced expiratory volume, a common index used to assess airway obstruction), air quality, and oximetry.

**Depression** (19 million). Wireless devices can monitor activity, communication patterns, tone and inflection of voice, facial recognition, vital signs, breathing patterns, galvanic skin response, and medication compliance.

**Diabetes** (21 million). Wireless devices can monitor blood glucose and hemoglobin.

**Heart failure** (5 million). Wireless devices can monitor vital signs, cardiac output and pressures, and chest fluid.

**Hypertension** (74 million). Wireless devices can continuously monitor blood pressure and track medication compliance.

**Obesity** (80 million). Wireless devices can track weight, and wireless smartphone sensors are being developed to scan food for caloric and nutritional content.

**Sleep apnea and disorders** (15 million). Wireless sensors can monitor each of the phases of sleep for quality of rest, detect apnea, and track vital signs.
needs to pass legislation that owning one’s data is a civil right, that hacking medical data carries the most serious penalties, and that no individual’s data can be sold or used in any fashion without the explicit agreement of the individual.”

FROM EHR TO PHR
In the United States, Topol says, the electronic health record (EHR) is “vastly incomplete.”

“It’s just a collection of one-off encounters, whether office visits or hospitalizations,” he says. “Ideally, we would have a PHR, a patient health record. It would have everything about the individual in it, including sensor-generated, real-time individual and environmental data, gene sequence, and microbiome and other biologic data. Moreover, instead of physicians having to focus on typing into the record during visits, every patient encounter would be captured with natural-language processing and machine-transcribed for both the patient and physician to edit.”

As much as anything, he says, what’s standing in the way is the profound reluctance of the medical community to give people their data—and with it, control over their own care. That reluctance, Topol says, is an outgrowth of the paternalism that has been a hallmark of health care.

A small start-up in California called Picnic Health is moving in the right direction, he says. The organization has developed software to collect all healthcare data from every provider a patient has ever seen, connect it, graph it, and make it accessible to patients via smartphone.

“I gave them the names of 20-some doctors I’ve seen over the last 25 years, in three cities in different health systems with many different electronic records,” Topol says. “Within two weeks, I could see on my phone every scan—actual scans, not just the reports—and every lab test, all connected in graph form. But I don’t own that data; I have to go onto their server to see it. I want it to be in my own private cloud. I want that for every individual.”

A DIFFERENT HOSPITAL ROOM
The hospital room of the future, Topol says, is the bedroom. Hospitals will have ICUs, ORs, EDs, and advanced imaging, but no regular patient rooms.

“Just as we saw the shift from inpatient to outpatient, the next shift is from outpatient to home,” he says. “With the remote monitoring capability we have today, it’s more economical, more convenient, and far safer to have patients recover in the comfort of their own rooms. Some systems are already moving in this direction.”

In 2015, for example, Mercy, one of the largest Catholic healthcare systems in the United States, opened the world’s first virtual care center, dedicated entirely to care outside its walls. The center includes the world’s largest single-hub eICU, which monitors more than 450 beds in 15 Mercy hospitals across five states; a telestroke program in which emergency department patients with suspected stroke can be seen immediately by a neurologist via telemedicine; virtual hospitalists; and home monitoring for chronically ill patients after hospitalization.

Such trends admittedly could result in large layoffs of hospital employees. Topol is blunt: “Health care, with a labor force that has grown unchecked over the last decades, is not immune to the whole trend of technology doing some things better without human beings involved.”

On the other hand, he says, although people will do much of

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their own diagnosing and monitoring—with access to a continuous stream of personal data and the digital resources to interpret it—they will still turn to physicians and the healthcare system for diagnostic oversight, interpretation, and treatment. The critical role of the doctor’s advice, experience, wisdom, and compassion will not be undermined, he contends.

And there will be significant new opportunities for hospitals. For one thing, Topol says, it would make sense for them to become aggregated data and information resource centers.

“While this could be done remotely by large, dedicated companies, it’s better if the data is proximal to patients—handled by physicians and staff who have familiarity with the individuals themselves,” he says. “That continuity and trust are important to patients.”

RATIONAL FINANCING

Topol would like to see everybody who works in the healthcare space be salaried, rather than incentivized to do things. He’s seen such an approach work in cardiology at the Cleveland Clinic, where, he says, people were amply rewarded for all their education, training, effort, and time.

“I think if we get away from the ‘medicine by the yard’ model—fee for service—we’ll be better off,” he says. “But the salary has to come with accountability for patient care and outcomes. While objective metrics can at times be difficult to define and can vary by type of practice, systematic patient and peer surveys can be helpful.”

Isn’t that what accountable care is all about, making care systems responsible for keeping their patients healthy? And isn’t that awfully close to population health management?

The concept of managing population health, Topol says, overlooks the key notion of the “high-def individual” taking charge. Accountable care is a good direction—just not aggressive enough. “The Affordable Care Act (ACA) approach moves at glacial speed,” he says. “If you really want to eliminate waste in our health system, you simply say, ‘No more fee for service, it’s over.’”

The pivot toward digitized, democratized health care, Topol says, is a worthy investment. The other trajectory, toward spending 20 percent of the country’s GDP on health care, is not acceptable.

“The problem is that none of the incumbents—hospitals, drug companies, physicians, insurers, etc.—have an incentive to make that investment,” he says. “Nor can we look to government; that big coupon was used up with the ACA, which was momentous in some ways but didn’t address the need or capitalize on the opportunity for individualized medicine.

“Hopefully, as we move forward with precision medicine, the Food and Drug Administration and Centers for Medicare & Medicaid Services will support innovations in digital and genomic technologies that define the medical essence of each individual. Except for legislation to deal with privacy and security, for which governmental intervention is wanting and vital, much progress in this space can be accelerated by less regulation.”

A more likely scenario, he says, is one in which the biggest employers say: “That’s it, we’re done paying all this money every year for a broken system. We’re going this other way, toward individual health—and by the way, we’re firing our insurer unless they support this initiative.”

If employers take such a step, Topol is convinced, “Then we’re off to the races.”

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