

The Wireless Revolution Hits Medicine

By RON WINSLOW April 16, 2012

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Eric Topol talks about the upheaval that's coming as the digitization of health care meets the smartphone

After 14 years as chief of cardiovascular medicine at the Cleveland Clinic, Eric Topol moved to La Jolla, Calif., in 2006 to become director of the Scripps Translational Science Institute, which was established to apply genetic discoveries to personalized medicine. Three years later, he helped launch the West Wireless Health Institute, for which he is vice chairman and which is investigating use of wireless technology in the delivery of health care.

The convergence of these two fields—genomics, marked by the rapidly plummeting cost of sequencing a person's entire genetic code, and wireless, with its flurry of innovative health-care apps—led Dr. Topol to write "The Creative Destruction of Medicine," a book that offers an illuminating perspective on the coming digitization of health care. It's also a reminder that while medicine is one of the globe's premier drivers of innovation, it is also a conservative culture that now finds itself buffeted by transformational change.

The Wall Street Journal's Ron Winslow discussed the implications with Dr. Topol. Here are edited excerpts from the conversation:

Unnecessary Boundaries

WSJ: Let's start with the title. "Creative Destruction" is a provocative term. What needs to be destroyed?

DR. TOPOL: There are two levels. One is that in medicine, everything we do essentially is at the population level. Whether it's mass screening or giving the same medication to all people with a particular diagnosis, this doesn't recognize the individuality of people. I think it's fundamentally flawed. We now have the tools to do much better.

The other is this analog world medicine lives in. The field has resisted a truly remarkable digital infrastructure to the nth degree. It hasn't really embraced genomics, wireless biosensors or advanced imaging that could be used to make medicine more precise. Or social networking.

The digital world has been in a separate orbit from our medical cocoon, and it's time the boundaries be taken down.

WSJ: So what are the tools challenging the status quo?

DR. TOPOL: The ability to sequence the human genome is finally making a difference, but it's far beyond that. By applying biosensors to the body, we can measure any physiologic metric—blood pressure, glucose, oxygen concentration in the blood—and send the data wirelessly through smartphones to doctors. That means you have this panoramic, high-definition, relatively

comprehensive view of a patient that doctors can use to assess and manage disease, and that patients can use to help maintain their health and direct their own care.

That is the essence of digitizing a human being. For medical purposes, it's getting all the essential data, and it will be the information to radically transform the future of medicine. Many of these things could be adapted today.

WSJ: What's the particular role of the smartphone?

DR. TOPOL: We're all essentially surgically connected to our smartphones, and we're still in the early stages of realizing their medical potential. But they should be a real threat to the medical profession.

You can get an add-on to a smartphone which does eye refraction and then texts [the prescription] to get your glasses made. If you're an optometrist, you might be worried about that. Or you can get your skin lesion scanned and get a text back quickly that there's nothing to worry about. If you're a dermatologist, that's a big part of your practice. You will be able to take a DNA sequence on a USB port and pop it into your smartphone and get data out of it. It just goes on and on.

Putting Tools to Use

WSJ: How would doctors and patients use these tools in practice?

DR. TOPOL: Let's say you want to prevent a child from ever having an asthma attack. You would know genomically from their DNA sequence that they're predisposed to asthma. Then you would apply a biosensor that could be worn to detect the early signs of an asthma attack and send data to the doctor through a smartphone before it occurred. Then medications could be used to ward off an asthma attack. Using the DNA sequence, the drugs would be matched up to the child's biologic basis for asthma, predicting responsiveness and the absence of significant side effects.

WSJ: What will a typical doctor appointment be like with this approach?

DR. TOPOL: I hope it's going to be a whole lot better than today, because the average appointment lasts seven minutes in the U.S. And usually the patient is waiting for an hour. So it's a very inefficient system.

With digital tools, if you're seeing someone who has high blood pressure and blood-sugar problems, a lot of the data that's relevant could be sent through the Web before or during the visit. That's different from today, when you and your doctor don't have data available during the visit.

But the other thing to consider is that in the future, many office visits will not be in person; they will be "house calls" through Skype and FaceTime and other video links.

Making It Personal

WSJ: Is there a possible irony that in using all this technology to "personalize" medicine you "depersonalize" it instead?

DR. TOPOL: When you have this type of rich data on an individual, there's a tendency to treat the scan or treat the DNA or treat the sensor data output rather than the patient. But it can actually increase the intimacy. I use a portable pocket ultrasound device instead of a stethoscope to listen to the heart, and I share it with the patient in real time. "Look at your valve, look at your heart-muscle strength." So they're looking at it with me. Normally a patient is tested by an ultrasonographer who is not allowed to tell them anything. They have to call the doctor and ask, "What did it show?"

WSJ: What are roadblocks for moving to this new world?

DR. TOPOL: A core problem is the medical profession. The average time it takes for a significant innovation to become standard clinical practice is 17 years. The Wall Street Journal had a piece about how 62% of doctors don't use email with their patients. I mean, help me. This is 2012. This is resistance.

But what has really gotten me stirred up is the issue of whether patients should have access to their own health data. The AMA [American Medical Association] was lobbying the government that consumers should not have access directly to their DNA data, that it has to be mediated through a doctor. The AMA did a survey of 10,000 doctors, and 90% said they have no comfort using genomics in their clinical practice. So how could they be the ultimate mediator by which the public gets access to their DNA data? That really speaks to medical paternalism.

The fact that consumers will have this ability to have themselves—their genome sequence, their lab tests, their tissues—digitized on their smartphones and their social networks will reboot the way doctors interact with patients.

WSJ: But not all the skeptics are knuckle-draggers. Some prominent scientists say very few of us will find value anytime soon in having our own DNA sequenced. And will people really want to be constantly streaming their digital vital signs into the ether?

DR. TOPOL: The skepticism is healthy, but we're already seeing remarkable effects in the precise management of cancer, in demystifying life-threatening and heretofore unknown conditions and matching drugs with a patient's genomic data.

The main thing is that there are these remarkable new tools that are hyperinnovative. People are already putting data on social networks, comparing genomic data and competing for the best quality sleep, best blood glucose. It will really take off if consumers are driving this via the power of their social networks. This radical transformation to a higher plateau of medicine is inevitable.