

FAST COMPANY

As Smartphones Get Smarter, You May Get Healthier: How mHealth Can Bring Cheaper Health Care To All

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By Adam Bluestein

Smartphones and tablets are transforming the future of health care. Can we really trust them to save lives?

The average auto refractor--that clunky-looking device eye doctors use to pinpoint your prescription--weighs about 40 pounds, costs \$10,000, and is virtually impossible to find in a rural village in the developing world. As a result, some half a billion people are living with vision problems, which make it tough to read and work. Ramesh Raskar knew fixing this problem would be tricky. It required a new way of thinking about eye tests--and a new kind of device, one powerful enough to support high-resolution visuals, cheap enough to scale, and simple enough to be used by just about anyone. The MIT professor briefly toyed with stand-alone options, which were complicated and costly. Then he reached into his pocket and pulled out an unexpected savior: his iPhone.



"The displays had gotten so good, thanks to people wanting to watch episodes of *Lost* in high definition," Raskar recalls. "I was immediately energized."

By creating an app and attachment for the popular smartphone, Raskar could tap into a huge existing user base and skirt millions in distribution and manufacturing costs. The result: a plastic clip-on eyepiece that uses an on-screen visual test to determine a patient's "refractive error" (a number doctors then use to dole out prescriptions). When his startup, EyeNetra, begins market testing later this year in Brazil, India, and Mexico--and eventually in the U.S.--its tech will deliver all the functionality of an optometrist's costly machine for less than \$30.

What Dr. Smartphone can do for you

EXAMINE YOUR EARS!
EarScope
A magnifying attachment turns any smartphone camera into a simple otoscope, which allows users to capture high-resolution images of their eardrums and middle ears for assessment. Future versions could be built software that can identify things like infections, earwax, and more.
Available from 2012

TAKE YOUR BLOOD PRESSURE!
Blood Pressure Monitor
One more plastic device into an iPhone, iPad, or Palm Pre, they can use their built-in cameras to check for blood pressure, cholesterol, and more.
Available from 2012

COACH YOUR LIFE!
ClapGo
The mobile phone is a powerful ally of our lives. "ClapGo" can help you learn to breathe, relax, and more. It's designed to help you learn to breathe, relax, and more. It's designed to help you learn to breathe, relax, and more.
Available from 2012

FEEL YOUR VISION!
EyeNetra, EyeCitra
A new way of thinking about eye tests. EyeNetra helps people check for vision problems by holding the device up to their eyes and taking pictures of their retinas. EyeCitra uses similar technology to check for vision problems. EyeCitra uses similar technology to check for vision problems.
Available from 2012

SHARE YOUR FETUS PHOTO!
Mobile Baby
This service from Sonnet Developer Great Connection allows hospital attendants to share photos of their newborn babies with friends and family.
Available from 2012

GET YOU PREGNANT!
Conception Monitor
Hundreds of U.S. women have used the sensors--which attach to the arm to monitor body temperature and other data--to help themselves get pregnant.
Available from 2012

PERFORM AN ULTRASOUND!
Mobile Ultrasound
Beyond monitoring pregnancies, this mobile ultrasound device, which is for patients like this one, allows them to see their own babies in real time.
Available from 2012

FLAG YOUR PULSE PROBLEMS!
Cardiac University
"Cardiac University" is a mobile health app that allows users to track their heart rate and other vital signs. It's designed to help users identify potential health problems and seek help from their doctors.
Available from 2012

MONITOR YOUR MOVES!
Selene Mita
Using "Selene Mita" smart shoes, wearable accelerometers that track a user's movements. In an iPhone, Mita's app can detect the user's movements and provide feedback on their posture and movement.
Available from 2012

TRACK YOUR BLOOD SUGAR!
Smart-A-Sugar
By using the app of an AA battery, this blood glucose monitor does work as an independent device. But when you use it, it can connect to your smartphone.
Available from 2012

HELP YOU SLEEP!
SleepSense
A new way of thinking about sleep. SleepSense helps people track their sleep patterns and provides feedback on their sleep quality. It's designed to help users identify potential sleep problems and seek help from their doctors.
Available from 2012

This is the thrilling, disruptive potential of "mHealth," the rapidly growing business of using mobile technology in health care. Leveraging the wonders of a device that's fast becoming ubiquitous--two in three people worldwide own a cell phone--a new generation of startups is building apps and add-ons that make your handheld work like high-end medical equipment. Except it's cheaper, sleeker, and a lot more versatile. "It's like the human body has developed a new organ," says Raja Rajamannar, chief innovation officer at Humana. Smartphones can already track calories burned and miles run, and measure sleep patterns. By 2013, they'll be detecting erratic heartbeats, monitoring tremors from Parkinson's disease, and even alerting you when it's prime time to make a baby.

At stake is the future of health care--and a share of the \$273 billion medical-device industry, which is dominated by the likes of GE and Philips. Although today's mHealth market barely tops \$2 billion, experts predict that number will skyrocket over the next decade as smartphones get smarter and patients lose, well, patience with the high costs and hassles of health care. "Why prescribe a \$1,000 test in the hospital when all you need is a heart rate?" asks Leslie Saxon, a cardiologist who heads the University of Southern California's Center for Body Computing. With inexpensive new technology, she notes, "I could tell a patient to go to the drugstore and buy an ECG [electrocardiogram] sensor for her phone."

But can we really trust our phones to dispense medical data? That's the question facing the FDA, which has spent the past year or so putting pioneering mHealth products through rigorous evaluations. "We had to show that our phone-computing platform and display quality were on par with existing devices," says Sailesh Chutani, CEO of Mobisante, whose ultrasound attachment was sanctioned in January--after about a year of costly back-and-forth. With this first wave of devices approved and a mobile-specific set of guidelines to be finalized later this year, the FDA expects to streamline its approval process, which should juice the mHealth market. "Regulatory clarity almost always drives investment--provided it's not a big, clear no," says Joseph Smith, who helps run the West Wireless Health Institute.

Whether these tools actually make us any healthier, however, will depend on how we use them. Given the ability to record our snacks, thoughts, naps, movements, and more, "we will be overwhelmed with data," warns John Moore, a lead researcher in the New Media Medicine group at the MIT Media Lab. "We need a holistic vision to make it all meaningful and motivating." Among other advances, that vision will require a seamless flow of data across myriad devices and platforms--think how the MP3 format transformed the music industry--and a physicians' movement to adopt electronic medical records. (Right now, only a third of them have.) And even then, there's no guarantee these tools will change behavior. Will we stop eating sugary foods? Or, as Smith wonders, will we just be staring curiously at "phones that show glucose readings in three colors"? Corporate titans are racing to find out. Johnson & Johnson, the world's largest medical-device maker, recently invested in sleep-monitoring technology from Zeo, a Massachusetts-based startup. Best Buy is funding earbuds that can monitor your heart rate. AT&T helped seed an employee-wellness program with WellDoc, whose apps help users manage diabetes, among other conditions. And Qualcomm, the renowned chipmaker, just launched a subsidiary that's helping to develop all kinds of mHealth devices. "Will this nascent technology attract consumers, health-care providers, and health-care payers?" says Don Jones, a VP at Qualcomm. "The entire world is keeping its fingers crossed."

Anatomy Of A Handheld Hospital



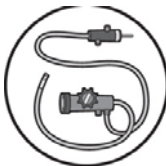
1 Processor that can power a pacemaker

Smartphones run superfast (in excess of 1 GHz) without consuming much power, much like top-notch pacemakers and cardiac defibrillators.



2 Display that can assess an ultrasound

The iPhone 4S's resolution (300 pixels per inch) is on par with most hospital-grade ultrasound monitors, and small screen size won't matter once projection tech takes off.



3 Camera that can capture cells

The HD video camera, which shoots 30 frames per second, is more advanced than some of the ones in colonoscopes, which doctors use to seek out potentially cancerous tissue.



4 Accelerometer that can guide physical therapy

The three-axis accelerometer captures the same subtle movements--tilts, shocks, rotations--as APDM motion sensors, which are used to monitor patients' Parkinson's disease and help them through physical therapy.



5 Microphone that can hear your heart

Because of its flat-frequency response rate--which drastically reduces noise distortion--a smartphone mic (with help from an amplifying attachment) can detect a heartbeat almost as well as a \$500 electronic stethoscope.