

Wireless medical monitors set to transform patient care

March 23 2012, By Steve Johnson, San Jose Mercury News

It's hard to find a better example of how technology is revolutionizing patient care than the tiny edible sensor Proteus Biomedical of Redwood City, Calif., plans to begin selling this fall in the United Kingdom.

When the grain-of-sand-sized sensor is integrated into a drug tablet or capsule and activated by stomach fluid, it signals when the medicine was taken to a patch on the patient's body. Then the patch relays the information along with the person's [heart rate](#) and other medical details to a caregiver's phone - all without a visit to the doctor.

"We're seeing an enormous surge in demand for [health services](#) across the globe," said Proteus CEO Andrew Thompson, noting that he plans to offer a similar product in the United States. To meet that need inexpensively, he added, "health care must digitize. It must move into the 21st century."

Some experts predict that in the near future, tens of millions of Americans will be tethered to gadgets that will automatically send their vital signs to [medical professionals](#), relatives and concerned friends. The technology already has generated an industry worth well over \$1 billion a year. And despite concerns that the data transmitted by patients could overwhelm doctors and be spied on by hackers, the trend is widely expected to transform the relationship between patients and physicians.

Eric Nagel, a 57-year-old semiconductor analyst who lives in Los Gatos, Calif., generally takes his [blood pressure](#) readings in the morning with a

monitor made by iHealth of [Mountain View](#), Calif. The device sends the data in an easy-to-understand form to his [iPhone](#) and every few weeks, he emails the data to his doctor, who became concerned about his [high blood pressure](#) a year ago.

"She wanted to put me on medicine," Nagel said. But he worried about the possible side effects and chose instead to exercise more and improve his diet.

"It's been a very positive thing for me," he said. "I've been able to get my blood pressure down. The device was able to show me what changes I was making that were positive and which ones weren't."

Lots of patients could benefit by sharing their medical data more regularly with a physician, said Dr. Joseph Smith of the West Wireless Health Institute in La Jolla, Calif., which seeks to lower health care costs in part through new innovations.

"The notion that your needs for health care are best met by seeing a doctor a couple times a year, when you live every day, is probably wrong," he said. "There is obvious value in knowing more."

Many people are reaching the same conclusion.

Of 2,000 consumers surveyed by PricewaterhouseCoopers in 2010, 40 percent said they would willingly buy a device and pay a monthly fee to automatically send their heart rate, blood pressure, blood sugar and weight data to their doctors. And Connecticut research firm Nerac estimates that by 2020, "at least 160 million Americans will be monitored and treated remotely for at least one chronic condition."

That represents a big business opportunity. Juniper Research has predicted the global market for remote patient-monitoring gadgets will

hit nearly \$1.9 billion in 2014. Another research firm, Park Associates of Dallas, has put the U.S. market alone this year at \$4.4 billion. Either way, several companies hope to cash in.

Besides Proteus and iHealth Lab, those include Santa Clara, Calif., chip-making giant Intel. It announced a deal with GE in 2010 to sell Intel's Health Guide, which helps patients collect information about their vital signs and share it with their doctors via the Internet.

Another company is Corventis of San Jose, which two years ago won FDA approval for its Nuvant mobile device for detecting irregular heartbeats. Able to be worn in the shower or while a person is sleeping, the product wirelessly sends data to the company, which reviews the information and notifies doctors of troublesome signs.

The technology also has aroused some concerns.

Some experts worry that medical monitoring devices could produce an information tsunami. Hospitals, clinics and doctor's offices already are flooded with enough electronically generated material to fill nearly two trillion file cabinets, according to a report in November by market researcher Frost & Sullivan. And it added that wireless monitors "have the potential to dramatically increase the amount of [health care](#) data."

Others fear hackers compromising the equipment could use the information to steal patient identities, post their vital signs on social network sites and alter their data to hide its seriousness or to issue false alarms.

Just a few months ago, a hospital employee admitted having hacked into a wireless medical monitor, according to Larry Ponemon, who runs a data-protection research institute in Michigan and was told of the incident. Similarly, a security researcher in August revealed at an

industry conference that he had discovered flaws in wireless insulin monitors that could allow someone to remotely alter their blood-sugar readouts.

That last incident prompted Reps. Anna Eshoo, D-Calif., and Edward Markey, D-Mass., to ask the U.S. Government Accountability Office to look into the potential for hacking. While few such breaches have been reported so far, the U.S. Food and Drug Administration is concerned because "any system with wireless communication can be subject to interception of data," said Bakul Patel, a policy adviser with the agency.

But others view the trend as inevitable and, ultimately, beneficial.

Preventive care is really the buzz word now," said Adam Lin, an iHealth senior vice president. "The way you do that is by allowing patients to take control of their own health." Because of that, he added, "remote monitoring is going to be big."

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