

A wireless way to thrive

Local companies helping health care, high tech unite

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One day in the not-so-distant future, as you slip toward pepperoni-mushroom temptation, a text message may intervene.

“Are you stopping for pizza?” your virtual conscience asks. “Your calendar says you were planning to hit the gym. You haven't had your heart rate in the target zone for 72 hours, and so far today you've consumed 200 calories more than you've burned.”

The melding of health care and wireless technology is creating new tools for health care providers, including the “m-diet” system from a University of California San Diego medical research team.



JOHN GIBBINS / Union-Tribune

The combination presents an opportunity for San Diego to launch a third major technology sector. The m-diet research, for example, has spawned a related startup company. Other young companies locally are developing or marketing products to monitor blood sugar, heart rhythms and a patient's vital signs.

Diabetic Troy Stork of San Diego uses a wireless glucose sensor implanted into his abdomen that monitors his blood-sugar levels and alerts him when they fall or rise.

“If wireless health care is developed anywhere, it should be here in San Diego with our strong wireless and biotechnology industries,” Qualcomm Chairman Paul Jacobs said in a recent interview.

Driven by laboratory breakthroughs, falling prices of existing technologies and interest from major companies such as Qualcomm, Intel, IBM, Microsoft and AT&T, wireless health care is expected to grow to a nearly \$2 billion industry in the next five years.

Qualcomm is taking steps to fulfill Jacobs' call for a vibrant wireless health care industry in San Diego. The company in 2005 founded the Wireless-Life Sciences Alliance, an organization of companies interested in wireless health care.

More recently, Qualcomm co-funded a pilot program to create the world's first physician-scholar program to focus on wireless health care research. Two physicians will spend two years in new positions at the Scripps Translational Science Institute, immersed in the study of wireless health care.

The project is part of a \$20 million grant from the National Institutes of Health awarded to the Translational Science Institute, a new organization with the mission of translating life-sciences research into real-world health care. The grant will create a "mini-NIH" in San Diego with some emphasis on wireless health care, said Eric Topol, director of the institute.

"When I came here in 2007, I said that the institute brings the future of medicine to San Diego alongside the life-sciences and wireless-technology industries," Topol said. "Now I say that the future of medicine is the convergence of life sciences and wireless technology."

Topol and Qualcomm's vice president for health care business development, Don Jones, said they hope the new research positions will serve as catalysts to get physicians thinking more about electronics and engineers thinking more about medicine.

"It's a funding mechanism to effectively force different disciplines to work together," Jones said.

Jones said wireless health care has the potential to alleviate the coming crunch as baby boomers become senior citizens. It also could help reduce the growing cost of health care.

"It has the potential to allow physicians to remotely manage hundreds or tens of thousands of patients," Jones said.

San Diego's fledgling wireless health care industry is expected to get a boost not only from Topol's organization at Scripps, but from research at UCSD and the related California Institute for Telecommunications and Information Technology, known as CalIT2.

Another vital area of support is expected to come from San Diego's computer-analytics industry. As sensors and wireless networks generate streams of information, the systems will require computers capable of monitoring the flood of information and, when appropriate, responding with a personalized pizza-intervention message or an alert to a patient and doctor that an irregular heartbeat has been detected.

"San Diego is very strong in computer analytics," said Ramesh Rao, director of the UCSD division of CalIT2. "The same software algorithms that can detect unusual credit-card activity can monitor health care information and detect irregular patterns."

At least four wireless health care startup companies have launched in San Diego. One of those, Santech, is commercializing UCSD technology for weight management, using text messages, sensors and wireless devices.

Santech uses accelerometers – the technology behind the motion-sensing Nintendo Wii – along with GPS and heart-rate monitors to track a participant's location and activity level. Information is sent from the sensors, via Bluetooth wireless to a phone, which relays it to Santech servers.

Participants also report what they eat, which is passed along to the servers. The system then calculates calories consumed and calories burned and composes text messages that call for a response.

In Santech's research, people participating in the two-way text chats lost 6½ pounds, while those in a control group lost 2 pounds, said Kevin Patrick, one of Santech's founders and a professor of preventive medicine at UCSD.

“We engage in a little dialogue with them, with custom messages,” Patrick said. “We've had people tell us they forgot they were chatting with a machine.”

Santech's commercially available Text4Diet application doesn't have a pizza-intervention component, but the system is moving in that direction, Patrick said.

Researchers are working to integrate a common phone sensor – the camera – to automate the record of calories consumed using photos of bar codes and images that show portion sizes of restaurant meals.

Patrick said San Diego is fertile ground for launching wireless health care startups.

“You've got the confluence of wonderful people in the wireless space and people in health care designing nanotech devices and sensors,” he said. “We've got people here working at every level. We're very well-positioned.”

Like Qualcomm, Intel has a strong interest in wireless health care. The dominant computer-chip-making company is testing a number of approaches, including systems to assist and monitor seniors in their own homes and a stress-reduction tool designed to improve heart health.

Eric Dishman, Intel's global director for digital health care, said wireless sensors on medicine bottles and toothbrushes can help track daily activities, such as taking medications. Accelerometers can make sure older residents don't fall at home. They also can trigger an alert to family members or other caregivers when there are no signs that the

patient has gotten out of bed.

Intel is also developing a “virtual therapy” application that monitors heart rate as part of a system to predict stress and intervene with cognitive behavioral therapy. The system has the goal of short-circuiting the cycle before stress reaches the point at which it begins to damage the heart.

When a calendar shows a meeting and the heart rate shows rising stress, the system would use the participant's phone to intervene with one of several strategies. Its screen might display photos of pets, children or other “positive images.” Or, it might display a guided relaxation program, such as breathing exercises. If stress indicators continue to rise, the device might execute an exit strategy such as calling to create an excuse to leave the meeting.

The emergence of wireless medicine is being driven in part by technological advances in sensors.

The continuous glucose monitor from San Diego-based DexCom is one example of a biosensor breakthrough fostering a startup company. The sensor is a thin, wirelike device inserted into the skin. A wireless module attaches above the skin. Every five minutes the device sends an update to a receiver, which has a display and a speaker to sound alerts.

As a result of the continuous monitoring, blood sugar is measured 12 times an hour instead of six times a day, which allows for improved management of diabetes, said Terrance Gregg, DexCom's president and chief executive.

Diabetic Troy Stork of San Diego says the DexCom monitor has given him more detailed information about his blood-sugar levels. His doctor has adjusted his insulin dose based on the system's log files. The device beeps to wake him if glucose levels drop during the night and alerts him when levels rise.

“Stress from work can make my blood sugar rise,” Stork said. “If it beeps, I know I need to take a walk around the block to manage it.”

Wireless health care is poised to become a \$1.8 billion annual industry within five years, said analyst Tim Deal of Maryland-based market research firm Pike & Fisher.

But Deal cautions that to be successful, the industry will have to get doctors to change the way they view the world.

“Medicine has some very old, rich traditions built on a well-established knowledge base,” he said. “It's a hands-on profession. There will be some reluctance to disconnect from patients.”

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