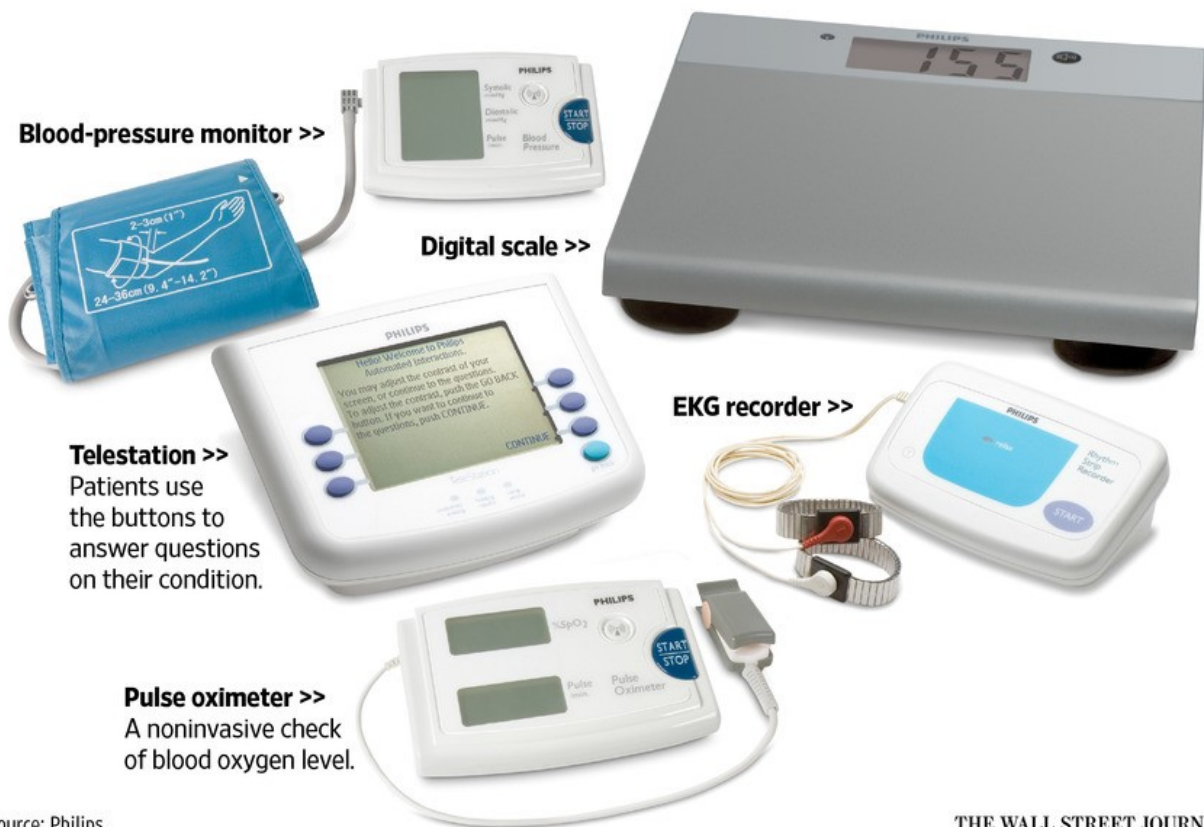


# Remote Patient Monitoring Lets Doctors Spot Trouble Early

For patients with chronic conditions, tracking of vital signs allows quick adjustments in care

## Long Reach

Wireless devices for remote patient monitoring



Source: Philips

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By **JONATHAN D. ROCKOFF**

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Richard Setzenfand had a wireless router installed in his Pittsburgh home last fall. But it wasn't for surfing the Internet or streaming video to his computer.

The router was sent by the University of Pittsburgh Medical Center to track how Mr. Setzenfand's diseased heart was doing. The device wirelessly collects the measurements taken in the patient's home by a scale, blood-pressure cuff and fingertip blood-oxygen meter, and sends them to the medical center.

Based on those transmissions, Mr. Setzenfand's doctor adjusted the doses of two blood-pressure drugs without the patient needing to visit the doctor or ending up in the emergency room. "I don't have to do anything other than use the equipment," says Mr. Setzenfand, a 78-year-old retired accountant.

Such a merging of wireless technology and medical care is still in its infancy, but health systems that began pilot programs with the technology in recent years say they see signs that it is keeping patients healthier. By enabling doctors to continuously monitor patients, they say, the systems can detect problems well before they grow serious.

"We've been able to show significant reduction" in hospital admissions, says Mark Rumans, chief medical officer at Vidant Health, which operates hospitals and other health-care facilities in eastern North Carolina.

## Cost, Care Concerns

Vidant, which started its program in February 2012, has 600 to 700 patients with congestive heart failure, diabetes and high blood pressure participating in its remote-monitoring program at any one time. Each receives various devices to measure blood pressure and other vital signs, along with a transmitting device to send the data via cellular service to Vidant.

Hospital admissions for these patients fell 74% in 2013 and dropped 54% during the first eight months of last year from the same period a year earlier, to 192, according to Dr. Rumans.

Remote-monitoring programs tend to focus on serious, chronic conditions like congestive heart failure, which typically have resulted in repeat hospitalizations. Readmissions for these conditions are a major health-care expense, and Medicare has begun penalizing hospital systems with high readmission rates.

"We are under considerable pressure all around to deliver better outcomes and keep costs down," says Ravi Ramani, director of the Integrated Heart Failure Program at the University of Pittsburgh Medical Center, or UPMC. "What we're trying to do is use technology" to further those efforts.

About 250 heart-failure, diabetes and other patients participate at any one time in the UPMC remote-monitoring program, says Andrew Watson, medical director of the program.

For instance, UPMC patients recovering from severe wounds take photos, which doctors and nurses then look at remotely to see if the wounds are healing well or require antibiotics or other treatment. Diabetics transmit their blood-sugar levels, while the weight, blood-oxygen levels and blood pressure of patients with congestive heart failure are monitored.

Last year, 12.9% of the patients with congestive heart failure in the program were readmitted to a hospital within 30 days of their initial hospitalization, compared with 20% of patients with the condition who didn't participate, Dr. Ramani says.

## Working Out the Kinks

Leading manufacturers of remote-monitoring equipment include [Medtronic Inc.](#), [PhilipsNV](#) and [St. Jude Medical](#) Inc. Sales are expected to total about \$32 billion this year, with a compound annual growth rate of 9.2% between 2014 and 2019, according to Kalorama Information, a medical-market division of Market Research Group LLC. Still, adoption of the technology hasn't always been smooth.

One persistent obstacle to running the programs, industry officials say, is a general lack of reimbursement from insurers for the costs of equipment and monitoring, which leaves providers to absorb those expenses.

Health systems also say they experienced growing pains as they began trying to keep tabs on patients from a distance. The volume of incoming data was overwhelming, requiring fine-tuning of algorithms to help sort out what should come to nurses' immediate attention. And some health systems decided it was better to hire a telecommunications company to install the equipment, rather than do it themselves.

In addition, some doctors complained that the information arrived in an unwieldy format that didn't relate the readings to each patient's overall health. So, UPMC tweaked its software to allow doctors to tailor the target levels for each patient's vital signs, so that they would only get clinically meaningful data, and developed an easy-to-use format, Dr. Ramani says.

At Mercy health system in Missouri and neighboring states, chronic-condition nurse Penny Lee watches the daily data stream on two computer screens at a Springfield, Mo., office and makes calls to patients if a red alert appears.

Ms. Lee says she makes about 20 calls a day prompted by the red warnings. For instance, if a patient with congestive heart failure is reported to have gained 3 pounds overnight, Ms. Lee asks questions designed to determine whether the patient's condition is worsening, there is a medication problem or the weight gain is simply a false alarm, maybe caused by a family member stepping on the scale.

Sometimes the problem is caused by the patient eating salt-heavy food or drinking too much fluid, in which case Ms. Lee will review proper diet. She reports her actions to the patient's doctor.

Allen England, 65, of Wheaton, Mo., had his blood-pressure medicines and their doses adjusted some 20 times remotely by Mercy after he was diagnosed with congestive heart failure and another heart condition called cardiomyopathy in 2013 and a home blood-pressure monitor reported dangerously low levels, says Jan England, his wife.

"It saved many trips to the emergency room," Ms. England says. Eventually, doctors and nurses decided Mr. England needed a defibrillator pacemaker, which was implanted in April 2014.

Mercy, based in Chesterfield, Mo., has anywhere from 270 to 500 patients with congestive heart failure and chronic obstructive pulmonary disease in its remote-monitoring program. Hospital readmission rates for the heart-failure patients fell to 15.7% last year from 18% in 2009. Mercy says it doesn't have data yet on COPD patients because the program won't be fully implemented for them until April.

A big component of the programs is teaching patients about their conditions and medicines, and helping them to manage both correctly. That usually starts when nurses talk with patients about joining the program and continues as feedback from the monitoring provides teaching moments.

"We see patients for only 15, 20 minutes at a time, but there is so much more that goes on in patients' lives, so we are trying to be out there with patients, at their homes, at their workplaces and in their communities" through remote monitoring, says Parag Agnihotri, who directs the Continuum of Care programs at Sharp HealthCare's Sharp Rees-Stealy Medical Group in San Diego.

## Breathing Easier

Sharp Rees-Stealy puts a sensor on asthma inhalers to make sure patients are using them appropriately. The sensors record when asthmatics like David Hogben press down on the button triggering their inhalers, then sends a signal to Mr. Hogben's cellphone, which transmits the information to Sharp Rees-Stealy.

Sharp Rees-Stealy nurses monitoring the data can see if Mr. Hogben is using his emergency inhaler, a possible sign that he isn't regularly using his controller inhaler as he should and could be heading toward the kind of troubled breathing that leads to an emergency-room visit.

Mr. Hogben, a 44-year-old San Diego resident, says he also gets text messages and emails from Sharp Rees-Stealy every day reminding him to use his regular inhaler and when to recharge the sensors.

After joining the program last year, Mr. Hogben says he experiences just one breathing episode a month, down from three a week. "This system has made such a big change in my asthma," he says.

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