

# BEYOND EHRs:

## How Technology Can Help You Treat Chronic Illness

**New tools may soon connect you to your patients at home.**



**M**ore than 133 million Americans currently live with a chronic condition.<sup>1</sup> The incidence of chronic illness is accelerating as the baby boom generation ages and young Americans become increasingly sedentary. Case in point: The number of individuals with diabetes in the United States is expected to double to more than 48 million by the year 2050.<sup>2</sup>

The numbers are staggering and perhaps overwhelming for primary care physicians. That's understandable because, in its present form, the U.S. health care system is largely ineffective in the management of chronic illness.<sup>3</sup> Several medical schools have responded by developing

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curricula emphasizing chronic disease management, but shortages of family physicians and other primary care specialists are expected to continue as fewer medical students enter these fields. This greater demand and diminished supply further support the need for new models of care delivery. Seven to 10 minutes is the norm for a typical follow-up office visit, but even if we could cut that time in half and double patient volume, we would not begin to address the growing supply and demand problem. Simply put, we are losing the capacity battle.

All hope is not lost, however. This article discusses how technology can help family physicians not only keep up with the needs of their chronically ill patients but also increase the quality of their care.

## Staying connected with your patients

Through initiatives such as the AAFP's 2007 Annual Clinical Focus on the management of chronic illness, family physicians have been introduced to the chronic care model. It outlines the critical elements needed for health systems and individual physicians to improve the health of the chronically ill.<sup>4</sup>

The chronic care model focuses on a proactive medical team that follows up with its patients as well as empowered patients who are active in and educated about their own treatment. A big part of this can be accomplished by using technology to transform health care delivery. This concept, referred to as "connected health," has emerged from the

need to maximize health care resources in the face of growing demand, combined with the diffusion of communication technologies into the U.S. health care system.

Our vision of connected health emphasizes two core elements: self-care and remote care. Self-care can lessen demand, and remote care can increase supply.

Self-care is a vital component of chronic disease management. It involves giving patients the feedback, motivation and education they need to manage their conditions on a day-to-day basis. It can also encourage healthy behaviors in those at risk for chronic illness. In both cases, tools that give patients ongoing feedback on their health can accelerate and support positive lifestyle changes.

Remote care involves monitoring, diagnosing and communicating with patients at a distance. It goes a step further than basic patient-physician messaging and uses sensors to capture quantitative data. This can facilitate higher quality care. It can also lead to greater efficiency for a multidisciplinary medical team if the data is reported through a centralized mechanism.

## Real-life examples

Several large health systems have positioned themselves to take a leading role in health care transformation and the integration of connected health services. One is Partners HealthCare's Center for Connected Health (CCH) in Boston. CCH has introduced several initiatives that demonstrate the value of technology-enabled, patient-centered care. For more information, see its Web site at <http://www.connected-health.org/programs.aspx>.

In one CCH program, more than 325 heart failure patients are monitored remotely through the collection of vital signs, including heart rate, blood pressure and weight, using simple devices in the patient's home. The information is sent daily to a home health nurse, who can identify early warning signs,

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New technologies could help family physicians stay on top of the needs of a growing population of chronically ill patients.

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A key portion of the chronic care model, which involves proactive medical teams and empowered patients, can be accomplished using technology.

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The concept of using technology to transform health care delivery is known as "connected health."

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### About the Authors

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notify the patient's primary care physician and intervene to avert potential health crises.

Another CCH initiative uses cell phone technology and a "smart" pill bottle to detect whether a patient has taken his or her scheduled medication. If the bottle is not opened at the right time, it sends a signal to a small light in the patient's home that glows red to remind him or her to take the medication. If the patient has opened the bottle and taken the medication on schedule, the light glows green.

A third CCH program is attempting to help hundreds of employees at a major Massachusetts company manage their high blood pressure through an Internet-based wellness program. It is hoped that this program will interest employers in connected health as a way to increase access and reduce health care cost. The impact of this program is still being evaluated, but early results are encouraging.

### The enabling technologies

Here is a rundown of the technologies that are being used in the CCH programs and that family physicians might soon use to track their physicians' conditions remotely:

**Sensors.** From off-the-shelf blood pressure cuffs to wireless oximeters to implantable glucose monitors, the sensor industry is exploding with accurate, cost-effective tools to capture, store and transmit physiologic parameters.

**Communicators.** Data from patients, including physiologic markers and information regarding their disease severity, clinical

state and functional status, must be aggregated and communicated to providers, and then displayed back to patients to encourage self-care. The technologies for achieving this include hand-held computers, desktop computers, mobile phones and even television.

**Networks.** While practices can choose from a variety of network technologies, including telephone, pager, Internet, wireless, cable and cellular, the leading trend is to use a single high-speed wireless Internet platform.

**Storage/processing/databases.** Robust, secure storage and computing power are both important parts of the technology mix. This includes sophisticated programs that use algorithms to identify important data points and trends, making some care decisions automatically in the background and presenting other cases to the appropriate clinician for action.

**Presentation.** For the clinician, this means the information transmitted to and from the patient must be integrated into an electronic health record (EHR) format for review, decision making and action. For the patient, this means the information must be presented in a clear and meaningful way that is easy to use and promotes self-care.

**Personal health records.** While just beginning to emerge, personal health records (PHRs) will increasingly be available to patients who wish to collect, store and share their personal health data. WebMD and Revolution Health are among a growing number of companies that offer secure, online PHRs. In the near future, other companies will offer personal health information with search

capability, Web services that deliver personalized guideline recommendations and customized delivery of medication information, including discount pricing and drug-drug interaction warnings.

### Addressing common concerns

As with any disruption to the status quo, the use of connected health tools will not be embraced without first addressing

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■ Self-care refers to giving patients the tools they need to manage their conditions on a day-to-day basis.

■ Remote care involves monitoring, diagnosing and communicating with patients from a distance.

### EARLY DEVELOPERS

Initiatives such as the Continua Health Alliance have established a forum for health plans, health systems, device manufacturers, technology companies, pharmaceutical companies, educational institutions and others to collaborate on connected health solutions. Since 2005, more than 140 organizations have joined the alliance, including Aetna, Cisco, IBM, Intel, Kaiser Permanente, Partners HealthCare, Pfizer, Sprint, the United Kingdom's National Health System and the University of Miami's Miller School of Medicine. Early adoption of the connected health approach could help family medicine to reaffirm its role as a vital component in the care and management of chronic disease.

# Physicians who have incorporated technology into their practices will fare better.

some common concerns for physicians.

First, it should be noted that there have been no liability claims filed by patients to date that involve allegations of negligence relating to the use of connected health technologies. Connected health maximizes patient information, education and participation, and it enables informed patient decision making. As such, it's likely that an informed patient, involved in decision making about his or her own health, will be much less likely to use legal recourse as a solution to a bad outcome.

Similarly, compliance with the Health Insurance Portability and Accountability Act (HIPAA) doesn't create insurmountable barriers to implementing connected health programs. Relatively simple measures can be taken to ensure the privacy of patient data even as it is transmitted electronically.

Concerns that online communication will reduce office visits (and thereby reduce income) are understandable but have not been borne out in early experiences. Once in place, electronic communication decreases the demand for certain types of office visits (e.g., low-level, follow-up visits), but it minimizes interruptions from phone calls and creates more capacity for high-level visits or for a larger panel of patients.<sup>5</sup>

Finally, many physicians worry about the costs of implementing these new technologies. While practices will need to invest in new technologies and teach their staff members how to use them, we are convinced that these costs will not outweigh the benefits of connected health technologies. In fact, they may usher in new models of reimbursement. In some states, several health plans are already reimbursing physicians for e-mail consultations through commercial portals such as RelayHealth.

Ultimately, physicians who have incorporated technology into their practices will fare better as the health care marketplace increasingly pays more for quality. It will be easier for these practices to take a population-based view of their patient panels, improve decision

making and meet performance targets.

Connected health technologies can also enable more efficient use of resources, resulting in higher quality care at a lower cost. This is in part due to the ability to move patients to lower cost environments. Care once delivered in the hospital can be delivered in the home, and care once delivered in the physician's office can be delivered to the patient's desktop. Such an improvement in system performance means providing the right care, at the right time and in the right place.

## A vision for the future

The impending burden of chronic disease will further tax the U.S. health care system and will require new models of care delivery. Connected health strategies provide for improved access, quality and efficiency by encouraging increased self-care and enabling remote care of patients. The defining feature of connected health is to offer quality care where the patient is, when the patient needs it. Interactive patient-provider online communications, remote lifestyle feedback and home monitoring of patients with chronic diseases lie at the center of this vision. **FPM**

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1. *Chronic Conditions: Making the Case for Ongoing Care*. Baltimore, Md: Partnership for Solutions; 2004. Available at: <http://www.partnershipforsolutions.org/DMS/files/chronicbook2004.pdf>. Accessed Jan. 16, 2008.

2. Narayan KM, Boyle JP, Geiss LS, Saaddine JB, Thompson TJ. Impact of recent increase in incidence on future diabetes burden: U.S., 2005-2050. *Diabetes Care*. 2006;29:2114-2116.

3. McGlynn EA, Asch SM, Adams J, et al. The quality of health care delivered to adults in the United States. *New Engl J Med*. 2003;348:2635-2645.

4. Wagner EH. Chronic disease management: What will it take to improve care for chronic illness? *Eff Clin Pract*. 1998;1:2-4.

5. Zhou YY, Garrido T, Chin HL, Wiesenthal AM, Liang LL. Patient access to an electronic health record with secure messaging: impact on primary care utilization. *Am J Manag Care*. 2007;13:418-424.

■ One example of connected health is a program in Boston that remotely monitors the vital signs of more than 325 heart failure patients.

■ Another connected health initiative uses cell-phone technology and a "smart" pill bottle to detect whether patients have taken their medication.

■ The sensor industry is bursting with accurate and cost-effective tools that can capture, store and transfer data from patients in their homes.