Emerging Technologies *for* Chronic Disease Care

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By Juliann Schaeffer

After tackling healthcare topics such as computerized physician order entry and tele-ICU, national health policy organization NEHI has taken on chronic disease in its latest research foray. Focusing on various underadopted high-value tools, the report "Getting to Value: Eleven Chronic Disease Technologies to Watch," published with support from the California HealthCare Foundation, seeks to identify the technologies with the greatest potential to improve care and lower costs for patients, providers, and payers.

Lead researcher Erin Bartolini says her team examined chronic diseases as a whole while also considering their role in various corners of the healthcare system. "For this report, we looked at technologies in the context of three major problems facing healthcare today," she says. "First, we focused on the alarming rate of chronic disease in our country. Nearly 50% of all people have a chronic disease, and more than 75% of the nation's total medical costs are spent on chronic disease.

"Second, we focused on limited access to quality care, especially for underserved and safety-net populations who are often the most burdened by chronic disease. Third, we focused on patient empowerment and engagement. Patients need to be an integral part of their care if we are to improve the quality and decrease the cost of care."

Technologies to Watch

In the report, NEHI points out 11 technologies that address various chronic diseases—from diabetes and asthma to heart disease and stroke—and breaks them down into four classes based on the available research and the number of adoption barriers.

"Our scan focused on identifying technologies that have the potential to address the three issues already described: chronic disease, access to quality care, and patient engagement," Bartolini says. "An initial list of 80 emerging technologies gleaned from the literature was whittled down to 11 based on specific criteria. We looked closely at whether these technologies were underadopted, had future potential for benefit, aligned with the safety-net population, were low cost, and had broad application."

NEHI researchers then broke down the 11 technologies into four classes. "Our classification system was designed to differentiate among the list of 11 technologies: those that had more supporting evidence and face fewer barriers and those that may require additional research and face more barriers to adoption," she says. "Generally speaking, class 1 and 2 technologies have stronger supporting evidence and face fewer barriers and thus are better positioned for earlier widespread adoption."

Class 1

• **Extended care e-visits:** These technologies allow physicians to consult with nursing home patients without having to physically make routine visits to extended-care facilities. It's a time-saver for busy doctors who spend a lot of time maintaining their regular practice. "As a result, most patients receive physician care in a hospital setting, often resulting in overuse of the emergency department among the elderly. A survey of physicians revealed the startling reality that nursing home physicians spend, on average, less than two hours per week on site," according to the report.

These e-visit technologies, including those offered by PhoneDOCTORx and InTouch Health, address the physician shortage challenge by providing 24/7 coverage with voice and/or videoconference functionality, connecting a physician hub to nursing home residents at their bedside.

Noting that 1.5 million people currently live in nursing homes—a number that will only increase as baby boomers enter this age bracket—NEHI sees promise for this technology to improve care for this patient population at minimal cost.

• **Home telehealth:** Like many of the tools listed in the report, home telehealth technologies allow patients to take a more active role in their health, a vital component of addressing chronic diseases without adding undue cost and strain on the healthcare system.

"Telemedicine approaches may not be appropriate for all Americans suffering from chronic disease, but recent estimates suggest a sizeable portion may benefit," according to the report, which cites a Veterans Health Administration estimate that 75,000 (about 50%) of its total patient population could be cared for at least to some extent with telehealth technologies.

Using these technologies, which include Bosch's Health Buddy and Philips' TeleStation, patients compile and then transmit certain health data (relevant to their disease and/or health state) from their homes to physician offices. Physicians will then give the patient individualized education and recommendations based on those data.

• **Telestroke care:** Currently the third leading cause of death for Americans, stroke affects almost 800,000 people each year, which is why NEHI believes telestroke technology has such huge life-saving potential.

"While ischemic strokes can be deadly and debilitating, the timely use of a clot-busting drug called a tissue plasminogen activator (tPA) can significantly reduce mortality rates and improve long-term speech and motor function. Unfortunately, the use of tPA is not without risk; the drug must be administered within four and a half (recently increased from three) hours of stroke onset and cannot be used for hemorrhagic (open vessel) stroke patients," the report details. "If used incorrectly, tPA can cause an intracerebral hemorrhage, a serious and sometimes fatal complication. As a result, tPA use is normally limited to stroke centers staffed by specialist stroke neurologists."

Telestroke technology seeks to get specialists to more patients through a video conference link with electronic data sharing to "virtually bring the expertise of the stroke centers

and provide enhanced stroke care, most notably the administration of the critical tPA, to smaller rural and community hospitals."

According to NEHI's report, "Data show that the number of patients receiving tPA therapy increases by approximately 10-fold over previous levels when telestroke technology is applied."

Two telestroke products currently on the market include the REACH telestroke application and InTouch Health's Telestroke Networks.

Class 2

• **Mobile clinical decision support:** This technology, which includes Health eVillages, Clinical Pharmacology Mobile, and NaviNet Mobile Connect as well as smartphones and other mobile devices, addresses the pervasive problem healthcare providers often face of not having accurate, up-to-date information at the point of care. As the report authors note, this problem is relevant for providers in primary care, ambulatory care, and other settings but is especially critical in emergency situations.

"Clinical decision support systems have repeatedly been suggested as a useful tool for improving guideline adherence and mobilizing evidence-based knowledge into daily clinical practice," according to the report, which notes the usefulness of mobile solutions for this purpose. "Mobile technologies can assist clinicians to reduce preventable hospital readmissions, prevent medical errors, and reduce adverse drug events."

The report authors noted that various mobile clinical decision-support solutions are currently on the market but expect more growth as other healthcare sectors, such as nursing, pharmacies, and managed care agencies, take advantage of the technology's ability to provide the necessary information to effectively evaluate, diagnose, and manage patient care.

• **Virtual visits:** Another telehealth tool, virtual visits refer to technologies that utilize Web-based platforms to allow patients and providers to interact remotely. According to the report, these tools seek to make physicians more available to patients, especially those in rural areas, while also addressing some of the reasons—such as the costs and time associated with making regular office visits—patients may avoid chronic disease management services.

By giving patients access to e-consultations, e-prescriptions, and EHR data with an Internet-enabled computer or a smartphone, virtual visits allow patients to take control of their chronic disease before complications and costly interventions present.

"Almost 90 percent of physicians would like their patients to monitor their health independently," according to the report, which lists American Well's Online Care Mobile, Stratus Video's Video Waiting Room, and IDEAL LIFE's Interactive Kiosk as technologies representative of virtual visits.

"Virtual visits allow patients and physicians to interact remotely. With many of these technologies, patients can log their clinical data and share info with their provider in real time, greatly enhancing the dialogue," Bartolini says.

Financial concerns are inhibiting widespread use of class 1 and 2 technologies, Bartolini says. "For many of the class 1 and 2 technologies, reimbursement is the biggest barrier to adoption. Because many of these technologies take care out of the doctor's office and into patient's homes, the fee-for-service payment model does not adequately incentivize their use," she says.

Classes 3 and 4

Class 3 technologies, those with slightly more barriers to adoption or less evidence available, include medication adherence tools designed to help patients take their drugs as prescribed (something up to one-half of patients don't currently do). These tools, such as cell phone apps with medication reminders, "represent an opportunity to save hundreds of billions of dollars," according to the report.

Mobile asthma management tools aim to "empower patients to better understand where and what triggers asthma attacks in order to prevent and manage complications," Bartolini says. Examples of these tools include GPS attachments to inhalers that record information about the whens and wheres of its use and early warning software.

Mobile diabetes management tools take the same premise and translate it to another chronic condition, allowing any of the 25.6 million diabetes patients in the United States to better manage their disease through mobile devices that can log and collect blood glucose readings, provide real-time alerts and reminders, and even interpret data trends over time.

> *Virtual visits allow patients to take control of their chronic disease before complications and costly interventions present.*

"A representative sample of tools include Telcare's Blood Glucose Meter, Sanofi-Aventis' iBGStar, Glooko's MeterSync Cable, PositiveID's iglucose and WellDoc's DiabetesManager," according to the report.

Class 4 technologies, which researchers view as promising but too new for a wealth of evidence, include in-car telehealth, currently under development by Ford and Toyota, which allows patients to manage their health while commuting to work. "In-car telemedicine is part of a trend of emerging technologies that leverage recent advancements in cars to monitor and manage chronic disease in real time," Bartolini explains.

Mobile cardiovascular tools enabling patients to monitor blood pressure and other aspects of their disease through wireless technology as well as health-promoting social media tools such as websites that allow patients to address personal fitness, nutrition, or overall well-being round out the class 4 technologies.

"For some of the class 3 and 4 technologies, further research to support the clinical benefit and costs savings for these technologies is the biggest barrier [to adoption]," Bartolini says.

Promise and Potential

While most of these technologies address different barriers to care for chronic diseases, Bartolini sees certain similarities in them as well. One similarity that stands out is mHealth, which she says is assuming a bigger role in patient care, especially self-care.

"We found in our research that many high-value technologies are moving away from stand-alone medical devices and toward technologies that leverage existing consumer products like cell phones, personal computers, and even cars," she says. "Patients already have these technologies at their fingertips, allowing them to seamlessly integrate these tools into their daily lives.

"We think these 11 technologies are unique because they have the potential to extend chronic disease care beyond a doctor's office to places where patients spend a great deal of their time: on their smartphones, personal computers, and in their car," she adds. "Often they are helping physicians get real-time data about their patients and in some cases, share resources where staffing or financial constraints limit proper chronic disease management."

Cost is a major part of these tools' potential, especially for the underserved, according to Bartolini. "These technologies don't have high cost barriers to use, making them accessible to safety-net populations. As a whole, they leverage mobile and telehealth technology and social media, which help patients seamlessly integrate the monitoring of their health into their daily routines. Many allow for the collection of aggregate data like disease factors and care regimens," she says.

Bartolini says it's critical to address the needs of the underserved, who face more barriers to accessing healthcare services because of cultural, linguistic, geographic, and financial issues. "The safety-net delivery system lacks the financial, human, and information technology resources needed to adequately manage chronic disease. Compounding the problem, the safety-net population is all too often uninsured or underinsured," she says. "As a result, many lack access to resources to properly manage their diseases, leading to frequent use of healthcare services and contributing to unnecessary spending."

Through the integration of these types of technologies, Bartolini says patients in general and safety-net populations in particular can be empowered to take care into their own hands—often from their own homes.

What comes next regarding which tools are more readily adopted by patients, providers, and payers is anyone's guess. But the bottom line, according to Bartolini, is that each of these technologies represents an exciting new frontier in healthcare, all with the potential to "empower patients to monitor their own health, better manage their conditions, and more easily communicate with their doctors."

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