Mobile technologies changing models for diabetes management

By Melissa Foster
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In the past, health care providers have often been puzzled by how best to optimize treatment for diabetes and improve diabetes self-management for patients. Now, with the exploding popularity of smartphones and increased Internet access, some might say: "There's an app for that."

"Any software application that can be used on a mobile phone is now being termed a mobile application. The advantage of mobile technology is that it is anywhere and everywhere and is becoming ubiquitous to all socioeconomic groups and all geographies," **Malinda Peeples, RN, CDE,** vice president for clinical advocacy at WellDoc, told *Endocrine Today*.

Charlene C. Quinn, RN, PhD, of the University of Maryland School of Medicine, said emerging research provides evidence that mobile health interventions improve patient diabetes care.

Photo by:
Thomas Jemski,
University of Maryland

In the realm of diabetes care, this ubiquity allows providers to expand their sphere of influence and maximize the results of their care, according to **Charlene C. Quinn, RN, PhD,** assistant professor at the University of Maryland School of Medicine.

"Physicians and nurse practitioners don't have time to do lifestyle coaching when they are seeing a patient. While these tools and technologies cannot replace providers, they can serve as an adjunct to the clinical therapies that they are providing," Quinn said in an interview.

Mobile technologies, however, are only one area of exploration. Many health care systems are now creating novel ways to incorporate Internet technologies into clinical practice. For instance, some offer online patient portals that provide patients with detailed information about previous visits to their physicians, their glucose levels and more. Others are using websites such as Skype to conduct counseling sessions, and telehealth remains popular for diabetes education for patients and providers. Many manufacturers are taking advantage of widespread connectivity to improve their devices, such as allowing patients to download data from equipment onto computers.

Yet, integrating these new tools and technologies presents unique challenges. There are reimbursement and regulatory issues, as well as concerns about patients' ability to access and use computers and cellphones or smartphones. Organization, time and training are concerns for busy providers as well, according to experts interviewed by *Endocrine Today*.

Even so, in the past few years alone, many providers have gone paperless, going to texting and established web-based services.

"Look at all of this innovation and how far we have come in medicine," **Marcia Draheim, RN, CDE,** past president of the American Association of Diabetes Educators and president of Draheim Dimensional Presentations, said in an interview. "I have every confidence that we can integrate these technologies into our practices. We just have to make up our minds to do it. And we will."

Basics, benefits of mobile health

A wide variety of tools fall into the category of mobile health. Development ranges from applications that provide health coaching to those that focus on diagnosis, treatment and mitigation of the disease, according to Peeples.

"Mobile health, or mHealth, is a term used for the practice of medical and public health supported by mobile communication devices," she said during a presentation at the 2011 AADE Annual Meeting & Exhibition in August. "It is a segment of e-health that includes applications that collect community and clinical health data; deliver health care information; and provide real-time monitoring of patient data and real-time direct care."

Malinda Peeples

According to Quinn, these features can greatly improve existing cornerstones of diabetes management, especially enhanced data collection.

"Patients have been doing logbooks for many years, but they may not consistently collect information and the information also isn't consistently available to physicians or nurse practitioners, so it has not really been useful for the providers or the patients," she said.

In the same vein, **Donna Tomky, MSN, RN, C-NP, CDE,** current president of the AADE, said these technologies offer patients information to give them insight into management of their disease. Downloading the data from glucose meters, for instance, allows patients to organize data and distinguish patterns in their blood glucose levels. Other applications, such as Lose It! or the Atkins Carb Counter, which are available through Apple's iTunes store, log caloric intake and physical activity and help patients track their diet and exercise more closely.

Donna Tomky

"In the broadest sense, these technologies can really change our behaviors," **B.J. Fogg, PhD,** director of research and design at Stanford University's Persuasive Technology Lab, told *Endocrine Today*. "They can help us create new habits in our lives by triggering us to do new behaviors at the right time, often enough that those new behaviors become habits."

B.J. Fogg

Nevertheless, consolidating this information alone may not lead to behavior change, Peeples said. "We need to be able to take that information, analyze it and present it to both the patient and the provider in a distinguishable or an actionable way by providing reports, action plans or feedback."

In addition, Peeples said patients often leave physicians' offices with treatment plans that may be difficult to implement in their daily lives. Taking the treatment plan and translating it into prompts for the patient through messaging or reminders can supply the patient with the support needed for successful diabetes self-management.

Another important aspect of mHealth, Quinn said, is the enhanced connectivity between patient and provider. **Neal Kaufman, MD, MPH,** founder and CEO of DPS Health, told*Endocrine Today* that Internet services, mobile applications and text messaging aid in delivering the help, support and information that a specific patient requires at that moment.

Neal Kaufman

Furthermore, using cellphones or smartphones may be the best way to reach a variety of populations. Peeples said many people, despite economic circumstances, own cellphones or smartphones, which may have worldwide implications as well.

"The mobile phone is becoming many people's first computer," she said. "The scalability for this is not only domestic — it is global for improving access and outreach. It offers an opportunity to democratize health care and make it more available to everybody."

Patient-centered care

A major benefit of mHealth and web-based programs is the ability to tailor care to the individual patient, according to Draheim. First, she said, these new platforms allow patients to choose how they would like to receive their information.

"For the first time in our history, in the last few years, we have actually been providing diabetes education to four different generations at one time," she said. "Of course there are the traditionalists, but many Gen Xers, Millennials and the generations to come are going to be extraordinarily tech-savvy and they are going to want information provided in this manner."

Draheim also said technology affords providers the opportunity to give diabetes education in different formats that may be more effective for certain patients. For example, written information could be provided on the Internet, but a patient could click on an icon that reads the information aloud. This system also easily allows translation into various languages so that non–English-speaking patients could access the same information in the same location. Or, also, physicians and diabetes educators could list frequently asked questions to refer patients to other reliable resources if they have questions about their diabetes care.

Marcia Draheim

"If it was appropriate, we could even insert rich media so that you could have an animation that would actually show or demonstrate to the patient what he or she has just read," Draheim said. "Also, if the information is meant to have an emotional impact, music or other elements could be incorporated as well."

What is even more exciting, she said, is that it is available at any time in any place. Patients can easily download this information or visit the website using a computer, a smartphone, an Internet pad or any other form of mobile technology. Moreover, certain items, such as quick response (QR) codes, expand the amount of information that a person can receive. Because most cellphones have cameras, a patient can easily scan a QR code placed on a piece of paper or brochure and be taken to a website or link with more information.

In another sense, patients who are unable to receive diabetes education in person may benefit from increased options for access, according to Draheim. Often, patients work during the day and are unable to attend all classes required for diabetes education. Therefore, offering the information online through a distance learning program may be more convenient. She said some people still may prefer to physically come to class or visit the physician, but providing a patient with options increases the likelihood of success.

Kaufman said technology may eventually be able to identify which interventions are most effective before initiating therapy. Although this is not yet a reality, an instrument that accounts for a patient's various characteristics, such as age, sex, socioeconomic status, BMI or style of learning, could modify the patient's experience and aid physicians in selecting the most effective course of treatment early on.

"These are the things now that we have to appreciate and start looking at and thinking: Who is our consumer, what are their needs and how do they want their information presented to them," Draheim said.

Issues of Concern

1 Mobile health, or mHealth, refers to the practice of medical and public health augmented by mobile devices or platforms that aid in data collection, real-time monitoring and delivery of care.

2 The FDA's proposed guidelines state that mobile applications associated with FDA-regulated devices or an application that turns a smartphone into a device should be reviewed.

3 Challenges of implementing new technologies into diabetes care include reimbursement and regulatory issues, widespread access and training.

Examining the value

Although these technologies present exciting opportunities, many providers question their value. Because mobile health is a relatively new field, few studies have examined its efficacy in depth. Nevertheless, research is emerging.

In a 2008 study published in *Diabetes Technology & Therapeutics*, Quinn and colleagues assessed HbA1c levels of patients who used cellphone-based software (WellDoc) that provided real-time information on patients' blood glucose levels; displayed medication regimens; used hypoglycemia and hyperglycemia treatment algorithms; and requested additional data required for evaluation of diabetes management. Results indicated better results in the intervention group, with these patients experiencing a 2.03% decrease in HbA1c levels compared with a 0.68% decrease among control patients. The health care providers of intervention patients also said the system facilitated therapeutic decision-making.

In the September issue of *Diabetes Care*, Quinn and colleagues reported similar results for the Mobile Diabetes Intervention Study, one of the first cluster randomized clinical studies of mobile health reported to date. The intervention included mobile- and web-based self-management patient coaching and offered decision support to providers (WellDoc). Automated, real-time educational and behavioral messaging was delivered to patients via cellphone according to blood glucose values, diabetes medications and behaviors. After 12 months, HbA1c levels decreased by 1.9% in the intervention group compared with 0.7% in the usual care group, according to information in the study.

Likewise, preliminary results from another study being performed by **Michael A. Harris, PhD,** director of psychology in the Child Development and Rehabilitation Center at Oregon Health Sciences University, using Skype — the free website that allows people to communicate over the Internet via webcam — to replace or supplement clinic visits among adolescents with diabetes has also produced positive results. Compared with adolescents receiving face-to-face care in a clinic, the patients using Skype had comparable improvements in diabetes management and metabolic control, Harris said at the American Diabetes Association's 71st Scientific Sessions in June.

Michael A. Harris

As this area of health care grows, more studies are being conducted and many are still in progress, according to experts interviewed by *Endocrine Today*. For example, the AADE has recently partnered with the US Department of Health and Human Services' Office of Minority Health and AT&T to evaluate the use of mobile devices to deliver diabetes self-management training within an underserved minority community in Dallas.

"There is an emerging science of mobile health, providing evidence that mobile health interventions work. Providers and patients will need to know not only if a mobile intervention works but also how it works," Quinn said.

POPULAR MOBILE APPS

▶ GoMeals

GoMeals draws information from the CalorieKing database on calorie, carbohydrate, protein and fat content. It also provides menus and locations of local restaurants.

"I use this app since it helps me and my patients to better appreciate the number of calories and their composition in what they can eat."

– GEORGE GRUNBERGER, MD
FOUNDER AND CO-CHAIR, GRUNBERGER DIABETES INSTITUTE

George Grunberger

▶ DailyBurn

DailyBurn allows people to track caloric intake and physical activity, and offers information on a variety of fitness plans.

"This is a great tool to track physical activity, weight and caloric intake on a daily basis. The app has a tool that contains more than 50,000 foods to track food intake more accurately. It can be used to motivate the user to track their progress and see improvement."

– DAWN SHERR, RD, CDE
PRACTICE MANAGER, AADE

Dawn Sherr

▶ Epocrates

Epocrates is a mobile drug reference resource.

"This app is useful for daily life in the clinic because it provides information on the dosing, pricing and formulation of various medications; color images to help patients and physicians identify pills; and alerts about drug interactions."

– STEPHEN A. BRIETZKE, MD
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These apps are all free and available for download at the Apple iTunes store.

Disclosure: The health care professionals report no direct financial interest in any of these products.

Current complications

Although technology has the potential to revolutionize the health care system, the rapid development and introduction of these new tools and resources has left many trying to catch up, including the FDA. The agency recently issued guidance addressing the possible regulatory issues related to mobile health

applications. A major question is determining at which point a mobile app or program becomes a medical device. Currently, the FDA is proposing that mobile apps that connect to a FDA-regulated device or an application that transforms a mobile platform into a medical device, such as an app that turns a smartphone into an electrocardiogram machine, require review. The agency, however, will not finalize the guidelines until after the public comment closes on Oct. 19.

Reimbursement remains many providers' chief concern, Kaufman said, because mobile health technologies are not yet considered reimbursable expenses. Nevertheless, as research confirms their benefits, insurers may likely realize that these tools actually save money.

"There is major return on investment when you help people improve their behaviors, such as quitting smoking, losing weight, practicing safe sex, and so on, because they will become healthier. So, currently, the problem is that mobile health isn't paid for, but in the future, it will be," he said.

Quinn said she is concerned about literacy as well. As more information becomes available to patients through patient portals, electronic health records or logbooks, it will be essential that providers ensure that patients understand what they are reading. Otherwise, they could easily misinterpret facts or data.

According to Tomky, the digital divide is an emerging issue. Although many providers are embracing these technologies, others have difficulty learning to use an application, program or system or figuring out how to implement it effectively into their practices. In addition, some patients may be reluctant to use technologies in which they are unfamiliar. Moreover, even though cellphones are commonplace, some patients may not be able to keep up with payments. If mobile health becomes standard of care, it will be more challenging to maintain a connection with these populations, she said.

Despite these problems, Draheim said addressing these issues as they arise is part of progressing to the next level in health care. Instead of focusing on the current limitations, providers should continue to think outside the box.

"We shouldn't think about how we can't do something because it is difficult to learn or it is too much money," she said. "Instead, I say, 'Be visionary.' We have the science of health care, but hidden in the vision, that is where the art of health care comes from. And I believe there needs to be a balance between the art and the science."