

PDA's Help Some Patients With Diabetes Self-Care

BY BRUCE K. DIXON
Chicago Bureau

Patients who have diabetes can take more active roles in their care and improve glycemic control by using a personal digital assistant preinstalled with special software, according to Dr. Samuel N. Forjuoh.

Dr. Forjuoh is leading a team of researchers who are examining the benefits of personal digital assistant (PDA) use with outpatients, with the goal of leveling the self-care playing field across socioeconomic groups.

However, their recently published pilot study showed although it is feasible to incorporate PDA use in diabetes self-care, it also poses challenges, said Dr. Forjuoh, professor of family and community medicine and director of research at the Scott and White Memorial Hospital in Temple, Tex.

An initial cohort of 43 subjects was provided with Diabetes Pilot software for Palm handhelds (*J. Am. Board Fam. Med.* 2007;20:375-84). Diabetes Pilot is made by Digital Altitudes LLC, Arlington Heights, Ill. The system enables users to record glucose measurements, insulin, and other medicines; meals; exercise; blood pressure; test results; and other notes, according to the Diabetes Pilot Web site. Among other things, the software tracks the intake of



COURTESY DR. SAMUEL N. FORJUOH

Researchers hope PDA use can extend to patients across all socioeconomic levels.

carbohydrate, calories, fat, protein, fiber, sodium, cholesterol, and other nutrients, and allows users to see trends in blood sugars with various reports and graphs.

Nineteen participants dropped out of the study; 6 more did not return and/or could not be reached after several attempts.

The 18 participants who completed the PDA intervention had a mean drop of 18% in hemoglobin A_{1c} (HbA_{1c}), from 9.7% at baseline to 8% after 6 months, Dr. Forjuoh said in an interview. Further updated results of the study, including data on exercise, foot care, and diet, are contained in a manuscript

that has been accepted for online publication this May in *Telemedicine and e-Health*.

"The more a patient used the PDA, the greater the drop in HbA_{1c}," he said, noting that other researchers have documented comparable reductions in blood glucose associated with PDAs or similar technology.

The 18 finishers had an average age of 58 years. The group comprised 56% women, 56% Caucasians, and 38% college graduates. Also, 72% had annual family incomes of \$30,000 or more, said Dr. Forjuoh. "[Most] of the patients in this pilot study were at the upper end of computer literacy, and it's apparent that only those who are comfortable using a PDA will benefit."

The researchers are about to launch a larger study of 400 patients drawn from 14 Scott and White Health System clinics. The cohort will be assigned to four arms: a PDA-only group, PDA plus chronic disease self-management classes, self-management classes alone, and a usual-care group. In addition, the participants will be representative of the Central Texas population with respect to race, ethnic group, income, location, and insurance status, said coinvestigator Jane N. Bolin, Ph.D.

"We want to see if we can use PDAs to reduce health disparities in the population, and we'll also do a cost analysis that will determine how many health care dollars can be saved for every unit reduction of

HbA_{1c}," said Dr. Bolin, director of the Southwest Rural Health Research Center, a branch of the Texas A & M University System Health Science Center, School of Rural Public Health in College Station.

In the pilot study, the researchers found that many patients were discouraged by the tedious task of tracking dietary effects on glucose by entering into the PDA all the foods they had eaten. The complaints and potential for further loss of participants led them to relax the rules on data entry. To make data entry easier, the vendor has been asked to fine-tune the software in time for the upcoming trial, Dr. Forjuoh said.

The cost per participant in the pilot study was \$650, but because that included expenses that patients would not normally bear, Dr. Forjuoh estimates the actual cost per patient at around \$300; the larger study with comparison groups is expected to settle that point, he said.

The spotty availability of reimbursement for such programs also curbs the widespread adoption of self-management technology, he said. "Many states don't require insurance companies to provide reimbursement for nutritional education and diabetes self-management education" so patients depend on clinics, "and eventually they end up in the emergency room."

Neither Dr. Forjuoh nor Dr. Bolin reported financial conflicts. ■

Touch-Screen Teaching

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Graduate students in the School for Rural Public Health programmed the kiosk and helped to design the multimedia curriculum, which is geared toward patients with low health literacy.

The computer itself is set up exclusively to operate the diabetes education software, and does not provide access to the Internet or other programs, according to Dr. Ory, a professor in the school's department of social and behavioral health.

The kiosks are initially being tested in Dr. McClellan's Brazos Family Medicine Residency clinic, which accepts Medicaid and Medicare patients, and in a federally qualified health center. Information collected from these test sites is expected to help ascertain what motivates people to use the kiosks and will help guide the placement of kiosks in at least three other health clinics in nearby rural counties.

Regardless of what a patient's appearance or behavior might suggest about his or her literacy level, physicians and other providers at these centers are encouraging patients to use the kiosk before or after their appointments, Dr. Ory said.

Some patients have agreed to allow their use of the kiosks to

be monitored, which will enable the investigators to analyze how often they use it, what goals they set, and what sections they view most often and for how long. Kiosk users will also be asked to complete a 10-question survey.

Other studies have been conducted on computer software programs for the management of chronic disease, but they have targeted populations with a higher degree of literacy, Dr. Bolin said. Kiosks built for people with low literacy will work just as well for people with a college education, but the reverse is not true, Dr. Ory added.

Dr. Bolin and Dr. Ory are trying to devise methods to cue people to use the kiosk, through signs, via the receptionist, or by embedding recommendations to use the kiosk in a patient's medical record.

The cost of developing each kiosk for the initial pilot project was about \$1,500, however the software itself will probably be made available for a nominal fee in large-scale distribution. It may be possible for clinics to set up the software and touch-screen monitor with already existing computers, Dr. Ory explained.

The expense of setting up a

waiting-room kiosk is far less than the cost of printing an educational booklet for each patient, "and we know that people don't read those booklets," she said.

The project is sponsored by the Centers for Disease Control and Prevention via funding that Texas A&M receives for its prevention research center. The Dell Foundation provided a grant for the computers.

The software also is being developed in Spanish. The word diabetes itself may be confusing to Spanish-speaking patients because it is commonly referred to as "sugar in my blood." The Tex-Mex blend of English and Spanish that some patients speak in the central part of the state also makes it challenging to translate. For example, it was difficult to translate the phrase "setting goals" into Spanish because the English word has no meaning for many Spanish speakers outside of soccer, Dr. Bolin said.

The investigators hope to expand the project to more clinics in their area and in south Texas. If the kiosks generate enough interest and are successful, they potentially could be expanded nationwide.

The hope is that such kiosks may be as commonplace as blood pressure monitoring machines at pharmacies and grocery stores, Dr. Bolin said. ■

Health Numeracy Brings a Challenge to Diabetes Care

BY JOYCE FRIEDEN
Senior Editor

ST. LOUIS — In addition to problems with health literacy in general, diabetes patients are especially susceptible to problems with a specific aspect of health literacy known as health numeracy.

Numeracy is the ability to understand and use numbers and math skills in daily life. Diabetes requires a lot of health numeracy skills—calculating insulin dosages, counting carbohydrates, calculating ratios for combination insulin regimens, and sick day management, Dr. Russell Rothman said at the annual meeting of the American Association of Diabetes Educators.

Dr. Rothman, director of the Effective Health Communication Program at Vanderbilt University, Nashville, Tenn., and his colleagues tested 398 diabetes patients using a 43-item examination. The patient population was 51% female, and the average age was 54 years; 14% of the patients had type 1 diabetes, and 86% had type 2 diabetes. In terms of education, 43% of the participants had no more than a high school education, and 69% had less than ninth-grade math skills as measured by the Wide Range Achievement Test.

The researchers sought to evaluate patients' ability to count carbohydrates, interpret glucose meter results, apply sliding-scale insulin regimens, calculate insulin dosage based on insulin to carbohydrate intake, and use other diabetes-related numeracy skills. They looked at the relationship between the test score and patients' hemoglobin A_{1c} (HbA_{1c}) levels, and other outcomes.

Patients correctly answered an average of 61% of the test questions. Problem areas included interpreting serving sizes from food labels, using fractions and decimals, and dealing with multiple-step problems (adjusting for blood sugar and carbohydrates at the same time).

Every 10-point increase on the numeracy test translated into an average 0.1% decrease in HbA_{1c}, after adjusting for age, gender, race, income, literacy, insulin status, and type of diabetes. Higher test scores were significantly correlated with higher educational status, literacy, math skills, and frequency of blood glucose monitoring.

Many people aren't good at estimating portion sizes, which causes difficulty when it comes to estimating insulin dosages correctly, said Dr. Rothman. "That brings home the importance of using measuring devices in diabetes education." ■