

ANALYSIS

Mobile Phones Integrated into Diabetes Management: A Logical Progression

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Abstract

In this issue of Journal of Diabetes Science and Technology, the intervention described by D. Katz, "Novel Interactive Cell-Phone Technology for Health Enhancement," uses cell phones to provide the rapid communication necessary for the support of intensive management of diabetes. Mobile technology is widely accepted in today's society and can be an effective tool for this cause. There have been numerous interventions using various communication tools, including cell phones, to manage chronic disease, which all propose that improved communication and feedback to patients would improve health status. Dr. Katz has taken the next step by giving semiautomated, real-time, immediate feedback on each data point all transmitted by cell phone.

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Management of chronic disease, including diabetes, has passed the point in which quarterly visits with a quick review of daily home measurements is adequate to maintain optimal health. Data collected have to be used to be an effective tool. Minimal action resulting from home monitoring destroys the motivation necessary to continue the collection of that data. Certainly the patient should be the primary "user" of that data, but even the most motivated patient needs a little guidance, a few reminders, and a lot of education to be maximally effective. The medical community is unprepared to collect or analyze all data requested. The logical step would be to streamline the process, automate as much as possible, and help each patient become as self-efficacious as possible.

Dr. Katz seeks to fill a very real need in the field of diabetes management. The flood of diabetes therapies,

coupled with the dramatic increase in diabetes prevalence, dictates a need to streamline our clinical practice. The technology he presents has the potential to increase efficiency by providing automated filtering of data to identify those which require immediate response. It can also increase communication by simplification and portability of the data entry point and providing feedback to the same cell phone.

Most patients are hesitant to "disturb" the health care provider with daily or even weekly phone calls to discuss blood glucose levels. Furthermore, there is almost no chance that patients would report a lack of monitoring to their doctor. Automated systems such as this would eliminate this barrier to care. Internet and text messaging provides a buffer of perceived anonymity,¹ which can allow for freer interchange between patients and the health care team.

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The Confidant system also improves the accuracy of the data input by eliminating the need for manual data input by the user. The portable device can convert meter data into a message that can be transmitted to the server. Before downloadable glucose meter memory, health care providers had to depend on manual data input; these data were subject to “smoothing” by the user to be able to tell the provider what they wanted to hear. By providing direct data download, Dr. Katz eliminates this deficiency. The same concept was used in the development of the integrated cell phone and glucose meter, GlucoPack by HealthPia² and in an iPhone with a peripheral glucose meter option. Katz’s approach differs from some by asking for immediate transfer of data and then offering immediate feedback. Farmer asked for the same “real-time” data entry and had similar automated feedback to the cell phone and an opportunity for health care provider review and further individualized response to the user.³ Other investigators have asked for daily or weekly pooled data transfers; these were reviewed in Dr. Katz’s article.

The platform offered by Katz gives the opportunity to provide education as well as data exchange. This, combined with the portability of the technology, opens a huge opportunity to teach and encourage behavior change.

A disadvantage of Dr. Katz’s intervention is the limited scope of the data input and feedback to the user. There is limited ability to manually enter data about physical activity (from a pedometer), medication, or dietary patterns. This deficiency is typical of our live follow-up clinic phone calls, but in this setting additional data can be added with a minimal increase in time by the user or provider, yet would improve the value of the feedback tremendously. HealthPia’s system also eliminates the downloading step and extra equipment by integrating the phone with the glucose meter. This advantage, unfortunately, precludes the use of other meter varieties. Katz’s device can convert data from many different meters and transmit data from other devices (e.g., blood pressure or weight measurement).

The second disadvantage is that input is user driven, so if the user is failing to monitor glucose levels or if the values are “too high” they can simply opt not to send in data. The “dashboard” is advantageous as it alerts the health care provider of out-of-range values and also lack of data input. The need to carry the transmitter, meter, and cell phone is reminiscent of the old laptop computers, which had separate CD drives, modem, and other peripheral devices; this may decrease use of this system.

Easier is almost always better. When cell phone data entry is compared to computer entry, the cell phone is preferred and used more frequently.⁴ When comparing manual to automated data entry, automated is more accurate and often captures more data.⁵ One would also have to postulate that eliminating the extra step of transferring data from the meter to the phone would also increase use and satisfaction.^{2,6}

It is also critical that the data analysis be as automated as possible so as not to increase the workload of the health care provider, and therefore the cost. Dr. Katz’s system sends an automated response and organizes data for presentation to the health care provider. Other systems have taken this a step farther to have the server suggest dosage changes.^{7,8} Ann Albright of the Centers for Disease Control voices our common concern, “We will need to find technology which allows us to upscale our interventions to large populations if we are to prepare for the huge need and cost for these treatments in the near future.” Systems like these are the logical step toward this goal.

References:

1. Lowe P, Hearnshaw H, Griffiths F. Attitudes of young people with diabetes to an Internet-based virtual clinic. *J Telemed Telecare*. 2005;11 Suppl 1:59-60.
2. Carroll AE, Marrero DG, Downs SM. The HealthPia GlucoPack Diabetes phone: a usability study. *Diabetes Technol Ther*. 2007 Apr;9(2):158-64.
3. Farmer A, Gibson O, Hayton P, Bryden K, Dudley C, Neil A, Tarassenko L. A real-time, mobile phone-based telemedicine system to support young adults with type 1 diabetes. *Inform Prim Care*. 2005;13(3):171-7.
4. Kim HS. A randomized controlled trial of a nurse short-message service by cellular phone for people with diabetes. *Int J Nurs Stud*. 2007 Jul;44(5):687-92.
5. Tasker AP, Gibson L, Franklin V, Gregor P, Greene S. What is the frequency of symptomatic mild hypoglycemia in type 1 diabetes in the young?: assessment by novel mobile phone technology and computer-based interviewing. *Pediatr Diabetes*. 2007 Feb;8(1):15-20.
6. Chun H, Kang J, Kim KJ, Park KS, Kim HC. IT-based diagnostic instrumentation systems for personalized healthcare services. *Stud Health Technol Inform*. 2005;117:180-90.
7. Vigersky RA, Hanson E, McDonough E, Rapp T, Pajak J, Galen RS. A wireless diabetes management and communication system. *Diabetes Technol Ther*. 2003;5(4):695-702.
8. Larizza C, Bellazzi R, Stefanelli M, Ferrari P, De Cata P, Gazzaruso C, Fratino P, D’Annunzio G, Hernando E, Gomez EJ. The M2DM Project—the experience of two Italian clinical sites with clinical evaluation of a multi-access service for the management of diabetes mellitus patients. *Methods Inf Med*. 2006;45(1):79-84.