Evaluation of the Feasibility of Implementing a Diabetes Self-Management Education Kiosk in Low Income Settings

Submitted by:
Jane N. Bolin, PhD, JD, BSN
Marcia G. Ory, PhD, MPH
Melissa Wilson, MD
Lesley Salge, MPH
Ashley Wilson, MPH
Laurie Cazalas, RN
Danielle Buchanan, RN

April 2011
Acknowledgements:
We recognize faculty support from The Center for Community Health Development which is a member of the Prevention Research Centers Program, supported by the Centers for Disease Control and Prevention cooperative agreement number 5U48DP000045. We also gratefully acknowledge support provided by the Morris L. Lichtenstein, Jr., Medical Research Foundation for whom we conducted this study. We also thank Jeremy Tarpley, Benjamin Liles, and Tom Peck for their software development and programming.

Contact Information:
For further information, contact: Dr. Jane N. Bolin, Department of Health Policy & Management, School of Rural Public Health, The Texas A&M Health Science Center, TAMU-1266, College Station, TX 77843 at (979) 862-4238 or jbolin@srph.tamhsc.edu.
TABLE OF CONTENTS

I Overview of Project.................................................................................................................4

II Research Goals & Aims.........................................................................................................6

III Addressing Research Goals & Aims..................................................................................7

IV Key Findings........................................................................................................................12

V Conclusions & Future Research Implications.................................................................14

VI References Cited................................................................................................................16

Tables, Charts, and Figures

Figure 1: Total Uses by Site....................................................................................................7

Figure 2: Cumulative Uses by Month.....................................................................................8

Table 1: Sustaining and Maintaining the Diosk.................................................................9

Table 2: Facilitators and Barriers of Sustainability..........................................................10

Figure 3: Challenges and Lessons Learned......................................................................11

Figure 4: Usage Patterns......................................................................................................12

Figure 5: Health Status & Technology Use by Demographic Factors.........................13
Background:
Despite concerted federal and state attempts over the past two decades to address the burden of type 2 diabetes (T2DM), national statistics continue to show rising rates of T2DM among African Americans and Hispanics. In particular, in the State of Texas 10.3% of the population (1.8 million) have diagnosed diabetes, and nearly five (5%) percent have undiagnosed diabetes (CDC, 2010; Texas Diabetes Council, 2011). Rates of T2DM are even higher in South Texas, and counties adjacent, such as the Gulf Bend Region of Texas which is 80% Hispanic/Latino. The appropriate management of diabetes presents significant challenges, as persons with diabetes are significantly more likely to have cardiovascular disease (CVD) than do other segments of the U.S. population (NCHS, 2005). Life-style changes may be more difficult in populations that are medically underserved due to the relative scarcity of healthcare providers, reduced access to medical care, opportunities for engaging in healthy lifestyles and lack of culturally appropriate diabetes education for low-income and low-literacy groups.

While there are nationally established “best practices” for patient self-management education, one of the greatest challenges faced by healthcare providers in low-income and medically underserved settings, has been finding the time and resources to present useful information in a manner that will be understandable and culturally acceptable to both low-income and low-literacy populations. This is a serious public health concern since low literacy has long been recognized as a predisposing factor for poor outcomes in chronic disease self-management (Baker, 1998; Schillinger, Grumback, et al. 2002; Valerio, 2010).

In a review of the literature, supportive evidence has been found that the use of simple computer assisted programs in populations with chronic problems could be effective in addressing health behaviors. Interactive behavior change technology (IBCT) is a potential resource for improving the effectiveness of health behavior change in healthcare systems (Piette, 2007). Touch-screen kiosks or monitors have been used effectively for health education and other medical purposes (Gerber, et al, 2005; Goldschmidt & Goodrich, 2004; Jossi, 2005; Peters & Jackson, 2005; Glasgow, et al, 2009). What are often lacking though are kiosks that are developed to accommodate low-income and low-literacy users.

Diabetes self-management education (DSME) is essential to successful diabetes treatment and complication prevention. Diabetes management requires patient knowledge and behavior change on a daily basis. Recent advances in medical treatment with the development of several categories of oral agents plus complicated insulin regimes have added to the need for thorough DSME. Currently, Medicaid reimburses (values) ten hours DSME and three hours Medical Nutrition Therapy (MNT) for newly diagnosed patients or those with inadequate glucose control. As the age of diagnosis decreases, many patients
Project Overview

needing DSME and MNT are working or raising families and find it difficult to take time for DSME and may not recognize its value to their well-being. Many low-income and low-literacy patients may be uninsured and not have easy access to DSME. Some are self-employed or in hourly wage jobs that do not provide sick-leave. These patients perceive that they cannot afford to miss work for DSME. Combine these barriers with minimal readiness to learn or change, and the result is a low rate of DSME in low-income and low-literacy populations plus lack of regular medical care with a primary physician to prescribe DSME.

**Purpose:**
The purpose of this research study is to evaluate the implementation of a Diabetes Self-Management Education (DSME) Kiosk, Diosks© with the aim of increasing exposure to diabetes self-management education in a low-income and low-literacy population with high risk for complications. The over-arching goals are to improve the availability and use of diabetes self-management education and training in diverse community settings through implementation of computer touch-screen diabetes education Diosks. Secondly, we hope to improve the ability of vulnerable populations at risk to prevent or self-manage diabetes through the ready availability of diabetes education tools, thus decreasing or delaying diabetes complications associated with poor self-management and lifestyle behaviors. Thirdly, we seek to better understand factors in organizations’ ability and willingness to serve as Diosk delivery sites.

**Study Design:**
The study design consisted of two initial phases or stages, and a third sustainability phase.

**In Project Stage/Phase 1** the project team conducted refinement and revision of the kiosk content. In particular the study team focused on expanded educational offerings (modules), adding such topics as management of medications, healthy recipes, sick days and disasters. Revisions to narration and narrator were also accomplished in both English and Spanish.

**Project Stage/Phase 2:** At the conclusion of revisions to the Diosk content, the study team placed three kiosks at sites that were identified as likely to have both low-income and low-literacy clients/customers with diabetes. These included: CHRISTIS Spohn Outpatient Pharmacy, Garcia Arts Center, and HEB on Leopard (low-income area). We first launched the English version for seven months with each site agreeing to solicit user surveys of Kiosk users. The Spanish version was launched in month seven, and at that time the project team expanded from three to five sites. The two new sites consisted of low-income, FQHC (Federally Qualified Health Centers) clinics serving a large population of persons with diabetes. During Phase 2 usage data, surveys, and stakeholder interviews were
conducted. While the goal for surveys during the pilot phase was 100, the project team was able to obtain over 200 surveys and substantial usage data.

**Project Phase/Stage Three:**
Funding for testing the feasibility of the Diosk officially concluded on January 31, 2011. At that time proposals were solicited from each organization to address factors deemed as important in continued support and maintenance of the Diosk.

**RESEARCH QUESTIONS:** The research questions for this study were:

**Question 1:** What is the reach in each organizational setting-i.e., how many uses are reported and what are the characteristics of the users?

**Question 2:** How does utilization of the Diosk change over time?

**Question 3:** Are the organizations able to sustain the Diosk on their own over time?

**Questions 4:** What factors facilitate or impede long term sustainability?

**FUTURE RESEARCH:**

**Question 5:** Can the Diosk be a successful gateway to other intervention strategies, e.g., encouraging stores to offer healthier foods at reduced prices?

**Question 6:** Does the Diosk increase communication with health care providers and generate more referrals to community programs for reducing diabetes risk?
Data Collection:
Kiosk usage data is collected through automatic collection of usage data created through software written for the computer program. Each user session is recorded into a raw data log. This data log is sent to the program manager at regular time intervals at which time a usage report can be generated. Data usage reports have been presented in a month to month format to the Foundation board beginning March 2010 and concluding January 2011. Users have the option of participating in a voluntary survey providing information on user characteristics. One hundred seventy nine users provide responses to this survey. Stakeholders were also given the opportunity to submit valuable feedback to the research team through a survey. All five sites participated in the survey.

Question 1: What is the reach in each organizational setting-i.e., how many uses are reported and what are the characteristics of users?

Figure 1 displays the total number of uses (N = 5,372) by individual site. The top three locations in amount of uses collected data from March 2010 to January 2011 were the original three sites. In descending order these were: the pharmacy setting of the hospital, the grocery store pharmacy, and the community arts center. The remaining two kiosks collected data from September 2010 to January 2011. Usage may have been compromised by renovations at the grocery store, holidays and summer break, and movement of the kiosks to different locations. Other data reveals the health status of individuals at the corresponding sites. Individuals voluntarily indicated that they were diagnosed or at risk for diabetes through user surveys (N=179). Of the 120 individuals reporting their diagnosed or at risk health status, 82 individuals had been diagnosed by a doctor with diabetes and 38 individuals have been told by a doctor that they are at risk for diabetes.

![Total Uses by Site](chart.png)

**Figure 1**
As shown in Figure 1, there were over 5,000 uses of the Diosk between March 2010 and January 2011.
Question 2: How does the utilization of the Diosk change over time?

Figure 2 indicates that usage decreases over time. This reduction in use may be due to holidays concentrated over the winter months. Elevated usage of the Diosk is seen in the summer months of July and August.

![Cumulative Uses by Month](image)

**Figure 2**
Figure 2 displays the number of users per month. Over the period of March 2010 to January 2011, the Diosk experienced 5,372 uses. Usage actually appears to decrease over time.

Question 3: Are the organizations able to sustain the kiosk on their own over time?

Funding for testing the feasibility of the Diosk officially concluded on January 31, 2011. At that time proposals were solicited from each organization to continue supporting and maintaining the Diosk. The continuation proposals provide encouraging responses from the sites regarding future sustainability. Each site must be able to provide wireless internet support for the Diosk, dedicated staff members to oversee Diosk maintenance, and paper for individuals to print Diosk modules. Table 1 below presents the sustainability plan for each organization submitting a continuation proposal and selected for sustaining the Diosk. Three out of five organizations have chosen to sustain the Diosk.
<table>
<thead>
<tr>
<th>Site Name</th>
<th>Sustainability Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Antonio E. Garcia Arts &amp; Education Center</strong></td>
<td>The Diosk will be situated in the foyer as you walk into the center. Center staff including an administrative assistant and the building maintenance service person will be tasked with ensuring the Diosk is operational every day. Center staff will work with the TAMHSC research team to ensure program problems are addressed in a timely manner. The University’s IT department can assist as needed. The Garcia Center is a current “hot spot” for the City of Corpus Christi’s CONNECTCC free Wi-Fi program. City employees are available to troubleshoot and fix any problems that may need correcting with the system. In the event of a problem, city personnel tend to respond fairly quickly to come up with a solution. The Garcia Center is equipped with an alarm system and security officers from the University’s Police Department to ensure safety during the center’s peak hours.</td>
</tr>
<tr>
<td><strong>Amistad Clinic</strong></td>
<td>Amistad currently has wireless internet access on-site and plans to continue access in the future. The clinic has an IT contract with Southern Networks to provide our IT support needs and they will be called upon to respond if we have technical problems. We will assign a staff team the responsibility of the Diosk. It will be the responsibility of the Administrative Clerk to check the Diosk twice daily to ensure proper functioning and paper availability for printing. In her absence, the Front Office Team will be responsible for this task. The task will be added to the job descriptions and work plans of each staff member involved to ensure accuracy and compliance.</td>
</tr>
<tr>
<td><strong>Catholic Charities of Corpus Christi Healthy Living Center</strong></td>
<td>The Healthy Living Center is equipped with wireless access to the internet. Additionally, the lobby area is adjacent to a reception area staffed by a community health worker. There will be adequate staffing to supervise the Diosk and its daily operations. A printer will be designated to the Diosk and paper will be maintained for client use. The facility is supported by the IT department at the Diocese of Corpus Christi.</td>
</tr>
<tr>
<td><strong>CHRISTUS Spohn Westside</strong></td>
<td>Roadrunner internet services will be ordered from Time Warner. This will allow us to offer our patients free wireless access. We plan on assigning the community health worker the task of daily maintenance of the Diosk. We will provide paper for user printing. We are exploring the possibility of additional Diosks for the other Family Health Centers through the CHRISTUS Spohn Foundation.</td>
</tr>
</tbody>
</table>
**Question 4: What factors facilitate or impede long term sustainability?**

Interventions, programs and projects are generally complex to implement, with the uncertainty of added costs, and unforeseen impediments. The resolution of challenges by the project creators is influenced by the actions of a number of different stakeholders and their particular organizational challenges. The Diosk project team learned that sustainability is affected by each individual organization’s organizational capacity and particular plans for sustaining the Diosk, including providing necessary resources.

The Diosk project team identified the following “facilitators and barriers” to long term sustainability:

<table>
<thead>
<tr>
<th>Table 2: Facilitators and Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FACILITATORS</strong></td>
</tr>
<tr>
<td>• Site Champions</td>
</tr>
<tr>
<td>• Significant need of the populations served</td>
</tr>
<tr>
<td>• Technology (Health IT) Capacity</td>
</tr>
<tr>
<td>• Uniqueness of the technology and methods of education</td>
</tr>
<tr>
<td>• Ability to enlist the support of local celebrities and community leaders</td>
</tr>
</tbody>
</table>

The Diosk team encountered challenges when implementing and maintaining the Diosks at the pilot sites. These challenges, as well as solutions and lessons learned are featured in Figure 3 below.
Figure 3 displays the challenges experienced during the pilot phase of the Diosk and lessons learned.

- **Revision of Educational Modules**
  - Challenge: Providing detailed educational modules
  - Solution: Revision of the educational modules
  - Comments: Most individuals only view a small amount or subset of the information. Condensing the material or changing it frequently may facilitate dissemination.

- **Language**
  - Challenge: Need for English and Spanish diabetes educational modules
  - Solution: Use local celebrities or key figures to narrate the modules in English and Spanish
  - Comments: Finding a narrator who is comfortable with the language and has excellent camera presence is a necessity.

- **Introduction of Electronic Survey**
  - Challenge: Low response rate of paper surveys
  - Solution: Create an electronic survey that can be accessed on the Diosk
  - Comments: Electronic survey response rate poor due to the length. In the future, it will be advantageous to introduce a shorter survey.

- **Technology Advancements**
  - Challenge: Reach a larger population
  - Solution: Create a web-based version of the Diosk educational modules
  - Comments: The process of converting the program to a web-based platform is labor intensive, but needed for dissemination.

- **Security**
  - Challenge: Secure the Diosk and related resources
  - Solution: Provide a locked cabinet for the Diosk and have a "live" individual overseeing the area.
  - Comments: Some settings are more secure than others. It is important to recognize security issues at the time of installation and identify site personnel to oversee the Diosk.
Usage Patterns

Key Findings

Usage Summary

- Average number of uses per day = 9.95 uses
- Median number of uses per day = 11 uses
- Average amount of time spent on all kiosks = 6.92 minutes
- Average number of views per use = 24.56 slides
- Total number of repeat uses = 733
- Total number of prints = 6,913 slides

User Characteristics

- The majority of users are female (64.25%).
- Most users are aged 36-49 years (39.66%).
- The majority of users reported that they were of Hispanic/Latino descent (66.48%).
- Most users have been diagnosed by a doctor with diabetes (45.25%).
- The vast majority of users plan to make a behavior change after using the kiosk (84.92%).

Figure 4
Figure 4 displays the usage patterns of the Diosks at all sites.
Figure 5
Figure 4 displays the self-disclosed diabetes status and technology use by demographic factors. The data was acquired through voluntary survey responses.
Conclusions & Future Implications

Conclusion:
Over the time the Diosk was implemented in the pilot sites, the research team was able to gather valuable data and knowledge about the implementation and maintenance of a diabetes education kiosk. The Diosk succeeded in increasing the exposure to diabetes self-management education in low-income and low-literacy populations with risk for high complications. The future placement of Diosks throughout the Coastal Bend community will continue to fulfill this aim. The data collected does not allow the research team to determine if the Diosk improved the ability of vulnerable populations at risk to prevent or self-manage diabetes. Future research can fill this void by collecting outcomes for further assessment of the effectiveness of the Diosk. Lastly, the Diosk implementation process allowed the research team to determine that community organizations are able and willing to serve as Diosk delivery sites.

Future Research:
Future research will aim to answer research questions that this study left unanswered. These questions will also be supported by assessing the success of full transfer and maintenance of the Diosk at sites selected to sustain the educational kiosk. Examples of these questions include:

**Question 5:** Can the Diosk be a successful gateway to other intervention strategies, e.g., encouraging stores to offer healthier foods at reduced prices?

**Question 6:** Does the Diosk increase communication with health care providers and generate more referrals to community programs for reducing diabetes risk?

Furthermore, future research will create new study challenges and successes. The next steps for the Diosk include:

- Promoting the web-based version of the Diosk
- Creating a closed-circuit television version of the Diosk
- Considering the development of a low-literacy Diosk for other chronic conditions

These future steps include the activities of:

Program Monitoring
Although the Diosk is evidence-informed (based on best practices for diabetes self-management) with documentation of positive outcomes in other settings, for quality assurance, it is important to monitor both patient and organizational outcomes over time. It is also valuable to assess the public health impact, documenting the numbers of persons reached, capacity that has been built, factors influencing development of collaborative partnerships for linking clinical
and community activities, and understanding how such evidence-based interventions can get embedded and disseminated within existing organizational structures.

**Adding Additional Kiosk Education Modules**
The Diosk project team solicited feedback from key stakeholders concerning needed changes or additional modules for the Diosk. In particular, we are exploring development of low literacy materials on other chronic disease modules or conditions (e.g. developing a module around generic self-care behaviors, other chronic diseases (CHF, asthma, COPD) or other requested topics). Future exploration will target the use of the Diosk to stimulate better food choices (e.g. working with HEB on healthy food incentives and monitoring), better management of medications, and increasing physical activity.

**Complement to Related Efforts in the Coastal Bend Region**
The Diosk will complement the ongoing evaluation of CHW/promotoras being conducted with uninsured patients with type 2 diabetes by the CHRISTUS Spohn Health System Community Health Department in the Coastal Bend Region. While utilizing some common measures for comparability, the Diosk team would work with CHRISTUS Spohn Memorial Hospital ER and Outpatient staff to implement a common core outcome battery for assessing individual patient outcomes, examining broader public health impacts, and comparing results to those achieved to the relatively few studies published in the areas of low-literacy computer assisted education.

**Outcomes and Milestones**
At the conclusion of the project, the Diosk team determined that it would be valuable to expand the program reach of the diabetes education kiosk into broader and unique venues in the Coastal Bend Region. In order to monitor outcomes and evaluate accomplishment of milestones, it is important to build in technologies for continual monitoring of the program, evaluate consumers/participants’ acceptance of the kiosk, evaluate improvement in participants’ health status, and continuously evaluate and improve the relationships to existing healthcare providers in the Coastal Bend Region.


Peters J, Jackson M. 2005. Accessibility and use of touchscreens by black and ethnic minority groups in the three cities project. Ethn Health. 10(3):199-211.