

# PILOT TESTING OF A DIABETES INFORMATION AND MANAGEMENT KIOSK IN A RURAL COMMUNITY PHARMACY

by

MARY BARNETT

(Under the Direction of Rebecca M. Mullis)

## ABSTRACT

Educating the 17 million people with diabetes in the United States about self-care for their disease management remains a challenge to the healthcare system. A web-enabled, interactive touch screen health information and management kiosk placed in a rural community pharmacy has the potential to address this issue. The kiosk may aid in patient monitoring and provide education materials needed to control Type 2 diabetes. Electronic databases record the activity of kiosk users and store data downloaded from patients' glucometer. The databases allow for remote monitoring of patients' blood glucose and kiosk maintenance. Ten participants used the kiosk through the four-month pilot trial and increased their understanding of diabetes care as well as general diabetes knowledge. Participants demonstrated a decrease in weight but not average blood glucose (A1c) or blood pressure. The data from this pilot study suggests the kiosk can be an effective tool for providing diabetes patients with health information and for monitoring blood glucose.

INDEX WORDS: Diabetes, Education, Blood glucose monitoring, Kiosk, Diabetes management, Rural, Pharmacy, Pilot testing, Telemedicine

PILOT TESTING OF A DIABETES INFORMATION AND MANAGEMENT KIOSK IN A RURAL  
COMMUNITY PHARMACY

by

Mary Barnett

B.S., Virginia Tech, 2002

A Thesis Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment of  
the Requirements for the Degree

MASTER OF SCIENCE

ATHENS, GEORGIA

2005

© 2005

Mary Barnett

All Rights Reserved

PILOT TESTING OF A DIABETES INFORMATION AND MANAGEMENT KIOSK IN A RURAL  
COMMUNITY PHARMACY

by

MARY BARNETT

Major Professor: Rebecca M. Mullis

Committee: Robert S. Galen  
Randall L. Tackett

Electronic Version Approved:

Maureen Grasso  
Dean of the Graduate School  
The University of Georgia  
May 2005

## ACKNOWLEDGEMENTS

This project gave me a unique and wonderful graduate experience that many students do not get to experience. I am truly honored by the confidence that my committee placed in me to undertake such a project. There were days that I felt the project and graduate school had broken me, but I kept on fighting in order to make this project a success. It was during the long weekly drives to Clayton that I would renew myself by thinking of all of the possibilities to deliver patient information on the kiosk, particularly about nutrition. One day I will complete them.

I want to thank my committee, Dr. Mullis, Dr. Galen and Dr. Cook for giving me this project and all of the encouragement it took to complete it. Dr. Cook, I particularly thank you for “volunteering” your wife’s pharmacy and for the emotional guidance you provided by still having a student perspective of how research goes. Dr. Fleming thanks for helping me along the writing process. Many thanks to everyone in the Department of Foods and Nutrition for all of the encouragement and help with the project.

Without the loving support from Bill Boebel, this project may not have made it. Thanks for coming to the rescue by building my website and teaching me html! Finally, thanks to all of my family and friends for their love and support throughout my many academic ventures.

## TABLE OF CONTENTS

<b>ACKNOWLEDGEMENTS.....</b>	<b>IV</b>
<b>LIST OF TABLES .....</b>	<b>VII</b>
<b>LIST OF FIGURES .....</b>	<b>VIII</b>
<b>CHAPTER 1 .....</b>	<b>1</b>
INTRODUCTION.....	1
<b>CHAPTER 2.....</b>	<b>3</b>
REVIEW OF LITERATURE .....	3
<b>CHAPTER 3.....</b>	<b>8</b>
METHODS .....	8
<b>CHAPTER 4.....</b>	<b>25</b>
RESULTS.....	25
<b>CHAPTER 5.....</b>	<b>45</b>
DISCUSSION, CONCLUSIONS, AND FUTURE RECOMMENDATIONS .....	45
<b>APPENDICIES .....</b>	<b>55</b>
APPENDIX 1 .....	56
APPENDIX 2 .....	57
APPENDIX 3 .....	59
APPENDIX 4 .....	61
APPENDIX 5 .....	64
APPENDIX 6 .....	66
APPENDIX 7 .....	67
APPENDIX 8 .....	68
APPENDIX 9 .....	69
APPENDIX 10 .....	70
APPENDIX 11 .....	72
APPENDIX 12 .....	73

APPENDIX 13 ..... 75

APPENDIX 14 ..... 77

APPENDIX 15 ..... 78

APPENDIX 16 ..... 80

**REFERENCES..... 81**

## LIST OF TABLES

Table 1.	Participant incentives for using the kiosk .....	22
Table 2.	Demographic information for all enrolled participants .....	27
Table 3.	Dates associated with kiosk usage/month for participants .....	32
Table 4.	Average kiosk usage time by user cohort .....	33
Table 5.	Guest users by gender and age range .....	34
Table 6.	Blood glucose data knowledge test score at pretest and posttest .....	35
Table 7.	Diabetes Knowledge Test score at pretest and posttest .....	38
Table 8.	Diet Adherence Scale mean response score at pretest and posttest .....	39
Table 9.	Understanding Scale of Diabetes Care mean response at pretest and posttest.....	39
Table 10.	Exercise Barriers Scale at pretest and posttest .....	39
Table 11.	Clinical values at pretest and posttest of the user cohort.....	40



## LIST OF FIGURES

Figure 1. Kiosk in Clayton Pharmacy .....	10
Figure 2. First screen to separate logins for guests and users.....	15
Figure 3. Participant login screen .....	15
Figure 4. Guest login screen .....	15
Figure 5. Main menu screen.....	15
Figure 6 The first Health Sentry page seen at the kiosk, the prompt screen to plug in glucometer to start.....	16
Figure 7. Health Sentry screen informing patients that meter has been recognized and touch OK to download information.....	17
Figure 8. Raw data table of participant blood glucose testing history .....	17
Figure 9. Graph of participant blood glucose history .....	17
Figure 10. Site Kiosk daily text report, top of page.....	18
Figure 11. Site Kiosk daily text report, portion extracted from full document. Shows all urls visited .....	18
Figure 12. Site Kiosk daily HTML report.....	19
Figure 13. Site Kiosk monthly HTML report.....	19
Figure 14. Diabetes Kiosk log file .....	20
Figure 15. Health Sentry participant 15 week compliance report .....	20
Figure 16. Health Sentry participant exception report .....	21
Figure 17. Health Sentry tabular form of an individual's glucose tests, administrators view .....	21

Figure 18. Health Sentry graph views of an individual's glucose tests, administrators view .....	21
Figure 19. Number of days per month the kiosk was available .....	29
Figure 20. Kiosk usage time per month.....	30
Figure 21. Total number of kiosk navigations per month.....	30
Figure 22. Number of pages printed from kiosk per month .....	30
Figure 23. Average number of page navigations on the kiosk per hour .....	31
Figure 24. Number of navigations per day of week .....	31
Figure 25. Usage patterns on kiosk per users .....	33
Figure 26. Attempted number of downloads vs. number of successful downloads .....	34
Figure 27. Change in BMI among the user cohort.....	41
Figure 28. Change in A1c among the user cohort.....	41
Figure 29. Change in blood pressure among the user cohort .....	41

## CHAPTER 1

### INTRODUCTION

#### Purpose of the Study

As Type 2 diabetes prevalence increases so does the need for disseminating diabetes care information, particularly in rural areas. The pharmacy as an access point and the potential of kiosk technology may be an ideal combination for reaching many diabetes patients. To date there is no published research on using kiosks in a rural community pharmacy for diabetes management. This study was designed to determine the feasibility of bridging technology and pharmacy together in order to increase the quality of diabetes patients' knowledge and disease management practices.

#### Rationale and Significance

The rationale for conducting the pilot study is that diabetes health information is needed in communities, particularly in rural areas. While having more diabetes education classes available to diabetes patients in the area would be ideal, it is costly and perhaps not feasible due to the limited availability of health professionals in rural areas. Though it could be feasible to offer classes at a reduced cost, not everyone would be able to attend the classes. By having information easily accessible in the community allows people to access it at their convenience. In addition, diabetes patients' blood glucose should be continually monitored in between routine doctor visits. Providing an easy to access platform for patients to download a glucometer and the continual monitoring of those results could reduce the number of diabetes patients that develop diabetes related health complications or slow the progression in individuals that have developed complications.

The significance of the pilot study is that using a kiosk for diabetes disease management and health information would further the current research in the use of technology for diabetes education and blood glucose monitoring. This method would provide more access to information that is essential for diabetes patients and their family members for disease management.

### Hypotheses

1. The kiosk will be an acceptable tool for providing patient information regarding healthy lifestyle choices and diabetes management for participants.
2. The kiosk will be an acceptable tool for providing diabetes information and healthy lifestyle choices to community residents other than participants.
3. The kiosk will be an effective tool for providing patient information regarding healthy lifestyle choices and managing diabetes if an improvement in participants' diabetes care understanding, general diabetes knowledge, or diet adherence can be demonstrated.
4. Participants using the kiosk for patient education and monitoring will improve their A1c levels, weight, and blood pressure.

### Specific Aims

1. To assess the rural community and individual needs related to diabetes information and management.
2. To develop a health information kiosk that will be used for diabetes care information and diabetes management.
3. To evaluate the acceptance of using the kiosk for health information and a disease management tool from the community and individuals.
4. To evaluate participants' knowledge related to diabetes, diet adherence and diabetes care at baseline and upon completion of the pilot study.
5. To evaluate participants A1c values, height, weight, and blood pressure at baseline and upon completion of the pilot study.

## CHAPTER 2

### REVIEW OF LITERATURE

#### Diabetes

Diabetes is a group of diseases that results from defects of insulin action, insulin secretion, or both.<sup>[1]</sup> At present, an estimated 17 million people in the United States have the disease.<sup>[2]</sup> This number has increased dramatically in recent years. From 1990 to 2000 there was a 49% increase<sup>[3]</sup> and it is expected to further increase by 165% by 2050.<sup>[4]</sup> This is of great concern because an individual with diabetes has an increased risk of developing other chronic diseases such as heart disease, kidney disease, blindness, and nervous system damage. The percentage of deaths from diabetic complications is also on the rise. In 1999, it was the sixth leading cause of death in the United States<sup>[3]</sup> and in 2002, it was the fifth leading cause of death.<sup>[5]</sup> Diabetes is not only a serious health issue; it is an economic burden. In 2002 the estimated direct and indirect costs accredited to diabetes was \$132 billion for the United States population; an individual with diabetes will spend ten thousand dollars more than the average individual in medical expenses each year.<sup>[5]</sup>

#### Type 2 diabetes

Type 2 diabetes is the most common form of the disease, representing 90-95% of all diabetes cases, and is commonly associated with individuals that are overweight or obese and have inactive lifestyles.<sup>[6]</sup> Type 2 diabetes is also more prevalent in the elderly population.<sup>[3]</sup> Therefore, as a person increases in age, weight, or inactivity they have a greater risk for developing diabetes. Geographic location, income<sup>[7]</sup>, and education<sup>[8]</sup> level has been shown to have an influence on the prevalence of Type 2 diabetes. People living in Southeastern United

States have a higher incidence of Type 2 diabetes.<sup>[3]</sup> In addition, as income and education levels decrease, the prevalence of Type 2 diabetes increases.

### Prevention of Complications

Though diabetes is a serious chronic disease which is usually accompanied with complications, these complications can be prevented or slowed with tight blood glucose control. The Diabetes Control and Complications Trial<sup>[9]</sup> found as blood glucose levels decreased in Type 1 diabetes patients, there was a 60% decrease in the risk of developing retinopathy, nephropathy, and neuropathy. In addition, the onset of complications was delayed by the control of blood glucose regulation and further progression was greatly slowed.

Similarly, the United Kingdom Prospective Diabetes Study<sup>[10]</sup> was a large scale clinical trial conducted to determine the effectiveness of intensive versus conventional diet therapy treatments for newly diagnosed Type 2 diabetes patients on the development of cardiovascular and microvascular complications. Participants at the beginning of the study had a mean Hemoglobin A1c (A1c), a blood test of average blood glucose of the past three to four months, of 9.1%. At the ten-year follow-up, the intensive therapy group had a median A1c of 7.0% and the conventional therapy group had a median A1c of 7.9%. This study found that for every percentage point decrease in A1c, there was a 35% decrease in the risk of microvascular complications and a 16% decrease in cardiovascular complications. It should be noted that though both studies found control in blood glucose reduced the risk of the onset of complications in Type 1 and Type 2 diabetes patients, it is not known if lowering blood glucose levels in patients with advanced complications would benefit.

### Diabetes Education

In order for patients to achieve and maintain lower blood glucose levels they must receive adequate education from a health care provider about positive lifestyle behaviors such as self-monitoring of blood glucose (SMBG), diet, physical activity, and medications. Research indicates the more knowledge patients have about diabetes and how to manage it, the more

successful they are in controlling their disease.<sup>[11-16]</sup> Unfortunately, less than half of the respondents to the National Health Interview survey in 1997 had received diabetes education.<sup>[17]</sup> The most common reason for decreased patient education results from physician's lack of time to spend with patients. The decreased time affects the additional time most diabetes patients need to discuss various diabetes disease management components, so the information provided is frequently insufficient.<sup>[18]</sup> Another reason for insufficient knowledge is many diabetes patients do not have access to group or individual diabetes education classes. Lack of access could be because classes are not affordable, not available, or the distance is too far for patients to attend.

### Rural Populations

Rural populations are at a greater disadvantage related to issues concerning a lack of access to care and insufficient information and treatment provided by the physician.<sup>[18-21]</sup> Three studies<sup>[18, 19, 21]</sup> have shown that rural practitioners were less likely to follow American Diabetes Association standards of care<sup>[22]</sup> such as foot exams, lab data, referrals, and diet and exercise counseling. One reason cited was a decrease in available resources in the rural community. For example, Danskey et al.<sup>[20]</sup> found that rural populations have fewer numbers of hospital beds, physicians, and medical specialist compared to urban areas (for each 100,000 persons). Another concern impacting rural diabetes patients health is a lack of transportation available.<sup>[23]</sup> Limited or lack of public transportation options for individuals in rural communities hinders their ability to receive regular medical check ups and attend diabetes education classes.

### The Pharmacy as a Community Setting for Diabetes Care

A diabetes patient will visit the pharmacist five times more frequently than other members of their health care team.<sup>[24]</sup> Pharmacists provide patients with self-testing supplies, medications, and some counseling. Pharmacists are typically more accessible than other health professionals, which could allow pharmacists to play an integral role in a patient's diabetes management. A successful example of the larger role a pharmacist can have in diabetes

management is the Asheville Project.<sup>[25, 26]</sup> The Asheville Project had 12 community pharmacists provide diabetes education for patients from two large companies in the area. Participants were able to receive a free monthly counseling session of diabetes education, training on self-blood glucose monitoring, and medication counseling. The first follow-up, at seven to nine months, showed a 12% increase in the number of patients that had optimal A1c results and 37% of patients had  $\geq 1\%$  decrease in A1c. At each of the follow up measurements, the number of patients reaching optimal A1c continued to increase. Additionally, the mean A1c continued to decrease among the patients compared to baseline.

Besides the Asheville Project, there has been little research in pharmacy care services specifically for diabetes patients; however, this study supports the conclusion that a pharmacist can play an integral part in a diabetes patient's management. This is particularly true for rural areas, where there tend to be less medical specialists and an increased patient to doctor ratio.<sup>[20]</sup>

### Technology and Diabetes

Recent advancements in technology have provided a way for diabetes patients, particularly in rural areas, to be monitored for changes in health and access to health information. The availability and diverse applications in technology has increased patients ability to learn more about their disease and maintain blood glucose levels. There have been several formats in which monitoring and education has taken place such as telephone lines and telephone modems,<sup>[27-29]</sup> the Internet,<sup>[30, 31]</sup> telemedicine,<sup>[32-34]</sup> televideo,<sup>[35, 36]</sup> computer programs,<sup>[37]</sup> and kiosks.<sup>[38]</sup> Kiosks have been used for many other health topics,<sup>[39-44]</sup> but only one study to date has been published using them specifically for diabetes information and there are no known studies using a kiosk for diabetes management.

Lewis et al.<sup>[38]</sup> placed a diabetes education kiosk in a physician waiting room. The purposes of this study were to determine if the kiosk was feasible for patient education and if the kiosk was useful. The kiosk was in the office for two weeks. During that time-period, 24



interviews with clients were conducted at random using a questionnaire. Only one of the participants (interviewee's) had diabetes while 12 knew someone with diabetes. Eleven of the participants used the kiosk and most felt that information was equal or better than health related information given by healthcare providers. Some of the reasons that the users liked the kiosk were it allowed them to go at their own pace, they were able to control it, and the visuals were better than books. Of the participants that did not use the kiosk, most stated they did not use the kiosk because they were called in before they had the opportunity.

A major limitation of the study was that the kiosk was only placed in the physicians' office for two weeks; such a short duration is not enough time to determine the full potential of the kiosk in providing health information. Though the time-period was brief and had a small sample of client interviews, the feedback given does suggest that a kiosk could be successful in providing diabetes education in a community setting.

## CHAPTER 3

### METHODS

#### Community Setting

The city of Clayton is the county seat of Rabun County located in the Northeast corner of Georgia. The rural mountain community serves as a retirement community and tourist attraction. Rabun County is classified as a growing rural county.<sup>[45]</sup> Growing rural counties are characterized by having an attraction that creates tourism and is able to sustain economic growth. The total estimated population for Rabun County for 2002 was 15,521 with 97.6% being white, .8% black, and 4.5% Hispanic/Latino. The median household income was \$33,899, 9% less than the Georgia median. Additionally, there was a higher percentage of families living with income less than \$10,000 to \$25,000 than the Georgia average. Thirteen percent of the 65 and older age group were below the poverty level. In comparison to the state average, fewer individuals attend some college or obtain a bachelor's degree. There are 19 doctors in the county, giving a ratio of 792:1 patients to doctors compared to the state average of 520:1.<sup>[45]</sup>

#### Pre-pilot Focus Groups

Two focus groups before the pilot study were conducted in the community with Type 2 diabetes patients. The primary purpose of these focus groups was to determine what these diabetes patients needs were related to diabetes information and care. The secondary purpose of the focus groups was to determine the types of technology these individuals were using and the attitudes regarding technology use.

Type 2 diabetes patients were identified and recruited by the Clayton Pharmacy pharmacist to participate in one of two focus groups in March 2003. The first focus group was in the evening to accommodate those who worked; the second was held in the morning for individuals that were either retired or unable to drive in the evenings. Before the focus group began participants were given two consent forms (Appendix 1), one to keep and one for research records and a demographics questionnaire (Appendix 2). The focus groups were conducted by a trained moderator for approximately 90 minutes with prepared opened-ended questions (Appendix 3). Focus groups were tape recorded and later transcribed.

### Key Informant Interviews

The purpose of the key informant interviews was to assess the concerns of the community's health care professionals related diabetes in the community such as, what information they felt was important for their patients and what was their perception of patients and healthcare workers using technology for managing diabetes. Interviews with physicians, a nurse, a pharmacist, and social services employees were conducted in March 2003. All interviewees were contacted by telephone to set an appointment. Meetings were conducted at the interviewee's place of business. Prepared questions were asked and responses were handwritten and compiled later.

### Kiosk Specifications

Kiosk development began in spring 2003. The kiosk was a standard low-end, slim model Dell desktop computer housed within a cabinet and included the following accessories: mouse (hidden), key board (hidden), headphones, download glucometer cord, printer, and touch screen monitor (Figure 1). The computer operating system is Windows XP. The monitor is a standard 15" LCD with touch screen components interfaced to the computer through USB-VGA cable. The kiosk is web-enabled and connected to high-speed internet.

The computer was also equipped with a kiosk management software program, Site Kiosk™. The program changes the function of the computer from standard Windows operations

to a controlled environment of the diabetes kiosk website. Site Kiosk™ also provides many administrative functions to allow customization of screens, print functions, back-end access, and usage reports.



Figure 1. Kiosk in Clayton Pharmacy

### Content Creation

The website content was created using XML and Active Server Pages (ASP). XML is a coding language that is used to store text, HTML and menu structure. ASP allows the stored XML content to be displayed by sending information back to the web browser in HTML and JavaScript format. Web browsers use HTML and JavaScript to render what you see on the screen. This combination of programming languages allows the site to be dynamic on the administrative and user side of the website. Administrative functionality enabled the site content to be frequently updated with new HTML, text and images.

The educational information/content (“internal site” pages) provided to kiosk users was based on the Clinical Practice Recommendations of the American Diabetes Association (2003).<sup>[46]</sup> Information included was also gathered from the Aspen Reference Group,<sup>[47]</sup> Centers

for Disease Control and Prevention (CDC),<sup>[48]</sup> and the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK).<sup>[49]</sup> Educational materials were primarily written on a sixth grade-reading level to ensure content would be easily understood. Content material was also delivered by linking to other websites (“external site” pages) (Appendix 4). External pages were heavily incorporated into the content pages to utilize the large volume of health information that is available via the internet.

### Participant Recruitment

Potential participants for the pilot study were patients with Type 2 diabetes that were >18 years of age were able to read and write in English. Individuals were identified and recruited primarily by the pharmacist at Clayton Pharmacy. Other participants were recruited through community outreach efforts: town meetings, newspaper coverage, and flyers at medical clinics or physician offices. All potential participants were contacted by telephone. Each call consisted of an explanation of the project description, the individual’s role in the study, a question and answer period, and if they were interested in participating in the study; and an appointment with the individual was made for pretesting. All procedures were approved by the Institutional Review Board of Human Subjects.

### Pretest Data Collection-Qualitative Measurements

Pretests were completed at the Clayton Pharmacy in a consultation room over a one-month period in summer 2003. Project details and the participant’s role were again explained to each subject verbally, and in written form. The written explanation was included in the consent form (Appendix 5). Once the consent forms were signed, a user name was selected by the participant and a password was assigned. Passwords were assigned from the last four digits of their Accu-chek® glucometer serial number. Next, participants were given five self-administered questionnaires (Appendices 2, 6-9). Four of the survey instruments were developed by the University of Michigan Diabetes Research and Training Center; all have been

validated and are reliable.<sup>[50, 51]</sup> Three of the instruments are sub-scales from a larger instrument, Diabetes Care Profile.

The first instrument given is a demographics questionnaire (Appendix 2). The demographics form is a short questionnaire to determine a person's age, sex, education level, work status, and items that could be found in the home such as a television, radio, DVD player, etc. The questionnaire takes approximately five minutes to complete.

The second questionnaire, the Brief Diabetes Knowledge Test (Appendix 6), tests a diabetes patient general understanding of diabetes. There are 23 items, 14 of the items are applicable to both Type 1 and Type 2 diabetes patients and nine of the items target Type 1 and Type 2 patients using insulin. The questionnaire is written on a sixth grade reading level and takes approximately 15 minutes to complete if all 23 questions are answered.

The third questionnaire is the Diabetes Understanding Scale (Appendix 7). The questions ask the patient to rate their understanding, Poor=1 to Excellent=5, on various aspects of diabetes care such as coping with stress, blood sugar control, prevention of complications, and foot care. There are 13 items and takes approximately five minutes to complete.

The fourth survey is the Diet Adherence Scale (Appendix 8). The eight-item scale assesses if the patient has been told by a healthcare professional to follow meal planning and eating recommendations and the frequency of completing the behaviors. Four questions have Likert-type scale responses and four questions have yes/no responses. This questionnaire takes approximately five minutes to complete.

Finally, the last scale given is the Exercise Barriers Scale (Appendix 9). There are five items to determine how often patients have trouble getting enough exercise. Responses are on a five point Likert-type scale from 1="rarely" to 5="often." The purpose of this instrument is to assess possible barriers to exercise. The time required to complete the survey takes less than five minutes.

### Pretest Quantitative Measurements

Participant's weight and height were measured using an eye level dual reading physician scale with height rod. Blood pressure was measured using a sphygmomanometer and stethoscope. All blood pressures were measured on the right arm. Hemoglobin A1c measurements were done, using Metrika® A1c Now one time use kits (Appendix 10). A large drop of blood from a finger stick was taken to place into the solution provided in the kit. The solution/blood mixture was placed on a sensor of the device and results were given in eight minutes. All information was recorded on paper and in a Microsoft Excel spreadsheet.

The participants were asked provide their physician's name, phone number and address in order to send a letter informing the physician that their patient was participating in the study. Physicians would be contacted if severe hypo and/or hyperglycemic values were downloaded from patient's glucometer (Appendix 11). Protocols were established on when to contact the patient and/or the patient's physician from the blood glucose values monitored via Health Sentry.

#### Contact Protocols:

- < 50 mg/dl, three or more per week call physician
- < 75 mg/dl, three or more per week call patient
- > 300 mg/dl, three or more per week call patient
- > 400 mg/dl, three or more per week call physician and patient
- > 500 mg/dl, one time call physician

### Glucometer and Kiosk Introduction

The download meter cord on the kiosk is specifically designed for use with an Accu-chek Advantage® glucometer. At pretest participants were given an Accu-chek Advantage glucometer and 100 test strips. A demonstration of how to use the glucometer and the testing strips was performed as well as setting the time and date to ensure accuracy when downloaded

into the kiosk. Participants were then shown the location of the kiosk in the pharmacy, how to activate the kiosk and navigate through the content modules of the kiosk.

### Kiosk Usage

There were two types of kiosk users, participants and guests. Participants had a unique username and password to use for logging on to the kiosk. Guests selected gender and age range when logging in. The reason for having the two login screens was to track usage of individual users and allow the download meter function to be visible only to participants (Figures 2-4).

The first screen, the main menu (Figure 5), consisted of the following categories:

- What is Diabetes?
- Taking Care of Your Body
- Blood Sugar Monitoring
- Diabetes Management
- Healthy Eating
- Medicines and Insulin
- Children with Diabetes
- Stop Smoking
- Diabetes Dictionary

These categories were further broken down in sub menus (Appendix 12). This format was chosen to create a self-guided atmosphere for users to gather information that is important to them and their individual diabetes care needs.



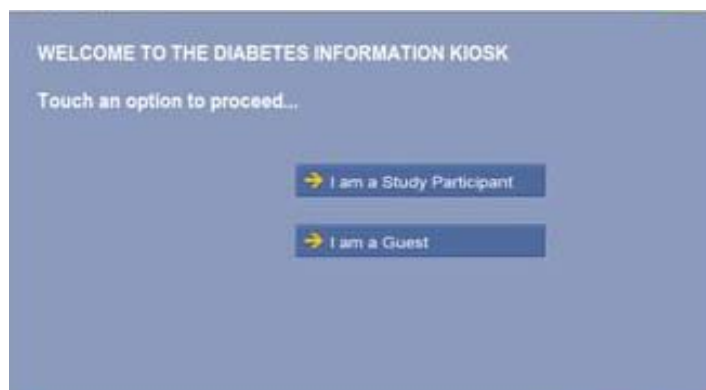


Figure 2. First screen to separate logins for guest and users

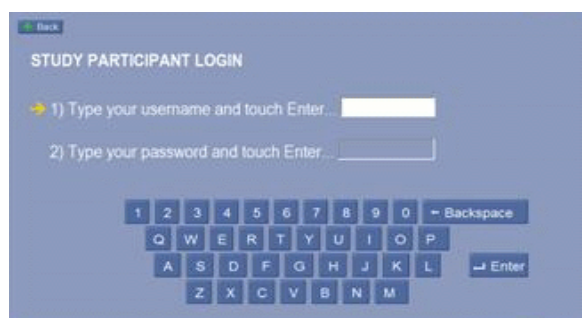


Figure 3. Participant login screen

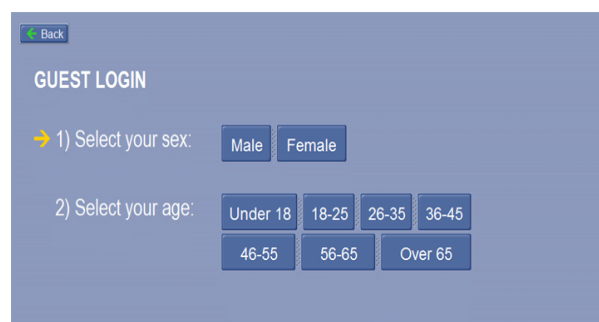


Figure 4. Guest login screen



Figure 5. Main menu

To test the kiosk as a disease management tool, a feature to download participant's glucometer was added. A link from the main menu was created that connected the participant to Health Sentry. The Health Sentry website was created for physicians and other healthcare professionals to monitor patient's daily self-blood glucose checks remotely. A physician or healthcare professional that monitors self-blood glucose checks from patients do so by creating

a patient list. The patient list is created by entering an individual's personal information, the type of glucometer they use, and the serial number of the glucometer. When a patient is connected to the Health Sentry website and a glucometer is attached to a download glucometer cord, the serial number for the meter is recognized. All of the information from the glucometer is transmitted via the internet into the patients on-line blood glucose logbook.

At the kiosk, when the participant was prompted, they would attach their glucometer to the cord provided at the kiosk (Figure 6). Once connected, a pop-up message box states that the meter is recognized and ready to be downloaded (Figure 7). The transmission of data takes about one minute. After the data is received by Health Sentry, a new screen is opened which contains a menu bar along the top of the page. The menu bar includes two data pages for the patients. The first page contains two graphical plots of their blood glucose history: previous two weeks and the complete history (Figure 8). The second page is a table of the individual numerical results (Figure 9). Both pages can be printed for the user to take with them. The ability of users to print the data was also meant to encourage them to take the graph to their physicians as a quick and easy way to view blood sugar patterns.



Figure 6. The first Health Sentry page seen at the kiosk, the prompt screen to plug in glucometer to start.

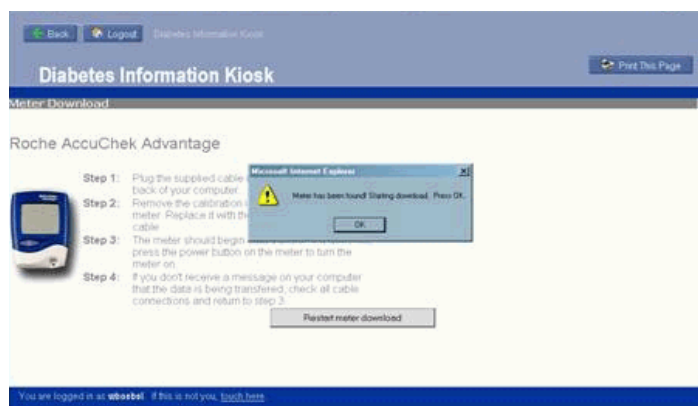


Figure 7. Health Sentry page informing patients that meter has been recognized and touch OK to download information

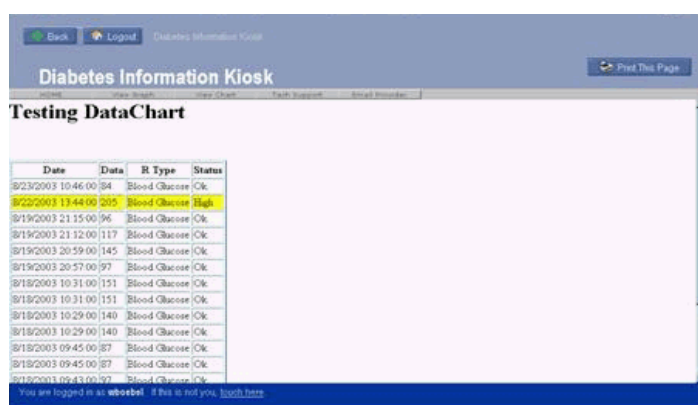


Figure 8. Raw data table of participant blood glucose testing history

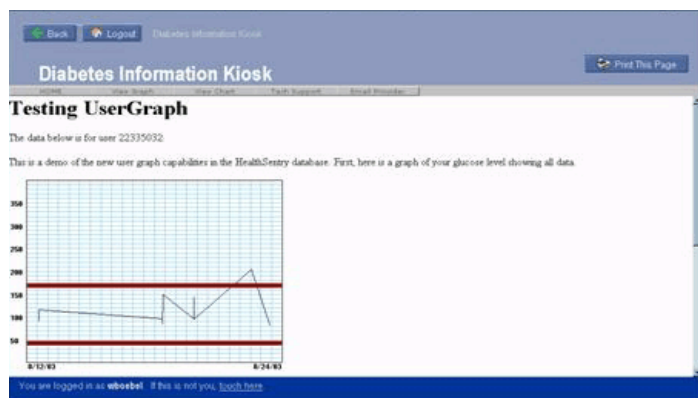


Figure 9. Graph of participant blood glucose history

### Databases for kiosk usage and blood glucose monitoring

Two databases were used to record participant and guest kiosk usage and one database was used to record and monitor participants' blood glucose values. Site Kiosk™ captures all navigations, pages printed, and any errors that may have occurred during use. Daily

and monthly reports are created by the program (Figures 10-13). Daily text files report exact URL visited and printed and the time that each function happens. Daily HTML files report a summary of the day's activity including number of navigations per hour, total usage time and the top 50 URLs visited. Monthly HTML files are the same as daily reports, except all information is a summary of the month's activity.

```

===== SiteKiosk LogFile =====
Terminal : (inactive) HAWIK_STATION1
Date      : 16-Dec-2003
Started   : 3 times      Crashed : 0 times
Navigations : 90         Homepage : 11 times
Emails    : 1           Printed  : 8 pages
Screensaver : 23:21:44  ( 5 times)
Dialup    : 00:00:00    ( 0 times)
Timestamp : 00:00:00

ID  Time      Action      Message
---
[00] 00:00:01 SiteKiosk Started
[00] 00:00:01 Notification [SiteReport] Generating summary for C:\Program Files\SiteKiosk\LogFiles\2003\December\logs\15
-Dec-2003.txt
[00] 00:00:01 Screensaver activated
[00] 00:00:02 Notification Beginning deletion of temporary internet files.
[00] 00:00:02 Notification [SiteReport] Beginning to upload and/or send logfiles.
[00] 00:00:02 Notification [SiteReport] E-mail not successfully sent. Trying again in 30 seconds.
[00] 00:00:12 Notification E-mail error: SMTP Error: Timeout
[00] 00:00:12 ERROR [SiteReport] E-mail not successfully sent. Trying again in 30 seconds.
[00] 00:00:52 Notification E-mail error: SMTP Error: Timeout
[00] 00:01:32 ERROR [SiteReport] sending logfiles via email failed, trying again on restart or midnight!
[00] 00:02:35 Notification [Memory Status] Physical Memory: 149.21 MB (105.80 MB free, 58.5% used); Paging File: 91.59 MB
[00] 00:02:35 Notification [Process Status] GDI Objects: 166; USER Objects: 64; Handles: 402; Process Memory usage: 17.62
[00] 00:17:35 Notification [Memory Status] Physical Memory: 148.94 MB (106.07 MB free, 58.4% used); Paging File: 91.53 MB
[00] 00:17:35 Notification [Process Status] GDI Objects: 166; USER Objects: 64; Handles: 398; Process Memory usage: 17.61
[00] 00:32:35 Notification [Memory Status] Physical Memory: 149.13 MB (105.89 MB free, 58.5% used); Paging File: 91.50 MB
[00] 00:32:35 Notification [Process Status] GDI Objects: 166; USER Objects: 64; Handles: 398; Process Memory usage: 17.61
[00] 00:47:35 Notification [Memory Status] Physical Memory: 148.80 MB (106.21 MB free, 58.4% used); Paging File: 91.45 MB
[00] 00:47:35 Notification [Process Status] GDI Objects: 166; USER Objects: 64; Handles: 398; Process Memory usage: 17.61
[00] 01:02:35 Notification [Memory Status] Physical Memory: 148.94 MB (106.07 MB free, 58.4% used); Paging File: 91.46 MB
[00] 01:02:35 Notification [Process Status] GDI Objects: 166; USER Objects: 64; Handles: 399; Process Memory usage: 17.61
[00] 01:17:35 Notification [Memory Status] Physical Memory: 149.12 MB (105.89 MB free, 58.5% used); Paging File: 91.48 MB
[00] 01:17:35 Notification [Process Status] GDI Objects: 166; USER Objects: 64; Handles: 399; Process Memory usage: 17.61
[00] 01:32:35 Notification [Memory Status] Physical Memory: 149.07 MB (105.94 MB free, 58.5% used); Paging File: 91.58 MB

```

Figure 10. Site Kiosk daily text report, top of page

```

[00] 12:32:36 Notification [Memory Status] Physical Memory: 154.62 MB (100.39 MB free, 60.6% used); Paging File: 95.79 MB
[00] 12:32:36 Notification [Process Status] GDI Objects: 201; USER Objects: 68; Handles: 532; Process Memory usage: 22.20
[00] 12:33:18 Screensaver deactivated after 02:13:41
[00] 12:33:18 Navigation http://www.diabeteskiosk.com/
[00] 12:33:18 Homepage http://www.diabeteskiosk.com/
[00] 12:33:18 Navigation http://www.diabeteskiosk.com/guest.asp
[00] 12:34:48 Navigation http://www.diabeteskiosk.com/guest-submit.asp
[00] 12:35:07 Navigation http://www.diabeteskiosk.com/nav/?u=/Bodycar/main/
[00] 12:35:20 Navigation http://www.diabeteskiosk.com/nav/?u=/Selfcare/footcare/footproblems/
[00] 12:35:43 Navigation http://www.diabeteskiosk.com/nav/?u=/Selfcare/footcare/footproblems/
[00] 12:35:57 Navigation http://www.diabeteskiosk.com/nav/?u=/Selfcare/footcare/cornandcallus/
[00] 12:36:08 Navigation http://www.diabeteskiosk.com/nav/?u=/Selfcare/footcare/blister/
[00] 12:36:21 Navigation http://www.diabeteskiosk.com/nav/?u=/Selfcare/footcare/ingrown toenail/
[00] 12:36:50 Navigation http://www.diabeteskiosk.com/nav/?u=/Selfcare/footcare/bunion/
[00] 12:37:23 Navigation http://www.diabeteskiosk.com/nav/?u=/Selfcare/footcare/hammertoe/
[00] 12:38:01 Navigation http://www.diabeteskiosk.com/nav/?u=/Selfcare/footcare/dryandcracked/
[00] 12:38:37 Navigation http://www.diabeteskiosk.com/nav/?u=/Selfcare/footcare/plantarwarts/
[00] 12:38:56 Navigation http://www.diabeteskiosk.com/nav/?u=/Selfcare/footcare/athletesfoot/
[00] 12:39:12 Navigation http://www.diabeteskiosk.com/nav/?u=/Bodycar/main/
[00] 12:39:17 Navigation http://www.diabeteskiosk.com/
[00] 12:41:17 Screensaver activated
[00] 12:41:18 Notification Beginning deletion of temporary internet files.
[00] 12:41:18 Notification 0 temporary internet files successfully deleted. Done.
[00] 12:47:36 Notification [Memory Status] Physical Memory: 156.21 MB (98.80 MB free, 61.3% used); Paging File: 97.11 MB
[00] 12:47:36 Notification [Process Status] GDI Objects: 245; USER Objects: 74; Handles: 589; Process Memory usage: 23.41
[00] 12:48:46 Screensaver deactivated after 00:07:29
[00] 12:48:46 Navigation http://www.diabeteskiosk.com/
[00] 12:48:46 Homepage http://www.diabeteskiosk.com/
[00] 12:48:46 Navigation http://www.diabeteskiosk.com/participant.asp
[00] 12:49:36 Navigation http://www.diabeteskiosk.com/participant-submit.asp
[00] 12:50:03 Navigation http://www.diabeteskiosk.com/participant-submit.asp
[00] 12:50:13 Navigation http://www.diabeteskiosk.com/nav/?u=/glucose-meter/
[00] 12:50:14 Navigation http://www.diabeteskiosk.com/nav/frameheader.asp?u=/&f=http://www.healthsentry.net/2/ADVANTAGE
.asp&bottom&b=2
[00] 12:50:14 Navigation http://www.diabeteskiosk.com/nav/frame-header.asp?u=/&p=bottom&b=-2
[00] 12:50:14 Navigation http://www.healthsentry.net/2/ADVANTAGE.asp
[00] 12:50:14 Navigation http://www.diabeteskiosk.com/nav/frame-footer.asp?u=/
[00] 12:50:18 Navigation http://www.healthsentry.net/2/blank.htm
[00] 12:50:38 Notification [Script Error] URL: about:blank; Errmsg: "Permission denied"; Line: 35; char: 3; code: 0;
[00] 12:50:39 Navigation http://www.healthsentry.net/2/blank.htm
[00] 12:51:05 Navigation http://www.healthsentry.net/2/blank.htm

```

Figure 11. Site Kiosk daily text report, portion extracted from full document. Shows all urls visited.



Figure 12. Site Kiosk daily HTML report

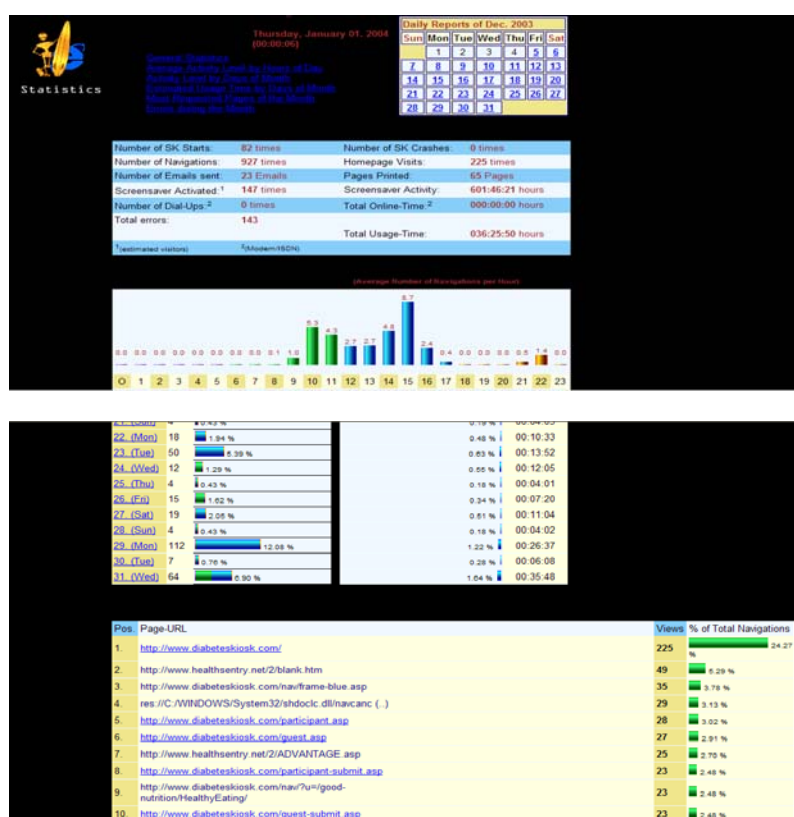


Figure 13. Site Kiosk monthly HTML report

The diabetes kiosk website creates a log file each day to record the information entered at login screens and all internal pages that are viewed (Figure 14). Guests that select “under 18” from the guest login screen only have the date, time, gender and age recorded, no information about sites viewed are recorded. The daily text file from Site Kiosk and the diabetes



kiosk log files allowed the kiosk to be monitored from a remote location to detect problems between kiosk maintenance checks.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
710	9/11/2003	65	247	255	dolly	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk > Healthy Eating > General Information > What do Carbohydrates										
711	9/11/2003	65	247	255	dolly	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk > Healthy Eating > General Information > What do Carbohydrates										
712	9/11/2003	65	247	255	dolly	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk > Healthy Eating > General Information > Good Sources of Nutrients										
713	9/11/2003	65	247	255	dolly	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk > Healthy Eating > General Information > Nutrients and Variety</FONT>										
714	9/11/2003	65	247	255	dolly	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk > Healthy Eating > General Information</FONT>										
715	9/11/2003	65	247	255	dolly	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk > Healthy Eating</FONT>										
716	9/11/2003	65	247	255	dolly	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk</FONT>										
717	9/11/2003	65	247	255	dolly	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk > Taking Care of Your Body</FONT>										
718	9/11/2003	65	247	255	dolly	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk > Taking Care of Your Body > Kidney Damage</FONT>										
719	9/11/2003	65	247	255	dolly	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk > Taking Care of Your Body > Kidney Damage</FONT>										
720	9/11/2003	65	247	255	dolly	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk > Taking Care of Your Body > Kidney Damage</FONT>										
721	9/11/2003	65	247	255	dolly	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk > Taking Care of Your Body > Kidney Damage</FONT>										
722	9/11/2003	65	247	255	dolly	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk > Taking Care of Your Body</FONT>										
723	9/11/2003	65	247	255	dolly	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk > Taking Care of Your Body > General Self Care</FONT>										
724	9/11/2003	65	247	255	dolly	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk > Taking Care of Your Body > General Self Care</FONT>										
725	9/11/2003	65	247	255	dolly	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk > Taking Care of Your Body > General Self Care</FONT>										
726	9/11/2003	65	247	255	dolly	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk > Download Glucose Meter</FONT>										
727	9/11/2003	65	247	255	dolly	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk > Download Glucose Meter</FONT>										
728	9/11/2003	65	247	255	dolly	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk</FONT>										
729	9/11/2003	65	247	255	dolly	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk</FONT>										
730	9/11/2003	65	247	255	dolly	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk > Download Glucose Meter</FONT>										
731	9/11/2003	65	247	255	dolly	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk</FONT>										
732	9/11/2003	65	247	255	dolly	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk</FONT>										
733	9/12/2003	65	247	255	kitty	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk</FONT>										
734	9/12/2003	65	247	255	kitty	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk > Download Glucose Meter</FONT>										
735	9/12/2003	65	247	255	kitty	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk</FONT>										
736	9/12/2003	65	247	255	kitty	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk</FONT>										
737	9/12/2003	65	247	255	kitty	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk</FONT>										
738	9/12/2003	65	247	255	kitty	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk > Download Glucose Meter</FONT>										
739	9/12/2003	65	247	255	kitty	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk</FONT>										
740	9/12/2003	65	247	255	kitty	female		<FONT CLASS=FentHistory>Diabetes Information Kiosk</FONT>										
741	9/10/2003	65	247	255	mike	male		<FONT CLASS=FentHistory>Diabetes Information Kiosk</FONT>										

Figure 14. Diabetes kiosk log file

Health Sentry stores participants' information transferred from the glucometer. Blood glucose information can be displayed per participant or all participants together. Group information includes a weekly compliance report for viewing the number of times patients download each week (Figure 15). Group information is also shown in an exception report which displays the last transmission, the number of records >180 mg/dl and number of records <60 mg/dl (Figure 16). Individual data can be viewed using a number of graphs and in tabular form of the test results (Figure 17, 18).

LOG-IN NAME	COMPLIANT	7/7/04	6/30/04	6/23/04	6/16/04	6/9/04	6/2/04	5/26/04	5/19/04	5/12/04	5/5/04	4/28/04	4/21/04	4/14/04	4/7/04	3/31/04
XXXXXX	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XXXXXX	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XXXXXX	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XXXXXX	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XXXXXX	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XXXXXX	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XXXXXX	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XXXXXX	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XXXXXX	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XXXXXX	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XXXXXX	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XXXXXX	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XXXXXX	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XXXXXX	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XXXXXX	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XXXXXX	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Figure 15. Health Sentry participant 15 week compliance report

HEALTHSENTRY									
CONNECTED IS PROTECTED									
HOME EXCEPTIONS COMPLIANCE TEST MENU LOG OUT									
Health Sentry Exception Report									
Return To Administration Page									
Patient Login Name	Last Transmitted	High Time	Low Time	In Range	High Values	Low Values	% Out	Email	Phone
XXXXXXXX	16 Dec 03	180.0	60.0	130	43	0	33	Email	Phone
XXXXXXXX	08 Oct 03	180.0	60.0	46	6	6	26	Email	Phone
XXXXXXXX	13 Jan 04	180.0	60.0	310	59	1	19	Email	Phone
XXXXXXXX	16 Dec 03	180.0	60.0	18	0	3	16	Email	Phone
XXXXXXXX	12 Dec 03	180.0	60.0	98	16	0	16	Email	Phone
XXXXXXXX	29 Dec 03	180.0	60.0	40	5	0	12	Email	Phone
XXXXXXXX	11 Sep 03	180.0	60.0	30	3	0	10	Email	Phone
XXXXXXXX	03 Jan 04	180.0	60.0	218	21	0	9	Email	Phone
XXXXXXXX	20 Dec 03	180.0	60.0	590	29	11	6	Email	Phone
XXXXXXXX	22 Oct 03	180.0	60.0	84	4	0	4	Email	Phone
XXXXXXXX	12 Dec 03	180.0	60.0	73	1	0	1	Email	Phone
XXXXXXXX	14 Nov 03	200.0	60.0	91	1	0	1	Email	Phone
XXXXXXXX	14 Nov 03	180.0	60.0	91	1	0	1	Email	Phone
XXXXXXXX	31 Oct 03	180.0	60.0	97	1	0	1	Email	Phone
XXXXXXXX	12 Jan 04	180.0	60.0	205	4	0	1	Email	Phone
XXXXXXXX	none	180.0	60.0	0	0	0	0	Email	Phone
XXXXXXXX	none	180.0	60.0	0	0	0	0	Email	Phone

Figure 16. Health Sentry participant exception report

HEALTHSENTRY									
CONNECTED IS PROTECTED									
HOME EXCEPTIONS COMPLIANCE TEST MENU LOG OUT									
Patient Logon Name: <input type="text"/>									
From: <input type="text" value="8/2/03"/>									
To: <input type="text" value="12/21/03"/>									
<input type="button" value="Update"/>									
	All	Night 01:00 04:59	Pre- Breakfast 05:00 08:59	Post- Breakfast 09:00 10:59	Pre- Lunch 11:00 12:59	Post- Lunch 13:00 15:59	Pre- Dinner 16:00 18:59	Post- Dinner 19:00 21:59	Bedtime 22:00 24:59
# records:	572	126	130	25	102	56	119	12	2
# under:	0	0	0	0	0	0	0	0	0
# over:	0	0	0	0	0	0	0	0	0
% under:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% over:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
average:	121.8	136.2	106.3	111.8	118.5	134.7	121.8	127.7	136.0
stddev:	33.8	20.2	36.6	25.8	31.7	35.8	36.4	28.5	4.0
avg tpd:	4.0	0.9	0.9	0.2	0.7	0.4	0.8	0.1	0.0
Date	Night 01:00 04:59	Pre- Breakfast 05:00 08:59	Post- Breakfast 09:00 10:59	Pre- Lunch 11:00 12:59	Post- Lunch 13:00 15:59	Pre- Dinner 16:00 18:59	Post- Dinner 19:00 21:59	Bedtime 22:00 24:59	
12/21/2003									
12/20/2003	126.0	121.0		171.0					
12/19/2003	127.0	118.0	133.0		126.0	191.0			
12/18/2003	121.0	94.0		133.0	175.0	150.0	143.0		

Figure 17. Health Sentry tabular form of an individual's glucose tests, administrative view

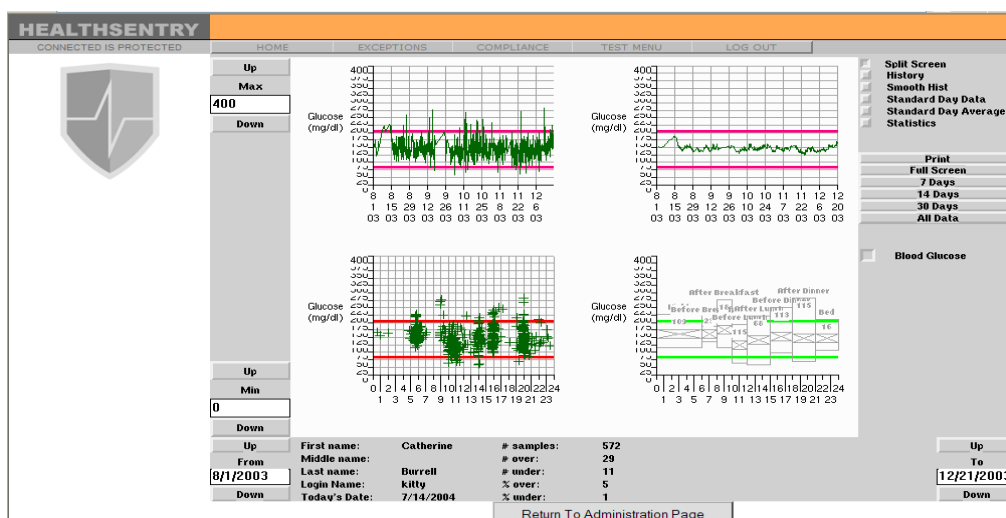


Figure 18. Health Sentry graph views of an individual's glucose tests, administrative view

Participants' data downloaded to the kiosk was monitored from a remote location on weekly basis by the investigator. Administrative access through the Health Sentry website allowed for participants to be monitored from a distant location in order to detect critical values in blood glucose test results. All databases are SSL secure and password protected.

#### Incentives and Participant Communication

Participants received a gift through the mail at the end of each month if they downloaded and/or viewed diabetes information at least one time per month. The gifts included blood glucose test strips, gift certificates, exercise bands, and more. Table 1 includes incentives that were sent out each month.

Table 1. Participant Incentives for Using the Kiosk

Month Number	Gift Received
1	100 test strips, \$10 gift certificate
2	\$15.00 Wal-Mart gift card
3	200 test strips
4	1 Thera-band exercise band, booklet of exercises, \$20 gift certificate

Participants were kept up to date of new material added to the kiosk, any technical issues, dates they could receive one-on-one help using the kiosk, and personnel contact information, through mailed letters. These letters also provided words of encouragement for continuing to use the kiosk.

#### Posttest Data Collection

Posttest with each of the participants was the same as pretest except an additional questionnaire was added. The additional instrument was the Kiosk Evaluation Questionnaire (Appendix 13). The purpose of this instrument was to determine what information the subject primarily sought on the kiosk, if the information received was reliable, if the participant thought this type of technology was useful and if the participant would use it again. At conclusion of the



study, participants who reported having access to a computer and internet were given the opportunity to receive the Accu-chek Compass® software, a download meter cord, and access to the diabetes information website that was run on the kiosk.

#### Follow-up Participant Monitoring

Monitoring of kiosk usage in the pharmacy was performed for two weeks following the end of the pilot study. Continued monitoring was done to investigate if participants would continue to use the kiosk after the study had ended and incentives were no longer given.

For one week after the kiosk was taken out of the pharmacy the website was monitored for potential usage by participants from a personal computer. The login screen of the diabetes information website, the website used for the kiosk, remained to track potential users.

#### Posttest Focus Group

A posttest focus group was conducted after the pilot study was over in order to obtain feedback about using the kiosk. All participants that used the kiosk were mailed a letter inviting them to take part in the focus group. Before the focus group began participants were given two consent forms, one to keep and one for research records, to sign (Appendix 14). The focus group lasted for approximately 60 minutes and had prepared open-ended questions asked by a trained moderator (Appendix 15). The session was tape-recorded and later transcribed. At the end of the session, participants were given a box of 100 Accu-chek® test strips and a pocket sized fast food nutrition guide.

The primary purpose of the focus group was to obtain feedback participants that had used the kiosk about their likes and dislikes of operating the kiosk. Information was also gathered about specific aspects of the kiosk, such as the content material, downloading the blood glucose meter and printer capabilities. Participants were asked to give specific information about changes for future kiosks.

### Statistical Analysis

Analysis of data was performed using Stat Pac for Windows. Stat Pac is a survey software program for creating questionnaires and statistical analysis. Codebooks are created for data entry. Statistical analyses of data can include a single variable or multiple variables at a time.

Data analysis for this project used information from pencil and paper questionnaires, information from Site Kiosk™ reports, and from the Health Sentry Database. The primary analyses performed were descriptive, frequency tables, t-tests, and Pearson's Product correlations. Microsoft Excel was also used for some data analysis and for creating charts and figures.

## CHAPTER 4

### RESULTS

#### Pre-pilot Focus Group

Individuals in the focus groups ranged in age from 31 years to 77 years. There were three males and nine females. The number of years the participants have had diabetes ranged from 1 to 47 years with a mean of 11.6 years. Responses from the participants focused on the lack of information they receive from health care professionals, the need for more information about food and meal planning, and medications. All of the respondents reported the need for more education on food portion sizes, and what to eat at home and away from home.

When asked about using technology to obtain the information most said that they would be willing to use a kiosk while only a few said they would probably not use it. Other comments about using technology suggested that the kiosk needs to be simple to use, contain visuals (e.g. diagrams, pictured examples), and provide up to date information that is easy to understand. Three of the participants from the focus group became participants of the pilot study.

#### Key Informant Interviews

Interviews were completed with a Public Health Department nurse, hospital pharmacist, dietitian, two physicians, and two social services agents in Rabun County. The theme reported by all interviewees was that many diabetes patients are lacking the skills and knowledge in order to control their diabetes because the patients do not understand the information given to them and some health professionals stated patients do not receive sufficient information from their doctor. Key Informants stated many of the diabetes patients in the area do not have enough money to pay for medications and supplies needed to perform regular self-blood glucose checks. Key informants also stated that patients typically do not ask questions until the

health care provider ask the patients questions about their care or until the patients are probed about questions to ask. Most of the interviewees believed that a number of people would be willing to use technology in order to seek diabetes information and manage their diabetes; however, concerns regarding older individuals acceptance of technology was expressed in those greater than 65 years of age.

### Participant Descriptions

Twenty-six individuals signed consent forms and completed the pretest. After month one, six participants dropped the study with two citing health reasons, three citing lack of time and one for unknown reasons. An additional participant dropped in month four of the pilot study due to health reasons. Of the remaining 19 participants, three did not use the kiosk and six participants discontinued using the kiosk beyond month two.

Ten participants remained that were considered the user cohort. The user cohort completed both the pretest and posttest and used the kiosk three or more times over the course of the four and a half month pilot trial period. There were five females and five males in the user group, all white/Caucasian. The age range for users was 43-71, with a mean age of 58. Table 2 includes demographic information for all individuals that registered to be in the pilot study. The seven individuals that requested to terminate participation were sent a brief exit survey with a self-addressed stamped envelope; no surveys were returned (Appendix 16).

Table 2. Demographic Information for All Enrolled Participants

	<b>Kiosk Users (n=10)</b>	<b>Officially dropped from study (n=7)</b>	<b>Participants completed pretest (n=26)</b>
Male	5	4	13
Female	5	3	13
Age Range	43-71	44-84	31-77
Mean Age	58	63	58
White, Non Hispanic	10	7	24
African American			1
Hispanic, Latino			1
< 1 Child living in	7	6	17
≥ 1 Child living in	3	1	9
Education 1-8 yrs	3	2	5
Education 9-11 yrs	1		1
HS/GED	2	4	9
Some college, no	1		5
Two year degree	1		1
Bachelors Degree			
Some grad work			2
Advanced degree	2	1	3
Full-Time	3	2	11
Part-Time			2
Homemaker	3	3	4
Retired	2		2
Disabled	1	3	5
Unemployed < 3 mo			
Unemployed > 3 mo	1	1	2
Eligible for food	1	2	4
No VCR	1	2	3
No DVD	5	3	11
No computer	4	3	9
No internet	5	6	13

## Kiosk Usage

### *System Information*

The kiosk was in the pharmacy from August 15, 2003 until January 13, 2004; however, the participants only had to use the kiosk through December. The two weeks in January were used as post-follow up days to monitor kiosk usage beyond what was required of the participants. Follow-up results are discussed in another section. The pharmacy was closed on Sundays and holidays, thus the kiosk was not available for use. There were additional days that the kiosk was not available for use from either not being turned on or other technical problems (Figure 19).

During August, the kiosk was used for half the month; during that period total usage time was 7 hours 58 minutes (Figure 20). Kiosk usage time increased during September to 13 hours 4 minutes, and gradually decreased through November to 8 hours 37 minutes. During the last month, December, total usage time sharply increased to 36 hours 26 minutes. The number of navigations (individual pages hit) followed a similar pattern, except for December (Figure 21). The usage time in December was highest while the navigations amounts were the lowest. The number of navigations during August was 1,940 and further increased in September, which had the greatest number of navigations, to 2,455. The remaining months navigations gradually decreased each month, with December having the least number of navigations of 927. The number of pages printed did not follow the patterns of usage time and number of navigations (Figure 22). Each month the amount of pages printed increased, with a substantial increase in November followed by an equally sharp drop in December. The number of pages printed in August was 12, increased to 100 in September 331 pages printed in November and finally 65 pages were printed in December.

The time of day that the kiosk was used during each of the months also demonstrated a clear pattern, the greatest usage occurred between 9 am and 12 pm (figure 23). The average number of navigations decreased around 1 pm and would remain steady throughout the rest of

the day, until the pharmacy closed at 6 pm. The kiosk was used primarily on Fridays, the average number of navigations for this day was 866.2 versus Wednesdays, the least used day, with an average of 155 navigations (Figure 24). The remaining days of the week, Monday, Tuesday, Thursday, and Saturday, had similar navigation averages of 190.8, 204, 202, and 198.2, respectively. The number of navigations on a Friday has a distinct pattern, August had the most navigations on a Friday and then the navigation numbers decreased each month until December, which had the least number of navigations on a Friday. The other days of the week did not have a similar navigation pattern during the pilot study period.

There were no correlations between number of navigations with the total usage time (Pearson's product correlation  $r = -.766$ ,  $p = .131$ ) or with the number of pages printed ( $r = -.295$ ,  $p = .630$ ). In addition, there was not a correlation with the number of days the kiosk was available to use with total usage time ( $r = .325$ ,  $p = .594$ ) or number of navigations ( $r = .004$ ,  $p = .995$ ).

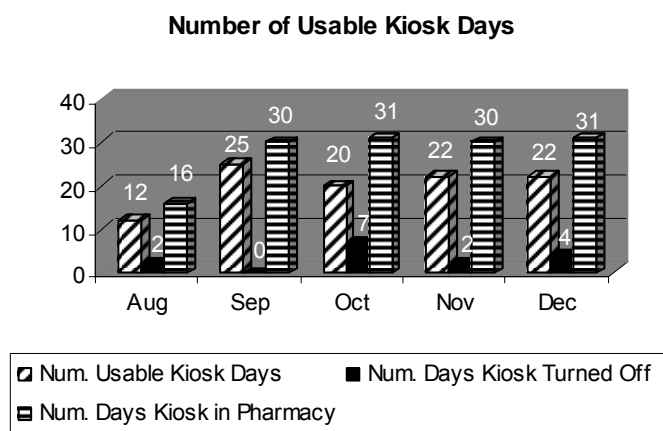


Figure 19. Number of days per month kiosk was available

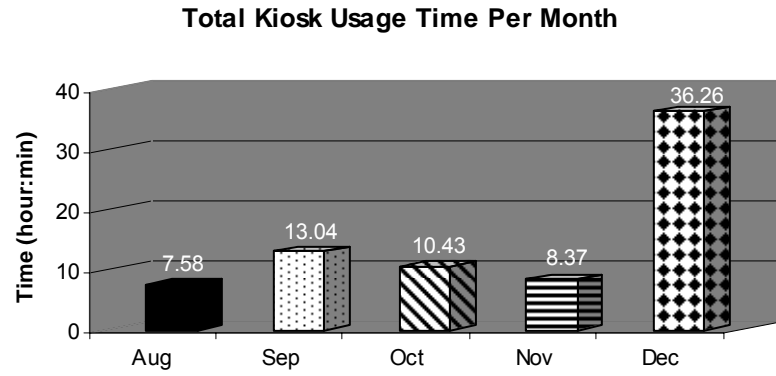


Figure 20. Kiosk usage time per month

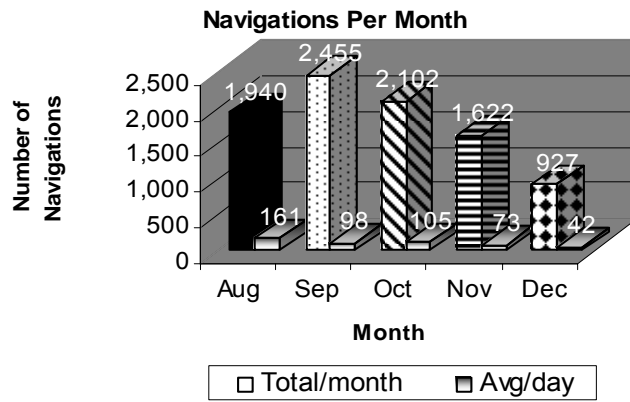


Figure 21. Total number of kiosk navigations per month

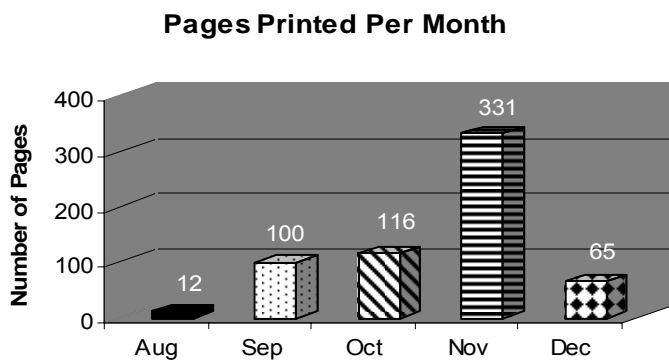


Figure 22. Number of pages printed from kiosk per month



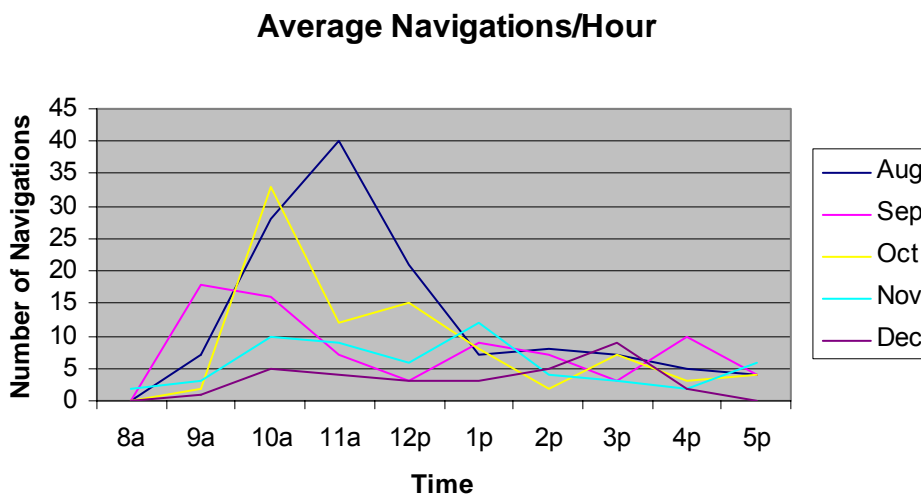


Figure 23. Average number of page navigations on the kiosk per hour

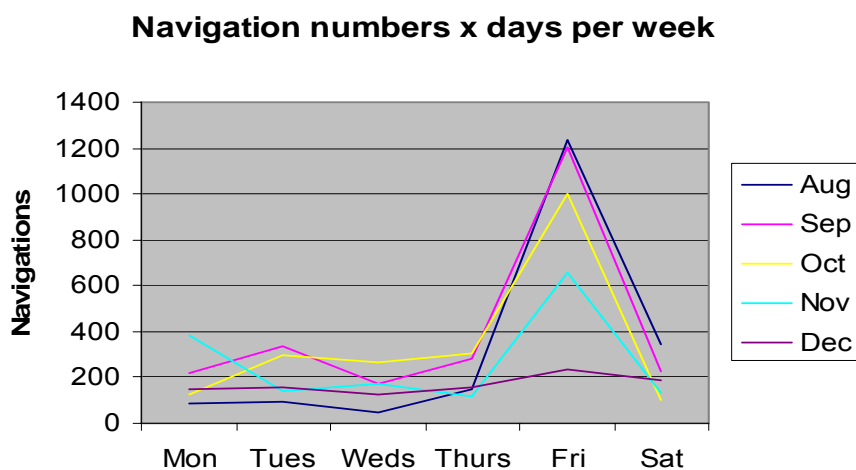


Figure 24. Number of navigations per day of week

### External Websites

The kiosk content material contained 78 direct links to external websites, not including HealthSentry.net. Twenty-six of the links were accessed by both participants and guests. The most frequent pages accessed were Lilly animated education pages (16 views), NIDDK Diabetes Dictionary (14 views), Med-Line Meal Planning module (10 views), Washington.edu diabetes risk test (7 views), Diabetes.org Kids Zone (6 views), and Diabetes Forecast (6 views). An additional six NIDDK pages were viewed that were not accessed by a direct link from

content pages, but through further exploration once connected to this website. Health Sentry was linked to 231 times. The list of external links in Appendix 6 also notes the number of times each site was accessed.

### *Participant Usage*

The periods referred to in the study as months one, two, three, four do not refer to actual calendar months but to four four-week periods which do not coincide exactly with calendar months. Table 3 shows the actual dates of the periods referred to in the study as months one, two, three, and four. The total number of logins by users was 84 (figure 25). The number of logins per month was relatively stable: 21, 24, 22, and 17 for months one to four, respectively. Fifty-nine percent of the logins were only downloading blood glucose meters, 12% were viewing information only and 29% were both downloading the blood glucose meter and viewing information. The mean number of logins per user was 8.7 (minimum = 3 and maximum = 14). The mean login time per user was 8 minutes and 42 seconds, and the mean total time per user logged on was 69 minutes and 24 seconds (Table 4). The total usage time by all users was 694 minutes.

Table 3. Dates Associated with Kiosk Usage/Month for Participants

Month	Dates
1	wk of 8/18 - 9/15
2	wk of 9/22- 10/20
3	wk of 10/27-11/24
4	wk of 12/1-12/29

Navigations by all users equaled 2,792 for all four months. Each months navigations were 656, 551, 850, and 735 for months one, two, three, and four, respectively. Lastly, 218 pages were printed by all users.

All participants who used the kiosk viewed the Healthy Eating section the most (47 visits), followed by Blood Sugar Monitoring (14 visits), Taking Care of Your Body (13 visits),

What is Diabetes (9 visits), Medicines and Insulin (6 visits), Diabetes Dictionary (6 visits), and Diabetes Management (4 visits). Sixty-one percent of these visits were accessed by the ten-person user cohort. There was a strong positive correlation with the users total number of navigations and their total time spent on the kiosk ( $r = .936$ ,  $p \leq .001$ ).

Table 4. Average Kiosk Usage Time by User Cohort

User	Average time in minutes/ Login	Total time in minutes/ Login
1	8	25
2	5	20
3	8	54
4	8	67
5	14	110
6	5	47
7	4	39
8	12	134
9	9	110
10	6	88
Total	8.42	69.42

Kiosk Users Login Patterns

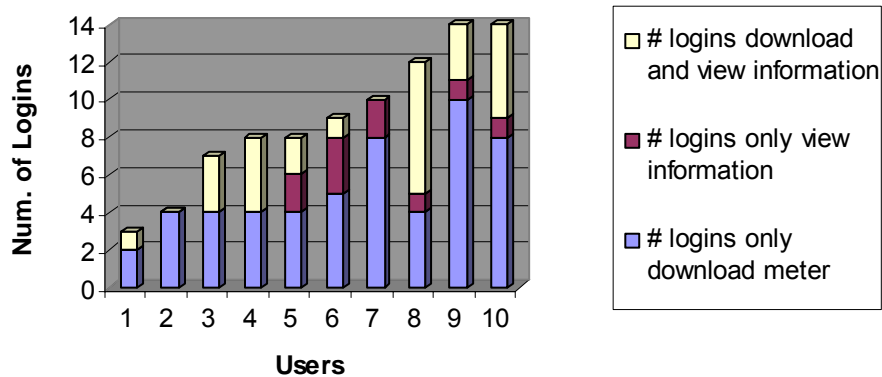


Figure 25. Usage patterns ok kiosk per user

### *Guest Usage*

A total of 72 guests  $\geq 18$  years old logged on to the kiosk during the four month pilot trial period and accessed information. An average of 15 guests per month logged on to the kiosk and viewed information, while an average of six guests logged on to the kiosk and did not view any information. Sixty percent of the guests that logged on were females and 40% were males. Females in the age groups 18-25 and  $> 65$  had the most logins vs. the males age group 26-35 had the most logins. Table 5 has the number of all age groups of each gender that logged on. Twenty-six guests under 18 logged in.

The sections that were viewed by five or more guests were What is Diabetes (23 visits), Nutrition Information (19 visits), Diabetes Dictionary (7 visits), American Diabetes Association Kids Zone (7 visits), and Diabetes Risk Test (5 visits). Fifteen other main topics were searched by one to four guests. The average time spent on the kiosk by guests was less than three minutes. Five total pages were printed, which occurred during a single guest session.

Table 5. Guest Users by Gender and Age Range

Age group	Males	Females
18-25	2	9
26-35	9	4
36-45	5	5
46-55	5	8
56-65	2	8
$> 65$	6	9
Total	29	43

### Health Sentry Usage

Nine of the 10-kiosk users' information is reported here, one user's meter information was inaccurate and not able to be analyzed. The mean number of records downloaded from blood glucose meters was 206 (minimum= 30, maximum = 572). Eight of the nine users were considered in control by having a blood glucose of  $\leq 170\text{mg/dl}$  <sup>[52]</sup> during the first month. Five



\* No data available for this participant

**Attempted Downloads vs Actual Downloads**

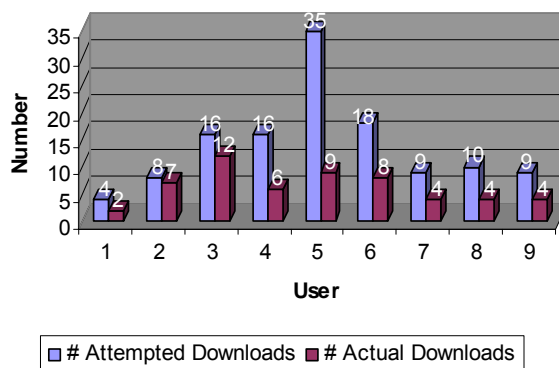


Figure 26. Attempted number of downloads vs. number of successful downloads

### Kiosk Evaluation Questionnaire

Based on the Kiosk Evaluation Questionnaire, users stated the primary information they searched for was nutrition related topics (9 users), blood glucose monitoring (8 users) and diabetes management (7 users). Nine of the participants usually or always found the information they searched for, and one participant answered sometimes. The majority of responses to items comparing information received from the kiosk and information received from other sources stated the kiosk information was equal to other sources of information including nurses (8 users), physicians (10 users), and patient educators (7 users). Some participants felt the kiosk information was better than other sources of information nurses, physicians, and nurses, three, four and five, respectively. None of the participants reported the kiosk information to be worse than other sources of information.

When asked if the kiosk lead them to seek information from health care professionals or from printed materials, three went to their physician, three to a dietitian, two to a nurse, one to a pharmacist, and two said books or pamphlets. Seven of the participants stated they received information they would not have gotten otherwise, one participant was neutral and two disagreed. Eight of the 10 users felt comfortable using the kiosk to obtain health information.

All participants always or usually found the blood glucose meter function on the kiosk to be helpful, but only four participants took the printed graphs to their physician. All users agreed that this type of technology would be an appropriate way for diabetes patients to receive health information. Nine of the 10 participants said they would definitely or most likely use kiosk like technology in the future for obtaining health information and to download self-blood glucose checks.

### Pre/Posttest Questionnaires

#### *Diabetes Knowledge Test*

Nine of the 10 participants in this cohort are non-insulin users; therefore, only questions 1-14 are used to calculate the score of the knowledge test. The score is calculated on the point value of the question. For example, if the correct response to a question is “c” then that question is worth three points; or if the correct response is “a” then that question is worth one point. The sum of all correct answers is 32.

Overall, there was not a statistically significant change among the user group in knowledge ( $p = .179$ ); however, eight of the participants improved or maintained their diabetes knowledge (Table 7). Three of the participants increased their knowledge by eight or more points. Questions about how to treat low blood sugar and how to determine a free food for a diabetes patient had the greatest decrease in wrong responses. Five of the 14 questions had an increase in the number of correct responses given by the participants. Six of the questions did not have a change in the number of correct or incorrect responses given, and three of the questions had an increase in the number of wrong responses given by participants.

#### *Diet Adherence Scale*

Questions asking if participants had been told by a healthcare professional to follow a meal-plan and eating recommendations had little change from pretest to posttest (Table 8). Three of the yes/no items changed from *no* to *yes* by four of the users and one of the yes/no items changed from *yes* to *no* by two users. The item “How often do you follow the schedule for

your meals and snacks?” had a significant change ( $p = .003$ ). The remaining frequency items did not have significant changes, but there was a slight positive difference from pretest to posttest. Three users reported an increase in how often they follow a meal plan, four users reported an increase in how often measure food, and six users reported an increase in how often they use the exchange list to plan meals.

#### *Understanding Scale*

Several items from the understanding scale had significant improvements ( $p \leq .05$ ) from pretest to posttest (Table 9). Items included an overall understanding of diabetes care ( $p = .024$ ), how exercise, diet, and medications affect blood glucose ( $p = .029$ ), prevention and treatment of low blood glucose ( $p = .037$ ), foot care ( $p = .015$ ), and pregnancy and diabetes ( $p = .026$ ). Understanding of medication use was nearly significant ( $p = .051$ ).

#### *Exercise Barriers Scale*

There was little change seen in the exercise barriers scale (Table 10). There was some improvement, perceived barrier mean score decreased, on three of the items and two items increased for perceived barriers to exercise. No items in the exercise barriers scale had significant changes in responses.

Table 7. Participants Diabetes Knowledge Test Score at Pretest and Posttest

Participant Number	1	2	3	4	5	6	7	8	9	10
Pre DKT Score	14	20	19	28	29	32	27	22	31	25
Post DKT Score	23	29	27	29	32	25	28	27	27	25



Table 8. Diet Adherence Scale Mean Response Score at Pretest and Posttest

Diet Adherence Scale	Pre-Mean (SD)	Post-Mean (SD)	t-test	p-value
How often follow meal plan	3.330 (.675)	3.700 (.823)	1.809	.104
How often follow schedule	2.800 (.919)	3.600 (.699)	4.00	.003*
How often weigh or measure food	2.111 (1.054)	2.333 (1.414)	.610	.559
How often use exchange lists to plan meals	2.333 (.0866)	2.667 (1.500)	.816	.438

\* indicates a significant p value,  $p \leq .05$

Table 9. Understanding Scale of Diabetes Care Mean Response at Pretest and Posttest

Understanding Scale Item	Pre-Mean (SD)	Post-Mean (SD)	t-test	p-value
Overall	3.30 (1.059)	3.90 (.994)	2.714	.024*
Stress	3.30 (1.160)	3.40 (1.265)	.361	.726
Diet & Sugar Control	3.20 (.789)	3.40 (1.075)	.802	.443
Exercise & Sugar Control	3.778 (1.302)	4.111 (1.364)	1.155	.282
Understanding of Meds	4.333 (.866)	4.889 (.333)	2.294	.051*
How to use blood sugar results	3.800 (1.229)	4.300 (.949)	1.861	.096
Diet, Exercise, Meds Affect blood sugar	3.900 (.994)	4.800 (.422)	2.586	.029*
Prevention & Treatment High Blood Sugar	3.800 (1.135)	4.500 (.707)	1.655	.132
Prevention & Treatment Low Blood Sugar	3.400 (1.174)	4.200 (1.317)	2.449	.037*
Prevention of Long Term Complications	3.800 (1.135)	4.400 (.690)	1.500	.168
Foot Care	4.100 (.738)	4.600 (.699)	3.000	.015*
Benefits of improving	4.300	4.300	0	1.00
Pregnancy <sup>a</sup>	1.857 (1.574)	3.714 (1.704)	2.931	.026*

\*indicates a significant p value,  $p \leq .05$

<sup>a</sup> Three responses were missing from this item

Table 10. Exercise Barriers Scale

Exercise Barriers Scale	Pre-Mean (SD)	Post-Mean (SD)	t-test	p-value
Exercise too much effort	2.000 (1.323)	2.333 (1.302)	.478	.645
Don't believe its useful	1.222 (.667)	1.556 (1.014)	2.00	.081
Don't like to do it	1.778 (1.093)	1.667 (1.118)	.229	.824
Because have a health problem	2.000 (1.414)	1.800 (1.317)	.309	.764
Diabetes more difficult to control	1.444 (.882)	1.222 (.667)	1.000	.347

### Pre/Posttest Clinical Values

Clinical values for weight, BMI and, blood pressure did not have significant changes; however, A1c was inversely significant ( $p = .016$ ) (Table 11). Weight loss occurred in seven of the users with a mean loss of 5.14 lbs (Figure 27). Seven of users had an increase in A1c, the mean increase was .45% (Figure 28). Two users did not have a change in A1c and one user decreased by .10%. Little improvements in blood pressure among the users occurred (Figure 29). One participant had an overall decrease in blood pressure, one improved systolic blood pressure and two improved or had no change in diastolic blood pressure. Seven users systolic blood pressure increased with a mean of 23 mm Hg and six users had a mean 5.6 mm Hg increase in diastolic blood pressure.

Table 11. Clinical Values at Pre and Posttest of the User Cohort

Clinical Values of Kiosk Users				
	Pre-Mean (SD)	Post-Mean (SD)	t-test	p-value
Weight	193.100 (50.967)	190.000 (50.693)	2.085	.067
BMI	31.310 (6.753)	30.860 (6.541)	1.738	.118
A1c	6.230 (.751)	6.680 (.745)	3.126	.016*
Systolic BP	124.778 (13.926)	136.889 (32.231)	1.321	.223
Diastolic BP	80.556 (11.812)	82.000 (13.096)	.564	.588

\*indicates a significant p value,  $p \leq .05$

### Change in Weight and BMI

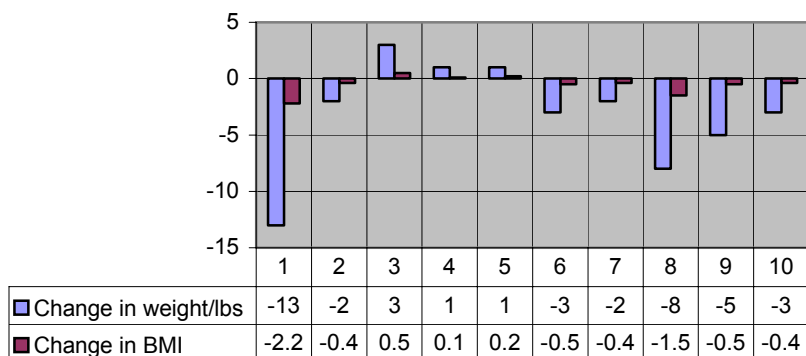


Figure 27. Change in BMI among the user cohort

### User A1c Pre/Post and Changes

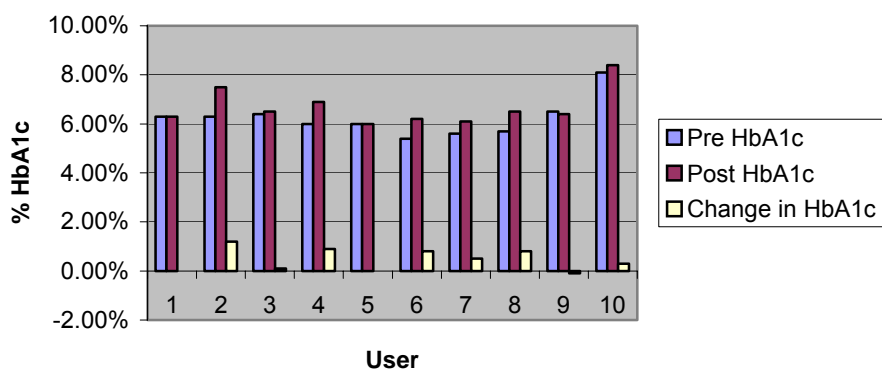


Figure 28. Change in A1c among the user cohort

### Change in Blood Pressure

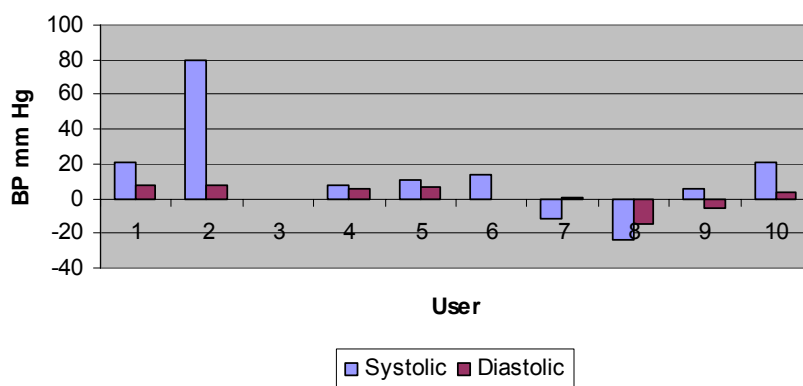


Figure 29. Change in blood pressure among the user cohort

### Follow-up Patient Monitoring

For two-weeks after the end of the pilot study, the kiosk remained in the pharmacy in order to monitor any continual usage. Three participants in the user cohort accessed the kiosk after the pilot study. Two users only downloaded blood glucose meters and one downloaded their blood glucose meter and viewed information. Information searched included stress and diabetes, online risk test, sick day management, and the diabetes dictionary. Five guests logged on, two females aged 26-35, one female over 65, and one male aged 56-65. Information sought included eye care, smoking cessation, diabetes definition and risk test, and children with diabetes. One person under 18 logged on to the kiosk.

At posttest, participants were given the website address to the kiosk content material. For one week following the removal of the kiosk from the pharmacy, the login screen remained on the diabetes kiosk website in order to enter the content material just as it was viewed at the kiosk. One participant logged on from home and viewed the meal planning, portion control and healthy recipes section over a 37-minute period.

### Posttest Focus Group

Two months after the pilot study had ended, a focus group was held for any of the 15 participants that had used the kiosk at least one time. Seven individuals attended the focus group, two partial users and five users, which included two females and five males. The focus group was held in order to gather feedback on kiosk content, functionality, the download blood glucose meter function as well as suggestions for future projects.

None of the participants had trouble logging onto the kiosk or navigating through the menus and content pages. The biggest problem participants had using the kiosk was the computer “freezing up”; no specific functions or pages were mentioned that would cause a freeze up, but it happened frequently during their use time. Several also stated when they arrived at the pharmacy to use the kiosk it was not working properly. Printing content pages was easy and little problems were experienced, but could be improved upon; however, no

specific suggestions were given. All participants agreed the kiosk contained a good variety of information, and stated one could get as much as information they wanted. The participants also believed the information came from reliable and valid sources. One user in particular thought the information was great for newly diagnosed diabetes patients. The headphones intended for use on web pages with audio were not used by any of the focus group participants because there was limited space available for the headphones and they were in an inconvenient location.

Once past the technical problems reported while transmitting data from the blood glucose meters, nearly all participants liked the kiosk as a way to download the blood glucose meter data. Two individuals kept their own records at home and felt that graphs were not as important, but served as more of an enhancement to their disease management. Two of the participants in the focus group took their graphs to their physician during check-ups. Both reported their physician liked the graphs because they made reviewing the patient's blood glucose patterns faster and easier. Participants specifically mentioned they would like to change the amount of information printed of the raw data from the meters to include only the most recent data. All data would print each time instead of the most current downloaded measurements, which gave them several sheets of repeated information.

Participants' biggest concern about using the kiosk was the location of the kiosk in the pharmacy. They felt "in the way" being next to the pharmacy counter and uncomfortable being in the busiest spot of the store. Most would have preferred to use the kiosk in another section of the store where there was little foot traffic, such as the front of the store. They also stated that had there been a chair to sit down, they would have stayed longer to look at more information. One feature the group would not want to change is the touch screen; all liked the size and the functionality.

In general, the participants considered the kiosk easy to use. Most said going to the pharmacy once a month to use the kiosk was convenient, but many would like to have the ability

to access the information and download their blood glucose meter at home. Some of the individuals said having this type of technology available in the community would be particularly helpful for those that do not have a computer or internet at home and for people that do not feel comfortable asking a doctor or pharmacist for the information. They also thought the kiosk was good for people with low incomes because it is free or if it had a small fee of < \$5, it would be more cost effective than a doctor's visit or purchasing books and magazines for information gathering. A few of the participants reported that if they had a computer with internet at home, paying even a minimal amount to get a print out of their blood glucose meter data or viewing information would not be worth the trip to the grocery store or pharmacy. Participants said they would definitely use a kiosk if it were located in a physician's office.

## CHAPTER 5

### DISCUSSION, CONCLUSIONS, AND FUTURE RECOMMENDATIONS

#### Discussion

##### Hypothesis 1

The data from this pilot trial suggests the kiosk can be an acceptable tool for providing patient information regarding healthy lifestyle choices and diabetes management. Fifty percent of the total sample used the kiosk through the pilot trial. These individuals were the user cohort (n=10). The user cohort logged in 84 times during the four-month study period. Seven of the users came to pharmacy to use the kiosk an average of two or more times per month for nearly 9 minutes per session. Over half, 59%, of the sessions were downloading the blood glucose meter data, 29% of the total logins were both viewing information and downloading the blood glucose meter and 12% of logins were users only viewing diabetes information.

The kiosk appears to be an acceptable tool for diabetes management among the participant group. The users, as stated above, logged-on primarily to download blood glucose meters. All of the users reported that they found this function helpful with their diabetes management, in fact, four of the users took the graph print outs to their physician.

The continued usage by the participants despite a number of technical problems experienced throughout the pilot trial period further demonstrates that the kiosk was a tool the participants wanted to use in order to gather information and receive printouts of their blood glucose monitoring. The kiosk would often freeze up during operation, usually causing the whole system to shut down. There were numerous days the kiosk was turned off or not functioning when participants went to the pharmacy to use the kiosk. During August, the first

month of the pilot trial, the printer would not function as designed. Over time, the printer functioned as intended.

Finally, the download blood glucose meter function was difficult to navigate through for many users. In the beginning, the diabetes kiosk website and the Health Sentry website were unable to function together. Once that was resolved and the two sites were integrated, it made the small navigation bar on the Health Sentry site harder to read and touch on the desired button to view the graph and table. There were a number of failed attempts to transmit the data to Health Sentry; however, it is believed to be because participants did not see the navigation bar once the information was ready to view causing them to attempt to download again. Other circumstances could have contributed to the difficulties users had when downloading, but no specific feedback was given.

### Hypothesis 2

The kiosk served as an acceptable tool for providing diabetes information to community residents other than participants. Individuals in the community also used the kiosk while the kiosk was in the pharmacy. The usage amount by guests was less than participants in the study, but this finding was expected since the information was specific to diabetes. The low average usage time per guest could mean that individuals did not need the information specifically for diabetes or they were interrupted during their session. If the kiosk had contained other modules not specific to diabetes for guest users there might have been an increase in the number of navigations and time spent using the kiosk.

### Hypothesis 3

The kiosk shows promise as an effective tool for providing patient information regarding healthy lifestyle choices and managing diabetes. Several items on the understanding scale showed a statistically significant improvement in their understanding about diabetes care: the overall understanding of diabetes, understanding of foot care, and understanding of the effects medications, exercise and diet have on blood glucose. One item from the diet adherence scale,



“How often do you follow the schedule for your meals and snacks?” had a significant change in responses. In addition, seven of the users had an increased score on the Brief Diabetes Knowledge Test, which indicates that knowledge improved in the patients that used the kiosk regularly.

The improvements seen from the pre/posttest questionnaires suggest that the information gathered from the kiosk by users increased their understanding and knowledge on diabetes care and management. It is not known if these individuals received information from other sources besides the kiosk that lead to their increase in knowledge and understanding. Therefore, we cannot be certain that the information from the kiosk caused the increase in knowledge about diabetes care. However, based on the seven of responses by users in which they reported receiving information from the kiosk they would not have received otherwise, implies that the kiosk was the primary reason for the positive changes.

#### Hypothesis 4

Using the kiosk for patient education and monitoring blood glucose appeared to influence most of the users' weights, but not A1c or blood pressure. Though most of the users' blood pressure increased, five users were within the recommended limits of 130/80 mm/Hg.<sup>[52]</sup> Seven of the users did lose weight, but 60% of those that lost weight showed little change in BMI. Oddly, the users had a statistically significant increase in A1c. Weight and A1c do not typically move in opposite directions, when diabetes patients lose weight they often have decreases in average blood glucose.<sup>[53]</sup> The negative relationship could have been caused by errors in measuring the weight of participants or the changes in weight were not large enough to have an impact on their blood glucose since eight of the users had an  $A1c \leq 7\%$ , the recommendation by the American Diabetes Association.<sup>[52]</sup> Another possible reason the participants may have had increases in blood glucose averages is because the A1c tests were taken shortly after the holiday season. People tend to eat more food during this time, which

may have caused a rise in blood glucose. The time of posttest measurements would have captured the individual's blood glucose averages from holidays including Thanksgiving, Christmas, and New Years; however, it does not explain the weight loss that occurred in the users.

The pilot study was short which could have made it difficult to see changes in behavior that lead to decreases in weight, A1c, or blood pressure. According to Jeffery et al.<sup>[54]</sup> six months is the suggested short-term point for assessing initial losses in weight. A1c is a measure of blood glucose the preceding two to three months, but it is difficult to see significant changes during that time. Studies have shown<sup>[12, 14]</sup> that a patient typically needs 23 hours of patient education in order to have a 1% decrease in A1c.

Due to the limited resources of the pilot study, there was not adequate time to build all of the education content material before the participants started using the kiosk; therefore, some of the materials needed to aid individuals in making healthy lifestyle changes were not available to them until several weeks into the intervention.

### Limitations

One of the limitations of this research was not having an expert on kiosk development for heavy use in communities that included varying web applications on the kiosk. Some technical issues related to the kiosk could have been avoided or resolved prior to community implementation had there been more resources to have an expert consultant. In addition, there was a long distance between the researchers and the community in order to maintain the kiosk, thus making it difficult to travel to the intervention site frequently to ensure the kiosk was functioning properly and resolve other technical issues. This may have contributed to the high drop out rate and frustrations experienced by users and pharmacy staff.

Another limitation of the study was not including only diabetes patients that had an A1c  $\geq$  8%. Many of the participants had acceptable A1c values; therefore, it is unknown if the kiosk could have been more effective in improving blood glucose values for those considered to be

out of control. Diabetes patients that have a normal A1c tend to be more motivated about caring for their disease as well as continuing to seek information about diabetes.

Other limitations of this study may have been the short intervention time and the time of year the study was conducted. The intervention duration was short, four months, and occurred during the holiday season. A longer intervention is needed in order to have an impact on patient's weight, A1c and blood pressure. The holiday season is a difficult time of year for many individuals, with or without diabetes, to maintain normal eating and exercise behaviors. Changing eating patterns and behaviors during these food-centered holidays is challenging.

Choosing to use the participants as the beta testers for the kiosks usability instead of beta testing prior to placing it in the pharmacy could have contributed to the large dropout rate and troubles experienced by all of the kiosk users. A beta period prior to launching the kiosk in the community allows time for the kinks of the major features and functions of the kiosk to be resolved and a greater probability of participants continuous use of such technology.

Finally, the small number of participants that used the kiosk throughout the study ( $n=10$ ) made it difficult to find statistical significance in any changes that occurred from using the kiosk. Had all recruited persons remained in the study; the sample was still too small to detect statistical significance. This intervention; however, was a pilot evaluation study. Evaluation studies and pilot studies are designed to examine the feasibility of the intervention, key components related to data collection, and to test the instruments used for the intervention. Pilot studies are shorter in length than a typical intervention. For these reasons outcome changes in participants are not critical to the success of the pilot project, but rather the importance is to examine the process and establish procedures for future study.

## Recommendations

### Technical Features

Given the novelty of using a kiosk for diabetes education and management in a community setting, there are a number of recommendations that can be made for future investigations. The most important, is the ability of the equipment to function properly and require minimal maintenance. Computers in public environments are not used gently; therefore, the equipment will need to be durable and appropriate for users to operate the kiosk. A standard low-end desktop computer may not be stable enough to handle the abuse that many individuals can inflict on a machine, such as repeated touching of one button, rapid clicking from one page format to another (html to pdf), and impatience when an expected image is not displayed instantaneously. Since kiosks are used in numerous public arenas, like the airport, there are companies that offer industrial grade computers that are more reliable under heavy use. Similarly, desktop printers are not stable or fast enough to be used and maintained in a harsh user environment. Standard printers require paper to be refilled frequently, ink replacement and paper jams are a likely occurrence. Thermal printers are a more cost effective and maintainable solution when a kiosk offers a printer function. Thermal printers do not require ink replacement and paper is on a roll allowing only the needed amount of paper to be used instead of single sheets, typical of desktop printers.

Using the internet is an effective and easy way to develop content since it can be changed quickly and links to other websites can be added to make use of the vast amount information available electronically. Web pages are created in a number of formats, thus they may not all be compatible when used together, particularly if the link is not opened in a new pop up window but rather within the current website. When linking to another website for a specific function use, like downloading blood glucose meter data, all operations from each website should be tested for potential conflicts, which may affect the usability of either site. The usability tests will need to be done on the kiosk using the kiosk software, not on a regular internet

explorer webpage. What may work on a typical desktop computer does not ensure that the sites will function in the intended environment.

### Ease of Use for Patient

A kiosk that is intended to provide a large amount of information to diabetes patients should be located in an environment that is comfortable both physically and psychologically for the users. The kiosk should either be a sit down model or provide a chair for users. Most participants in the current study stated had there been a chair to sit at they would have stayed longer to view information. The location in the store should also be considered when placing a kiosk. Placing a kiosk in a semi private area or in a little used part of the store is ideal. The kiosk in this study was placed next to the pharmacy check out counter. This area in the store has the most traffic, this made users feel as though they were in the way and everyone was able to see what they were doing. In addition, the pharmacy area is busy and probably distracting making it difficult to concentrate on the information.

### Community Setting

More research should be conducted using the pharmacy as a setting for a health information kiosk. This study suggests that a pharmacy is an acceptable place to access the information, particularly in areas where there is limited availability of resources and access to health information, especially about diabetes. Future studies could determine what type of pharmacy (e.g. independent, free standing chains, or located within a store) would be most effective reaching individuals that need information. Kiosk impact on pharmacists should also be examined: Does the kiosk alleviate the pharmacists time spent answering common questions or does the kiosk provide basic knowledge allowing patients to ask the pharmacist more specific questions about their disease if needed? Finally, studies should be conducted to determine if a kiosk used by diabetes patients increases sales at the pharmacy.

Additional studies may look at placing kiosks in other areas of the community in which diabetes patients are likely to frequent such as physician offices and medical clinics, the public

health department, and the grocery store. Each location has the potential to reach diabetes patients. The kiosk placed in a medical clinic for diabetes information by Lewis et al.<sup>[38]</sup> showed that individuals were interested in the information that the kiosk provided and thought that it could be helpful for receiving this type of information in the future. As mentioned in the posttest focus group participants agreed that they would feel very comfortable using a kiosk in a physician's waiting room to view information and download their blood glucose meter.

### Kiosks for Disease Management

The easiest use of a kiosk is a vehicle for providing information, but a kiosk also has great potential for becoming a tool in diabetes patients' management. Allowing patients to download their blood glucose meter at a kiosk and have a pictorial representation may be a more meaningful way for them to interpret their blood glucose values, leading them to make changes in their daily care. Doctors could also benefit from having the patient's information via a graph. Two participants in the posttest focus group reported their physician liked the graphs and found them to be useful to see their blood glucose patterns. Future investigations may look at the effectiveness of patients meter data downloaded directly to a physicians email or a website monitored by the physician or the nursing staff. Patient monitoring between check-ups could prevent patients from developing complications or slow the progression of existing diabetes complications.

Kiosks connected to the internet in a community location frequented by diabetes patients provide a point of access for patients to be monitored remotely in between office visits. A kiosk placed in pharmacy could potentially streamline the steps the patient, physician, and pharmacist take in order to make changes in the medications patients are taking. Information from a patient's glucometer downloaded at the kiosk is stored in a database that is monitored by the physician. If the patient's blood glucose checks are not in a desirable range and medication needs to be increased, the physician electronically sends the change of the patient's

prescription to the pharmacist. In turn, the pharmacist will make the necessary changes and alert the patient of the adjustment to their medication regiment.

#### Future Funding and Sustainability

Although there are research dollars available to conduct studies, at some point this approach will need to be self sustaining. Typically, once grant money ends the intervention also ends. If the intervention was successful, then there will be users who still need and want the information and management tools that were provided, as well as new patients that could benefit from the technology.

Taking the information and the tools diabetes patients need to control their disease without grant money could be accomplished several ways. Drug manufacturers and other companies that provide goods for disease management use television and magazine advertisements to increase the awareness of their products. The kiosk can also serve as an advertising platform to reach individuals. Advertising money could easily offset the cost of maintaining a kiosk in a public location. The kiosk, when not in use, can display rotating ads of products that diabetes patients commonly use for example, Accu-chek test strips. Sick day management information on the kiosk can contain information about specific diabetes friendly over the counter medicines.

Another approach could be for users to pay a small fee to use a kiosk for a designated amount of time. Consumers pre-pay for a number of services like long distance calling cards, cell phones, and internet usage time at public computers. A similar model could be established for accessing the information to the kiosk for important information about: meal planning, healthy recipes, exercise materials, and to download their blood glucose meter to be sent to their physician. Pre-paid cards with access codes could be purchased at check out counters and used at the user's convenience. As with pre-paid long distance calling cards and cell phones, the kiosk access cards could be recharged as needed.

As with all technology for individual use, not everyone is going to be able to afford it. Kiosks are an economical way for many individuals who cannot afford to use a personal computer, personal digital assistant (PDA), or other means of delivering and receiving information. Kiosks can be easily upgraded to keep from becoming obsolete technology and changed to meet the needs of users.

### Conclusion

Diabetes patients, particularly in rural areas, are in need of information to help control their diabetes and decrease the development or progression of complications. Continual monitoring by health care professionals is needed in order to detect problems as they occur instead of after several months. A community pharmacy provides a location for patients not only to acquire the supplies and medications needed in their daily care but also as a valuable source for health information. Furthermore, pharmacists have a great opportunity to expand their role in a patient's care as an integral part of disease management. Using available technology can enhance the amount of information and amount of blood glucose monitoring a pharmacist or physician is able to provide. Web-enabled kiosks are an easily adaptable platform for providing health information as well as a tool for remote patient monitoring.

The kiosk used in this pilot study was a valuable tool that provided patients needed information and a way to monitor self-blood glucose checks. Participants were able to increase their knowledge and understanding of diabetes care through the online content provided. The improvements in knowledge and understanding can aid the patient in better caring for their disease. Though there was little change in the participants overall blood glucose values, they still found the graph and chart helpful in their diabetes management. It is possible that a longer study period would have had a positive impact on participant's clinical measures.



## APPENDICIES

## APPENDIX 1

Focus Group Consent Form  
 “Diabetes telemedicine kiosk for patient education”

I, \_\_\_\_\_, have been asked to participate as a subject in a focus group titled “Pilot testing of a diabetes telemedicine kiosk for patient education in a rural community pharmacy setting” for developing diabetes education materials. This study is being conducted by Dr. Rebecca Mullis and Beth Barnett of the University of Georgia Department of Foods and Nutrition. The researchers’ phone number is 1-706-542-4875, and they can answer any questions that I may have about the study.

I understand that I may refuse to participate in this study, and if I do choose to participate, I may stop at any time. If I refuse to participate or decide to stop, I will not be penalized and will not lose any benefits to which I am entitled. I can ask to have all personal information returned to me, removed from research records, or destroyed.

I understand that I will be asked to participate in a focus group to answer questions about information related to my diabetes and education for my disease and the preferred method of receiving that information. The focus group discussion will last about 90 minutes. I understand that I will receive cash or a gift valued at \$25.00 for taking part in the focus group.

There are no foreseeable physical discomforts or risks associated with taking part in the focus group discussions. The outcome of the study may not benefit me directly, but it may lead to the development of new programs that will foster healthy eating and physical activity among diabetes patients.

All data that could reveal my identity will be stored in a secured, locked cabinet within the University of Georgia nutrition research facilities accessible to research staff only. The data will be summarized and reported only in group form. Information that is gathered about me will not be reported to anyone outside the research project in a manner that personally identifies me. I understand that the focus group will be audio-taped and that handwritten notes will be taken. The audio-tapes will be destroyed within 24 hours of tape transcription.

I may ask questions about this project of the principal investigator, Dr. Rebecca M. Mullis of the University of Georgia Department of Foods and Nutrition, who can be reached at (706) 542-4875.

My signature below indicates that the researchers have answered all of my questions to my satisfaction and that I may consent to volunteer for this study. I have been given a copy of this form.

\_\_\_\_\_  
 Signature of Investigator    Date

\_\_\_\_\_  
 Signature of Participant    Date

For questions or problems about your rights please call or write: Chris A Joseph, Ph.D., Human Subjects Office, University of Georgia, 606A Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-3199; E-Mail Address IRB@uga.edu.

## APPENDIX 2

## University of Georgia Demographics Questionnaire

1. What is your birth date?                                  
   Month      Year
2. Are you:
  - 1   ☐ Male
  - 2   ☐ Female
3. How do you describe yourself?
  - 1   ☐ American Indian or Alaska Native
  - 2   ☐ Asian
  - 3   ☐ Black or African American
  - 4   ☐ Hispanic or Latino
  - 5   ☐ Native Hawaiian or Other Pacific Islander
  - 6   ☐ White, non-Hispanic, non-Latino
  - 7   ☐ Other
4. Marital Status
  - 1   ☐ Married
  - 2   ☐ Single
  - 3   ☐ Divorced
  - 4   ☐ Separated
  - 5   ☐ Widowed
5. How many children do you have living in your home?
6. What is the highest grade of school or year in college you have completed?
  - 1   ☐ 1 to 8 years
  - 2   ☐ 9 to 11 years, some high school
  - 3   ☐ High School Diploma/GED
  - 4   ☐ Some college, technical school, no degree
  - 5   ☐ Two year degree
  - 6   ☐ Bachelors Degree

- 7 ☐ Some graduate work
- 8 ☐ Advanced Degree, Professional Degree
- 7. Check your current employment status: (Check all that apply)
  - Employed:
    - 1 ☐ Full Time
    - 2 ☐ Part Time
    - 3 ☐ Homemaker
    - 4 ☐ Retired
    - 5 ☐ Disabled
  - Unemployed:
    - 6 ☐ Less than 3 months
    - 7 ☐ 3 months or longer
- 8. Are you eligible to receive Food Stamps?
  - 1 ☐ Yes
  - 2 ☐ No
- 9. Are you eligible to receive WIC?
  - 1 ☐ Yes
  - 2 ☐ No
- 10. Check all that you have in your house:
  - 1 ☐ Television
  - 2 ☐ VCR
  - 3 ☐ DVD
  - 3 ☐ Radio
  - 4 ☐ Refrigerator
  - 5 ☐ Stove/oven
  - 6 ☐ Microwave oven
  - 7 ☐ Computer
  - 8 ☐ Internet Access
- 11. Check all that you have in your kitchen:
  - 1 ☐ Measuring Cups
  - 2 ☐ Measuring Spoons

## APPENDIX 3

Pre-pilot Focus Group Question for Type 2 Diabetes Patients

1. How long ago were you diagnosed with type 2 diabetes?
2. When you were first diagnosed with diabetes did your doctor explain to you how to control your diabetes, or did he recommend that you attend education classes?
3. If your doctor recommended classes and you did not attend the classes, what were some of the reasons that kept you from going?
4. If you did go to the classes, how many did you go to? What did you find helpful from the class? What did you find unhelpful or confusing from the classes?
5. What types of information did you receive from the class or your doctor about controlling your diabetes?
6. How did you feel about the information given to you by your doctor or the diabetes educator? (*Were you overwhelmed, confused, frightened, didn't care, etc....?*)
7. Did you find that information provided to you about what you should to control your diabetes helpful? Did you use the information provided to you?
8. How important to your health do you think it is to manage your diabetes? What are some of the reasons you feel that it is or isn't important to manage your diabetes?
9. What kinds of questions do you have about diabetes? or What kind of information would you like to have about diabetes?
10. What kinds of problems do you have managing your diabetes? (*i.e. glucose levels, A1c, sick days*)
11. What are some troubles you have deciding what kinds of food to eat?
12. What would help you the most to manage your diabetes?
13. How would you like to receive that information? (*i.e. through the mail, the internet, give it to you at the pharmacy?*)
14. At home, what kinds of technology do you use? (*i.e. VCR, DVD player, computer, glucose monitor*)
15. Away from home what kinds of technology do you use? (*Computer, ATM, self check out at grocery stores, etc..*)
16. How does using new types of technology make you feel? uncomfortable, comfortable, anxious, wish it wasn't around
17. What kind of technology would you like to have to manage your diabetes?

18. Would you use a computer to manage your diabetes?
19. If a computer was placed in the pharmacy that had a touch screen, links to diabetes websites, information on how to control your diabetes, and could even hook up your glucose monitor would you feel comfortable using it? Do you feel that you could use it to control your diabetes?
20. Do you have any final comments you would like to make?
21. Do you have any questions for me?

## APPENDIX 4

Direct links from content pages, numbers in parentheses are the number of times the page was accessed by users and guests.

1. Lilly for the illustrations of how food, insulin, and sugar work on the cells in a normal person, a person with type 2 diabetes and type 1 diabetes. Don't have the url any more because those pages are no longer accessible. **(16)**
2. [http://www.roche-diagnostics.com/health\\_kiosk/framesets/index\\_e.html](http://www.roche-diagnostics.com/health_kiosk/framesets/index_e.html)
3. <http://depts.washington.edu/jacds/risk.html> {on line risk test for diabetes} **(7)**
4. <http://www.bayercaresdiabetes.com/diabcare/controlling/sickDays/index.asp>
5. [http://www.diabetes-insight.info/lwd/management/type\\_1/DI\\_T1\\_sick\\_days.asp](http://www.diabetes-insight.info/lwd/management/type_1/DI_T1_sick_days.asp)
6. [http://www.minimedrx.com/patientfam/pf\\_kt\\_pumpitup\\_tips\\_sickdays.shtml](http://www.minimedrx.com/patientfam/pf_kt_pumpitup_tips_sickdays.shtml)
7. <http://www.acs.ohio-state.edu/units/osuhosp/patedu/Materials/PDFDocs/dis-cond/diab-end/diabetes/stress.pdf>
8. <http://www0.sw.org/dnet/manage/stress.htm>
9. <http://diabetes.niddk.nih.gov/dm/pubs/financialhelp/index.htm&p=1> **(1)**
10. <http://www.diabetes.org/advocacy-and-legalresources/healthcare/insurance.jsp&p=1>
11. [http://diabetes.niddk.nih.gov/dm/pubs/complications\\_control/index.htm](http://diabetes.niddk.nih.gov/dm/pubs/complications_control/index.htm)
12. <http://www.diabetes.org/main/uedocuments/ADA-EngWeb.pdf> **(2)**
13. [http://www.actos.com/sub\\_sec6\\_doctor.asp](http://www.actos.com/sub_sec6_doctor.asp) (chart for scheduling visits with doctors)
14. <http://www.bddiabetes.com/us/understanding/carecard.asp&p=1>
15. [http://www.apma.org/vnr\\_dm\\_month\\_2001.htm](http://www.apma.org/vnr_dm_month_2001.htm) (Video of James Brown)
16. <http://www.nlm.nih.gov/medlineplus/tutorials/diabetesfootcare/db029101.html>
17. <http://orthoinfo.aaos.org/category.cfm?topcategory=Foot>
18. <http://www.nlm.nih.gov/medlineplus/tutorials/diabetesseyecomplikations/db019101.html>
19. <http://www.nei.nih.gov/nehep/pdf/dedqtest.pdf>
20. [http://diabetes.niddk.nih.gov/dm/pubs/complications\\_eyes/index.htm](http://diabetes.niddk.nih.gov/dm/pubs/complications_eyes/index.htm)
21. <http://www.nei.nih.gov/health/diabetic/retinopathy.htm>
22. <http://www.niddk.nih.gov/health/diabetes/pubs/complications/heart/heart.htm>
23. <http://www.diabetes.org/main/uedocuments/englishmtl.pdf>
24. <http://www.bayercaresdiabetes.com/diabcare/aboutDiab/complications/heartDisease.asp> **(2)**
25. <http://www.nlm.nih.gov/medlineplus/tutorials/kidneyfailure/id269101.html> **(2)**

26. [http://diabetes.niddk.nih.gov/dm/pubs/complications\\_kidneys/index.htm](http://diabetes.niddk.nih.gov/dm/pubs/complications_kidneys/index.htm)
27. <http://www.cdc.gov/diabetes/pubs/tcyd/kidney.htm>
28. [http://diabetes.niddk.nih.gov/dm/pubs/complications\\_nerves/index.htm](http://diabetes.niddk.nih.gov/dm/pubs/complications_nerves/index.htm) (1)
29. <http://www.diabetic.com/newsletter/archives/Nov2001/&p=1>
30. [http://diabetes.niddk.nih.gov/dm/pubs/complications\\_teeth/index.htm](http://diabetes.niddk.nih.gov/dm/pubs/complications_teeth/index.htm)
31. <http://www.diabetescareguide.com/dentalcare.htm>
32. <http://orthoinfo.aaos.org&p=1> (for frozen shoulder information) (1)
33. [http://www.diabetesnet.com/diabetes\\_complications/frozen\\_shoulder.php](http://www.diabetesnet.com/diabetes_complications/frozen_shoulder.php)
34. <http://www.nlm.nih.gov/medlineplus/tutorials/diabetesandmealplanning/db059102.html>  
(10)
35. <http://www.wvda.org/nutrient/>
36. [http://www.weightwatchers.com/health/asm/calc\\_healthyweight.aspx](http://www.weightwatchers.com/health/asm/calc_healthyweight.aspx) (1)
37. Taco Bell nutrition information (1)
38. Wendy's nutrition information (3)
39. McDonalds nutrition information (2)
40. KFC nutrition information (1)
41. Subway nutrition information (1)
42. <http://www.glycemicindex.com/>
43. [http://www.diabetesnet.com/diabetes\\_food\\_diet/glycemic\\_index.php&p=1](http://www.diabetesnet.com/diabetes_food_diet/glycemic_index.php&p=1)
44. <http://www.sweetnlow.com/recipes/index.html&p=1>
45. <http://www.aspartame.org/>
46. <http://www.equal.com/Recipes/&p=1>
47. <http://www.splenda.com/page.ihtml?jsessionid=YZFDH2M0OU3D0CQPCCGSUZYKB2IIQNSC?id=splenda/recipes/library.inc&p=1> (1)
48. <http://www.stevia.net&p=1>
49. <http://www.diabetes.org/main/health/nutrition/eating/default.jsp> (2)
50. <http://www.diabetes.org/diabetes-forecast.jsp> (6)
51. [http://www.diabetesdigest.com/dd\\_meters2.htm&p=1](http://www.diabetesdigest.com/dd_meters2.htm&p=1) (2)
52. [http://health4u.tamu.edu/AGENTS/health\\_and\\_safety/diabetes/SelfCare/My\\_Weekly\\_Food\\_Glucose\\_Log\\_Sheet.pdf](http://health4u.tamu.edu/AGENTS/health_and_safety/diabetes/SelfCare/My_Weekly_Food_Glucose_Log_Sheet.pdf)
53. <http://ndep.nih.gov/materials/pubs/A1c/A1c-checkIQ.htm&p=1>
54. <http://www.diabetes.org/type-2-diabetes/hypoglycemia.jsp>
55. <http://www.diabetes.niddk.nih.gov/dm/pubs/hypoglycemia/index.htm#information> (2)
56. <http://www.dhss.state.mo.us/diabetes/manual/DMGlucoseGuidelines.PDF>



57. [http://diabetes.niddk.nih.gov/dm/pubs/medicines\\_ez/printerfriendly.htm](http://diabetes.niddk.nih.gov/dm/pubs/medicines_ez/printerfriendly.htm) (1)
58. <http://www.mayoclinic.com/invoke.cfm?objectid=A8F7B74A-9500-446D-806467B1DE6E1BBB>
59. <http://www.mayoclinic.com/invoke.cfm?objectId=5271E812-D7EB-4F94-9659106783FD19B3>
60. <http://www.mayoclinic.com/invoke.cfm?objectId=ADE10C53-CF0D-4BAB-B23D190B2D47A8D8>
61. <http://www.diabetesselfmanagement.com/article.cfm?aid=420&char=591>
62. <http://www.sinuscarecenter.com/throaaao.html>
63. [http://www.diabetesnet.com/diabetes\\_treatments/insulin\\_action\\_times.php&p=1](http://www.diabetesnet.com/diabetes_treatments/insulin_action_times.php&p=1)
64. <http://www.novonordisk-us.com/view.asp?ID=1177>
65. <http://www.novolog.com/consumer/pathway/considering.asp>
66. [http://www.lillydiabetes.com/using\\_insulin/what\\_types\\_of\\_insulin.jsp?reqNavId=3.3](http://www.lillydiabetes.com/using_insulin/what_types_of_insulin.jsp?reqNavId=3.3)
67. <http://www.bddiabetes.com/us/demos/injecting.asp>
68. [http://www.bddiabetes.com/us/yourinsulin/howto\\_injection.asp](http://www.bddiabetes.com/us/yourinsulin/howto_injection.asp)
69. <http://www.childrenwithdiabetes.com/pumps/>
70. [http://www.animascorp.com/vpR1000/pr\\_virtual\\_p.shtml](http://www.animascorp.com/vpR1000/pr_virtual_p.shtml)
71. [http://www.lillydiabetes.com/product/insulin\\_pens.jsp?reqNavId=5.5](http://www.lillydiabetes.com/product/insulin_pens.jsp?reqNavId=5.5)
72. <http://www.insulindevice.com/>
73. [http://www.diabetes.org/health/body\\_care/smoking/default.jsp&p=1](http://www.diabetes.org/health/body_care/smoking/default.jsp&p=1)
74. <http://www.smokefree.gov>
75. <http://www.surgeongeneral.gov/tobacco/lowlit.htm> (1)
76. [http://www.philipmorrisusa.com/health\\_issues/quitting\\_smoking.asp](http://www.philipmorrisusa.com/health_issues/quitting_smoking.asp) (2)
77. <http://web.diabetes.org/wizdom/index.shtml> (6)
78. <http://diabetes.niddk.nih.gov/dm/pubs/dictionary/index.htm&b=-2> (14)
79. HealthSentry.net
80. NIDDK various pages not directly linked to (6)

## APPENDIX 5

## Participant in Pilot Study Consent Form

## “PILOT TESTING OF A DIABETES TELEMEDICINE KIOSK FOR PATIENT EDUCATION IN A RURAL COMMUNITY PHARMACY”

I, \_\_\_\_\_, agree to take part in a research study titled “Pilot testing of a diabetes telemedicine kiosk for patient education in a rural community pharmacy setting”, which is being conducted by Elizabeth Barnett, Department of Foods and Nutrition at the University of Georgia, under the direction of Dr. Rebecca Mullis Department of Foods and Nutrition at the University of Georgia. The researchers’ phone number is 1-706-542-4875, and they can answer any questions that I may have about the study. I do not have to take part in this study; I can stop taking part at any time without giving any reason, and without penalty. I can ask to have information about me returned to me, removed from the research records, or destroyed.

The purpose of this study is to provide diabetes educational materials and to provide patient blood glucose monitoring through a touch-screen kiosk that will be located in an easily accessible location within the community. The benefits that I may expect from it are: a better understanding of diabetes and information related to diabetes care, an improvement in blood glucose control, an improvement in A1c levels, and an improvement in overall health and well being.

If I volunteer to take part in this study, I will be asked to do the following things:

- 1) To have my height, weight, blood pressure, and A1c measured by finger stick method
- 2) To answer a brief demographics questionnaire
- 3) To answer 4 brief questionnaires about general diabetes knowledge, diabetes understanding, diet adherence, and possible exercise barriers.

The above three items will take place approximately one week before the start of the study and again one week after the end of the study; which will be completed at The Clayton Pharmacy and will take approximately 70 minutes to complete.

Through the six month study time period I will be asked to go to The Clayton Pharmacy to use the health information kiosk, located near the pharmacy counter, to download and print my glucose meter results at least once per month or more if I wish to, to view the health information on the kiosk that relates to diabetes care. The number of visits and time that is expected to visit the kiosk will vary depending on how frequently I wish to visit the kiosk and how much material I wish to view at the kiosk.

I will receive a free blood glucose meter and two boxes of 100 strips for being a participant in the study. Lastly, I will receive at least one gift item at the end of each month for coming to the kiosk and viewing tutorials at least one time per month and for downloading my glucose meter at least one time per month for a total of at least two visits per month.

There are no foreseeable physical discomforts or risks associated with taking part in the pilot study, except for a sore finger from the finger stick.

My participation in this project will be held confidential. All data that could reveal my identity will be stored in a secure, locked cabinet within the University of Georgia nutrition research facilities accessible to research staff only. The data will be summarized and reported only in-group form.

Information that is gathered about me will not be reported to anyone outside the research project in a manner that personally identifies me. I will be assigned an identifying number and this number will be used on all of the questionnaires I fill out and to log-on to the kiosk.

I may ask questions about this project of the principal researcher, Dr. Rebecca M. Mullis of the University of Georgia Department of Foods and Nutrition, who can be reached at (706) 542-4875.

My signature below indicates that the researchers have answered all of my questions to my satisfaction and that I consent to volunteer for this study. I have been given a copy of this form.

Rebecca M Mullis  
**Name of Researcher**  
**Telephone: 706-542-4875**  
**Email: rmm@fcs.uga.edu**

\_\_\_\_\_  
**Signature/Date**

\_\_\_\_\_  
**Name of Participant**

\_\_\_\_\_  
**Signature/Date**

**Please sign both copies, keep one and return one to the researcher.**

Additional questions or problems regarding your rights as a research participant should be addressed to: Chris A Joseph, Ph.D., Human Subjects Office, University of Georgia, 606A Boyd Graduate Studies Research Center, Athens, Georgia, 30602-7411; Telephone (706)542-3199; Email Address IRB@uga.edu.

## APPENDIX 6

1. The diabetes diet is:
  - a. the way most American people eat
  - b.\* a healthy diet for most people
  - c. too high in carbohydrate for most people
  - d. too high in protein for most people
2. Which of the following is highest in carbohydrate?
  - a. Baked chicken
  - b. Swiss cheese
  - c.\* Baked potato
  - d. Peanut butter
3. Which of the following is highest in fat?
  - a.\* Low fat milk
  - b. Orange juice
  - c. Corn
  - d. Honey
4. Which of the following is a “free food”?
  - a. Any unsweetened food
  - b. Any dietetic food
  - c. Any food that says “sugar free” on the label
  - d.\* Any food that has less than 20 calories per serving
5. Glycosylated hemoglobin (hemoglobin A1) is a test that is a measure of your average blood glucose level for the past:
  - a. day
  - b. week
  - c.\* 6-10 weeks
  - d. 6 months
6. Which is the best method for testing blood glucose?
  - a. Urine testing
  - b.\* Blood testing
  - c. Both are equally good
7. What effect does unsweetened fruit juice have on blood glucose?
  - a. Lowers it
  - b.\* Raises it
  - c. Has no effect
8. Which should not be used to treat low blood glucose?
  - a. 3 hard candies
  - b. 1/2 cup orange juice
  - c.\* 1 cup diet soft drink
  - d. 1 cup skim milk
9. For a person in good control, what effect does exercise have on blood glucose?
  - a.\* Lowers it
  - b. Raises it
  - c. Has no effect
10. Infection is likely to cause:
  - a.\* an increase in blood glucose
  - b. a decrease in blood glucose
  - c. no change in blood glucose
11. The best way to take care of your feet is to:
  - a.\* look at and wash them each day
  - b. massage them with alcohol each day
  - c. soak them for one hour each day
  - d. buy shoes a size larger than usual
12. Eating foods lower in fat decreases your risk for:
  - a. nerve disease
  - b. kidney disease
  - c.\* heart disease
  - d. eye disease
13. Numbness and tingling may be symptoms of:
  - a. kidney disease
  - b.\* nerve disease
  - c. eye disease
  - d. liver disease
14. Which of the following is usually not associated with diabetes:
  - a. vision problems
  - b. kidney problems
  - c. nerve problems
  - d.\* lung problems
15. Signs of ketoacidosis include:
  - a. shakiness
  - b. sweating
  - c.\* vomiting
  - d. low blood glucose
16. If you are sick with the flu, which of the following changes should you make?
  - a. Take less insulin
  - b. Drink less liquids
  - c. Eat more proteins
  - d.\* Test for glucose and ketones more often
17. If you have taken intermediate-acting insulin (NPH or Lente), you are most likely to have an insulin reaction in:
  - a. 1-3 hours
  - b.\* 6-12 hours
  - c. 12-15 hours
  - d. more than 15 hours
18. You realize just before lunch time that you forgot to take your insulin before breakfast. What should you do now?
  - a. Skip lunch to lower your blood glucose
  - b. Take the insulin that you usually take at breakfast
  - c. Take twice as much insulin as you usually take at breakfast
  - d.\* Check your blood glucose level to decide how much insulin to take
19. If you are beginning to have an insulin reaction, you should:
  - a. exercise
  - b. lie down and rest
  - c.\* drink some juice
  - d. take regular insulin
20. Low blood glucose may be caused by:
  - a.\* too much insulin
  - b. too little insulin
  - c. too much food
  - d. too little exercise
21. If you take your morning insulin but skip breakfast your blood glucose level will usually:
  - a. increase
  - b.\* decrease
  - c. remain the same
22. High blood glucose may be caused by:
  - a.\* not enough insulin
  - b. skipping meals
  - c. delaying your snack
  - d. large ketones in your urine
23. Which one of the following will most likely cause an insulin reaction:
  - a.\* heavy exercise
  - b. infection
  - c. overeating
  - d. not taking your insulin

## APPENDIX 7

**Section IV - Understanding**

Q1.	How do you rate your understanding of: (circle one answer for each line)	<b>Poor</b>		<b>Good</b>		<b>Excellent</b>
	a) overall diabetes care	1	2	3	4	5
	b) coping with stress	1	2	3	4	5
	c) diet for blood sugar control	1	2	3	4	5
	d) the role of exercise in diabetes care	1	2	3	4	5
	e) medications you are taking	1	2	3	4	5
	f) how to use the results of blood sugar monitoring	1	2	3	4	5
	g) how diet, exercise, and medicines affect blood sugar levels	1	2	3	4	5
	h) prevention and treatment of high blood sugar	1	2	3	4	5
	i) prevention and treatment of low blood sugar	1	2	3	4	5
	j) prevention of long-term complications of diabetes	1	2	3	4	5
	k) foot care	1	2	3	4	5
	l) benefits of improving blood sugar control	1	2	3	4	5
	m) pregnancy and diabetes	1	2	3	4	5

## APPENDIX 8

**Section IX - Diet Adherence Scale**

Q1. Has any health care provider or nurse ☐<sub>1</sub> No ☐<sub>2</sub> Yes ☐<sub>3</sub> Not sure told you to follow a meal plan or diet?

	Never		Sometimes		Always
Q2. How often do you follow a meal plan or diet?	1	2	3	4	5

Q3. Have you been told to follow a schedule for your meals and snacks? ☐<sub>1</sub> No ☐<sub>2</sub> Yes

Q4. Have you been told to weigh or measure your food? ☐<sub>1</sub> No ☐<sub>2</sub> Yes

Q5. Have you been told to use exchange lists or food group lists to plan your meals? ☐<sub>1</sub> No ☐<sub>2</sub> Yes

	Never		Sometimes		Always
Q6. How often do you follow the schedule for your meals and snacks?	1	2	3	4	5
Q7. How often do you weigh or measure your food?	1	2	3	4	5
Q8. How often do you (or the person who cooks your food) use the exchange lists or food group lists to plan your meals?	1	2	3	4	5

## APPENDIX 9

**Section XI - Exercise Barriers Scale**

For the following questions, please circle the appropriate response.  
(circle one answer for each line)

Q1.	How often do you have trouble getting enough exercise because:	Rarely		Sometimes		Often
	a) it takes too much effort?	1	2	3	4	5
	b) you don't believe it is useful?	1	2	3	4	5
	c) you don't like to do it?	1	2	3	4	5
	d) you have a health problem?	1	2	3	4	5
	e) it makes your diabetes more difficult to control?	1	2	3	4	5

## APPENDIX 10

## Professional-Use Product Insert

### Intended Use

The A1cNow<sup>™</sup> test provides quantitative measurement of the percent of glycated hemoglobin (%HbA1c) levels in capillary (fingerstick) or venous whole blood samples. The test is for professional use to monitor glycemic control in people with diabetes.

### Summary and Explanation

High levels of blood glucose result in over-glycation of proteins throughout the body, including hemoglobin<sup>1</sup>. Glycation of hemoglobin can occur at the amino termini of the alpha and beta chains, as well as other sites with free amino groups<sup>1</sup>. Hemoglobin A undergoes a slow glycation with glucose that is dependent on the time-average concentration of glucose over the 120-day life span of red blood cells.

The most prevalent and well-characterized species of glycated hemoglobin A is HbA1c, making up approximately 3% to 6% of total hemoglobin in healthy individuals<sup>1</sup>. The correlation of HbA1c and blood glucose levels make it a useful method of monitoring long-term blood glucose levels in people with diabetes<sup>2</sup>. Previous studies, such as the Diabetes Complications and Control Trial (DCCT) and the United Kingdom Prospective Diabetes Study (UKPDS), used glycated hemoglobin as a way to measure overall glycemic control during the studies. These studies, and others, have shown that tight glycemic control is associated with fewer diabetes-related complications (e.g., vision problems, cardiovascular problems, and kidney problems)<sup>3</sup>. The National Glycohemoglobin Standardization Program (NGSP) was established to assure traceability of hemoglobin A1c (HbA1c) results to the DCCT. Studies show a direct relationship from %HbA1c to average blood glucose (MBG) levels. For every 1% change in HbA1c there is a change of about 30 mg/dl in MBG<sup>4</sup>. The formula used to calculate the mean (average) blood glucose levels from the HbA1c levels is  $MBG = (31.7 \times HbA1c) - 66.1$ . To convert to mean plasma glucose (MPG) use:  $MPG = MBG \times 1.11$ .

HbA1c can be measured by a variety of techniques, and over the past decade they have expanded to include point-of-care assays. Point-of-care assays are well suited to environments such as physicians' offices and clinics, because they are generally easy to perform, require no laboratory equipment, and provide results with a rapid turn-around-time from sampling to result<sup>5</sup>. This immediate feedback of results enhances physician/patient interaction and, therefore better enables disease management.

### Principle of the Assay

Metrika has developed an enabling technology called MODM<sup>™</sup> (Micro-Optical Detection Method) that incorporates microelectronics, optics,

and dry-reagent chemistry strips within a self-contained, integrated, single-use monitor. An unmeasured whole blood mixture (diluted) is directly Appendix 10

applied to the sample port, and results are displayed in numeric form on

the monitor's liquid crystal display after 8 minutes. Having no switches or buttons, the monitor self-activates upon addition of the sample. The A1cNow monitor utilizes both immunoassay and chemistry technology to measure HbA1c and total hemoglobin, respectively. Upon the addition of a diluted blood sample, blue microparticles conjugated to anti-HbA1c antibodies migrate along reagent strips. The amount of blue microparticles captured on the strips reflects the amount of HbA1c in the sample.

For the total hemoglobin (Hb) portion of the test, the sample diluent converts Hb to met-Hb. The intensity of met-Hb color measured on the reagent strips is proportional to the concentration of hemoglobin in the sample. Test results are expressed as %HbA1c ( $HbA1c \div \text{total Hb} \times 100$ ). Calibration of the A1cNow is performed with a set of blood samples that have been value-assigned by a National Glycohemoglobin Standardization Program (NGSP) certified laboratory using an NGSP reference method. Total Hb calibration values for those samples are obtained with a Total Hb analyzer (HemoCue B-Hemoglobin System, HemoCue Ab, Ängelholm, Sweden). The calibration of the A1cNow test is thus traceable to the NGSP, and to an NGSP Certified Network Method.

### Specimen Collection and Storage

**Note: No special diet is necessary**

#### **Fingerstick:**

The A1cNow test requires 10 microliters (µL) of whole blood (1 large drop). Fingerstick blood is obtained by standard techniques with any lancing system. If alcohol is used for cleansing, be sure the finger is completely dry before lancing.

#### **Venipuncture:**

Venous blood is to be collected in an EDTA tube ("Purple Top"). Blood should be well-mixed, and tested at room temperature. Venous blood samples are stable for up to 8 hours at room temperature, and up to 14 days if refrigerated (2-8°C).

### Warnings and Precautions

- If refrigerated, bring sealed pouches to room temperature for one hour.
- For in vitro diagnostic use only.
- Handle and dispose of all samples and pipets following appropriate biohazard procedures.



- The A1cNow monitor should not be used if it is cracked or broken, or if the foil pouch is damaged.
  - The Dilution Buffer contains ferricyanide in a buffered detergent solution.
- Do Not Ingest.** In case of contact with skin or eyes flush the area with large amounts of water.
- Carefully read and follow the "Procedure" section to ensure proper test performance.
  - The A1cNow monitor should be used within 15 minutes after the pouch is opened.
  - Do not reuse any portion of the test.
  - Do not mix pouches from different lots.

### Package Components

- A1cNow Monitor (10)
- Each monitor includes the following chemistries: antibody to HbA1c, antigen conjugate that binds to the antibody, and membranes.

- Sample Dilution Kit (10)
- Each Sample Dilution Kit contains:
- Capillary (1)
  - Tube (1), containing 0.69 mL of buffered detergent solution with ferricyanide
  - Transfer Pipet (1)
  - Tube Holder (1)
  - Product insert (1)
  - Procedure card (1)
  - Patient result labels (10)

### Materials Required but Not Supplied

- Fingerstick sample: lancet, or other blood fingerstick collection device
- Venous sample: EDTA tube ("purple top"), venous collection supplies
- Gauze pad or cotton ball
- Bandage

## APPENDIX 11

Dear **Dr. Spock**,

I am pleased to inform you that your patient, **James Brown**, has volunteered to participate in a six month Diabetes Management pilot program at the Clayton Pharmacy. One of our graduate students, Beth Barnett, has implemented a “kiosk” based Diabetes Education and Management program using a touch-screen web-enabled Kiosk, which is located in the Clayton Pharmacy. Your patient has been shown how to access the program, as well as how to download **his/her** glucose meter readings to a secure data base using the kiosk. Your patient will be able to print out a graph of **his/her** recent glucose measurements on the kiosk and will be encouraged to discuss those results with Clayton Pharmacist, Kimberly Cook, R.Ph., C.D.M., whom I believe you know. In addition, **he/she** will bring their graph to their next office visit with you.

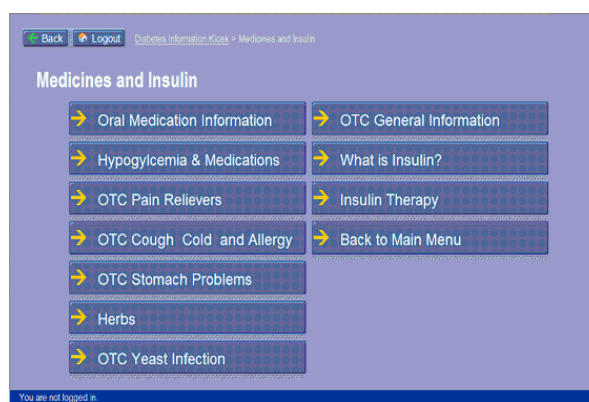
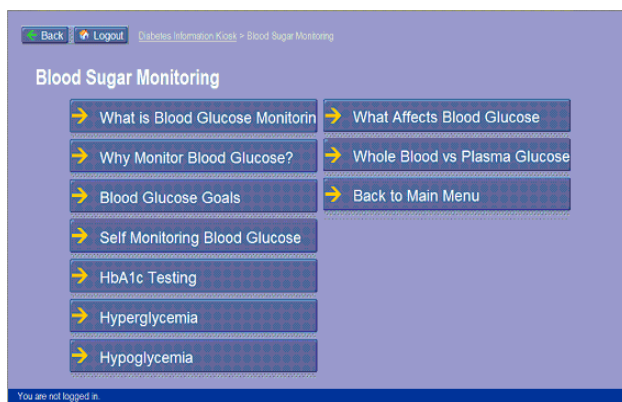
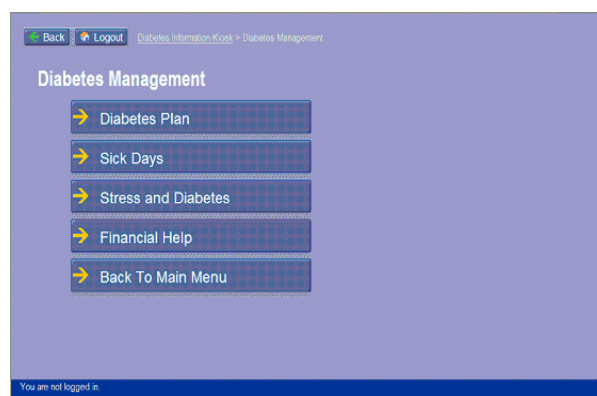
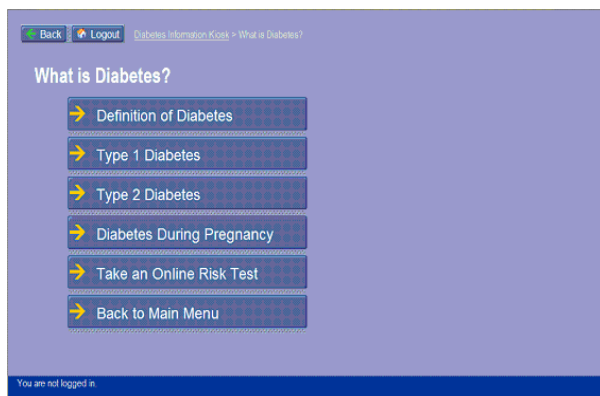
During the course of this study our graduate student will be monitoring the HealthSentry.net web site where your patient’s results will be stored. If there are significant problems with your patient’s glucose control, she or the pharmacist will contact your office.

We would be happy to discuss this study with you further and encourage you to visit the kiosk at the Clayton Pharmacy. If you decide to visit, please ask the Pharmacist to show you how it works. In addition, if you have any questions or concerns, please don’t hesitate to call the Pharmacy, or contact me directly.

Sincerely,

Robert S. Galen, M.D., M.P.H.  
Professor, College of Pharmacy, and  
Department of Foods and Nutrition  
bgalen@mail.rx.uga.edu

## APPENDIX 12



Back Logout Diabetes Information Kiosk > Stop Smoking > Stop Smoking

## Stop Smoking

Print This Page

If you have diabetes and smoke, it makes the complications from diabetes worse. It is important for a person with or without diabetes to quit smoking. Below are some links to websites on how to quit smoking and some possible resources for help.

Check out the following websites for information on how to stop smoking for good.

- [View and Print](#) information from the American Diabetes Association regarding Smoking and Diabetes.
- To see information from the Center for Disease Control [Touch here](#).
- [Touch here](#) for helpful hints to quit from the Surgeon General.
- [Touch here](#) for information from Phillip Morris about resources for quitting smoking.

Next

You are not logged in.

Back Logout Diabetes Information Kiosk > Children with Diabetes

## Children with Diabetes

American Diabetes Association  
Home > Care > Children with Diabetes

**What is Diabetes?**

**Diabetes Care**


**Living with Diabetes**

**Healthy Eating**

**Exercise**

**Diabetes & the Law**

**Fun & Games**



**Welcome to the American Diabetes Association Youth Zone**

Inside you'll find all kinds of great stuff to help you manage your diabetes. You'll also find fun games, tips, and links.

Now it's time to get into the Youth Zone!

**What is Diabetes?**  
Learn about type 1 and type 2 diabetes.

**Diabetes Care**  
This section will give you information about how to care for your diabetes.

**Living with Diabetes**  
Find out how you can deal with the challenges of every day life.

**Healthy Eating**  
Learn how to eat healthy without giving up your favorite foods.

**Exercise**  
Find out why exercise is important for people with diabetes.

You are not logged in.

Back Logout Diabetes Information Kiosk > Diabetes Dictionary

## Diabetes Dictionary

National Diabetes Information Clearinghouse (NDIC)  
A service of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), NIH

Diabetes Home

Intro Treatments Complications Statistics Clinical Trials In Spanish Resources Order About Us

Home Diabetes A-Z List of Topics and Titles Diabetes Dictionary

Email To A Friend

[Spanish Version](#)

### Diabetes Dictionary

This dictionary defines words that are often used when people talk or write about diabetes. It is designed for people who have diabetes and for their families and friends.

The words are listed in alphabetical order. Some words have many meanings; only those meanings that relate to diabetes are included. Words that appear in **bold italic** are defined elsewhere in the dictionary. A term will refer the reader to another definition only when the second definition gives additional information about a topic that is directly related to the first term.

Information in this dictionary is not a substitute for your health care professional's advice.

The U.S. Government does not endorse or favor any specific commercial product or company. Trade, proprietary, or company names appearing in this document are used only because they are considered

You are not logged in.

## APPENDIX 13

**Evaluation Questionnaire for Diabetes Information Kiosk**

1. What type of information did you primarily seek for on the kiosk?

- ☐ Food/Nutrition
  - ☐ Meal Planning
  - ☐ Portion Control
  - ☐ Making Smart Choices with Food Selection
  - ☐ Eating Out
  - ☐ Measuring Food
  - ☐ General Nutrition Information
- ☐ Blood glucose monitoring
- ☐ Taking care of your body
- ☐ Diabetes Management
- ☐ No particular topics, a little bit of everything
- ☐ Other \_\_\_\_\_

2. Did you find the information you were looking for?

Never                  Rarely                  Sometimes                  Usually                  Always

3. Was the information you received from the kiosk better or worse than that received from the following sources?

Other	Worse Than	Equal To	Better Than
Physician	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Patient Educator	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nurse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Family/Friends	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Video	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pamphlet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. Did the kiosk lead you to get additional diabetes information from:

Doctor	Yes	No
Nurse	Yes	No
Pharmacist	Yes	No
Dietitian	Yes	No
Books or Pamphlet	Yes	No

5. I received diabetes information from the kiosk that I would not have gotten otherwise.

Strongly Disagree    Disagree    Neutral    Agree    Strongly Agree

6. I felt comfortable getting health information from the kiosk.

Strongly Disagree    Disagree    Neutral    Agree    Strongly Agree

7. I think that this type of technology could be helpful (for myself or others) in the future.

Strongly Disagree    Disagree    Neutral    Agree    Strongly Agree

8. How likely are you to use this type of technology again in the future?

Not Likely    Somewhat Likely    Not Sure    Most Likely    Definitely

9. I found the glucose meter function to be helpful.

Never    Rarely    Sometimes    Usually    Always

10. I took the meter graphs to my physician.

Never    Rarely    Sometimes    Usually    Always

11. I would recommend this technology to my friends who have diabetes.

Strongly Disagree    Disagree    Neutral    Agree    Strongly Agree

## APPENDIX 14

## Focus Group Consent Form

“Pilot testing of a diabetes telemedicine kiosk for patient education in a rural community pharmacy”

I, \_\_\_\_\_, have been asked to participate as a focus group participant for the project titled Pilot testing of a diabetes telemedicine kiosk for patient education in a rural community pharmacy” to determine what you thought of the kiosk. This study is being conducted by Dr. Rebecca Mullis and Beth Barnett of the University of Georgia Department of Foods and Nutrition. The researchers’ phone number is (706) 542-4875, and they can answer any questions that I may have about the study.

I understand that I may refuse to participate in this focus group, and if I do choose to participate, I may stop at any time. If I refuse to participate or decide to stop, I will not be penalized and will not lose any benefits to which I am entitled. I can ask to have all personal information returned to me, removed from the research records, or destroyed.

I understand that I will be asked to participate in a focus group to answer questions about information related to using the kiosk and suggestions for future kiosk projects. The focus group discussion will last about 60 minutes. I understand that I will receive a box of Accu-chek glucose test strips and \$20 of gift certificates for taking part in the focus group.

There are no foreseeable physical discomforts or risks associated with taking part in the focus group discussions. The outcome of this focus group may not benefit me directly, but it may lead to the development of more-user friendly kiosks that will foster healthy eating and physical activity among diabetes patients.

All data that could reveal my identity will be store in a secure, locked cabinet within the University of Georgia nutrition research facilities accessible to research staff only. The data will be summarized and reported in-group form. Information that is gathered about me will not be reported to anyone outside the research project in a manner that personally identifies me. I understand that the focus group will be audiotaped and that hand written notes will be taken. The audiotapes will be destroyed within 24 hours of tape transcription.

I may ask questions about this project of the principal researcher, Dr. Rebecca M Mullis of the University of Georgia Department of Foods and Nutrition, who can be reached at (706) 542-4875.

My signature below indicates that the researchers have answered all of my questions to my satisfaction and that I consent to volunteer for this study. I have been given a copy of this form.

\_\_\_\_\_  
Signature of Investigator    Date

\_\_\_\_\_  
Signature of Participant    Date

For questions or problems about your rights please call or write: Chris A Joseph, Ph.D., Human Subjects Office, University of Georgia, 606A Boyd Graduate Studies Research Center, Athens, Georgia, 30602-7411; Telephone (706)542-3199; Email Address [IRB@uga.edu](mailto:IRB@uga.edu)

## APPENDIX 15

Post-test focus group- kiosk evaluation.

*The purpose of the focus group is to determine what they liked and did not like and offer suggestions for the future.*

*Ice breaker: I would like for everyone to go around the room and say their name and what their favorite thing to do in the spring is.*

*Now, I'm going to start asking some questions about the kiosk. Before I do that, I want you to think back to when you used the kiosk and get a fresh image of using it. First, think only of finding information, nothing about downloading the glucose meter.*

- What, if any problems did you have when logging in to the kiosk. *(note: this is when you entered in the user name and password)*
- What kinds of problems did you have getting (navigating) through the information pages *(note: going back or going to the next page, back to the main menus)?*
- What are some things that you liked about navigating through the information pages?
- What are some problems you may have had printing pages? What did you like about printing pages, remember this doesn't include printing the downloaded glucose meter reports.
- The information that was on the kiosk about diabetes what did you find helpful? What was not so helpful?
- Did you use the headphones to listen to some of the pages that had audio?
- What are some things (features) from the kiosk that you would like to change or add? *(note: looking for things that they would want if they were to help create a kiosk)*
- What were some things that made the kiosk easy to use? Not easy to use?
- What information did you learn that you didn't know before using the kiosk?
- What information do you think you wish was on the kiosk that wasn't?
- What information did you find the most helpful on the kiosk?
- Overall, beyond the technical problems, did you like being able to download your glucose meter into the kiosk? What did you like most about this feature? What did you like least about this feature?
- If a kiosk had all of the features that you wanted and was located in a pharmacy or a grocery store would you use it?  
Follow up questions: if not, why



- If yes, why Would you be willing to pay \$5/month? \$10/month?

That is all of the questions that I had- is there anything else you would like to add?

## APPENDIX 16

## Exit Survey

Name of Participant \_\_\_\_\_

Date of Drop \_\_\_\_\_

1. What was the primary reason you ended participation from the study?

- a. Took too much time
- b. Did not like using the kiosk
- c. Thought that using the kiosk was too difficult
- d. Thought that the information was not good
- e. Too inconvenient to go to the pharmacy
- f. Other \_\_\_\_\_

2a. If a kiosk was available for free use in the community in the future would you use it to obtain health information?

- a. Yes
- b. No
- c. I don't know

2b. To download your blood glucose meter?

- a. Yes
- b. No
- c. I don't know

2. Please add any additional comments.

---

---

---

## REFERENCES

1. *Food, Nutrition, and Diet Therapy*, ed. Mahan. 2000, Philadelphia: W.B.Saunders Company.
2. *National Diabetes Statistics: General information and national estimates on diabetes in the United States, 2000*. 2000, National Institute of Diabetes and Digestive and Kidney Diseases.
3. *Diabetes: Disabling, Deadly, and on the Rise: Diabetes At A Glance, 2002*. 2002, CDC.
4. Boyle, J.P., et al., *Projection of diabetes burden through 2050: impact of changing demography and disease prevalence in the U.S.* Diabetes Care, 2001. **24**(11): p. 1936-40.
5. Hogan, P., T. Dall, and P. Nikolov, *Economic costs of diabetes in the US in 2002*. Diabetes Care, 2003. **26**(3): p. 917-32.
6. *Report of the expert committee on the diagnosis and classification of diabetes mellitus*. Diabetes Care, 2003. **26 Suppl 1**: p. S5-20.
7. Robbins, J.M., et al., *Socioeconomic status and type 2 diabetes in African American and non-Hispanic white women and men: evidence from the Third National Health and Nutrition Examination Survey*. Am J Public Health, 2001. **91**(1): p. 76-83.
8. Mokdad, A.H., et al., *Prevalence of obesity, diabetes, and obesity-related health risk factors, 2001*. Jama, 2003. **289**(1): p. 76-9.
9. *The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. The Diabetes Control and Complications Trial Research Group*. N Engl J Med, 1993. **329**(14): p. 977-86.
10. Genuth, S., et al., *Implications of the United kingdom prospective diabetes study*. Diabetes Care, 2003. **26 Suppl 1**: p. S28-32.
11. Franciosi, M., et al., *The impact of blood glucose self-monitoring on metabolic control and quality of life in type 2 diabetic patients: an urgent need for better educational strategies*. Diabetes Care, 2001. **24**(11): p. 1870-7.
12. Norris, S.L., et al., *Self-management education for adults with type 2 diabetes: a meta-analysis of the effect on glycemic control*. Diabetes Care, 2002. **25**(7): p. 1159-71.
13. Mayer-Davis, E.J., et al., *Pilot study of strategies for effective weight management in type 2 diabetes: Pounds Off with Empowerment (POWER)*. Fam Community Health, 2001. **24**(2): p. 27-35.
14. Harris, F., et al., *Development and initiation of a diabetes self-management program for an underserved population*. Diabetes Educ, 2000. **26**(5): p. 760-4, 766-7.

15. Rimmer, J.H., et al., *Feasibility of a health promotion intervention for a group of predominantly African American women with type 2 diabetes*. Diabetes Educ, 2002. **28**(4): p. 571-80.
16. Miller, C.K., et al., *Nutrition education improves metabolic outcomes among older adults with diabetes mellitus: results from a randomized controlled trial*. Prev Med, 2002. **34**(2): p. 252-9.
17. Keyserling, T.C., et al., *A diabetes management program for African American women with type 2 diabetes*. Diabetes Educ, 2000. **26**(5): p. 796-805.
18. Kirkman, M.S., et al., *Impact of a program to improve adherence to diabetes guidelines by primary care physicians*. Diabetes Care, 2002. **25**(11): p. 1946-51.
19. Zoorob, R.J. and A.G. Mainous, 3rd, *Practice patterns of rural family physicians based on the American Diabetes Association standards of care*. J Community Health, 1996. **21**(3): p. 175-82.
20. Dansky, K.H. and R. Dirani, *The use of health care services by people with diabetes in rural areas*. J Rural Health, 1998. **14**(2): p. 129-37.
21. Andrus, M.R., et al., *A comparison of diabetes care in rural and urban medical clinics in Alabama*. J Community Health, 2004. **29**(1): p. 29-44.
22. Mensing, C., et al., *National standards for diabetes self-management education*. Diabetes Care, 2003. **26 Suppl 1**: p. S149-56.
23. Bell, R.A., et al., *Quality of diabetes care among low-income patients in North Carolina*. Am J Prev Med, 2001. **21**(2): p. 124-31.
24. Campbell, R.K., *Role of the pharmacist in diabetes management*. American Journal of Health-System Pharmacy, 2002. **59**(23): p. S18-S21.
25. Cranor, C.W., B.A. Bunting, and D.B. Christensen, *The Asheville Project: long-term clinical and economic outcomes of a community pharmacy diabetes care program*. J Am Pharm Assoc (Wash), 2003. **43**(2): p. 173-84.
26. Cranor, C.W. and D.B. Christensen, *The Asheville Project: short-term outcomes of a community pharmacy diabetes care program*. J Am Pharm Assoc (Wash), 2003. **43**(2): p. 149-59.
27. Ahring, K.K., et al., *Telephone modem access improves diabetes control in those with insulin-requiring diabetes*. Diabetes Care, 1992. **15**(8): p. 971-5.
28. Piette, J.D., et al., *Use of automated telephone disease management calls in an ethnically diverse sample of low-income patients with diabetes*. Diabetes Care, 1999. **22**(8): p. 1302-9.

29. Piette, J.D., *Satisfaction with automated telephone disease management calls and its relationship to their use*. Diabetes Educ, 2000. **26**(6): p. 1003-10.
30. Feil, E.G., et al., *Who participates in Internet-based self-management programs? A study among novice computer users in a primary care setting*. Diabetes Educator, 2000. **26**(5): p. 806-811.
31. Smith, L. and C. Weinert, *Telecommunication support for rural women with diabetes*. Diabetes Educ, 2000. **26**(4): p. 645-55.
32. Cherry, J.C., *Diabetes Disease Management Program for an Indigent Population Empowered by Telemedicine Technology*. Diabetes Technol Ther, 2002. **4**(6): p. 783-791.
33. Izquierdo, R.E., et al., *A comparison of diabetes education administered through telemedicine versus in person*. Diabetes Care, 2003. **26**(4): p. 1002-7.
34. Whitlock, W.L., et al., *Telemedicine improved diabetic management*. Mil Med, 2000. **165**(8): p. 579-84.
35. Dansky, K.H. and K.H. Bowles, *Lessons learned from a telehomecare project*. Caring, 2002. **21**(4): p. 18-22.
36. Bowles, K.H. and K.H. Dansky, *Teaching self-management of diabetes via telehomecare*. Home Healthc Nurse, 2002. **20**(1): p. 36-42.
37. Nebel, I.T., et al., *Evaluation of a computer based interactive diabetes education program designed to train the estimation of the energy or carbohydrate contents of foods*. Patient Educ Couns, 2002. **46**(1): p. 55-9.
38. Lewis, D. and C. Nath, *Feasibility of a kiosk-based patient education system in a busy outpatient clinic setting*. Diabetes Educ, 1997. **23**(5): p. 577-81, 585-6.
39. Hripcsak, G., et al., *A health information network for managing innercity tuberculosis: Bridging clinical care, public health, and home care*. Computers and Biomedical Research, 1999. **32**(1): p. 67-76.
40. Connell, C.M., et al., *The development of an Alzheimer's disease channel for the Michigan Interactive Health Kiosk Project*. Journal of Health Communication, 2003. **8**(1): p. 11-22.
41. Nicholas, D., P. Huntington, and P. Williams, *Health kiosk use: a national comparative study*. Aslib Proceedings, 2001. **53**(4): p. 130-140.
42. Nicholas, D., et al., *Health information: an evaluation of the use of touch screen kiosks in two hospitals*. Health Info Libr J, 2001. **18**(4): p. 213-9.
43. Fintor, L., *The Michigan health kiosk: cancer info on the go*. J Natl Cancer Inst, 1998. **90**(11): p. 809-10.

44. Westman, J., H. Hampel, and T. Bradley, *Efficacy of a touchscreen computer based family cancer history questionnaire and subsequent cancer risk assessment*. J Med Genet, 2000. **37**(5): p. 354-60.
45. Boatright, S.R., *The Georgia County Guide*. 2003, University of Georgia: Athens.
46. Association, A.D., *American Diabetes Association: Clinical Practice Recommendations 2003*. Diabetes Care, 2003. **26 Suppl 1**.
47. *Diabetes Patient Education Manual*. 2001, ASPEN Reference Group: Gaithersburg.
48. CDC, *Take Charge of Your Diabetes*. 1997: Atlanta.
49. NIDDK, *What I need to know about Eating and Diabetes*. 2002, National Diabetes Information Clearinghouse: Bethesda.
50. Fitzgerald, J.T., et al., *Development and validation of the Diabetes Care Profile*. Eval Health Prof, 1996. **19**(2): p. 208-30.
51. Fitzgerald, J.T., et al., *The reliability and validity of a brief diabetes knowledge test*. Diabetes Care, 1998. **21**(5): p. 706-10.
52. *Standards of medical care for patients with diabetes mellitus*. Diabetes Care, 2003. **26 Suppl 1**: p. S33-50.
53. *Evidence-based nutrition principles and recommendations for the treatment and prevention of diabetes and related complications*. Diabetes Care, 2002. **25**(1): p. 202-12.
54. Jeffery, R.W., et al., *Long-term maintenance of weight loss: current status*. Health Psychol, 2000. **19 Suppl 1**: p. 5-16.