Telehealth For Diabetes Self-Management
The Outcomes Associated with a Web Based Intervention: Lessons Learned

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The Emergence of the WWW
In the Last Decade

- Revolutionize healthcare delivery
- Empower consumers
- Allow nursing to explore the feasibility of delivering interventions via the Web
Top priority for NIH is research that involves web-based interventions to promote patient adherence to treatment.

Findings from recent studies have shown that the Internet can significantly impact health outcomes related to knowledge, self-efficacy, and self-care management (Brennan, Lorig, Gustafson).
But the Burning Questions that Need to be Addressed

- How well web based nursing interventions can be delivered
- Which nursing interventions will be the most effective
- Which interventions will provide the best quality of professional care to people
To describe this researcher’s experience with the development and implementation of a web-based intervention to enhance diabetes self-management for a group of older adults

Report the preliminary outcome results associated with participants who have used a web-based intervention
Study Methods

Study Aims

- Investigate the feasibility of a web-based intervention for older adults who had been diagnosed with diabetes
- Evaluate the immediate and long-term efficacy of a six month web-based telehealth intervention for improving diabetes physical outcomes
Evaluation of the Intervention

Three domains are being used to determine intervention effectiveness:

1) physical (glycosylated hemoglobin [HbA1C], weight, and lipid levels)
2) behavioral (monitoring blood glucose levels, feet inspections, diet, and exercise frequency)
3) psychosocial (depression, quality of life, social support, and adjustment to diabetes)
STUDY DESIGN

A randomized pre-post-post-two group controlled trial (n=62)

Each participant randomized into the invention (treatment) group

- Receives PC-based computer
- 17 inch monitor
- Printer
- Dial-Up Access to the Internet
Access to a library of articles and sites on diabetes and other health related topics

Receiving on-line advice, counseling, and encouragement from a nurse via e-mail

The ability to participate in bi-weekly chat/discussion with a nurse led peer support question and answer and problem-solving forum
Receiving tailored self-management instruction from the study nurse regarding the development of personal action plans.

The ability to submit a daily log of diabetes self-management activities (blood sugar levels, medication administration, meal intake, weight, and blood pressure).
An internet bulletin board used to present the latest news in diabetes, to post diabetes management goals of participants, and to provide problem solving suggestions to assist other study participants to better manage their diabetes, psychosocial well-being, and possible depression.
The speaker will now go to
www.diabetes-takecharge.org for
tour of the web site
Study Web Site

Diabetes Self-Management - Microsoft Internet Explorer

Welcome gbond@u.washington.edu | Diabetes Home | Site Documentation | Logoff

Home  Personal Log of Activities  Goal Setting Plan  Bulletin Board  Information  Reports  B Board

Activities Log:
- Weight & Blood Pressure
- Feet Inspection
- Exercise Activities
- Blood Glucose Reading
- Meals and Snacks
- Insulin Intake

Today is 6/11/2005 9:23:10 PM

Select an activity from the left menu to proceed.
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Overview of the Implementation Phases

Planning Phase

- Plan the budget
- Review the literature
- Meet with an Informatics expert to determine technology and personnel needs
- Identify your patient population and determine the appropriate resources/content to be used
- Identify the technology environment/framework that will be used
Budget

- Set-up Costs and Travel to Subject Homes
- Equipment (including cell phones, pagers) and software
- Internet Service
- Training subjects and developing training Manuals
- Developmental server and a production server
Feasibility testing
Ongoing web page maintenance, and
Software for database development and web page construction
Salaries for IT Project Manager, Programmer, Web Designer, Hardware and Software Technicians
Pre-Implementation Phase

- Determine how you will merge the practice and theory of a given health related discipline with the limitations of Internet technology
- Identify software and hardware that will be used
- Develop protocols for configuring and testing the hardware and software
- Develop training protocols and manuals
- Conduct usability testing and evaluation of the web site with real users
First Decision

Identify the technology environment/platform that will be used
Given the study’s financial constraints

We chose ASP.NET as the platform which gave us the flexibility to choose from a variety of computer languages as opposed to being limited to Java.
Environment

IIS as Web server

MS SQL as database server

Visual Studio.NET as development environment.

C# and Visual Basic as the programming languages
To reduce costs associated with building the application
We used existing modules
- Web portal application (IBuySpy)
- ScPl, a chart library for .NET
- MSN Messenger and a security shell (Secway's SimpLite) which enables the encryption
- Crystal Reports (whose development functionality comes bundled with Visual Studio)
Evaluated and Attended

Senior Net (Nation wide)
Bothell Senior Center (Local)

Two Organizations that provide computer training to older adults
Configurations

- Windows 2000
- McAffe Anivirus Program
- Adobe
- Notepad
- Word Reader
- UW Dial-Up
- Did not allow administrator Rights
Overcoming the Obstacle of Costs

For Hardware--Contacted the library System
Software---Programs were free since Windows 2000 McAffewas licensed to UW and all other programs were free

To resolve technical/graphical and Programming costs
Internship program
1) programming; 2) graphics design, and 3) IT support (hardware and software configurations, computer installations, training, and trouble shooting hardware and software problems)
Usability Testing

Conducted 3 Focus Group sessions with potential users (to determine feasibility)

Heuristic evaluation (involving a panel of informatics experts)

Cognitive task analysis (usability testing)
Implementation

- Protection of equipment during delivery
- Handling the technical problems
- Training of Subjects
- Testing the site
- Hardware and software testing
- Ensure 7th grade readability training materials
Post Implementation

- Maintenance, testing and updating of website (ensure 24/7 access)
- Make revisions based on feedback from users
- Provide on-going technical (hardware and software) support for users
- Ongoing study equipment testing
- Ensuring Ongoing Access
- Make arrangements for a backup server
Preliminary Results (n=15) over the first 5 Months of the Intervention (Phase I)

Average decrease in blood sugar readings among 10 of the 15 participants was 15 points.

All 15 subjects reported increases in their exercise duration (minutes per week [average increase equaled 38 minutes]).

Average weight loss was 2.9 lbs.
Mean decrease in calories and fat was 336 calories (range of 55 to 386) and 11 grams of fat (range of 4 to 40 grams).

Blood pressure showed a mean drop in systolic and diastolic blood pressure of 10 and 5 points respectively.

Participants are entering their diabetes self-care activities data on an average of 4.5 times a week.
Analysis using Mixed Effects Modeling of participants self report daily blood sugar entries showed:

Regardless of A1c level pre-intervention--participants who entered the study with fewer comorbidities problems were more likely to experience a linear decline in their blood sugar readings over time than participants with more comorbidities.
Summary/Lessons Learned

- Ensure an adequate budget to cover technology expenses
- Hire an informatics Expert
- Learn the informatics language/take the necessary coursework
- Build in adequate amount of time for training the users and getting the equipment installed
- Conduct ongoing testing of the site
Welcome to Diabetes Self-Management

The purpose of this Web site is to help you manage living with diabetes by giving you a variety of tools:

- **Personal Log of Activities**
  - Monitor your weight, blood pressure, diet, exercise, blood glucose level, and medication.
- **Goal Setting Plan**
  - Set personal goals to better manage living with diabetes.
- **Bulletin Board**
  (Study subjects only)
Diabetes Self-Management > Communication > Latest News about Diabetes (DNN 2.1.2) - Mozilla Firefox

Logoff

Home  Diabetes Self-Management  Communication Reports  About Us

Latest News about Diabetes
Forum
Bulletin Board

Diabetes News (RSS)

Obesity, Diabetes Raise Joint Replacement Risks

Key Factors Raise Clogged Artery Risk

Many Heart Attack Patients Have Metabolic Syndrome
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If Today’s Presentation Has Left You Confused
This should Clarify
Contact Information

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