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A MedlinePlus® Kiosk Promoting Health Literacy

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Abstract

As an ongoing community outreach project, a pictorial touch-screen kiosk and Web site was developed for 48 MedlinePlus® tutorials. This learning experience serves Davidson County, Tennessee's uninsured patients at the University of Tennessee/Baptist Hospital's Internal Medicine Clinic. The availability of a health information kiosk at the University of Tennessee/Baptist Hospital primary care clinic significantly increases health literacy for patients by providing reliable, physician-recommended information in an appropriate format—information these patients did not previously find readily available. Participants report they have a greater understanding of their health issues, and the project is introducing hundreds of patients to MedlinePlus.

Keywords

Community health centers; computer literacy; consumer health information; educational technology; health literacy; health promotion; MedlinePlus®

INTRODUCTION

Uninsured individuals able to prove residency in Davidson County, Tennessee, have the opportunity to qualify for Bridges to Care (BTC), Middle Tennessee's network of primary health care clinics charging for services based on an individual's ability to pay. One such clinic is the University of Tennessee/Baptist Hospital's Internal Medicine Clinic. Each month, this clinic serves the medical needs of approximately 150 BTC patients. According to the UT/Baptist Hospital's Internal Medicine Clinic Manager, "More than 50% of our patients are unemployed, almost 40% are age 65 or older, and roughly 85% of these patients experience chronic health issues such as diabetes, hypertension, obesity, tobacco use, and alcohol and/or drug abuse." She adds, "Most BTC patients entering the clinic have not received preventive healthcare throughout their lifetimes."

Compounding the overwhelming complexities of dealing with chronic medical problems, these patients struggle with the basic understanding of how to manage their health. In the United States, more than one in three adults has low health literacy. This can have an adverse effect on the quality of life and increase health care costs. People with low health literacy "are less likely than those who are health literate to be knowledgeable about their chronic diseases and possess adequate self-management skills, and are more likely to make medication errors."¹ Older adults who lack health literacy skills experience poorer physical and mental health.^{2,3}

Tennessee patients limited in such expertise report a higher number of days in which they felt ill or chose to limit their activities.⁴ Other research demonstrates that high medication costs result in prescriptions not being taken as directed.^{5,6} Results from two studies indicate

uninsured adults have a higher annual mortality rate than adults with private insurance.^{7,8} Patients' quality-of-life can be enhanced by improved health literacy.^{4,9–11}

However, the health of the uninsured can be complicated by their not having access to computers or to computers with Internet connectivity. A study at a community health clinic reveals that patients who state they are comfortable using a computer regard Internet access as unavailable or Inter-net navigation to be difficult or uncomfortable.¹²

NEEDS ASSESSMENT

The Baptist Hospital Medical Library is located several blocks from the clinic, so it is unreasonable to expect clinic patients to obtain any desired information from the library. A lack of transportation makes it problematic for patients to obtain information elsewhere. Therefore, the librarian realized it would be necessary to present information in an easy-to-read format within the clinic setting, where BTC patients could access that information while visiting their physicians.

The librarian was aware of similar projects where colleagues reported difficulties when participants were able to view inappropriate sites on computers and believed it would be better to present health resources on a kiosk dedicated solely for educational purposes making optimal use of these patients' time. The ideal resource for this demographic group appeared to be the National Library of Medicine's (NLM) MedlinePlus[®] interactive tutorials. The tutorials present reliable, peer-reviewed information, and each one explains a procedure or condition in simplified language. The tutorials employ animated graphics, and individuals can listen to a narration of the content rather than relying on their reading skills. The tutorials are approximately 15 minutes in length, depending on the user's level of understanding. Questions are incorporated in every tutorial to verify a participant's comprehension of the content. If a person answers a question incorrectly, the screen will not advance and the material repeats until the individual selects the correct answer. Despite the advantages of using MedlinePlus, the librarian was concerned that even if BTC patients were able to locate a computer with Internet access, the site itself might be too challenging for them to navigate. The librarian observed the ease of use of touch-screen grocery kiosks with images that shoppers follow to complete their transactions and felt that creating a kiosk with a picture-based interface would enable clinic patients to access MedlinePlus content endorsed by their physicians. Developing a pictorial touch-screen interface so patients are not required to possess Inter-net skills, combined with an option to listen to the content via headphones, makes the tutorials understandable to those who have inadequate health literacy or who have learned English as a second language.

The librarian asked the UT Clinic faculty if they wanted to collaborate with the library to develop a touch-screen pictorial MedlinePlus kiosk to allow their patients to learn more about diseases, medications, and healthy lifestyle choices. The dedicated faculty and residents fully supported the project to enhance their patients' health through the benefits of accessible, easy-to-understand health resources. The faculty stressed that the audio portion of the tutorials are essential to ensuring each patient understands the presented material. The UT residency program director suggested that since the patients' transportation usually arrives at the clinic 30 minutes prior to their appointments, this time could be employed to deliver MedlinePlus content and could be an excellent teaching opportunity.

With physicians' support, the librarian began exploring vendors for the products and services needed for the project. The first step was to secure the MedlinePlus content as the tutorials link to various pictures rather than directly to MedlinePlus. The tutorials used for MedlinePlus are modules from the Patient Education Institute (PEI), so the librarian negotiated the price for placing them on the kiosk. The next step was selecting a kiosk vendor that could develop a

pictorial interface corresponding to each tutorial. The librarian solicited advice from colleagues about vendors, and several people shared their success with using the kiosk vendor, Self-Service Networks. The company would manufacture the kiosk, customize its content, remotely monitor the kiosk's operational status, and provide usage data. Self-Service could not supply the pictorial interface but recommended Kolb Net Works, as Self-Service had worked with Kolb on another health literacy project. Once Kolb provided the interface, Self-Service Networks would adapt it for the kiosk.

Kolb Net Works developed a template of the interface, displaying three rows of four large buttons/images lined across the page (see Figure 1). The background of the site was an attractive light blue. As part of the project, the librarian wanted to collect data on the experience of users, both patients and health care providers, with using MedlinePlus, specifically whether users considered it helpful and easy to use. Kolb was able to integrate questions about the participants' experience into the design; however, Kolb explained that putting survey questions at the end of the tutorial was unlikely to provide valid data as people can leave their session at any point. Therefore, in the interface that was developed, users see the questions before the home page appears, and only respondents who have previously accessed MedlinePlus resources are asked if MedlinePlus is easy to use and if its information is helpful. Health professionals who previously used MedlinePlus are asked two different questions: how likely are you to recommend MedlinePlus to a patient, and what impact has MedlinePlus had on patient education?

Kolb Net Works offered to host a mirror Web site of the kiosk's content <baptistmedicallibrary.com> for the library's patrons, which was customized it to automatically collect data about the user's session into a database.

INTERFACE DESIGN

After reviewing Kolb Net Works' template, the UT faculty decided to adapt it for the kiosk project. They identified 72 primary diagnoses for BTC patients and requested that the librarian locate tutorials addressing these issues. The librarian planned the main page layout to include 12 major subject categories incorporating the topics of greatest interest to patients. When the user clicks on the Home tab at the top of the screen, the individual returns to the main menu on the Home page. If a participant clicks on the Help tab, the person is instructed to pick up the telephone handset on the table next to the kiosk and connect to the Medical Library for immediate assistance. There are three orange tabs across the screen bottom: the Favorites tab, which includes five topics that did not fit in any of the major categories; the Drugs tab, which enables participants to find their medications on the MedlinePlus alphabetized Drugs, Supplements, and Herbal Information page; and the A-Z tab, which provides an additional access point where all the topics are listed alphabetically.

The doctors approved the 48 tutorials selected and the screen template; they were enthusiastic about the project as it would allow their patients to watch a tutorial based on their medical history. For example, a clinic physician may recommend that a patient view the kiosk's tutorial on heart attack. When the patient touches the kiosk's screen, the introductory three-question survey appears. The user is asked whether he or she is a patient or medical professional and if the individual has ever used MedlinePlus. Each participant has the option of completing the survey or skipping it. Following the survey, the participant sees the main menu screen depicting the 12 major subject categories with a disclaimer stating, "This health information should not replace your doctor's advice." The project's funding information appears at the bottom of the introductory screen (see Figure 1).

Depending on the subject, it may be necessary for a patient to proceed through more than one screen to reach a specific tutorial. In the example used here, the patient touches the image for Heart Disease and High Blood Pressure—portrayed by a stethoscope with a heart at the end of it—on the main subject category page, which leads to the page illustrating a group of cardiovascular conditions (see Figure 2).

The Heart Disease and High Blood Pressure icon opens, and the image for the heart attack tutorial (a picture of several EKGs) becomes visible as the first item in the second row (see Figure 3).

Once a tutorial is selected, the audio for that topic begins; the participant clicks to agree with the tutorial's terms of use. All the tutorials have a similar format that includes an explanation of the condition, its symptoms, relevant anatomy, any known causes, medical treatments, possible preventive measures, and a summary to help ensure the patient understands—details a busy health care professional might not have time to explain in such depth (see Figure 4).

A participant may proceed through the entire tutorial, or skip to a section of interest, such as treatment. Questions are interspersed throughout the material, and when the person responds to a question, the rationale is given for the selected answer (see Figure 5).

Planning for the outreach project was completed, and quotes were solicited from three vendors. Originally, the project was to be funded from the library budget until the quote for the kiosk arrived. With a price tag of more than \$8,000, including warranty, maintenance, and security contracts, it was apparent that the librarian would need to secure outside funding. The Southeastern/Atlantic Region of the National Network of Libraries of Medicine (NN/LM SE/A) was accepting applications for projects benefiting underserved or at-risk health consumers. The goal of the kiosk project was to improve Bridges to Care patients' access to health resources, so the librarian submitted a proposal for a Consumer Health Outreach Project Award.

The NN/LM SE/A reviewed the application and recommended three significant enhancements for the outreach project: have doctors hand patients an *Information Rx* prescription in addition to requesting that patients view tutorials relevant to their particular diagnosis; add a built-in printer to the kiosk so patients could take home tutorial summaries; and include a dedicated phone that would ring directly into the librarian's office for patients desiring real-time assistance.

In June 2007, the librarian was notified that the project would be funded under contract NO1-LM-6-3502 with the University of Maryland at Baltimore Health Sciences and Human Services Library. The subcontract period ran from July 1, 2007, through July 31, 2008, with the hospital making a commitment to continue the project for an additional five years.

The librarian contacted the vendors to let them know the project had received funding. Self-Service committed to shipping the kiosk in six weeks. The librarian contracted with Kolb Net Works to add a question about participants' zip codes so data could be collected regarding the geographic areas reached by the project.

IMPLEMENTATION

Before the kiosk's arrival, the librarian conducted training sessions for the UT Clinic doctors and staff showing them the AMA health literacy video *Help Your Patient Understand* and furnished physicians with several of the plain and printed *Information Rx* prescriptions pads. The librarian requested that everyone refer to the tutorials as "videos" rather than using the words "tutorial" or "computer," which might be intimidating to patients. As they checked in, randomly selected individuals would be given an invitation to use the kiosk. When the kiosk

arrived at the end of September 2007, it was put in a private area across from the clinic checkout counter where patients passed while entering and exiting the exam rooms. Great care was taken to make the setting as attractive and inviting as possible. The kiosk's mahogany finish complements the adjacent chairs; a coffee table and framed artwork complete the space. The Information Technology Department connected the kiosk to the hospital's network, and the equipment and Web site are available for patient use. The librarian visited the clinic one afternoon each week to encourage BTC patients' participation. This approach combined with the doctors' efforts resulted in enlisting 740 patients during the first eight months of the outreach.

The librarian gave users a MedlinePlus bookmark and asked participants viewing MedlinePlus for the first time about their experiences. Countless people said MedlinePlus was easy to understand, and numerous participants reported they liked the tutorials, which reflected the medical literature.¹³ One woman declared, "I always wanted to know the difference between osteoarthritis and rheumatoid arthritis. Now, after looking at the video, I understand the difference." Many of the elderly patients stated they did not own a computer, but they planned to ask their grandchildren to research topics of interest in the future. The nursing staff noted that one person sat at the kiosk watching various topics from early in the afternoon until the clinic closed that evening. Others told the librarian that the kiosk's information answered a question they had wondered about for a long time. Many patients were pleased to view resources about their medications (more than half of the clinic's patients are on multiple prescriptions) and took the printed materials home with them. Although the vast majority of patients appreciated having the kiosk available, a few patients were reluctant to try it despite encouragement from their physicians and the librarian. Anyone desiring more information can utilize the phone sitting on a table next to the kiosk that connects directly to the library. Upon receiving a request, the librarian will mail additional material to the patient's homes.

The UT residency program director summed up the UT faculty's perspective on the outreach project:

"We see a large number of low literate and indigent patients in the clinic. Their ability to obtain resources for education is minimal, and we feel that the educational materials available at the kiosk (at the point of care) has the potential to greatly enhance patient understanding and maybe even compliance with treatment. We do feel it is of benefit for the residents to understand the importance of patient education in all encounters."

Prior to being involved with the outreach project, the librarian believed that knowledge of MedlinePlus was widespread. However, from October 2007 through June 2008, of the 740 patients who watched tutorials, 613 (83%) indicated they were first-time MedlinePlus users. When the 127 patients who had used MedlinePlus previously were queried regarding MedlinePlus, 124 (98%) reported it was easy to use, and all 127 found MedlinePlus information helpful. The most frequently viewed topics were Healthy Living; Diabetes; MedlinePlus Drug, Supplements, and Herbal Information; Heart Disease and High Blood Pressure; Muscle & Joint; and Geriatrics.

During the same period, 69 health professionals viewed MedlinePlus tutorials. Of that number, 32 (46%) had never tried MedlinePlus, while 37 (54%) had utilized it previously. When the group was asked if they would recommend MedlinePlus to their patients, 70% of health professionals said they *would definitely* recommend it to their patients, 27% said they *would be likely* to recommend it, and 3% (one person) said he *would not be likely* to recommend it to his patients.

As an unexpected outcome of the project, the Patient Education Institute incorporated the librarian's idea of utilizing pictures in all of their English and Spanish tutorials. When the

interface became available, the librarian applied to the NN/LM SE/A for an Express Outreach Follow-Up award, proposing an expansion of the project to add 50 tutorials about diabetes to the kiosk and placing the tutorials in Saint Thomas Health Services' two Diabetes Centers. The outreach extension received funding in November 2009 and is being implemented. More content will be added to the Web site, and changes will be made in its appearance to reflect the new interface.

CONCLUSION

Research indicates that patients want their physicians to guide them in finding reliable information and to help them apply it to their situation. Physicians who assume this role or provide an Internet prescription have a positive impact on the physician–patient relationship.^{14,15}

The kiosk creates an avenue for UT doctors to discuss subjects related to their patients' health and to reinforce the importance of complying with prescription and medical recommendations. University of Tennessee Internal Medicine residents have an increased awareness of the challenges and opportunities of facilitating health literacy. During its first eight months of operation, this project successfully introduced a total of 809 patients and health care providers to MedlinePlus. The kiosk provides physician-approved information at the point of care, and based on responses of their experiences with MedlinePlus, patients have a better understanding of their health.

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FIGURE 1.
Main menu.

FIGURE 2.
Heart disease icon.

FIGURE 3.
Heart attack icon.

FIGURE 4.
Tutorial layout.

FIGURE 5.
Question rationale.