Underserved Patients' Choice of Kiosk-based Preventive Health Information

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<u>Background and Objectives</u>: *Compliance with health promotion recommendations falls short of expectations nearly every time it is studied. Some of the most successful programs, however, focus on the patient and incorporate computers.* <u>Methods</u>: *Interactive kiosks in waiting rooms of clinics for the medically underserved were used to educate patients about alcohol consumption, exercise, smoking cessation, and weight control.* <u>Results</u>: *Kiosks were accessed 11,401 times. Users averaged 40 years old, and most had at least a high school education and an average body mass index (BMI) of 29.8. Sixty percent were white, and 64% were women. Weight control garnered the most interest followed by smoking cessation. Those overweight and men with sleep disorders were more interested in weight control. Smokers and depressed women were most interested in smoking cessation. Men who were older, Latino, or had high blood pressure and women who were overweight were most interested in exercise. Those interested most in alcohol consumption were men who were white, drink alcohol, or married and women who were younger, single, black, Latino, or smoke.* <u>Conclusions</u>: *These results add to our understanding of underserved populations and individuals who might be more receptive to preventive health interventions so that educational efforts might be more likely to result in behavior change.*

Patient compliance with health promotion recommendations continues to fall short of expectations. A number of strategies have been used to improve patient behavior[1-4] with some of the most successful health promotion programs focusing on patient actions or responsibilities, such as telephone reminders regarding health promotion and disease prevention activities[5] and patient-held minirecords.[6] Many practices use patient education in the waiting room in an attempt to extend communication with patients, engage them in the effort to improve the delivery of preventive services,

and to make use of "down time" in the office visit. In the past, the most common forms of patient education in the waiting room have been handouts, posters, and educational videos.[7-9] Using computer technology for patient education has been found to be an effective strategy both for transferring knowledge and for patient skill development.[10]

Advances in computer technology provide new options for electronic delivery of preventive health messages, some being Web based and accessible from home, office, or public library computers.[11,12] More active forms of education, such as interactive kiosks, also have been used.[13] Kiosks have been placed in health care settings, including patient waiting areas of physicians' offices,[14,15] emergency departments,[16] and outpatient clinics[17] and focus on a variety of health topics. For example, users of a kiosk designed by Goldschmidt and Goodrich were very satisfied with stored and Web-based information they obtained. They also

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found an overall increase in flu vaccines administered over the previous year and suggest that kiosks may increase compliance with selected clinical guidelines and instructions.[14] Hripcsak and colleagues designed a computer-based communication network that included information kiosks to coordinate tuberculosis care.[18] Others kiosks have been placed in more public locations, including a fast-food restaurant, motor vehicle office, and public library.[19] Nicholas and colleagues have published extensively about their evaluation of touch-screen information kiosks placed in a variety of types of locations throughout the United Kingdom. They found that the top four locations ranked by the number of pages viewed per day included hospitals and walk-in centers (ie, clinics).[20] Their mail survey found that kiosk users were more likely to be younger (age 36–55) and those who visited the doctor more regularly in the last 12 months. Two of the most important topics accessed were healthy living and general health.[21] Few programs, however, have targeted medically underserved populations who have multiple health issues, including concomitant illness, low income, and low literacy levels, each of which may constitute an additional barrier to poor patients incorporating health promotion behaviors into their lifestyles.

Patient-centered care in general and two elements in particular, improved communication and continuity of care, have been shown to improve the provision of preventive services in primary care practices.[22] However, health care providers who practice in clinics for the medically underserved face barriers to providing effective preventive health care. Providers may be volunteers representing many medical specialties, some of whom typically do not need to counsel patients regarding preventive health issues. Volunteers may spend a limited amount of time at the clinic; therefore, there is often a lack of continuity of provider. Finally, it is not uncommon for the provider to see patients with multiple problems and advanced stages of illness who require immediate attention, so there may be little opportunity to provide preventive education. Increasing patient-provider discussions and providing appropriate patient education materials are necessary first steps to increasing healthy behaviors.

With the intent of increasing the likelihood that underserved patients will receive education, counseling, referral, and treatment for their preventive health care needs, we placed interactive kiosks in the waiting rooms of clinics that provide primary care to medically underserved patients to deliver education directly to patients and to stimulate patient-provider discussion regarding preventive health in four target areas—alcohol consumption, exercise, smoking cessation, and weight control. This paper is the first presentation of an extensive longitudinal study of the use of these kiosks to provide patients with preventive health education, stimulate patient interest in knowing more about preventive health, and increase physician-patient conversations about these four areas. This paper presents the most important patient characteristics and chronic diseases/comorbid conditions that predict patient access of information about exercise, smoking cessation, weight management, and reducing alcohol intake, based on kiosk use.

Methods

Study Sites and Participants

Study participants were adults who self-identified as being able to speak English and used "For Your Health," an interactive computer kiosk placed in the patient waiting rooms of six clinics for medically underserved persons in northeastern Ohio—two federally qualified community health centers and four free clinics. Patient waiting rooms were sometimes busy, but the kiosks had side panels to foster confidentiality, and an attempt was made to place the kiosks in lower traffic areas of the waiting rooms.

Study Design and Intervention

This descriptive study is based on data collected for the first 6 months following installation of the kiosks. Based on health literacy principles and the Transtheoretical Model of Behavior Change,[23] the "For Your Health" touch-screen computer kiosks deliver stage-of-change appropriate preventive health education regarding weight control, smoking, exercise, and alcohol use directly to patients.

Opening screens ask users (1) if they ever used the computer before, (2) if their data can be saved for research purposes, and (3) to select the topic area that is of interest to them. The computer then asks demographic information about the user, including gender, age, education, race, ethnicity, marital status, and current health conditions. The computer also asks users to enter their height and weight, from which the computer calculates the patient's body mass index (BMI).

The next screen introduces the topic the patient selected. For example, the topic of alcohol use begins with a screen that illustrates and describes what is meant by a single drink of alcohol. Users are then asked about their engagement in and willingness to modify the particular health behavior of interest, with question wording based on the transtheoretical model.[23] The computer then displays stage of change-matched education based on user responses. Recognizing that patients could use the computer multiple times and not have altered their intent to change their behavior, five low-literacy messages targeted for the fourth-grade reading level were developed for each of the five stages of change for each of the four health behaviors, increasing the likelihood that patients will receive a new message each time they use the kiosk.

Messages were developed by a team of three experienced patient educators based on existing materials and the transtheoretical model. All messages were reviewed and approved by the project team before being pilot tested in two sites. To help ensure readability of the messages provided, to the extent possible, the length of words was limited to two or fewer syllables, and sentence length was limited to no more than 10 words. Text is displayed in a large font on the computer, and the printed copy was large (18 point) font with at least 50% white space. The reading level was determined using the SMOG readability formula.[24] For example, a sample message provided to a user who is in the preparation stage of smoking cessation is: "Good for you. You are planning to quit smoking soon. Your doctor can help. You can join a group to stop smoking with other people. Cut down on how many cigarettes you smoke each day. Give up an extra smoke a day. Set a date to quit."

In selected areas, the program discerns appropriateness of education to change behavior. For example, messages of encouragement and acknowledgment of positive behavior are provided to patients who indicate that they do not smoke cigarettes. Messages encourage patients to talk with their health care provider to obtain additional information and support and advise patients to discuss certain health behavior changes with their provider prior to taking action, eg, beginning an exercise program.

The program concludes by asking users if they would like to print a copy of the information. If yes is selected, two copies are printed and given to the patient, one for the patient's reference and one to share with the health care provider to stimulate discussion regarding preventive health. Finally, patients are asked if the computer was easy to use.

Data Collection and Analysis

Data from adults reporting their age to be ≥ 18 were saved for analysis if the user agreed. Data were excluded from analysis if the data appeared to be "play" use and exceeded expected data ranges. Data analyzed for this paper is limited to first-time users of the kiosk. Data were stored in an Access database on the hard drive of each kiosk computer and then retrieved for analysis using SPSS, version 12.0. Descriptive statistics provided a profile of the first-time users of the kiosk and the preventive health topic selected by the user. These profiles served as a guide to the development of logistic regression models to identify the most important patient characteristics and chronic diseases/comorbid conditions that predict patient interest in exercise, smoking cessation, weight management, and reducing alcohol intake. Significant differences between user groups were determined by the z-test for two proportions (also called the binomial test for proportional differences) with $P \le .05$.

Human Subjects

This research was approved by the Institutional Review Boards of the Northeastern Ohio Universities Colleges of Medicine and Pharmacy, The University of Akron, and Kent State University.

Results

During the first 6 months of use, the study sites provided approximately 16,650 primary care patient visits, and the kiosks were accessed 11,401 times. In 5,276 instances the user provided permission to allow their data to be saved and available for research, of which 2,895 were self-reported as the first use. The findings reported in this paper are based on analyses of the data of the 2,895 first-time users.

User Profile

The 2,895 first-time users were an average of 40 years old, 80% had at least a high school education, and the average BMI was 29.8. Sixty percent were white, and 64% were women. Fifty-three percent (1,523 users) were interested in weight information, followed by smoking (24.5%, 710 users), exercise (12.1%, 350 users), and alcohol consumption (10.8%, 312 users). The most frequently reported health problems were being overweight, sleep disorders, depression, smoking, and arthritis (Tables 1 and 2).

Gender Profiles

Table 3 provides module access considering patient characteristics by gender. Generally, male users were older overall and for each of the modules. Although this age difference was not significant, it is important to note that the age difference was especially pronounced in the exercise and alcohol modules. Older men were more likely to select exercise, and younger women were more likely to access the alcohol module.

Looking at educational differences, only those who accessed the alcohol module had significant educational differences; men who accessed the alcohol module had higher educational levels than women who accessed alcohol information.

Few significant differences in access exist by race, but they are apparent in access of the alcohol module. White men were much more likely than white women, and black women were far more likely than black men, to choose the alcohol module. When ethnicity is considered, Latino men were far more likely to access the weight and exercise modules.

Those who are married or live-ins were significantly more likely to be men, while those who were divorced or widowed were more likely to be women. Among those who reported having a live-in companion, men were more likely to elicit information from the smoking module. The largest differences among those who are divorced are found with the weight and exercise

Table 1

Total Sample: Patient Characteristics for All First-time Users and Each Module Sample

Sociodemographics	*All First-time Users (n=2,895)*	*Weight Module (n=1,523)*	*Smoking Module (n=710)*	*Exercise Module (n=350)*	*Alcohol Module (n=312)*
Gender (%)					
Male	35.9	26.5	44.4	38.6	59.5
Female	64.1	73.5	55.6	61.4	40.5
Age (mean years)	38.6	38.8	38.0	39.7	38.2
Body mass index (mean)	29.8	31.2	27.8	28.9	27.8
Education (%)					
High school	80.3	82.6	73.4	66.4	77.7
Latino (%)	15.3	13.0	14.9	18.5	23.5
Race (%)*					
White	60.1	60.4	60.7	57.5	59.7
Black	30.5	30.7	31.9	29.8	27.4
Native American	3.0	1.8	4.0	4.2	5.3
Asian	2.2	1.7	1.3	5.1	3.0
Pacific Islander	.4	.2	.4	0.0	2.0
Other	8.4	6.4	8.3	13.6	12.2
Marital status (%)					
Single	36.6	36.9	34.2	38.3	38.6
Married	27.1	28.5	25.4	28.2	22.4
Live-in	17.1	15.8	21.4	12.3	19.3
Divorced	15.6	15.2	15.1	17.5	16.6
Widowed	3.6	3.7	3.6	3.7	3.1

* Race categories may total to more than 100% because patients could choose more than one.

modules. Divorced women were more likely than men to access the weight and exercise modules. Significantly more widowed men than widowed women accessed the weight module.

Table 4 displays module access by chronic disease and gender. Overall, women were significantly more likely than men to report chronic diseases of overweight, sleep disorders, depression, nerves, and cancer. Men were more likely to report blood pressure, lung and heart issues, and alcohol use. For those who reported being overweight, women were significantly more likely than men to select each of the modules. Both men and women who were overweight were more likely to select the weight and exercise modules.

Women who indicated that they had a sleep disorder were significantly more likely to select the weight and exercise modules. Among those who self-reported depression, women were significantly more likely to select the weight, smoking, and exercise modules. Among those who smoke, most men and women accessed the smoking module (54.4% and 66.0%, respectively), as

would be expected. Significantly more women than men who smoke accessed information on smoking or alcohol. Gender differences among those who self-report a problem with nerves were consistent across all modules. Women who reported problems with their nerves were significantly more likely than men to select information on weight, smoking, exercise, and alcohol.

A number of significant differences were evident among the remaining chronic diseases. Among those who report alcohol use, more men than women accessed information on weight. While the number of men and women who report any of the remaining chronic conditions was relatively small, there are some significant gender differences. Among those who were diabetic, more men selected exercise. Among those who reported heart problems, more men selected the smoking module, and more men who reported kidney problems selected the weight module. Among those with stroke problems, more women than men selected weight, and among those with cancer, more women selected the alcohol module.

Table 2

Chronic Diseases and Health Behavior Profile for All First-time Users and Each Module Sample

Chronic Disease and Health Behavior (% reporting)	All First-time Users (n=2,895)	Weight Module (n=1,523)	Smoking Module (n=710)	Exercise Module (n=350)	Alcohol Module (n=312)
Chronic Diseases					
Overweight	41.7	51.0	30.2	39.1	24.7
Sleep disorder	41.0	42.2	43.0	32.7	39.7
Depression	38.3	38.3	43.5	27.5	39.0
Arthritis	31.2	33.9	29.6	26.9	26.8
Nerves	27.0	26.1	32.5	16.2	31.0
Blood pressure	24.5	26.3	19.6	24.8	26.1
Cholesterol	16.7	17.5	15.3	17.7	15.3
Diabetes	11.7	13.3	9.6	11.9	8.4
Lung	9.7	8.3	14.2	4.6	12.2
Heart problems	7.0	6.4	9.5	5.5	6.6
Kidney	4.6	4.2	4.0	6.7	5.2
Liver	4.5	4.1	3.8	4.9	7.3
Stroke	3.3	3.3	2.5	4.6	3.8
Cancer	3.1	3.3	2.6	1.5	5.6
Health Behaviors					
Smoking	35.1	27.3	60.9	16.2	36.6
Alcohol use	15.1	8.8	17.9	5.8	50.5

Table 3

Patient Characteristics by Gender for All First-time Users and Each Module*

Patient Characteristics	First-time Users Male/Female (n=1,038/1,857)	Weight Module (n=403/1,120)	Smoking Module (n=315/395)	Exercise Module (n=135/215)	Alcohol Module (n=185/127)
Age (mean years)	39.7/38.0	39.5/38.5	39.1/37.1	42.1/38.2	39.3/36.7
Education (%)					
High school	81.6/79.6	84.8/81.9	76.5/71.1	82.9/88.4	82.1/71.1
Latino (%)	**20.1/13.1**	**18.0/11.7**	17.0/13.5	**31.8/11.4**	20.0/28.6
Race (%)**					
White	61.3/59.4	60.6/60.4	61.1/60.4	58.4/57.0	**64.8/52.4**
Black	**26.5/32.7**	27.0/32.0	30.1/33.3	26.4/31.9	**19.6/38.7**
Native American	3.1/3.0	1.6/1.9	4.1/3.9	4.8/3.9	3.4/8.1
Asian	2.1/2.2	2.4/1.5	2.0/0.8	1.6/7.2	2.2/4.0
Pacific Islander	0.0/0.7	0.0/0.3	0.0/0.8	0.0/0.0	0.0/4.8
Other	9.4/7.8	8.1/5.8	9.1/7.6	12.8/14.0	10.1/15.3
Marital status (%)					
Single	36.5/36.7	40.2/35.8	31.5/36.3	40.5/37.0	34.1/45.0
Married	**29.4/25.9**	31.5/27.4	27.7/24.2	32.5/24.4	25.3/18.3
Live-in	**18.7/16.3**	15.9/15.7	**25.0/18.5**	12.7/12.0	18.2/20.8
Divorced	**13.8/16.6**	**11.6/16.4**	13.4/16.4	**12.7/20.5**	20.0/11.7
Widowed	**1.7/4.7**	**0.8/4.7**	2.4/4.6	1.6/5.0	2.4/4.2
Body mass index (mean)	28.5/30.4	30.2/31.6	27.0/28.5	28.4/29.1	27.5/28.4

* Significant differences between user groups are bolded and were determined by the z-test for two proportions (also called the binomial test for proportional differences) with $P \leq .05$.
** Race categories may total to more than 100% because patients could choose more than one.

Table 4

Chronic Disease and Health Behavior Profiles by Gender for All First-time Users and Each Module*

Chronic Disease and Health Behavior (% reporting)	First-time Users Males/Females (n=1,038/1,857)	Weight Module (n=403/1,120)	Smoking Module (n=315/395)	Exercise Module (n=135/215)	Alcohol Module (n=185/127)
Chronic Diseases					
Overweight	**25.9/50.1**	**36.0/56.1**	**17.5/39.9**	**26.2/46.8**	**18.2/34.2**
Sleep disorder	**36.1/43.6**	**27.1/44.0**	41.8/44.0	**18.0/41.5**	37.6/42.7
Depression	**32.3/41.6**	**31.6/40.6**	**35.8/49.5**	**19.7/32.2**	37.1/41.9
Arthritis	30.8/31.4	34.1/33.8	30.5/28.8	23.0/29.3	30.0/22.2
Nerves	**21.7/29.8**	**20.5/28.0**	**28.1/35.9**	**6.6/22.0**	**24.7/40.2**
Blood pressure	**28.3/22.4**	**34.1/23.6**	22.8/17.1	29.5/22.0	24.1/29.1
Cholesterol	17.7/16.2	18.0/17.3	16.5/14.4	18.9/17.1	18.2/11.1
Diabetes	11.1/12.0	12.5/13.6	8.4/10.6	**17.2/8.8**	8.2/8.5
Lung	**11.5/8.7**	10.2/7.6	16.1/12.8	6.6/3.4	10.0/15.4
Heart problems	**8.7/6.1**	7.8/5.9	**13.3/6.5**	5.7/5.4	5.3/8.5
Kidney	5.0/4.3	**6.1/3.5**	2.8/4.9	7.4/6.3	4.7/6.0
Liver	5.0/4.2	3.9/4.2	5.3/2.7	5.7/4.4	6.5/8.5
Stroke	2.6/3.7	**1.4/3.9**	2.1/2.7	7.4/2.9	2.4/6.0
Cancer	**1.7/3.9**	1.9/3.7	1.8/3.3	1.6/1.5	**1.2/12.0**
Health Behaviors					
Smoking	35.4/35.0	28.3/27.0	**54.4/66.0**	19.7/14.1	**30.0/46.2**
Alcohol use	**23.9/10.4**	**17.5/5.8**	20.4/16.0	9.0/3.9	54.1/45.3

* Significant differences between user groups are bolded and were determined by the z-test for two proportions (also called the binomial test for proportional differences) with $P \leq .05$

Conclusions

The results of this study, which focused on an underserved population, reinforce the findings of earlier research investigating the use of active forms of patient-involved education, such as computer kiosks. Patients, even those who are underserved, do want information about preventive health behaviors, and they will access such information when conveniently available. We believe that the high use of the kiosks is an indicator of interest in knowing about preventive health issues. Users were interested enough in either the computer itself or the topic of preventive health to approach and use the kiosk, many more than once. The results also add to our understanding of the medically underserved populations who rely on care from safety net providers.

Each of the four preventive health education modules (weight, smoking, exercise, alcohol) was accessed to some degree, with self-reported chronic health conditions closely mirroring module use.[22] People who rely on free clinics and other sites for the medically uninsured and underinsured are often thought of as a fairly uneducated population. This sample, however, was fairly

well educated, with more than 80% reporting that they have at least a high school degree.

Information access varied by a number of patient characteristics, and a variety of information characteristics were found by gender. While many of these gender differences are significant, it is important to note that even though the gender distribution of BMI was similar between women (30.4) and men (28.5), for women, 30.4 essentially is at the cutoff between overweight/obese; for men 28.5 is considered overweight. Again, while not significant, this slight difference in BMI, where women have higher levels, existed for the users of all four modules. It appears that the interactions of gender, Hispanic heritage, and race, often all socially visible group characteristics, are important indicators of information access and can be clinically relevant when promoting healthy behaviors or encouraging patients to reduce risky ones.

Regardless of which chronic diseases are reported (ie, overweight, sleep disorder, depression, smoking, arthritis, and nerves) when there is a significant difference in module selection, women always access the information module more frequently than men. While

women were more likely to report chronic diseases of being overweight, having a sleep disorder, being depressed, or having a problem with nerves, it appears that women may be more interested than men in information about starting positive behaviors (controlling their weight and exercise) and stopping addictive behaviors (smoking and alcohol).

We recognize that there are several limitations to this study. The data are self-reported by the kiosk users, which inherently carries some degree of error. Patient choice of topic could have been biased by the order of presentation of the four topics, which were presented in two different orders (an attract loop repeated the words alcohol, smoking, exercise, and weight), and the screen asking the user to choose a topic presented the choices in two rows with weight and smoking (left to right) on the top and exercise and alcohol underneath. Prevalence of use reflected this order, the "Z-pattern" typical of reading in the English language (starting at the upper left of a document, reading from left to right, then moving to the lower-left, and reading from the left to right). The topic selected and data entered by the user may not be directly applicable to the health of the user him/herself but rather to an important second party (for example, spouse, child) or to satisfy a curiosity. Further, the user might have been engaged in "play use." However, we believe that we have controlled for this type of use by excluding out-of-range data. The kiosk is certainly a unique way of delivering patient education and has had varying levels of effectiveness. For example, Treweek and colleagues found that computer-generated patient education material did have positive, albeit small, effect on professional practice with some improvement in patient outcomes.[25] However, what we don't know is whether the kiosk would be used more than pamphlets placed in the waiting rooms. Finally, this study is a descriptive study, intended to identify characteristics of people that might be helpful to health care providers as they engage patients in preventive health interventions. Therefore, there are no measures of outcome or changes in behavior based on the intervention.

The high rate of kiosk use indicates that patients who are uninsured or underinsured are interested in information about preventive health. Data about kiosk users tell us that men who are overweight and men with sleep disorders were most interested in information about weight control. Those who smoke and women who report being depressed were most interested in learning about smoking cessation. Men who were older, Latino, or had high blood pressure and women who were overweight accessed exercise information most often. And, those interested most in learning about reducing alcohol consumption were men who were white, drink alcohol, or married, and women who were younger, single, black, Latino, or smoke. Health care professionals can use the results of this study to help

direct their preventive health interventions to medically underserved patients who might be more receptive to hearing about and making specific improvements in their health behavior.

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