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Health Knowledge Acquisition by Rural Women with Chronic Health Conditions: A Tale of Two Web Approaches

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Abstract

Objectives—To determine the differences in health knowledge acquisition and the perceived impact on self-management of chronic illness provided by two approaches to providing Web-based information.

Design—Questionnaires (with the same set of questions at baseline, 23, and 53 weeks; a post-computer intervention survey).

Setting and participants—One hundred seventy-six chronically ill women (aged 32–68 years) living in rural areas.

Main outcome measures—Scores on knowledge questions for three questionnaires; ratings on perceptions of abilities to self-manage.

Intervention—The 22 week computer-based intervention provided online support and health information. Women were randomly assigned to an intense intervention ($n = 54$); less intense intervention ($n = 58$); or control group ($n = 64$).

Results—Both computer intervention groups gained significantly in health knowledge with little differential effect at intervention conclusion or after six months, when there was a drop-off in health knowledge retention of about one-third. (Intense--baseline mean = .54, week 23 = .69, week 53 = .65; less intense--.58, .68, .65). Control remained about the same (.51, .51, .53). Using an ANOVA analysis, there was no appreciable difference between intervention groups in ability to self-manage illness (intense—mean = 4.02 [on a scale of 1 to 6], $sd=0.99$); less intense (mean = 3.85, $sd = 1.00$), $t(107) = 0.895$, $p = .373$).

Conclusions—A less-intense intervention can be as effective as a more complex, labour-intensive, costly intervention in assisting chronically ill rural women to acquire health knowledge they consider to be moderately helpful in managing their chronic conditions.

Keywords

Chronic illness; computer-based intervention; health knowledge acquisition; rural

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Introduction

The rapid proliferation of communication technologies has placed a huge repository of health information at the finger tips of those who have a computer and a desire to learn more about managing their health. Seeking health information represents one of the most common reasons for going online, and 50% to 75% of those using the World Wide Web (WWW) have explored sources of health information. Women were more likely than men to seek health care information on-line, and the highest proportion of usage was by those between 30 and 64 years of age.(1–4) The Internet can be a resource for those who want more and better information about their health problems and how to live better with them, such as those who are chronically ill.(5) For rural residents, this technology makes it possible to gain equity with urban counterparts in accessing health information.

An example of a rural academic computer-based outreach program is the Women to Women Project (WTW) which has been providing a support and health information intervention, for nearly 12 years, to rural women who are chronically ill. The overall goal is to provide health information and social support to rural, chronically ill women via computers to enable them to better manage their long-term illnesses. The purposes of this article are to report on one facet of the WTW project to determine: a) differences in health knowledge acquisition, and b) impact on self-management of chronic illness provided by two approaches to providing Web-based information.

Method

Criteria for Participation

Participants were women with at least one chronic condition, between 35 to 65 years old, and living at least 25 miles outside of a town of 12,500 or more people, or in a small town in Montana, Idaho, North Dakota, South Dakota, or Wyoming. The study was approved by the Montana State University Institutional Review Board for the Protection of Human Subjects.

Design

As a detailed description of the WTW project methodology is provided elsewhere, (6–8) only an overview is given here. The study consisted of a 22 week WebCT supported intervention with the same questionnaire administered at intervals. The power computations, based on Cohen,(9) were used to estimate sample size. The participants were recruited through media, agricultural extension service, and mailings by voluntary agencies. A statistical soft-ware program was used for randomisation into the study groups. The intense intervention included online health teaching units with Internet/WWW access and expert-facilitated discussions (*Health Roundtable* -asynchronous (not real time). For each health teaching unit, a member of the research team skilled in that content area monitored the postings, facilitated the discussions, and answered questions. For example, a doctorally prepared registered dietician was the expert facilitator for the *Nutrition* unit. The less intense intervention participants used the online health teaching units independently. The control group only filled out the questionnaires.

Data Generation and Analysis

Data were collected between 2002 and 2006. Three questionnaires were used for this analysis; baseline; conclusion of intervention at 23 weeks; and approximately 6 months later.

Health knowledge acquisition—The assessment of health knowledge acquired was based on five content questions per health teaching unit developed specifically for the WTW project. The topics were all focused on health information regarding various aspects of self-management and covered: *Web Skills, Living with Chronic Illness, Nutrition, Women's*

Health, and Family Finance. Five questions for each of the five areas were constructed so that an overall health knowledge acquisition score could be calculated by summing correct responses across the 25 questions. Possible total scores ranged from 0 to 25. To evaluate the effects of the intense and less intense interventions on changes in health knowledge acquired, a repeated-measures analysis of variance was conducted. The models tested included the dependent variable of health knowledge test scores, one within-subjects factor of time, i.e., baseline, 23-week, and 53-week measurements, and one between-subjects factor of membership in the intense intervention, less intense intervention, or control groups.

Perceived impact on self-management—A mail computer intervention survey was administered to the two intervention groups at 24 weeks. The questions analysed were designed to assess the women's perceptions of how much their health behaviour was impacted by participating in the activities of the health teaching units. One question for each of the five health teaching units was posed. For example, "Please rate how much your participation in the *Women's Health* unit affected the way in which you manage your chronic illness." These were rated from 1 (no change) to 6 (extreme change). Scores on the questions were averaged for each of the intervention groups.

Results

The participants were primarily Caucasians who lived on a modest income, had a mean age of 51.8 years, and an average of 14.4 years of education (see Table 1). The sample for this analysis was 176 women (intense, $n = 54$; less intense, $n = 58$; control, $n = 64$). There were no differences in the demographic characteristics among the three groups.

Health Teaching Unit Outcomes

Mode of total items correct—The mode of total items correct was similar for the two intervention groups with the exception that the intense group scored higher on knowledge of Web skills (see Figure 1). The greatest differences between the control group and the intervention groups were in *Women's Health*, where the control group's modal score was "0" — keeping in mind that while most got no questions correct on this scale, there was a distribution of scores. The control group scored much lower than either of the intervention groups in *Web Skills*. The *Nutrition* modal score was the same for all groups.

Health knowledge acquisition findings—The means and standard deviations for all scale scores for all three time periods are presented in Table 2. Means shown represent the proportion of items answered correctly. After assurance that ANOVA assumptions were met, e.g., normality, homogeneity of variance, it can be seen that a significant time-by-treatment interaction exists for health knowledge ($F[4, 346] = 13.75, p = .000$) suggesting that the group's scores changed differently across time. An examination of the means and standard deviations in Table 2 and the chart of means in Figure 2 indicate that, for both the intense and less intense interventions, change was appreciable from baseline to 23 weeks but dropped in parallel by week 53. Scores for the control group remained about the same across all three time periods. Based on the post-hoc tests, using Tukeys HSD, the intense intervention group differed significantly from the control (Mean difference = .107, $p = .000$) and likewise the less intense intervention group was also significantly different (Mean difference = .112, $p = .000$), but no difference was found between the two intervention groups (Mean difference = $-.005$, $p = .963$) (see Table 3). It appears that both interventions had an appreciable effect on health knowledge acquisition, but that the interventions did not appear to have differential effects.

Impact on Self-Management Findings

To test whether participants in the two types of interventions rated the impact differently on their ability to manage their chronic illnesses, an independent group t-test was conducted. No differences were found between the intense intervention group (mean = 4.02, sd = 0.99) and the less intense intervention group (mean = 3.85, sd = 1.00), $t(107) = 0.895$, $p = .373$.

Discussion

Health knowledge, measured at the intervention's conclusion, was nearly identical for both intervention groups, while the control group scored lower in all but one health teaching unit (nutrition). Both intervention groups gained significantly in health knowledge with little differential effect by the end of the intervention or after six months. There was no appreciable difference between intervention groups in perceptions of their ability to self-manage illness. Both groups considered the health teaching units to have a moderate influence on their self-management abilities. The acquisition of health knowledge was consistent with other studies which, like WTW, found that involvement in a health knowledge-focused intervention improved participants' short-term health knowledge acquisition.(10–13)

One intent was to determine whether the women who engaged in self-study could learn as much as those who had peer support and access to content experts. A less labor-intensive model for the intervention would have greater application in the clinical arena. From the similarities in health knowledge acquisition patterns, it appears that the less intense approach is nearly as effective. The finding that both the intense and less intense intervention groups had similar scores (4.02 and 3.85) on the perception of their ability to manage their chronic illnesses was another indicator that a less intense approach could be as effective as a more complex and costly application.

An observation of note was the high level of health knowledge acquired from completing the *Web Skills* unit that was achieved by both intervention groups. Because a focal purpose of WTW has been to provide participants with the Web skills that could serve them well for a lifetime of chronic illness self-management, this finding was of particular significance. In a preliminary analysis, a comparison between the intense intervention group ($n=29$) and the control group ($n=34$) was made nine months post-intervention on the scores for self-rated computer skills and comfort.(14) It was found that the scores for these variables were significantly higher for the intense intervention group than for the control group. Likewise, in an earlier phase of the project, we found a significant change from baseline until the end of the intervention (4.88 – 6.88) for the intense intervention group's self-rated computer skills.(15)

An anticipated outcome was that computer skills/knowledge would be maximised as these can become a key to unlocking the rich treasure chest of health information resources available on the Web and ultimately lead to enhanced self-management abilities and overall well-being. Others(16) have maintained that the evolution of the Internet as a health information resource has the potential to empower individuals by providing flexible applications with shorter implementation cycles. This view, coupled with the findings reported here, supports the revisions in the next phase of the program. Strategies have been developed to reduce the study design complexity and cost, as well as the time commitment burden on participants. With these changes, there is no loss anticipated in the ability to effectively impart health information.

A caveat to this analysis is a measurement limitation because the 25 multiple-choice questions, used to assess health knowledge acquisition, were developed by the research team specifically for this study and had no prior evaluation. There were only five questions per teaching unit, and these were generally in the context of content. Secondly, the health knowledge acquisition questions were administered as part of a larger questionnaire packet that was not timed to

coincide with the administration of the health teaching units. Knowledge acquisition was not tested immediately following the completion of each unit. This would be a concern immediately after completing the intervention at week 23 because the 'recency effect' could account for relatively high scores on finance management. Third, the health teaching units were focused on content, and, on further evaluation, it is clear that these units need to be focused on learning skills for self-management, such as problem solving. In addition, a clear study limitation is related to its non-random sample, thus limiting its generalisability to wider populations.

The fact that the women perceived their participation as having only a moderate effect on their ability to self-manage suggested that a prudent move would be to put an emphasis on the teaching of the process of self-management. Experts recommended that the education focus should be shifted from individuals' knowledge of disease and treatment to their confidence and skills in managing their conditions.(17)

Cognisant of the study limitations, the findings that the intervention groups performed better on knowledge acquisition than the control is heartening. The further development of the Women to Women Project has been guided by the findings reported here. We anticipate that the future findings will be more robust, interpretable, and reflect more accurately the impact of the intervention on the women's ability to better self-manage their chronic illnesses.

What is already known on this subject?

- Three-fourths of Americans use the Internet from home, thus giving them access to health information on the Internet.
- According to a variety of surveys, seeking health information represents one of the most common reasons for going online.

What does this study add?

- Rural women who are chronically ill can be aided to seek and evaluate health information online.
- Less complex, labour-intensive, and costly computer interventions can be as effective as more complex, costly interventions in assisting rural women to acquire health knowledge online.
- Dependable knowledge acquired online can help chronically ill rural women to manage their chronic illnesses more effectively.

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Figure 1.
All Groups: Mode of Total Items Correct at 23 Weeks

Figure 2.
All Groups: Health Knowledge Acquisition Level at Baseline, 23 Weeks, and 53 Weeks.

Table 1
Participant Characteristics

	Participant (n = 176)	Sample %
Age		
30–39	16	9.1
40–49	47	26.7
50–59	81	46.0
60–69	32	18.20
Ethnicity		
Caucasian	167	94.90
Hispanic or Latino	1	0.60
American Indian or Alaskan Native	4	2.30
Other	4	2.30
Marital Status		
Married	147	83.50
Divorced	16	9.10
Separated	1	0.60
Widowed/Never Married	11	6.30
Living Together	1	0.60
Education (# years of school completed)		
12 or less	45	0.26
13–15	71	.403
16–18	55	.313
19 or greater	4	.023
Income *		
Less than \$15,000	27	15.3
\$15,000 to \$24,999	30	17.0
\$25,000 to 34,999	29	16.5
\$35,000 to 44,999	25	14.2
\$45,000 to 54,999	27	15.3
\$55,000 to 64,999	17	9.7
\$65,000 to 74,999	10	5.7
\$75,000 to 84,999	6	3.4
Over \$85,000	4	2.3
Employment (outside home)		
Yes	65	36.9
No	111	63.1

* Missing data for 1 subject

Table 2

Mean Health Knowledge Scores for Each Treatment/Group by Time Measured.

Treatment Group	Baseline Mean (SD)	23 Week Mean (SD)	53 Week Mean (SD)
Intense (n = 54)	0.54 (0.11)	0.69 (0.11)	0.65 (.13)
Less Intense (n = 58)	0.58 (0.12)	0.68 (0.12)	0.63 (0.14)
Control (n = 64)	0.51 (0.14)	0.51 (0.14)	0.53 (0.13)

Table 3
ANOVA Summary Table of Health Knowledge Scores

Health Knowledge	Sum of Squares	Df	Mean Square	F	P-value	Mean Difference	Std. Error
Time	0.60	2	0.30	46.6	0		
Time * Group	0.35	4	0.09	13.8	0		
<i>Multiple Comparisons*</i>							
Intense vs. Control					0	0.11	0.02
Less Intense vs. Control					0	0.11	0.02
Intense vs. Less Intense					0.96	-0.005	0.02

* Tukey HSD; p-values 2-tailed