

Can a Back Pain E-mail Discussion Group Improve Health Status and Lower Health Care Costs?

A Randomized Study

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Background: Given the high health care utilization, limited evidence for the effectiveness of back pain interventions, and the proliferation of e-mail health discussion groups, this study seeks to determine if the Internet can be used to improve health status and health care utilization for people with chronic back pain.

Methods: Randomized controlled trial. Participants included 580 people from 49 states with chronic back pain having at least 1 outpatient visit in the past year, no “red-flag” symptoms, and access to e-mail. Major exclusion criteria included continuous back pain for more than 90 days causing major activity intolerance and/or receiving disability payments.

Intervention: Closed, moderated, e-mail discussion group. Participants also received a book and videotape about back pain. Controls received a subscription to a non-health-related magazine of their choice.

Main Outcome Measures: Pain, disability, role function, health distress, and health care utilization.

Results: At 1-year treatment, subjects compared with controls demonstrated improvements in pain ($P = .045$), disability ($P = .02$), role function ($P = .007$), and health distress ($P = .001$). Physician visits for the past 6 months declined by 1.5 visits for the treatment group and by 0.65 visits for the control group ($P = .07$). Mean hospital days declined nearly 0.20 days for the treated group vs and increased 0.04 days for the control group ($P = .24$).

Conclusions: An e-mail discussion group can positively affect health status and possibly health care utilization. It may have a place in the treatment of chronic recurrent back pain.

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IN RECENT YEARS, the Internet has become a source for health information. In many cases, this information has become a source of support for people with similar health conditions. Today, there are hundreds if not thousands of health-related Internet support groups. However, few of these groups have been evaluated. Thus, this study seeks to answer the question: Can a behavioral intervention delivered via the Internet affect the quality of life and health care utilization among people with chronic recurrent back pain?

Chronic recurrent back pain is one of the most highly prevalent medical conditions. After respiratory tract infections, it is the most common symptomatic reason people seek health care.¹ Its direct economic impact has been estimated at \$24 billion, while the indirect impact may be as high as \$50 billion.¹ Although there have been many educational and behavioral attempts to affect the pain, disability, and health care utilization associated with chronic back pain, findings from previ-

ous back pain education programs have been equivocal.

Cohen et al² reviewed 13 primary studies of group education for people with low back pain. They concluded in the 6 well-designed studies that there was “insufficient evidence to recommend group education for people with low back pain.”

Di Fabio³ conducted a meta-analysis of back schools with or without a comprehensive rehabilitation program. These programs increased strength and endurance (effect size, 0.40) and compliance (effect size, 0.27). They had little effect on utilization or lost workdays. A recent Cochrane review by van Tulder et al⁴ suggests that exercise is not useful in the acute phase of back pain but that combined exercise programs may help prevent recurrence or reduce chronic back pain.

Turner⁵ has examined cognitive behavioral interventions for low back pain. She reviewed 12 studies that used 1 or more cognitive or behavioral approach, some combined with exercise. In most of the studies, cognitive behavioral approaches seemed to

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SUBJECTS AND METHODS

Subjects were recruited from workplaces, through public service announcements, and by donated Web page banners on Yahoo!, an Internet search engine. To enroll in the study, subjects were directed to a Web site that described the study. The entire enrollment process occurred through the study Web site. This Web site was accessed approximately 46 000 times during the enrollment period. Of these, 2056 completed the eligibility form and of 889 eligible, 580 completed the informed consent and baseline study questionnaire. Eligibility criteria included having at least 1 outpatient visit for back pain in the past year, no "red-flag" symptoms (back pain accompanied by unintended weight loss, pain not improved with rest, back pain secondary to significant trauma, acute onset of urinary retention or overflow incontinence, loss of anal sphincter tone or fecal incontinence, saddle anesthesia, or global or progressive motor weakness in the lower limbs), access to a computer and an e-mail account, and living in the United States. Subjects were excluded if they had back pain that had continued for more than 90 consecutive days and continued to cause major activity intolerance, were planning back surgery, were currently receiving disability insurance payments for back pain, were unable to understand and write English, were pregnant, had back pain due to systemic disease, had a severe comorbid condition that limited functional ability, or had a terminal illness. Of the 1167 who failed the eligibility criteria, 14% had not been to a physician regarding their back in the last year, 14% had bladder or bowel control problems, 12% had numbness in their crotch area, and 13% were receiving disability or workers' compensation payments for their back problems.

DESIGN

Names and e-mail addresses of potential subjects were collected during a 4-month period. Six weeks before going online all those who expressed interest were asked to

complete the eligibility questionnaire. If they qualified, potential subjects then completed the informed consent process and the study questionnaire. After completing this questionnaire, they were randomized to treatment or control status. All treatment subjects entered the intervention at the same time, within 6 weeks of completing baseline data. Control subjects continued with usual care and received a subscription to their choice of popular non-health-related magazines. All subjects in both groups simultaneously completed study questionnaires 6 and 12 months after baseline.

INTERVENTION

The intervention consisted of 3 parts: a closed e-mail discussion group in which all group members received all e-mails sent by group members, moderators, and content experts; a copy of *The Back Pain Helpbook*⁸; and a videotape that modeled how to continue an active life with back pain.

In the discussion group, all members received e-mail sent by any member or moderator. There was no real-time discussion. The discussion group had 2 moderators and 3 content experts, a physician with expertise in back pain, a physical therapist, and a psychologist. The moderators served as group leaders. For example, if there had been no e-mail for several days, a moderator might ask a question to stimulate interaction. Participants were not allowed to be judgmental or negative to other participants, nor were they allowed to discuss individual health care professionals. There were no other limits on discussion topics. One of the moderators maintained the technical aspects of the discussion groups, such as removing members at their request, changing e-mail addresses, notifying users of computer viruses, and troubleshooting computer problems.

The content experts were available to answer general questions and comment on the discussion. They were not allowed to give individual medical advice. They estimated their online time to be 2 or less hours per week. There was

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be superior to usual care. Four of the studies had sufficient data to be included in a meta-analysis.⁵ Effect sizes ranged from -0.36 to -1.57 for pain and from -0.16 to -1.16 for functional disability. No specific cognitive or behavioral intervention seemed to be superior. The Agency for Health Care Policy and Research guidelines dealing with low back pain found only moderate evidence supporting patient education as an intervention for this condition.⁶ None of these studies used the Internet as a mode of program delivery.

According to a 1999 Harris Poll,⁷ 68% of Internet users seek health-related information, and among the most frequently accessed sites are those for musculoskeletal conditions. The Internet can be used to seek information and/or to gain support through chat rooms conducted in real time, or bulletin boards or e-mail discussion groups which do not take place in real time. The randomized study described herein involves an intervention, consisting of a moderated e-mail discussion group, a videotape, and a book about back pain, with the objectives of improving quality of life (disability, pain,

role function, and psychological distress), while lowering health care utilization.

RESULTS

At 6 months, 202 treatment subjects (68%) and 252 control subjects (89%) completed data. At 12 months, 190 treatment subjects (64%) and 231 control subjects (81%) completed the study. During the first days of the intervention, the number of e-mails per day exceeded 150. This caused 54 treatment subjects to discontinue the intervention during the first month of the intervention. These subjects were invited back into the intervention 2 times during the first year. Of the 107 treatment subjects who requested to be removed from the intervention during the first year, 43 returned to the intervention. Data were requested from all subjects who had been randomized, irrespective of their actual participation in the intervention. Demographics of subjects at baseline are given in **Table 1**.

At baseline, the only significant ($P < .01$) difference between treatment and control subjects was that a greater

no attempt by either the moderators or content experts to direct or end discussion, although sometimes when the discussion was inactive, a content expert might make a comment or ask a question to stimulate discussion. In general, the Agency for Health Care Policy and Research back pain guidelines were used in giving advice.⁶

*The Back Pain Helpbook*⁸ was written for a previous study and emphasizes the principle that “hurt does not equal harm.” This was accomplished by discussing the Agency for Health Care Policy and Research guidelines and making recommendations for self care. The book was included as part of the intervention so that participants could have a specific reference concerning exercise and other treatments.

Finally, treatment subjects received a videotape produced by Northern California Kaiser Permanente Medical called *Easing Back: Taking Control of Your Back Problem*. The videotape had vignettes of several people with back pain who told their stories and discussed how they were able to live and work with back pain. The videotape did not teach specific exercises but rather emphasized posture and walking. The purpose of adding the videotape to the intervention was to provide the subjects with models of appropriate back care behaviors.

STUDY VARIABLES

All data were collected by self-administered questionnaires. All subjects completed the baseline questionnaire online. Ten percent requested to complete either the 6- or 12-month questionnaire by mail, and 2% completed both questionnaires by mail. Primary outcomes for this study were changes in quality of life (pain, disability, role function, and health distress) and changes in health care utilization (back-related visits to physicians, physical therapists and chiropractors, and back-related days of hospitalization). Secondary outcomes included endurance exercise, self-care orientation, and self-efficacy.

All instruments had been previously validated. Pain was measured with a visual numeric scale, a variation of the more traditional visual analog scale.⁹ Disability was measured by the revised Roland-Morris Scale, which was specifically developed to study disability caused by back pain.¹⁰⁻¹² Role function was measured by the Illness Intrusiveness Scale, which measures how much one’s illness interferes with 5 areas of life: physical well being, work and finances, married and family life, recreational and social activities, and other aspects of life.¹³ Health Distress (the amount of time one has felt worried, fearful, or frustrated about health problems) is a short scale developed for the Medical Outcomes Study.¹⁴ All utilization measures were self-reported. In a recent study, Ritter et al¹⁵ have found that self-reported utilization compares favorably with utilization recorded by medical chart audit and electronic medical records. Furthermore, they established that there is no gold standard for utilization data as there are problems with all 3 methods. However, the correlation between self-report and medical chart audits and electronic medical records is generally in the range of 0.8 or better. Self-efficacy was measured by combining previous instruments. The new 6-item measure has an $\alpha = .85$. Self-care orientation was measured using a scale developed by Saunders et al.¹⁶

STATISTICAL ANALYSES

First, to test the randomization, we compared the baseline variables for treatment vs control subjects using simple *t* tests. Second, all hypotheses were tested using analysis of covariance to estimate 1-year scores, controlling for demographic variables and baseline status. One-year change scores were also computed. Third, intent-to-treat analyses were performed by first substituting the last known data (baseline or 6 month) for missing 12-month data and then repeating the analyses of covariance. Finally, we used regression analyses to examine if 6-month changes in self-efficacy and self-care orientation were associated with 1-year outcomes.

Table 1. Baseline Data for Treatment and Control Groups and Baseline Data for Those Completing 1 Year of Treatment

Characteristic	All Data		1-Year Treatment Data	
	Treatment (n = 296)	Control (n = 284)	Treatment (n = 190)	Control (n = 231)
Age, mean, y	46	45	47	45
Sex, male, %	62	61	61	60
Education, mean, y	16.5	16.6	16.5	16.7
Married, %	67	77	71	76

percentage of control subjects were married. Examining the baseline differences between treatment and control subjects who completed 1 year, only age approached significance ($P = .05$) with the treatment subjects being older. The earlier difference in marital status disappeared, suggesting a greater tendency for unmarried subjects to discontinue the study.

During the yearlong study, a total of 2399 e-mail messages were posted to the group. A total of 204 (69%) of

the treatment subjects sent 1 or more e-mail messages to the group. Forty-one percent of subjects reported reading most or all the e-mail messages, while an additional 37% of the subjects reported reading only the e-mail messages of interest to them. The 211 subjects remaining active members of the discussion group at the end of 1 year posted e-mail messages a mean of 8.0 times (median, 2).

Sixty-eight percent of the subjects reported that they had watched the entire videotape, 24% had not watched it, and 18% had watched part of the videotape. Most participants reported that they had read part of the book (mean, 56%). Only 33% had read the entire book, and 12% had not read any of the book.

At 1 year, treatment subjects compared with controls demonstrated significant improvements in all 4 of the primary health status variables (pain, disability, role function, and health distress) ($P < .05$, **Table 2**). For health care utilization (visits to physicians, chiropractors, and physical therapists, as well as hospital days), the treatment group demonstrated greater declines than the control group. For physician visits, this approached significance ($P = .07$). Physician visits for the past 6 months

Table 2. Baseline Mean (SD) Health Status and Health Care Utilization Values and 1-Year Mean (SD) Changes*

Variable (Range, Direction Improvement)	Baseline		12-Month Change		P Values	
	Treatment (n = 190)	Control (n = 231)	Treatment (n = 190)	Control (n = 231)	Probability (95% CI)	Intent-to-Treat Analyses
Health Status Variables						
Disability (0-23, ↓ = better)	10.18 (5.15)	9.53 (4.88)	-2.77 (4.68)	-1.51 (4.97)	.01 (0.32-2.19)	≤.001
Health distress (0-5, ↓ = better)	2.62 (1.10)	2.61 (1.10)	-0.921 (1.12)	-0.570 (1.09)	.001 (0.14-0.56)	<.001
Pain interference (0-10, ↓ = better)	3.97 (2.36)	3.82 (2.36)	-1.50 (2.64)	-1.02 (2.60)	.05 (-0.02 to 0.99)	.002
Role function (0-7, ↓ = better)	3.04 (1.22)	2.94 (1.22)	-0.830 (1.05)	-0.531 (1.14)	.007 (0.09-0.51)	<.001
Self-care orientation (1-5, ↑ = better)	2.95 (0.69)	2.99 (0.63)	0.27 (0.63)	0.12 (0.63)	.014 (-0.27 to -0.03)	.002
Self-efficacy (1-10, ↑ = better)	6.49 (2.00)	6.78 (1.90)	0.56 (2.17)	-0.12 (2.03)	.003 (-1.08 to -0.27)	.02
Health Care Utilization Values						
Variable†	Treatment (n = 190)	Control (n = 231)	Treatment (n = 190)	Control (n = 231)	Probability (95% CI)	Worst-Case Analysis
Physician visits for back	2.46 (4.62)	1.93 (3.03)	-1.54 (4.16)	-0.65 (3.47)	.07 (0.15-1.62)	.01
Chiropractor visits for back	3.70 (8.90)	3.71 (8.17)	-1.32 (11.30)	-0.797 (9.19)	.35 (-1.45 to 2.49)	.11
Physical therapist visits for back	3.31 (6.80)	2.91 (7.72)	-1.99 (6.45)	-1.31 (9.00)	.43 (-0.861 to 2.22)	.32
Hospital days	0.25 (1.45)	0.07 (0.569)	-0.198 (1.47)	0.04 (0.898)	.24 (0.01-0.47)	.08

*For probabilities, the outcomes are the same for the control vs treatment subjects. They are calculated using analysis of covariance models estimating year 1 variable from baseline variable and intervention group, with age, sex, education, whether non-Hispanic white, and whether married, as covariates. Worst-case probabilities assume no change at 1 year from last known data (n = 296 for treatment, n = 284 for controls). The 95% confidence intervals (CIs) are the difference between the 1-year change scores for treatment minus control.

†All visits and/or days are the number for the past 6 months.

declined by 1.54 visits for the treatment group and 0.65 visits for the control group. Mean hospital days declined nearly 0.25 days for the treated group and increased 0.04 days for the control group ($P = .24$).

Two other variables that might have influenced health status and health care utilization were also examined, self-care orientation and self-efficacy. Self-care orientation and self-efficacy were significantly enhanced in the treated group (both 9%) compared with the control group (4% and -2%) ($P = .01$ and $P = .003$, respectively).

It may be that study dropouts, if included, would have significantly influenced the study outcomes. To investigate this possibility, we performed intent-to-treat analyses. The results were nearly the same as with the analyses that excluded dropouts (Table 2). Using the intent-to-treat analysis, the reduction in hospital days approached significance ($P = .08$).

In addition, baseline and 6-month changes in self-efficacy were associated with 12-month health status. Specifically 6-month changes in self-efficacy were significantly ($P < .001$) associated with 1-year changes in disability, health distress, pain interference, and role function (Pearson $r = -0.20, -0.33, -0.18,$ and 0.26 , respectively). Using regression models, we calculated adjusted health status variables at 1 year. Independent variables used in the model were the health status variables at baseline, self-efficacy at baseline, 6-month change in self-efficacy, and demographic variables (age, sex, education, married, and non-Hispanic white). Baseline self-efficacy and 6-month change in self-efficacy were associated with 1-year disability, health distress, pain interference, and role function at the ≤ 0.001 level. In these models, baseline demographic variables did not significantly predict 1-year outcomes, except that older age was associated with higher levels of disability. When we added baseline self-care ori-

entation and 6-month change in self-care orientation to the regression models, both were significantly associated with physician utilization at 1 year ($P = .02, P = .005$, respectively). Thus 6-month changes in self-efficacy seem to be associated with 1-year improvements in health status, while 6-month changes in self-care orientation seem to be associated with 1-year reductions in physician utilization.

COMMENT

This study suggests that a simple low-cost use of the Internet may improve health status and lower health care utilization for persons with recurrent back pain. The question is whether these changes are clinically significant. Fischer et al¹⁷ found that arthritis patients rated a 30% improvement in disability as meaningful and satisfying. In this study, patients achieved a 34% reduction in disability (effect size, 0.3).

Another important question involves potential savings. When we examined utilization, the treatment group reduced their total outpatient utilization from 9.47 visits in the 6 months before baseline to 4.32 visits in months 6 to 12 of the study, for a total reduction of 5.15 visits. The control group reduced their visits from 8.55 to 5.74 for a total of 2.81 visits. Thus, the treatment group had 46% fewer visits than the control group during the last 6 months of the study. This same pattern, although not statistically significant, was observed in hospital days with the treatment group reducing hospital days by 0.20 compared with less than 0.05 days for the control group. These reductions, if replicated in other groups, could represent substantial savings because of the high utilization patterns of people with recurrent back pain. The cost of the intervention was approximately \$15 per person for the book and videotape and

approximately 11 hours per week of professional time (2 hours per week for each of 3 content experts and 5 hours a week for the moderators). Using a professional salary of \$100 000/year, the total cost of the intervention per participant was approximately \$100. This would be increased if the purchase of computers and software were included.

With improved health status and health care utilization, one must ask why these changes occurred. It is not possible to identify the individual contributions of the various parts of the intervention. However, we do know that most past educational interventions for back pain have been ineffective. At the same time, Turner⁵ has suggested that psychobehavioral interventions may be more effective in the treatment of this condition. From our data, it seems that baseline self-efficacy as well as changes in self-efficacy may be important contributors to the positive health status outcomes.

There are several caveats. It may be that those participating in the intervention were a select group. During a 3- to 4-month recruiting period, 46 000 people had at least an initial interest as indicated by hits on the study Web site. In addition, the utilization rates and disability scores of study subjects do not differ greatly from those reported in the general population. In fact, the subjects in this study may be more representative than in past studies. They came from 49 states and had a wide age range. On the other hand, we had few minority subjects and, of course, those without Internet access were excluded.

In addition, this study did not include recurrent back pain patients receiving disability compensation. This was intentional to avoid the problems sometimes encountered with the competing demands of improvement in condition with the desire to maintain disability benefits. We are currently beginning a replication study for people who have applied for workers' compensation because of low back pain.

In conclusion, while there are many caveats and much more to be learned about the use of an Internet discussion group for persons with chronic health conditions, this is one of the first randomized studies to investigate this new delivery mechanism, to our knowledge. The results suggest that a combination of information and support largely offered through an Internet discussion group improves health status and health care utilization for up to 1 year. In the future, we will learn much more about the potential and limitations of this new media for delivering health care interventions.

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