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Do Lessons Learned in a Training Intervention on Web-Based Health Care Resources Diffuse to Nonexposed Members in the Primary Care Setting? A Comparative Study

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Abstract

Objective—The Internet offers a significant information resource for health professionals. A strategy to improve the use of these resources is for health care providers and staff to receive specific training. The aim of this study was to determine whether those who attended an Internet health care resource training intervention transferred knowledge and skills to others in the practice.

Methods—Twenty-four primary care practices participated in the study in which 64 providers and staff attended a training intervention and 288 did not. A preintervention questionnaire that assessed knowledge, skill, and Internet usage was compared with a postintervention questionnaire. The main effect of interest in the linear model was the group by time interaction term, to determine whether knowledge and skill improved for both groups.

Results—There were 41 attendees and 222 nonattendees that completed both pre- and postintervention questionnaires. There were 9 variables that showed a possible diffusion pattern, in which both attendees and nonattendees improved between pre- and postintervention. Overall, the training intervention seemed to have impacted knowledge and skills of the respondents and also reported improvements in the clinical area of patient education, but frequency of use for most Web resources for medical decision making did not improve.

Conclusion—An improvement strategy that depends on a training intervention for a few members in a practice may not necessarily transfer relative to all aspects of patient care.

Keywords

diffusion of innovation; Internet; medical decision making; patient education

In the United States, the use of the Internet has grown dramatically, and almost 3 out of 4 adults say they used the Internet.¹ Information about health-related diseases, conditions, symptoms, treatments, and medications is abundant on the Internet, which makes it a significant information resource that both consumers and health professionals are accessing.^{2–6} Health care Web sites have the potential to engage patients in learning about how to manage specific diseases or conditions.⁷ This is especially important in chronic disease management, where an empowered and informed patient is an essential component of reducing the burden of illness.^{8,9}

Patients are accessing Web-based health care information^{10–16} and may need help or advice in assessing quality Web sites.^{17,18} Similarly, health care providers and clinical staff members may not have adequate Internet skills¹⁹ or knowledge of the vast array of Web sites that patients are accessing. Health care professionals are seeking information to support patient care,^{4,5,19,20} and resources on the Internet could assist in their medical decision making.

Searching the Internet on one's own time may be well worth the effort, but in a busy health care environment, time may be in short supply.^{21,22} For successful and continued use of the Internet in patient care, accessing information needs to work within the process of taking care of patients. One possible strategy to initiate the use (or more frequent use) of Web resources and improve Internet usage skills is for providers and staff to receive specific training on locating and using high-quality Web resources.^{23,24}

A previous study by the authors examined knowledge, skills, and frequency of use of the Internet by health care providers and staff members who attended workshops on how to access and assess health care Web-based resources.²⁵ In addition to this training, they also developed a practice-based plan to incorporate and increase the use of Web-based resources in their own practice settings. Part of the practice plans were to discuss appropriate opportunities within the practice, to share information learned at the workshops, and to encourage and/or train others on these resources. The study showed that the attendees improved their knowledge, skills, and frequency of use 1 year later compared with control group practices that did not receive training.

Although the previous study showed positive effects of the Internet training, it was also of interest to determine whether there was a spread of the knowledge and skills to other members of the practice who did not attend the training session. A theoretical framework used in this study to help us think about the process of the workshop attendees spreading information to others is diffusion of innovation.²⁶ Diffusion is a specific process in which information is spread to others using their social network and an innovation is a new way of working or a set behavior that is explicitly designed to improve some element of patient care.²⁶ The process of diffusion is passive compared with a dissemination process in which people are persuaded to adopt an innovation or an implementation process when an innovation is put into an organization.²⁶

In the previous study we examined the effectiveness of a dissemination strategy in which biomedical librarians taught the workshop attendees about the Web-based health care resources via presentations and experiential learning activities. As aforementioned, workshop attendees seemed to incorporate Web-based resources into their professional practices,²⁵ but it was also of interest to determine whether attendees shared lessons learned with others. Diffusion would be the only mechanism that could have occurred because practices were not required to implement or disseminate specific plans to improve nonattendees' Internet skills and knowledge—attendees were only encouraged to share information learned at the workshops, and it was assumed that diffusion of knowledge and skill would penetrate the practice over time because of a passive process of sharing information they learned in their own way.

The research aim of this comparison study was to determine whether information learned by the workshop attendees diffused or spread to others in the practice. This was done by examining whether the nonattendees improved their skills and knowledge of Web-based health care resources as much as the attendees did over time.

METHODS

As described in a previously published article, a prospective pair-matched cluster randomized study was conducted between July 2004 and September 2006, to determine the effectiveness of a training intervention to improve health care providers' and staff members' knowledge,

skill, and frequency of use of Web-based health care resources.²⁵ Twenty-four primary care practices located in New Hampshire and Vermont were recruited. The practices were matched by size, specialty, and location. One group in each pair was randomly assigned to a Web-based health care resource training intervention and the other to the control group, which received training a year later. Each practice in both groups received 2 computers and access to high-speed Internet to ensure equal technological property. One computer was designated for patients to access Web-based resources and was usually placed in the waiting room. The other computer was available for clinical staff and providers.

The training intervention included 4 components: 2 workshops held 2 months apart, a follow-up phone call 1 month after the workshops, and a site visit 1 month after the phone call. The workshops involved presentations from biomedical librarians on how to access and efficiently use a variety of Web-based resources, and experiential learning activities, such as searching various Web sites on relevant and recent clinical and/or patient questions. The attendees also received information on how to change clinical practice. They created flow diagrams of a specific patient care process and developed an improvement plan of how the practice would use the Internet in daily patient care. This work was shared with the group for feedback and further plan development and clarity. The phone call and site visit entailed conversation with 1 or more of the workshop attendees to hear whether or not they followed through with their plan and to provide advice or answer any questions, as needed.

A year later, the control group received the training intervention. The control group had the computers and high-speed Internet access for a year before the training intervention. Having these computers before training did not have a major impact on attendees' Internet knowledge, skill, or usage. Attendees in both groups showed improvement in their Internet knowledge, skill, or usage mainly due to the training intervention.²⁵

The previously published study examined the workshop attendees to assess the effectiveness of the training intervention; however, it was also of interest to determine whether nonattendees improved their Internet knowledge, skill, and frequency of usage due to their colleagues being exposed to the training intervention. The study design for the current research was a comparison of knowledge, skill, and frequency of use of the Internet between those exposed to the training intervention versus other members in the practice who had patient contact and were not exposed to the training intervention.

Description of practices and sample

The 24 practices consisted of 9 family medicine practices, 5 internal medicine practices, 5 pediatric practices, and 5 multispecialty practices. Practice size ranged from 5 practices with a single provider, 13 practices with 2 to 5 providers, and 6 practices with more than 5 providers (range = 6–16). The number of patients seen per week ranged from 50 to 800.

The attendees of the workshops comprised of up to 3 representatives (providers, clinical staff, and office staff) from each of the 24 practices ($n = 64$). The nonattendees were providers and staff members who had patient contact but did not attend the workshops ($n = 288$).

Questionnaire

As previously reported, a questionnaire was developed to assess knowledge, skills, and use of Web-based resources for general patient care, and more specifically, patient education and medical decision making.²⁵ The self-report questionnaire was mailed to the practices at 3 time points during the study: baseline, follow-up at year 1, and follow-up at year 2. The baseline questionnaire was completed before receiving the computers and high-speed Internet access. The follow-up year 1 questionnaire was sent after the first half of the practices' workshop

attendees received the training intervention plus a 4-month period of no contact. The questionnaire at follow-up year 2 was collected after the other practices sent their workshop attendees to receive training (with the similar 4-month period of no contact after the training intervention).

To determine whether the attendees transferred lessons learned to the nonattendees, a comparison of responses between pre- and postintervention questionnaires was conducted. The preintervention questionnaire was considered the questionnaire completed prior to the attendees receiving the training intervention and the postintervention questionnaire was considered the questionnaire completed a year later. For half of the practices the preintervention questionnaire was the baseline questionnaire and postintervention questionnaire was the follow-up at year 1 questionnaire. For the other practices, the preintervention questionnaire was the follow-up at year 1 questionnaire (similar to baseline—prior to their attendees receiving the training intervention) and the postintervention questionnaire was the follow-up at year 2 questionnaire. Specific questions were selected for analyses, which were grouped into 2 domains: (1) knowledge and skill and (2) frequency of use.

Analysis

For the descriptive characteristics, Pearson chi-square analysis was used for the categorical variables and 2-sample *t* test was used for the continuous variables to determine any differences between attendees and nonattendees. A linear mixed model was used to determine whether lessons learned in the training intervention received by the attendees were diffused to the nonattendees within the practices. The model had 2 fixed factors of *group* (attendees and nonattendees) and *time* (pre- and postintervention), whereas the respondent completing both questionnaires was considered a random factor. Because respondents work within a particular context of their practices, nesting them within practices controlled for their interconnectedness.

The main effect of interest was the group by time interaction term, because this term would determine whether the attendees versus the nonattendees improved at different rates between the 2 measured time points, and thus, whether lessons learned at the workshops were spread to others within the practice. Post hoc analyses of significant results, those reaching a *P* value less than .05, were investigated with paired or 2-sample *t* tests. Posthoc tests had 4 possible pairwise contrasts, so the significance levels of these tests were adjusted for multiple comparisons using the Bonferroni adjustment.²⁷ Thus, an adjusted *P* value of .0125 was needed for significance.

RESULTS

There were 41 attendees and 222 nonattendees who completed both pre- and postintervention questionnaires. The response rate for the questionnaires was 64% for the attendees and 77% for the nonattendees. Table 1 presents the descriptive statistics for the respondents' characteristics by attendees and nonattendees. Most of the respondents were women (82% in the combined groups). The respondents' roles in their respective practices were significantly different (*P* = .003) between the groups. For the attendees, 44% were providers and 23% were clinic support staff, whereas the nonattendees were 27% providers and 36% clinic support staff. There was no difference between the groups relative to prior use of the Internet, in which 95% of the respondents reported using the Internet in the past. There was no difference between the groups' average age (combined age = 44 years; SD = 11.7) and similarly there was no difference between the groups' average years of service in primary care (combined service = 11.2 years; SD = 9.2). There was a difference between the attendees and nonattendees in their self-reports on whether other people were seeking advice from them. The attendees' average score was 4.2 (SD = 0.6; slightly above agree on a 5-response Likert-type scale) versus the nonattendees' average score of 3.9 (SD = 0.7). There was no difference between the groups in their ability

to teach others how to effectively search the Web, in which both groups rated their teaching ability at slightly below moderately well.

The Appendix contains the questions analyzed using the linear mixed model and the 4 groups by time variable means and standard deviations and the interaction term statistic results. The following sections describe the results in the Appendix.

Knowledge and skill

The respondents rated their ability to use 7 Web resources and there were 2 specific patterns in the statistical results. The first pattern occurred with 5 of the 7 Web-based resources: MEDLINE (eg, via PubMed or OVID), clinical (eg, UpToDate, MDConsult), evidence-based review (eg, Cochrane), medical organization (eg, American Heart Association, Center for Disease Control and Prevention), and patient orientated (eg, MedlinePlus, WebMD). The resultant pattern for these 5 Web-based resources was that both groups rated their ability equally before the training intervention and both groups improved a year later; however, the attendees improved more compared with the nonattendees. Figure 1 shows a graph of the results for the MEDLINE question, which illustrates this pattern.

The other specific statistical result pattern occurred in 2 of the 7 Web resources, in which both groups rated their ability to use these resources in a similar manner before the training intervention but only the attendees reported a statistical significant improvement a year later. This pattern occurred with online practice guidelines (eg, National Guidelines Clearing-house, Institute for Clinical Systems Improvement) and medical profession (eg, American Academy of Family Physicians) Web sites. Figure 2 shows a graph of the medical profession Web site, which illustrates this pattern (improvement only in the attendees) seen for these 2 Web resources.

Part of each workshop was dedicated to teaching attendees how to use effective search techniques. Two of the 3 search techniques, which were using limits to narrow search results and developing an effective search strategy for a patient care question, improved for the attendees but not the nonattendees (similar to the pattern seen in Figure 2). The last question in the knowledge and skill domain asked respondents how well they could find Web-based educational materials for patients. Both groups reported improvement, which is similar to the pattern seen in Figure 1.

Frequency of use

Respondents reported using the Internet at work for any reason at least weekly (interaction term was not statistically significant). The remaining frequency of use of Web resource questions was grouped into 2 categories: patient education and medical decision making. Both attendees and nonattendees reported a statistical significant improvement in using Web resources for patient education (show/give/tell patient Web-based materials), in which the attendees' frequency showed more improvement compared with the nonattendees (similar to pattern seen in Figure 1). The other patient education question was whether respondents referred patients to specific Web sites. Both attendees and nonattendees reported a statistical significant improvement with the attendees reporting more referrals than the nonattendees (similar to pattern seen in Figure 1).

In the workshops, the attendees were shown 6 Web resources that could aid in medical decision making. The frequency of use did not change between pre- and postinterventions for both the attendees and nonattendees for 3 of 6 Web resources: clinical, medical profession, and medical organizations. For 2 of the 6 Web resources, evidence-based review and practice guideline, there was no statistical difference between the groups for pre- and postintervention time frames;

however, the attendees did significantly report improvement but their average improvement did not exceed the nonattendees postintervention reports. The last medical decision-making Web resource, MEDLINE, had a statistical result pattern similar to Figure 1, in which both the attendees and nonattendees increased their use pre- to postintervention and the attendees' use was significantly more frequent than the nonattendees in the postintervention questionnaire.

DISCUSSION

In this study, we examined whether attendees of a training intervention transferred knowledge and skills to others in the practice and whether frequency of use of the Internet improved from the preintervention questionnaire. On average, respondents reported their ability to access information on the Web as moderate to very well (which did not improve pre- to postintervention) and they used the Internet at least once or twice a week. This parallels findings by Case-beer and colleagues⁴ in their office-based specialty physician survey, in which 80% used the Internet to find medical information and 54% used the Internet weekly.

Statistical results were summarized in a 3×3 matrix, which is displayed in Table 2. This table shows the findings aggregated by the statistical result pattern (diffusion, no diffusion, and no impact) and by clinical area (general patient care, patient education, and medical decision making). A diffusion pattern was seen in 9 of the variables (similar to the pattern seen in Figure 1). A lack of diffusion was seen in 4 of the variables in which improvement was only reported for those exposed to the training intervention (similar to the pattern seen in Figure 2). There were 8 variables that showed no differences between groups and time frames and thus the intervention seemed to have no impact.

Overall the training intervention seemed to have an impact on the practices relative to knowledge and skill, in which both the attendees and nonattendees reported an improvement in knowing how to use some of the Web-based resources for general patient care. In addition, there seemed to be a positive spread of information related to patient education from the attendees to the nonattendees. Both groups reported an improvement in their ability to use patient-orientated Web sites and also improved their ability to find Web-based educational information for patients, increased their frequency of using patient education Web-based materials, and increased their frequency in referring patient to specific Web sites. However, diffusion may not have been the only variable that could have influenced those results. All practices were given a computer dedicated to patient education, which may have been more influential than communication between attendees and nonattendees.

The intervention seemed to have no impact on the clinical area of medical decision making. There was no reported increase in frequency of use for most Web resources except for MEDLINE. A study by Beaulieu and colleagues²⁸ explored how physicians assessed scientific information. They found that family physicians thought credible information sources came from recognized organizations and/or continuing medical education activities; however, with more familiar issues, such as treating hypertension, physicians tended to rely on professional experience because studies were usually conducted on a population that did not represent the patients they were currently delivering care to and a treatment or intervention that they could not reproduce in their setting.²⁸ Therefore, primary care physicians may see that these health care Web-based resources provided knowledge on which they could not act promptly.

A limitation of this comparative study was relative to the nature of an analysis on a randomized control trial that was not specifically designed to study specific elements or determinants of diffusion relative to Web resources between attendees and nonattendees. There was also a difference in the role distribution between the groups that may have affected the comparisons. The nonattendees had more clinical support responders (38% vs 23%) and the attendees had

more providers (44% vs 27%). Another possible influential factor on these results could have been the growing popularity of the Internet and its presence in the home and community that could have influenced the results more than possible communications among attendees and nonattendees.

CONCLUSION

An improvement strategy that depends on providers and staff to inform others on what they learned at training workshops may not have adequate leverage within a practice relative to all aspects of patient care. Future studies may benefit from examining specific characteristics of the attendees and their relationships with others and whether they have the ability to influence the practice members to help encourage and change practice behaviors. It is also essential to consider the aims and goals of a practice and whether Web resources would even be on their list of concerns and whether the practice members see the Internet as a helpful tool or just another thing to add to their already busy day.

Additional concern with this strategy is that attendees may not have felt confident that they could teach others or that they would like to get more comfortable and knowledgeable of the Web sites themselves before showing it to others. For instance, Chew and colleagues²³ found that family physicians need time to learn how to use the Internet and experience the benefits. Therefore, specific instruction on teaching skills in the workshop may help boost the attendees confidence level and aid in the spread of their learning experience, but this would require additional time in the workshops to cover this material and to reflect on one's teaching style.

This study was undertaken to determine whether the assumption of diffusion was valid and, in general terms, show that some elements of the training intervention and providing a patient computer might have created a spread of knowledge and skill for some Web resources and increased opportunities for patient education via the Internet resources. However, the use of the Internet for specific medical decision making seemed to foster little usage for the health care professionals and staff members.

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How well do you know how to use MEDLINE

Figure 1.

The average score of the respondents in both groups and time frames relative to self-reports of their skill in using MEDLINE (both groups improved; however, the attendees improved more).

How well do you know how to use medical professions Web site

Figure 2.

The average score of the respondents in both groups and time frames relative to self-reports of their ability to use medical profession Web site (only attendees improved their skill).

Table 1
CHARACTERISTICS OF THE RESPONDENTS BY ATTENDEES AND NONATTENDEES

	Attendees		Nonattendees	
	<i>n</i>	%	<i>n</i>	%
Number of respondents	41	16	222	84
Gender				
Male	10	24	36	17
Female	31	76	100	83
Role in practice ^a				
Provider (MD, DO, PA, NP)	36	44	114	27
Clinic staff (RN, LPN, MA, SW)	19	23	152	36
Administration support	6	7	69	16
Other	21	26	93	22
Used the Internet				
Yes	39	98	205	94
No	1	2	12	6
	Mean	SD	Mean	SD
Age, y	46.4	11.2	43.9	11.8
Work in primary care, y	11.6	9.6	11.1	9.0
Other people seek advice from me (1 = strongly disagree to 5 = strongly agree) ^b	4.2	0.6	3.9	0.7
I can teach others how to effectively search the Web (1 = not at all well to 5 = extremely well)	2.7	1.1	2.8	1.2

^aPearson chi-square, $P = .003$.

^b2 sample t test, $P = .006$.

Table 2**SUMMARY OF RESULTS**

	Resultant pattern between pre- and postintervention		
	Diffusion: Improvement in both groups	No Diffusion: Improvement only in attendees	No impact: No difference between groups or time frames
General patient care	K & S—know how to use MEDLINE Clinical Evidence based Medical organization	K & S—know how to use or do Practice guidelines Medical professions Narrow search limit Develop an effective search strategy	K & S—find information on Web K & S—know how to use “or” & “and” Frequency—use Web at work
Patient education	K & S—know how to use Patient-orientated Web sites Find patient education on Web Frequency Use Web for patient education Refer patients to specific Web		
Medical decision making	Frequency MEDLINE		Frequency Clinical Evidence based ^a Practice guidelines ^a Medical professions Medical organization

Abbreviations: K & S, Knowledge and skill.

^a Attendees showed improvement pre- to postintervention, but attendees did not rate their frequency of use significantly more than nonattendees.

Appendix

Group by time interaction term results: Means, standard deviations (SD), interaction statistical results, and 4 post hoc comparison results.

Domains and questions	Attendees		Nonattendees	
	Preintervention Mean (SD)	Postintervention Mean (SD)	Preintervention Mean (SD)	Postintervention Mean (SD)
Knowledge and skill				
4a. <i>Please indicate how well you can find information you need on the Web</i> (Not at all well = 1 to Extremely well = 5) $P > .05$	3.3 (1.0)	3.9 (0.9)	3.4 (1.1)	3.6 (1.1)
6. <i>How well do you know how to use the following Web-based resources?</i> (I am not familiar with this = 1 to Extremely well = 6)				
b. MEDLINE $P < .001$; NS-S-S-S	2.3 (1.3)	4.4 (0.9)	2.2 (1.4)	2.5 (1.6)
c. Online clinical resource $P = .048$; NS-S-S-S	2.8 (1.7)	4.1 (1.3)	2.3 (1.6)	2.6 (1.7)
d. Online evidence-based review resource $P < .001$; NS-S-S-S	1.7 (0.9)	3.2 (1.2)	1.7 (1.1)	1.9 (1.3)
e. Practice guidelines online $P < .001$; NS-S-S-NS	1.7 (1.0)	2.9 (1.2)	1.9 (1.3)	2.0 (1.3)
f. Medical professions Web site $P = .008$; NS-S-S-NS	2.6 (1.6)	3.7 (1.3)	2.6 (1.7)	2.6 (1.7)
g. Medical organization Web site $P = .005$; NS-S-S-S	2.7 (1.5)	3.9 (1.0)	2.8 (1.6)	3.0 (1.6)
h. Patient-oriented health information Web site $P < .001$; NS-S-S-S	2.4 (1.7)	4.9 (0.8)	2.6 (1.8)	3.2 (1.9)
9. <i>Please indicate how well you can do the following Web tasks</i> (Not at all well = 1 to Extremely well = 5)				
a. I can narrow search results using limits $P = .008$; NS-S-S-NS	2.3 (1.0)	3.2 (1.2)	2.3 (1.4)	2.4 (1.3)
b. I can develop an effective online search strategy from my patient care questions $P = .002$; NS-S-S-NS	2.1 (1.2)	3.2 (1.2)	2.3 (1.2)	2.4 (1.3)
c. I can use terms such as "or" and "and" to widen or narrow my search $P > 0.05$	2.3 (1.3)	3.1 (1.3)	2.2 (1.3)	2.4 (1.2)

Domains and questions	Attendees		Nonattendees	
	Preintervention Mean (SD)	Postintervention Mean (SD)	Preintervention Mean (SD)	Postintervention Mean (SD)
14. Please indicate how well you can find educational materials for patients on the Web (Not at all well = 1 to Extremely well = 5) <i>P</i> = .019; NS-S-S-S				
	2.2 (1.0)	3.3 (1.0)	2.2 (1.2)	2.6 (1.2)
Domains and questions Mean (SD)				
Attendees				
Nonattendees				
Frequency of use				
2b. In general how often do you use the Web at work for any reason? (Never = 1 to Several times a day = 6) <i>P</i> > .05				
	4.4 (1.9)	5.0 (1.4)	3.8 (1.8)	4.1 (1.7)
12a. Indicate how often in a typical month you use (eg, show to a patient, give to a patient, tell patient about) Web-based materials as patient education resources (Do not own or have access = 1 to Daily or almost daily = 5) <i>P</i> = .040; NS-S-S-S				
	2.5 (1.0)	3.3 (1.1)	2.6 (1.1)	2.8 (1.0)
18d. Please estimate how often you refer patients to specific Web Sites (Never = 1 to Daily or almost daily = 5) <i>P</i> = .025; NS-S-S-S				
	2.0 (0.9)	2.9 (1.1)	1.8 (1.1)	2.1 (1.1)
7. Indicate how often in a typical month you use each resource listed to find information for making specific patient care decisions (Do not own or have access = 1 to Daily or almost daily = 5)				
h. MEDLINE <i>P</i> = .001; NS-S-S-S				
	1.9 (0.7)	2.8 (0.9)	2.0 (0.8)	2.2 (0.9)
i. Online clinical resource <i>P</i> > .05				
	2.5 (1.3)	2.6 (1.2)	2.2 (1.2)	2.4 (1.2)
j. Online evidence-based review resource <i>P</i> = .023; NS-NS-S-NS				
	1.5 (0.5)	2.1 (0.6)	1.7 (0.7)	1.9 (0.8)
k. Online practice guidelines <i>P</i> = .034; NS-NS-S-NS				
	1.6 (0.7)	2.1 (0.6)	1.8 (0.7)	1.9 (0.8)
l. Medical professions Web site <i>P</i> > .05				
	1.9 (0.8)	2.4 (0.7)	2.2 (1.0)	2.2 (0.9)
m. Medical organization Web site <i>P</i> > .05				
	2.0 (0.9)	2.5 (0.6)	2.2 (0.9)	2.3 (0.9)

Post hoc comparison results—NS (nonsignificant), S (significant).

First term: attendees vs nonattendees, preintervention means—2-sample *t* test.

Second term: attendees vs nonattendees, postintervention means—2-sample *t* test.

Third term: pre- vs postintervention attendees', means—paired *t* test.

Fourth term: pre- vs postintervention, nonattendees' means—paired *t* test.