Original Investigation

Enhanced Didactic Methods of Smoking Cessation Training for Medical Students—A Randomized Study

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Abstract

Background: It is essential that medical students are adequately trained in smoking cessation. A web-based tobacco abstinence training program might supplement or replace traditional didactic methods.

Methods: One-hundred and forty third-year medical students were all provided access to a self-directed web-based learning module on smoking cessation. Thereafter, they were randomly allocated to attend 1 of 4 education approaches: (a) web-based training using the same tool, (b) lecture, (c) role playing, and (d) supervised interaction with real patients.

Results: Success of the intervention was measured in an objective structured clinical examination. Scores were highest in Group 4 (35.9 ± 8.7), followed by Groups 3 (35.7 ± 6.5), 2 (33.5 ± 9.4), and 1 (28.0 ± 9.6; $p = .007$). Students in Groups 4 (60.7%) and 3 (57.7%) achieved adequate counseling skills more frequently than those in Groups 2 (34.8%) and 1 (30%; $p = .043$). There was no difference in the scores reflecting theoretical knowledge ($p = .439$). Self-assessment of cessation skills and students' satisfaction with training was significantly better in Groups 3 and 4 as compared with 1 and 2 ($p < .001$ and $p = .006$, respectively).

Conclusions: Role playing and interaction with real patients are equally efficient and both more powerful learning tools than web-based learning with or without a lecture.

Introduction

It is essential that medical students receive the adequate knowledge and training on smoking-related diseases and the skills to successfully promote smoking cessation (Richmond, 1999). However, upon completion of their medical studies, only 27% of European medical students believe having acquired adequate knowledge to counsel (Richmond, Debono, Larcos, & Kehoe, 1998). Although the curriculum of the majority of the schools covered various clinical aspects of tobacco-related diseases, they are passed on to students neither in a systematic nor in an integrated manner (Spangler, George, Foley, & Crandall, 2002).

Lecturing was the most common teaching format in medical schools (Chamberlain et al., 1992). However, the efficiency of this traditional didactic method is questionable (Roche, Eccleston, & Sanson-Fisher, 1996). Alternative teaching formats, such as role playing and the use of simulated patients, were all successful in changing the students' attitude toward tobacco use and improved smoking cessation counseling skills (Richmond, 1999).

Recently, web-based instruction has been used increasingly in many educational domains (Fiore, Epps, & Manley, 1994). However, web-based instructional initiatives are not necessarily superior to traditional methods of instruction (Pederson, Blumenthal, Dever, & McGrady, 2006). This study aimed to evaluate the efficiency of a self-directed web-based learning module on smoking cessation in combination with traditional (lecture) and enhanced didactic method of smoking cessation counseling skills (role playing and supervised interaction with real patients) in a randomized fashion. The primary end point of the study was the score in an objective structured clinical examination (OSCE).

Methods

Setting and Study Population

This prospective, controlled randomized intervention study on teaching methods for smoking cessation skills was performed at the University Basel, Switzerland. The curriculum involved in the study has adopted as required instructional material for a

course and was waived from submission to the ethics committee according to the Center of Academic Instruction of the Faculty of Medicine. Students were invited to take part and instructed about the protocol, design, and objectives of the study by the Center of Academic Instruction of the Faculty of Medicine, University of Basel, Switzerland.

Study Design

One hundred and forty third-year medical students were provided access to a specifically designed self-directed web-based learning module on smoking cessation. The curriculum was based on standardized smoking cessation literature (Richmond, 1996; Roche et al., 1996; Services, 2000; Spangler et al., 2002; Confederation. last access 2010) and included material on epidemiology, public health, primary care medicine, respiratory medicine, and psychosomatic medicine. The module targeted the transfer of tobacco-related knowledge to patients, including the role of the medical practitioner in tobacco control, the effect of medical professionals in advising patients to quit, smoking prevalence in Switzerland, economic aspects of tobacco consumption, harmful components of tobacco, including nicotine, tar, and carbon monoxide, health effects of tobacco use, benefits of quitting smoking, health effects of passive smoking, type of tobacco products, identification of smokers, smoking history, identification of the stage of readiness to change smoking behavior, physical and psychological nicotine dependence, high-risk groups with highest resistance to quitting, motivational interviewing, behavioral changes, counseling skills strategies, pharmacologic agents (nicotine replacement or antidepressant therapy), and relapse prevention.

Thereafter, students were randomly divided into four equal groups of 35 subjects according to a computer-based block-randomization scheme. Accordingly, between 2 and 4 weeks after gaining access to the web-based learning module on smoking cessation, each group was given one of the following 2-hr supervised smoking cessation education settings: (a) "web-based training" using the newly designed web-based learning module; (b) "lecture": instruction through a faculty preceptor including demonstration of video material followed by group discussion; (c) "patient-centered counseling through role play in small groups": one medical student acted as a smoker and another one acted as the physician, following a standardized case description; and (d) supervised "interaction with real patients": counseling encounters with real patients who smoke and took part in a smoking cessation intervention program for university hospital employees.

Upon completion of the teaching session, all students were evaluated by a 12-item OSCE. The OSCE consisted of one of two standard situations reflecting a patient–physician encounter located in the primary care physician setting. Lay persons of both genders were trained to perform the role of smoking patients willing to quit, for example, patient instructor. OSCE's were evaluated by a respiratory or primary care physician and a didactic assistant trained in smoking cessation using a standardized previously defined evaluation form. Training sessions for role-playing volunteers and evaluating physicians were standardized and included both personal advice by experienced nursing staff and a video interview with smoking subjects. Scores were divided into quartiles, resulting in four categories: "inadequate," "rather inadequate," "rather adequate," and "adequate."

The theoretical knowledge of the students was assessed by 20 multiple choice questions. In addition, a questionnaire evaluated the risk awareness of tobacco use before and after the teaching session (two questions), self-assessment of counseling skills (five questions), students' preferences (one question), and students' satisfaction with the training (five questions). OSCE's, the assessment of theoretical knowledge, and questionnaire evaluations were performed within 6 weeks after the teaching sessions. The amount of time applied by students for self-directed study of the web site was documented.

Statistical Analyses

We hypothesized that enhanced didactic methods would improve OSCE scores as compared with the standard didactic method (lecture) by 30% (from 25 ± 8 to 32.5 ± 8). Assuming that 35 medical students were enrolled in each group and an alpha error of .05, the study had a power to detect a 15% difference among the groups. Discrete variables are expressed as counts (percentages) and continuous variables as median (interquartile range). Comparability of groups was analyzed by Mann–Whitney U test or Kruskal–Wallis test, as appropriate. All tests were two tailed; $p < .05$ was defined as significant. Data were analyzed using standard statistical software (Statistical Package for Social Sciences, version 17 for Windows; SPSS, Chicago IL).

Results

Of a total of 140 students, who were eligible for inclusion, a complete dataset was available for 129 (95.6%). There were 87 females (67.4%) and 42 males (32.6%). Recruitment did not differ significantly between the groups: 100% ($n = 35$) for web-based training only (Group 1), 85.7% ($n = 30$) for lecture (Group 2), 88.6% ($n = 31$) for role playing (Group 3), and 94.3% ($n = 33$) for supervised interaction with real patients (Group 4). Students randomized to lecture, role playing, and critique interaction with real patients groups spent a median time of 30 min on the web-based module, while students randomized to the web tool only used it for a total of 40 min ($p = .03$).

Primary End Point: OSCE Scores

The statistical analysis of OSCE scores on smoking cessation skills showed a significant difference between web-based training alone compared with the other three educational approaches ($p = .007$). Scores were similar in the lecture (33.5 ± 9.4), role playing (35.7 ± 6.5), and supervised interaction with real patients' groups (35.9 ± 8.7), while the group "web-based training alone" (28.0 ± 9.6) achieved the lowest score (Figure 1).

Secondary End Points

A summary of the secondary end point of the study is depicted in Table 1. All four teaching methods provided a similar level of theoretical knowledge about the effect of tobacco smoking on health ($p = .439$). Self-assessment of cessation skills, as assessed by the percentage of students feeling "completely sure" or "sure" about their counseling skills, differed among the randomized groups ($p < .0001$). Most students feeling "completely sure" or "sure" about their counseling skills were found in role playing followed by students from the interaction group with real patients. Lecture instruction made student feel sure about
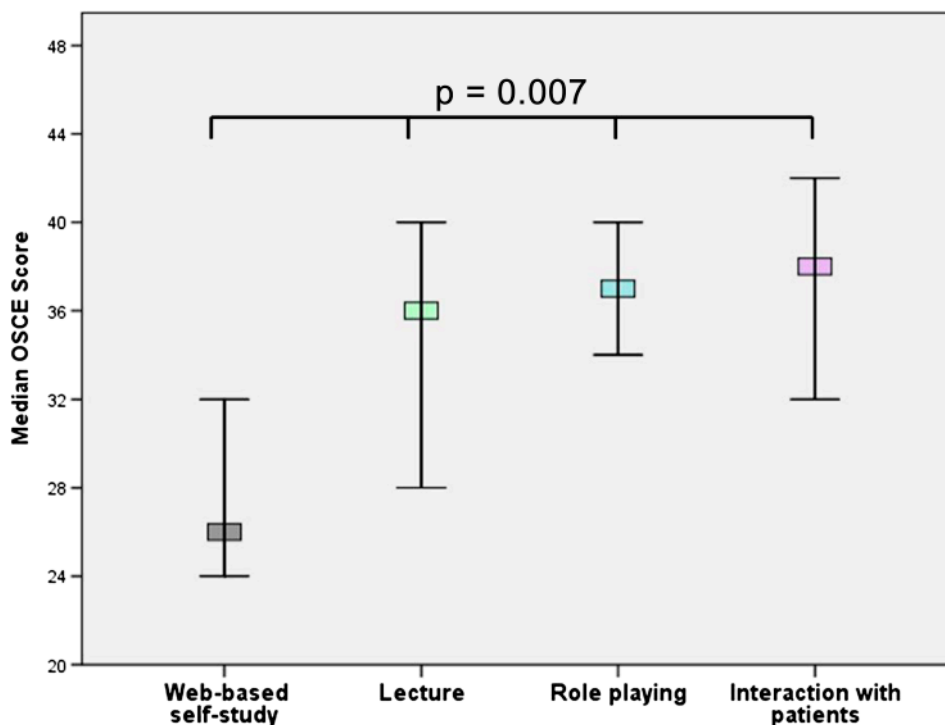
Figure 1. Objective structured clinical examination (OSCE) scores on smoking cessation skills in the four randomized groups: lecture (33.5 ± 9.4), role playing (35.7 ± 6.5), supervised interaction with real patients (35.9 ± 8.7), and "web-based training alone" (28.0 ± 9.6). The OSCE score in the "web-based training alone" group was significantly lower than the OSCE score of the other three educational approaches (p = .007).

the counseling skills in only 40% of the cases; the web-based training group reported the lowest rate of self-confidence in smoking cessation counseling. The improvement in risk awareness of tobacco use differed among the four groups: In contrast to the other three groups, there was no significant increase in risk awareness in the web-based only group after training.

Role playing and supervised patients' interaction were rated highest on students' preferences, followed by lecture. The lowest rating was stated for the web-based training.

Discussion

This study examines whether different educational methods improve the success of a training module on smoking cessation based upon a self-directed web-based learning module. Results

reveal that role play or supervised interaction with real patients improves students' skills on smoking cessation counseling significantly more than a lecture or web-based training alone. Lecture, role playing, and supervised interaction with real patients in addition to web-based training successfully improved awareness on tobacco-related issues. Theoretical knowledge transfer can be equally achieved irrespective of the didactic approach. Finally, both students' preference and satisfaction favor enhanced didactic methods over traditional approaches.

Changes in tobacco knowledge and attitudes (Chung, Lam, & Cheng, 1996) and quality of OSCE scores (Boehlecke et al., 1996) have been described following conventional didactic approaches. While both lecture alone and in combination with role playing improve advice giving and behavioral strategies, some investigators did not find significant differences between both strategies (Roche et al., 1996). Coultas et al. (1994) found

Table 1. Secondary Outcomes in the Evaluation of Four Didactic Methods for Smoking Cessation Training

Assessment	Web-based training only	Lecture	Role playing	Interaction with real patients	p value*
Theoretical knowledge	50.3 (9.2)	47.4 (8.8)	51.3 (7.5)	47.8 (8.5)	.439
Self-assessment of cessation skills	19.5%	40.7%	76.9%	62.5%	<.001
Risk awareness of tobacco use	0.6 (2.3)	1.7 (2.0)	1.9 (1.8)	1.9 (1.9)	.016
Student satisfaction	5 [3–7]	7 [5–8]	8 [7–9]	8 [7–9]	.006

Note. *p values refer to the comparison of the data ranks of all four randomized groups with each other at the same time (Kruskal–Wallis one-way analysis of variance). Results are presented as means (*SD*) and percentages or median [IQR]. Theoretical knowledge was assessed by multiple choice questions. Values for risk awareness of tobacco use represent differences between scores pre- and posttraining.

that the combination of lecture, interaction with standardized patient instructors, and role playing is superior to traditional course material. On the other hand, Roche et al. (1996) showed that role playing is better than lecture alone but no different from audiotape or videotape review in improving smoking cessation skills. To our knowledge, this is the first study evaluating a self-directed web-based learning module on smoking cessation in combination with traditional and enhanced didactic methods of smoking cessation counseling skills in a randomized fashion. Although it has been demonstrated that a short internet-based intervention can result in significant changes in physician behavior (Macrae et al., 2004), our results suggest that the web-based tool neither alone or in combination with a lecture was as effective as role playing or interaction with real patients. These findings are supported by the fact that a substantial number of students who accessed a web-based curriculum demonstrated no improvement in knowledge or confidence (Pederson et al., 2006). In addition, it could be demonstrated that the web-based module alone is not adequate to improve awareness on smoking cessation, although students randomized to the web-based training alone did spend 10 min more on the web compared with the other groups.

Our results support the fact that the transmission of pure theoretical knowledge could be achieved by an inexpensive low-staff requirement method, such as web-based training or a lecture. In contrast, the costs associated with the implementation of role playing or contact with real patients are justified by a measurable improvement in smoking cessation counseling skills of medical students.

It has been previously described that role playing with standardized patients instructor is preferred over role playing with other students (Papadakis, Croughan-Minihane, Fromm, Wilkie, & Ernster, 1997; Usatine, Wilkes, Slavin, & Wilkerson, 1996), yet both methods were equally effective. In light of the similar results achieved in the objective measurements of smoking cessation skills in this randomized trial, we believe that there is need for formal cost-effectiveness analyses comparing different enhanced didactic methods for smoking cessation.

Our study has some limitations. We included a homogeneous relatively small student population from a single university in Switzerland during third-year medical school. At this university, medical students are beginning their interaction with real patients in the third year. As cultural aspects might play a major role in counseling, these results might not be generalizable to other countries. An additional study limitation that should be acknowledged is that improvements (relative to the web only group) could be due to the extra educational time spent and therefore might not necessarily be a consequence of the content or mode of delivery of smoking cessation training.

In conclusion, our findings suggest that neither a web-based learning alone nor lecturing is adequate for providing skills for smoking cessation counseling. The study clearly indicated the need for enhanced didactic methods for smoking cessation training in the curriculum of medical students.

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Declaration of Interests

None declared.

Acknowledgments

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