

Original Article

Evaluation of Occupational Health Teaching Sessions for Final Year Medical Students

Ali Naci YILDIZ, Nazmi BILIR, Derya CAMUR and Ozge Karadag CAMAN

Department of Public Health, Hacettepe University Faculty of Medicine, Ankara, Turkey

Objectives: The study was conducted with the aim of evaluating applied occupational health teaching for final-year medical students at Hacettepe University, Faculty of Medicine.

Methods: The study included all sixth grade medical students (n=293) during one academic year. Pre- and post-training tests were used to assess the magnitude of change in knowledge and attitude of students on occupational health, whereas the opinion of students on several aspects of the quality of teaching sessions were assessed by using post-training questionnaires.

Results: Post-training tests revealed that the level of knowledge on all aspects of occupational health increased among medical students. An evaluation of the teaching sessions showed favorable results for the overall quality of the sessions: 81.3% of the students stated that the sessions were well organized, 81.7% remarked the workplace/factory visit was a valuable experience, and 91.0% stated feeling more competent on occupational health issues.

Conclusion: There was a greater increase in students' knowledge on technical precautions than their knowledge on issues related to medical practice in the workplace. Visiting a workplace was found to contribute to the overall aim of knowledge and attitude change on occupational health issues. The scope of undergraduate medical education should be extended by improving occupational health education with respect to educational content, duration, and methods.

Key Words: Medical students, Medical education, Occupational health, Evaluation studies

Introduction

As both a technical and a medical branch of science, occupational health is one of the essential components of medical education [1]. On the other hand, most work-related health problems are likely to be managed by non-occupational physicians. Therefore, all medical students should receive training on occupational health. According to Schilling (1970), the teaching of occupational health should provide an orientation to occupational health and cover the following basic components:

occupational history taking, job-related patient management, occupational diseases and their epidemiology, protection of the patient as a worker, and the goals of occupational health services [2]. In brief, medical students should know the two-sided relationship between occupation and health as well as occupational history taking and work-related health problems [3]. Many national/international bodies and medical authorities have reiterated the importance of medical input in occupational health issues and the desirability of training in the discipline at the medical undergraduate level [4-7].

In terms of medical education, the content and duration of occupational health training varies between different countries and universities [8-16]. In 1980, only 30% of medical schools in the United States (US) required occupational health teaching in their curricula [14]. Another study in the US has revealed that 78 (68%) of the 115 responding schools specifically taught occupational health during the 1991/92 academic

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Correspondence to: Ali Naci YILDIZ

Hacettepe Universitesi Tıp Fakültesi, Halk Sağlığı Anabilim Dalı
06100 Sıhhiye, Ankara, Turkey

Tel: +90-3123051597, **Fax:** +90-3123110072

E-mail: anyildiz@hacettepe.edu.tr

year, in comparison with 50% in the 1977/78 and 66% in the 1982/83 academic years. The median curriculum time required was 6 hours in 1991/92, compared to 4 hours in both previous surveys [12,13]. In Australia and New Zealand, the number of hours devoted to occupational and environmental medicine topics varied widely, but averaged 12.8 hours and 10.5 topics, in the medical courses taught in 1998 [16]. In England, Harrington et al. [17] found that the number of schools delivering formal instruction in occupational medicine had increased from 60% in 1974 to 92% in 1989. Although occupational health issues are covered in theoretical courses to some extent, most medical education curricula do not include workplace visits [10,11,18]. In 1989, workplace visits were undertaken by 40% of medical schools in England, whereas in 2000, none were reported to be undertaken by any institution [11].

In Turkey, undergraduate and graduate occupational health trainings are delivered mainly by public health departments of medical schools with varying content and duration. Published reports on undergraduate teaching in occupational medicine are very limited. According to Ergor et al. [18], occupational health courses were delivered in 70% of the medical schools surveyed in Turkey; however, only 22% were found to offer applied training opportunities, such as site visits to industrial facilities. In 2005, Hamzaoglu et al. [10] reported that there was no structured applied training on occupational health except one medical faculty. According to a recent survey in 25 medical schools in Turkey, Yildiz and Caman [19] reported that all public health departments of participating medical schools have an undergraduate occupational health education. The study showed that the mean value for the total education time was 8.1 hours, in which most of the courses were carried out as class lectures or small group work. Practical sessions were carried out in nearly half (44%) and workplace visits were paid in one third (32%) of the schools.

In Hacettepe University Faculty of Medicine, occupational health topics have been mainly covered under the Public Health Program, while several aspects of occupational health were covered under clinical courses, such as Internal Medicine or Pulmonology. The Undergraduate Public Health Education Program has been designed to cover occupational health topics in the first, third, and sixth years of the medical curriculum. In the first year, the aim of the course, which is delivered in 2 working hours, is to introduce the term “occupational health” and the understanding of occupational diseases. In the third year of the medical curriculum, 6 working hours are reserved for occupational health with the aim of delivering theoretical knowledge on major topics and examples of major occupational diseases. Final year students (interns) are required to par-

ticipate in the Public Health Internship Program for 2 months. During this period, a total of 40-50 students work in smaller groups of 3-4 students in various primary health care centers designated as field sites for public health practice and research.

Among the public health topics covered, occupational health education have long been aimed at developing positive attitudes and behaviors with respect to the discipline; however, the nature and duration of educational sessions have evolved over time. Until November 2003, occupational health teaching sessions were comprised of three-hour presentations prepared by several students for a larger group of 25-30 students, followed by discussions. From November 2003 to October 2007, 3-hour small group discussions were conducted with groups of 12-15 students. However, starting in November 2007, the content and duration of occupational health teaching sessions were revised as to respond to the students’ needs and faculty’s suggestions as well as to conform to internationally recognized practices. This paper presents key findings of the evaluation of the revised occupational health teaching sessions conducted among 12 consecutive student (intern) groups in the period between November 2007-October 2008.

Materials and Methods

The study was conducted between November 2007 and October 2008. Each intern group who attended the Public Health Internship Program for 2 months were divided into 2 smaller groups of 20-25 students each. Under the program, each group received occupational health trainings for 2 days (4 teaching sessions of 3 hours). Trainings were conducted by a professor and an associate professor, who were qualified in occupational health, and facilitated by research assistants from the public health department.

First Day-Morning Session: The session started with a short introduction followed by a pre-training test. Thereafter, every student was asked to introduce him/herself and name an occupational risk related to any kind of occupation. After this warm-up exercise, learning objectives of the sessions as well as the general content were explained. An occupational health problem was presented as a three-step case study in which the students were facilitated to work in small groups. The students were then asked to present and discuss their small group work to the entire group. During the discussions, the importance of taking occupational history was emphasized.

First Day-Afternoon Session: In order to demonstrate how theory is applied to practice, students visited a factory and its associated health center. The factory, with its 270 workers, was a medium-sized factory in the metal industry. Students, in

groups of 4 to 6, completed a standard workplace risk assessment form, including a check-list. During the visit, students were accompanied by the chief occupational physician. In addition, an engineer, who was responsible for the occupational health and safety, delivered information regarding health and safety issues.

Second Day-Morning Session: Workplace risk assessment results were presented by the small groups and discussed. After that, a 15-minute film on personal safety measures was shown.

Second Day-Afternoon Session: Small groups of 4 to 6 students were instructed to work on and present occupational health topics, such as duties and responsibilities of an occupational physician, and legislation related to occupational safety and health. After 10-15 minute presentations by members of the small groups, relevant topics were discussed and the session ended with a general wrap-up, followed by the post-training test.

The pre-post training tests, which were used to assess the overall change in knowledge and attitudes of students, were composed of 11 statements on occupational health practice. The students were asked to respond to the statements through a 5-point Likert scale, presented as “strongly disagree,” “disagree,” “undecided,” “agree,” and “strongly agree.” Identical questions were used in the pre-post training tests.

After the teaching sessions, the students were also asked to evaluate the quality of teaching, including questions on the general organization, duration, and content of the sessions, their experience with the factory visit and group work, as well as the quality of the trainers and the training atmosphere.

The study group consisted of 293 last-year medical students of Hacettepe University, Faculty of Medicine. SPSS 15.0 statistical package programme (SPSS Inc., Chicago, IL, USA) was used to analyze the data. During the final analysis, responses to the statements were grouped into categories for convenience, e.g., “strongly disagree/disagree,” “undecided,” and “strongly agree/agree.”

Results

During the academic year between November 2007 and October 2008, a total of 293 final-year medical students participated in 12 consecutive occupational health teaching sessions. The mean number of students per group was 24.4 (minimum = 19, maximum = 31). There was no absenteeism in the 3 groups; whereas in the other 9 groups, 8 students (2.7%) were absent for one day and 26 students (8.8%) were absent for half a day. The main reason for the different number of responses in pre-post training tests was absenteeism.

Occupational health knowledge

Post-training tests revealed that the level of knowledge on all aspects of occupational health increased among medical students. Pre-post training test difference in the “disagree” responses was highest for the statement, “In order to eliminate hazardous effects of work-related gases, an aspiration system should ideally be placed above the level of the worker’s head.” The percentage of students who disagreed with this statement increased from 12.1% to 70.0%, which indicated a 5.8 fold increase in the correct answers. The percentage of correct answers for the statement, “Using ear plugs is the first precaution that has to be taken in case of a noisy workplace” increased from 18.4% to 73.8%, while the percentage of correct answers for the statement, “Using preventive masks in a dusty working environment is a very effective preventive measure” increased from 15.2% to 56.6%. Although the last-mentioned statement was the least correctly answered statement, the increase in correct answers (41.4 points) was still considerable. The statement that students disagreed the most in both pre- (74.6%) and post-training tests (95.7%) was “When I ask my patients about their occupation, I get satisfied with their answers about their occupations and workplace,” which meant that the students did actually ask further questions. Pre-post training test difference in the proportion of students who disagreed with the statement, “The primary role of occupational physicians is to diagnose and treat diseases” was the lowest (from 73.4% to 92.5%) among all statements, with only a 19.1 point increase (Table 1).

Attitudes with respect to occupational health practice

Post-training tests revealed that favorable answers with respect to all attitude-related statements had increased among the study group. The most significant (6.5 fold) pre-post training test difference among attitudes with respect to occupational health practice was for “I can conduct a workplace risk assessment in order to determine work-related risk factors and develop preventive measures accordingly.” The proportion of students who agreed with this statement increased from 11.0% to 71.7%. In addition, the proportion of students who stated that they would like to work as an occupational physician in the future increased 2.5 fold (from 9.9% to 24.8%). The percentage of “agree” responses in both pre and post training tests to “I know the importance of the effects of workplace conditions on health,” “I know the importance of the effects of state of health on worklife,” and “I take an occupational history during my medical practice as a medical student” were found to be high (91.1%, 96.5%, and 77.6% in the pre-training test and 98.9%, 99.3%, and 81.2% in the post-training test, respectively) (Table 2).

Table 1. Percentage distribution of responses to evaluating the level of knowledge on occupational health (Ankara, 2008)

| Statement ($n_{pre-test}/n_{post-test}$) | Strongly disagree/ Disagree | | Undecided | | Strongly agree/ Agree | | Increase in correct answers (%) [*] | Post/pre-test ratio of correct answers [†] |
|---|--------------------------------|-------------|-----------|-----------|--------------------------|-------------|--|---|
| | Pre-test | Post-test | Pre-test | Post-test | Pre-test | Post-test | | |
| Using ear plugs is the first precaution that has to be taken in a noisy workplace (282/279) | 18.4 | 73.8 | 28.3 | 1.1 | 53.4 | 25.1 | 55.4 | 4.0 |
| Notification of work related accidents is the responsibility of the occupational physician (283/277) | 6.4 | 9.0 | 40.2 | 4.7 | 53.4 | 86.3 | 32.9 | 1.6 |
| Using preventive masks in a dusty working environment is a very effective preventive measure (281/279) | 15.2 | 56.6 | 25.8 | 2.9 | 59.0 | 40.5 | 41.4 | 3.7 |
| In order to eliminate hazardous effects of work-related gases, an aspiration system should be placed above the level of the worker's head (281/280) | 12.1 | 70.0 | 43.4 | 1.1 | 44.5 | 28.9 | 57.9 | 5.8 |
| When I ask my patients about their occupation, I get satisfied with their answers telling me what their occupations are and where they work (283/280) | 74.6 | 95.7 | 9.5 | 1.1 | 15.9 | 3.2 | 21.1 | 1.3 |
| The primary role of occupational physicians is to diagnose and treat diseases (282/280) | 73.4 | 92.5 | 14.5 | 1.8 | 12.1 | 5.7 | 19.1 | 1.3 |

Correct answers are in bold.

*Post-training test – pre-training test, [†]Post-training test/pre-training test.

Table 2. Percentage distribution of responses for evaluating attitudes with respect to occupational health practice (Ankara, 2008)

| Statement ($n_{pre-test}/n_{post-test}$) | Strongly disagree/ Disagree | | Undecided | | Strongly agree/ Agree | | Increase in favorable responses (%) [*] | Post/pre-test ratio of favorable responses [†] |
|---|--------------------------------|-----------|-----------|-----------|--------------------------|-------------|--|---|
| | Pre-test | Post-test | Pre-test | Post-test | Pre-test | Post-test | | |
| I can conduct a workplace risk assessment in order to determine work-related risk factors and develop preventive measures accordingly (281/279) | 41.3 | 7.2 | 47.7 | 21.1 | 11.0 | 71.7 | 60.7 | 6.5 |
| I know and attach importance to the effects of workplace conditions on health (282/279) | 1.4 | 1.1 | 7.4 | - | 91.1 | 98.9 | 7.8 | 1.1 |
| I know and attach importance to the effects of state of health on worklife (283/279) | 1.4 | 0.7 | 2.1 | - | 96.5 | 99.3 | 2.8 | 1.0 |
| I take occupational history during my medical practice as a medical student (281/277) | 14.9 | 13.0 | 7.5 | 5.8 | 77.6 | 81.2 | 3.6 | 1.1 |
| I would like to work as an occupational physician in the future (282/278) | 58.2 | 48.6 | 31.9 | 26.6 | 9.9 | 24.8 | 14.9 | 2.5 |

Favorable responses are in bold.

*Post-training test – pre-training test, [†]Post-training test/pre-training test.

Table 3. Percentage distribution of student opinions regarding the overall quality of the training sessions (Ankara, 2008)

| Statement | n | Strongly disagree/ Disagree | Undecided | Strongly agree/ Agree |
|---|-----|--------------------------------|-----------|--------------------------|
| The session was well organized. | 278 | 8.3 | 10.4 | 81.3 |
| Information provided was new. | 279 | 7.2 | 12.2 | 80.6 |
| Duration of the session was appropriate. | 278 | 12.9 | 9.4 | 77.7 |
| Visiting a workplace/factory was a valuable experience. | 273 | 9.2 | 9.2 | 81.7 |
| All participants were actively engaged in the discussions. | 279 | 13.6 | 24.4 | 62.0 |
| Group work has facilitated the learning process. | 279 | 6.8 | 18.3 | 74.9 |
| Case studies have facilitated the learning process. | 230 | 3.5 | 13.9 | 82.6 |
| The training atmosphere was positive. | 279 | 7.2 | 15.4 | 77.4 |
| Trainers were qualified. | 279 | 2.2 | 3.6 | 94.3 |
| Departure & arrival times for the workplace/factory visit was suitable. | 279 | 7.7 | 9.5 | 82.8 |
| I feel more competent on occupational health issues. | 273 | 2.2 | 6.8 | 91.0 |

Evaluation of teaching sessions

Evaluation of the teaching sessions revealed favorable results for the overall quality of the sessions: 81.3% of the students stated that the sessions were well organized, 80.6% thought that the information provided was new, and 81.7% remarked the workplace/factory visit as a valuable experience. Most of the students stated that small group work (74.9%) and case study (82.6%) facilitated the learning process. In addition, 77.4% of the students thought that the training atmosphere was positive, while 94.3% thought that the trainers were qualified. Duration of the factory visit and the teaching sessions in general were found to be appropriately planned by most students (82.8% and 77.7%, respectively). The rest were more likely to find the duration of the sessions longer than needed. Sixty two percent of the students believed that all students were actively engaged in the discussions, while 91.0% stated feeling more competent on occupational health issues (Table 3).

Discussion

For medical education at the undergraduate level, occupational health trainings continue to be delivered via different methods. Before the recent occupational health program at Hacettepe University, medical students lacked practical experience, such as going on a workplace/factory visit. The most significant barriers were the lack of human resources needed to deliver applied training, problems encountered with free transportation of students for the site visit, and insufficient teaching hours. In November 2007, occupational health teaching sessions were

revised to include more topics as well as workplace visits. As an initial evaluation of the first year of the new program, knowledge, attitudes and opinions of participants were assessed. In parallel with the overall learning objectives, there was a positive change in all statements regarding students' knowledge and attitudes.

The increase in both students' knowledge and attitudes on technical precautions with respect to the workplace was more than for knowledge and attitudes on issues related to medical practice in the workplace. Positive changes in the level of knowledge regarding the relevant statements is likely to be a result of the factory visit, where students had the opportunity to observe and discuss hazardous workplace factors and corresponding preventive measures.

In medical practice, practitioners often do not pay much attention or do not allocate adequate time for taking the occupational history, which is the most important portion to explore the health-work relationship. The literature review revealed a questionnaire survey with 75% of the general practitioners asking their patients about their occupation and 81% recording the type of occupation in the patient's medical records [20]. In the current study, one out of 5 medical students stated that she/he does not take an occupational history. In Turkey, the officially reported number of occupational diseases per year is approximately 400-500, whereas the actual number of cases is estimated to be 30,000. This huge discrepancy between the reported and estimated cases indicates that most medical practitioners either do not take a full occupational history or that they do/cannot report all cases. Some of the underlying reasons might

be inadequate training, heavy workload, not knowing how or whom to report such cases, or concerns about the implications of reporting.

Our findings demonstrated that most of the students were not interested in working as an occupational physician in the future. In Turkey, there are approximately 800,000 workplaces; however, only 12,000 of them have 50 or more workers, and thus are legally obliged to recruit an occupational physician. The students' desire to specialize in clinical specialties and a lack of knowledge on occupational medicine may be the underlying reasons for the fact that only 9.9% of the students were found to be interested in working as an occupational physician at the beginning of the study. This proportion increased by 2.5 fold (up to 24.8%) after the teaching sessions. Although the underlying reasons for the increased interest of students were not evaluated in this study, visiting a workplace, meeting with an occupational physician, and learning the job description in detail might have increased the students' interest, at least transiently.

The most significant (6.5 fold) increase in favorable attitudes was for "I can conduct a workplace risk assessment in order to determine work-related risk factors and develop preventive measures accordingly." Before receiving applied training on occupational health, most students had some theoretical background on how to conduct a workplace risk assessment and the proportion of students who believed they could conduct a workplace risk assessment in practice was only 11.0%. After the applied training, including the workplace visit, workplace risk assessment, and the group discussions, the proportion increased to 62.6%.

Opinions of the students on the overall quality of the teaching sessions were mostly positive. Most of the students stated that the workplace visit, case study, and small group discussions had facilitated the learning process and the two-day program in general was successful. By comparison, the duration of this educational program is similar to the program conducted in the United Arab Emirates University, which consists of 15 hours of didactic teaching plus 3 hours of a site visit [15].

In this study, the workplace visit was found to contribute to the overall learning objectives of the program. In literature, there are conflicting results with respect to student evaluations regarding workplace visits. In the UK, students consistently identified the use of case scenarios as helpful but demonstrated a dichotomy of opinions regarding the value of a workplace visit [21]. Workplace visits appear to have been successfully incorporated into undergraduate teaching elsewhere, although they were not formally evaluated [15]. Practical difficulties may preclude the widespread use of workplace visits in medical

schools.

Workplace visits, as part of the occupational health education, are not widespread in the undergraduate medical education throughout the world. These visits require considerable organizational effort, especially with a large number of students. The results of this study indicate the necessity to include workplace visits as an integral part of the occupational health trainings in medical curricula. Applied trainings will contribute to the use of the theoretical knowledge in occupational health practice. Occupational health trainings will also help medical students to be equipped with basic knowledge and attitudes to be able to assess their own occupational health risks and take necessary precautions.

Physicians, whether working in primary, secondary or tertiary health care, have an important role in the prevention of diseases and promotion of health; therefore, it is essential that they have a basic level of knowledge as well as favorable attitudes on occupational health practice. The scope of undergraduate medical education has to be extended by improving occupational health education with respect to educational content, duration, and methods. Educational programs can further be improved by incorporating ward-based trainings with actual cases of occupational diseases or by benefiting more from internet and distant education methods [22]. As part of the community-based education programs, medical students can be given the opportunity to work in occupational health centers or with occupational physicians for longer periods.

Although contributing to the literature in several ways, this study has a couple of limitations. The study was designed to evaluate students' opinions on the teaching sessions and partly to evaluate the effect of teaching sessions on students' knowledge and attitudes. One of the limitations is that the study does not show whether the improvements in knowledge and attitudes were transient or long-lasting. In addition, other outcomes, such as behaviour (transfer of knowledge and skills) and results (organizational impact of teaching) were not included in the evaluation [23]. Future studies could be designed to include further outcome evaluations with follow-ups.

Another limitation was the problem of evaluating the teaching sessions in general rather than on a student basis. In order to avoid potential response bias, which may result from the desire of students to get higher grades at the end of the occupational health teaching sessions, students were asked to fill in the pre-post training tests anonymously. However, the anonymity of the tests have prevented the researchers to assess and compare the tests on an individual basis, which may have hindered a detailed analysis of the data.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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