Tobacco Dependence Curricula in US Undergraduate Medical Education

Linda Hyder Ferry, MD, MPH
Linda M. Grissino, MD, MPH
Pamela Sieler Runfola, MD, MPH

Tobacco use, the leading cause of preventable death and disability in the United States, accounts for nearly a half million premature deaths per year. Although 70% of smokers visit a physician each year, most are not advised or assisted in an attempt to quit. A 1991 survey showed that only 21% of practicing physicians felt that their formal medical training prepared them to help patients stop smoking.

A randomized trial by Cummings and coworkers suggests that medical school is the optimal time for training in smoking cessation techniques. An expert panel convened in 1992 by the National Cancer Institute (NCI) recommended that effective smoking cessation and prevention interventions become a mandatory component of undergraduate medical education in every US medical school by 1995. The NCI panel also recommended a systematic assessment of tobacco curricula in medical school education. The only such published survey had been conducted by Horton in 1984 and was limited by a low response rate (51%).

A randomized trial by Cummings and coworkers suggests that medical school is the optimal time for training in smoking cessation techniques. An expert panel convened in 1992 by the National Cancer Institute (NCI) recommended that effective smoking cessation and prevention interventions become a mandatory component of undergraduate medical education in every US medical school by 1995. The NCI panel also recommended a systematic assessment of tobacco curricula in medical school education. The only such published survey had been conducted by Horton in 1984 and was limited by a low response rate (51%).

A 1998 international curricula survey by the Tobacco Prevention Section of the International Union Against Tuberculosis and Lung Disease had no specific information on US medical schools, but evaluated North America as a whole and had a 35% response rate.

Our survey was designed to assess the content and extent of tobacco curricula in US undergraduate medical education as suggested by the NCI panel. For the purpose of this study, the phrase “tobacco curricula” includes epidemiology of tobacco use, prevention, risk of tobacco-related diseases, and tobacco dependence treatment. “Smoking cessation” includes behavior modification techniques, pharmacotherapy, and counseling skills.

Context Tobacco use is the leading preventable cause of death in the United States. And yet only 21% of practicing physicians claim they received adequate training to help their patients stop smoking.

Objective To assess the content and extent of tobacco education and intervention skills in US medical schools’ curricula.

Design A survey with 13 multiple-response items on tobacco education. Survey questions were based on the recommendations of the Agency for Health Care Policy and Research and the National Cancer Institute Expert Panel. The Liaison Committee on Medical Education included 4 of these items in a modified form on the 1997 annual questionnaire.

Setting One hundred twenty-six US medical schools.

Participants Surveys were obtained from 122 associate deans for medical education (98.6%).

Main Outcome Measures Curriculum content in basic science and clinical science, elective or required clinical experience, hours of instruction, and resource materials.

Results Inclusion of all 6 tobacco curricula content areas recommended by the National Cancer Institute and the Agency for Health Care Policy and Research was higher in basic science (63/115 [54.8%]) than in clinical science (5/115 [4.4%]). Most medical schools (83/120 [69.2%]) did not require clinical training in smoking cessation techniques, while 23.5% (27/115) offered additional experience as an elective course. Thirty-one percent (32/102) of schools averaged less than 1 hour of instruction per year in smoking cessation techniques during the 4 years of medical school. A minority of schools reported 3 or more hours of clinical smoking cessation instruction in the third (14.7%) and fourth (4.9%) years.

Conclusions A majority of US medical school graduates are not adequately trained to treat nicotine dependence. The major deficit is the lack of smoking cessation instruction and evaluation in the clinical years. A model core tobacco curricula that meets national recommendations should be developed and implemented in all US medical schools.

JAMA. 1999;282:825-829

METHODS

Survey Design

We designed the survey instrument to be a descriptive summary of tobacco education in US medical school curricula.
MEDICAL SCHOOL CURRICULA ON TOBACCO USE

Table 1. Tobacco Curriculum Content Areas*

<table>
<thead>
<tr>
<th>Basic science</th>
<th>Clinical science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancer risk from tobacco</td>
<td>Clinical intervention (5 A’s—Anticipate, Ask, Advise, Assist, and Arrange)</td>
</tr>
<tr>
<td>Health effects: tobacco-related diseases</td>
<td>Relapse prevention</td>
</tr>
<tr>
<td>Effective smoking</td>
<td>Pharmacologic agents: nicotine replacement or antidepressant therapy</td>
</tr>
<tr>
<td>Cigarette smoke contents (nicotine, tar, carbon monoxide)</td>
<td>Smoking cessation techniques in artificial setting (no patients)</td>
</tr>
<tr>
<td>Nicotine withdrawal symptoms</td>
<td>Smoking cessation techniques in clinical setting with patients</td>
</tr>
<tr>
<td>High-risk groups with most difficulty quitting (eg, teens, pregnancy, and psychiatric disorders)</td>
<td>Smoking cessation techniques in clinical setting with patients and evaluation of performance</td>
</tr>
</tbody>
</table>

*Wording of the 12 content areas on the survey as selected from the Agency for Health Care Policy and Research and National Cancer Institute panel recommendations.

Table 2. Comparison of Similar Items on the Survey of Curricula in US Medical Schools With the 1996-1997 LCME Questionnaire*

<table>
<thead>
<tr>
<th>Study Survey</th>
<th>Modifications by the LCME Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>How much discussion of clinical intervention techniques is included in your curriculum?†</td>
<td>Discussion of clinical intervention techniques?‡</td>
</tr>
<tr>
<td>The 5 A’s: Anticipate, Ask, Advise, Assist, Arrange</td>
<td></td>
</tr>
<tr>
<td>Relapse prevention</td>
<td></td>
</tr>
<tr>
<td>Reduction of automatic smoking</td>
<td></td>
</tr>
<tr>
<td>How much does your curriculum address specific pharmacologic agents for use in the smoking cessation settings?†</td>
<td>Discussion of pharmacologic agents (eg, nicotine replacement)?‡</td>
</tr>
<tr>
<td>Nicotine replacement</td>
<td></td>
</tr>
<tr>
<td>Clonidine</td>
<td></td>
</tr>
<tr>
<td>Antidepressant</td>
<td></td>
</tr>
<tr>
<td>Does your curriculum provide a setting in which students are taught smoking cessation techniques to use with patients in a clinical setting?§</td>
<td>Clinical experiences with actual patients?‡</td>
</tr>
<tr>
<td>What was used as resource material for developing your curriculum?¶</td>
<td>Indicate which of the following were used in developing your smoking cessation curriculum or are used by students as resource material.¶</td>
</tr>
</tbody>
</table>

*LCME indicates Liaison Committee for Medical Education.
†Possible responses were not covered, covered briefly, or covered in detail.
‡Possible responses were yes or no.
§Possible responses were not required, required artificial setting with no patients, required clinical setting with patients, or required setting and evaluated.
¶See the “Survey Design” subsection of the “Methods” section for a description of resource material.

We modeled 1 question on a Liaison Committee for Medical Education (LCME) questionnaire (1989-1990) that asked whether smoking cessation was taught as a required course, as part of a required course, as a separate elective course, as part of an elective course, or through other educational experiences. Our survey asked whether the 12 topics were covered as part of a required course, as a required course dedicated to tobacco-related diseases, as an elective course, or not offered. To investigate models of smoking cessation instruction, the following options were listed: not required, required in (1) an artificial setting without patients, (2) a clinical setting with patients, or (3) a clinical setting with patients with evaluation of the student’s performance. A third section of the survey assessed the number of hours of instruction devoted to smoking cessation in each year of medical school: none, less than 1 hour, 1 to 3 hours, 3 to 5 hours, or more than 5 hours.

Finally, resource materials used to develop the tobacco curriculum were assessed. Options included the following: Guide to Clinical Preventive Services, private educational material, review of scientific literature, NCI’s How to Help Your Patients Stop Smoking, volunteer agency material (such as American Lung Association, American Heart Association, American Cancer Society literature), the Project ADEPT publication by Goldstein, AHCPR Clinical Practice Guideline No. 18, the Stop Smoking Kit from the American Academy of Family Physicians, and the Clinician’s Handbook of Preventive Services manual from the US Department of Health and Human Services.

Collection of Surveys

The survey was pilot tested with leading tobacco control experts and the associate deans of several medical schools. After incorporating their suggestions, the revised survey was sent to the attention of the associate dean for medical education at all 126 accredited US medical schools. Nonrespondents were sent a second survey and contacted by telephone up to 3 times to encourage return of the completed survey.

LCME Questionnaire Design

In an effort to validate the findings from our voluntary survey, we asked the LCME to include items from our survey in their annual (1996-1997) questionnaire required of all US medical schools. The LCME questionnaire reformatted 4 items from our survey questions into 2 multiple-choice questions. Although the LCME questions were not worded identically, the results have comparability to validate similar items in our survey (TABLE 2).
Data Analysis
Descriptive statistics summarized the survey responses of the US medical schools. The McNemar test was used to compare the responses to the items included in our survey and the tobacco items on the LCME questionnaire.

RESULTS
Response Rate
Multiple telephone calls and repeat mailings of our survey, beginning with the pilot testing in March 1996, resulted in a 70% (88/126) return rate by January 1997 and a final response rate of 96.8% (122/126) by July 1998. Because the final 34 surveys were collected in the next academic year (1997-1998), we compared the results of the early and late responders and found no significant differences in the number of hours per year in the curriculum (2.4% maximum difference) or content coverage between the 2 groups.

The LCME questionnaire for 1996-1997 yielded a 100% response rate due to the obligatory nature of the questionnaire.

Basic and Clinical Science Content Areas
On the questions regarding basic and clinical science curricula, 94.3% of the schools (115/120) responded. The non-respondents to these specific items were not included in this subanalysis; thus, 115 is used as the denominator.

Of the 6 basic science (first and second years) content areas (Table 1), a mean (SD) of 5.2 (1.2) topics were covered. The inclusion of all 6 basic science topics was reported by 54.8% (63/115) of respondents.

For the 6 clinical science content areas (third and fourth years), a mean (SD) of 2.6 (1.5) topics were reported covered. Only 4.4% of schools (5/115) covered all 6 clinical science topics. Four percent (5/115) did not report including any of the 6 clinical topics. Basic and clinical science content areas are compared in the Figure.

Almost all schools reporting tobacco curricula indicated basic science content topics were “part of a required course” (98.3% [113/115]), and 23.5% (27/115) of the schools offered additional experience as an “elective course.” Smoking cessation skills were more commonly reported as part of a required course (67.2% [80/119]) than as an elective (14.3% [17/119]). Only 3 schools (2.4%) had a required course devoted specifically to tobacco education: Boston University, Bowman Gray University, and Loma Linda University. Twenty schools (16.8% [20/119]) stated they did not require smoking cessation training, and 3 schools (2.5%) did not respond to the question.

We assessed whether the smoking cessation training included an artificial or clinical setting and whether student performance was evaluated. The majority of schools (69.2% [83/120]) did not require any clinical training for smoking cessation skills. Of the schools that required training in smoking cessation techniques, 12.5% (15/120) provided an artificial setting without patients, and 13.3% (16/120) provided a clinical setting with actual patients. Only 5.0% (6/120) of the schools required training in a clinical setting with an evaluation of the student’s performance.

Hours of Instruction on Smoking Cessation
One hundred two respondents (83.6% [102/122]) answered the section on the number of hours of instruction on smoking cessation techniques in their curriculum (Table 3). Eight schools (6.6%) reported a total of less than 1 hour of instruction during all 4 years; 24 schools (19.7%) reported 1 to 3 hours of instruction, 10 schools (8.2%) reported 3 to 5 hours of instruction, and 60 schools (49.2%) reported more than 5 hours of instruction. Nearly one third of the respondent schools (31.4% [32/102]) spent 3 hours or less on smoking cessation over the entire 4 years of medical school.

An estimate of the limited smoking cessation curriculum can be made by

![Figure. Total Number of Content Areas Covered](image-url)

Data shown are percentages of US medical schools including (0-6) content areas in basic and clinical sciences.

Table 3. Number of Medical Schools Reporting Hours of Smoking Cessation Instruction During Each Year*

<table>
<thead>
<tr>
<th>No. of Hours</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>46 (45.1)</td>
<td>23 (22.5)</td>
<td>25 (24.5)</td>
<td>60 (58.8)</td>
</tr>
<tr>
<td>&lt;1</td>
<td>26 (21.3)</td>
<td>25 (20.5)</td>
<td>27 (22.1)</td>
<td>25 (20.5)</td>
</tr>
<tr>
<td>1-3</td>
<td>22 (18.0)</td>
<td>42 (34.5)</td>
<td>35 (28.7)</td>
<td>12 (9.8)</td>
</tr>
<tr>
<td>3-5</td>
<td>5 (4.1)</td>
<td>8 (6.6)</td>
<td>10 (8.2)</td>
<td>4 (3.3)</td>
</tr>
<tr>
<td>&gt;5</td>
<td>3 (2.5)</td>
<td>4 (3.3)</td>
<td>5 (4.1)</td>
<td>1 (0.8)</td>
</tr>
</tbody>
</table>

*The total number of schools is 102, since 16.4% (20/122) of schools did not respond to this section of the survey.

©1999 American Medical Association. All rights reserved.
combining the number of schools that did not provide answers to this question (20/122) with those that clearly indicated they had no hours of smoking cessation instruction in each particular academic year. This provides a measure of low commitment of academic medicine: first year, 64.7%; second year, 47.2%; third year, 44.1%; and fourth year, 65.5%. The second (52.9% [34/102]) and third (49.0% [50/102]) years consistently rate higher than the first (29.4% [30/102]) or fourth (17% [17/102]) years for including more than 1 hour of education per year (combined categories of 1-3, 3-5, and >5 hours). Only 6 medical schools (5.8%) provided more than 5 hours of instruction on tobacco intervention in the clinical (third and fourth) years.

**Curriculum Resource Material**

The resource most frequently cited for developing curricular content was peer-reviewed scientific literature (47.5%). The next most commonly noted resources were *Guide to Clinical Preventive Services*13 (31.1%), volunteer agencies (30.3%), and the NCI training guide *How to Help Your Patients Stop Smoking*10 (27.0%). Although the AHCPR smoking cessation guideline9 had just been released in April 1996, 20.5% of the schools reported using it. The 7-year-old office guidelines kit13 of the American Academy of Family Physicians was cited by 19.7% of the respondents, and the Brown University Project ADEPT curriculum12 by 8.2%.

**LCME Questionnaire Findings**

We compared the responses to those items that occurred on our survey and on the 1996-1997 LCME questionnaire. The percentage of responses that were the same on items from both instruments were as follows: clinical intervention, 78.9% to 84.5%; pharmacological agents, 84.5%; and clinical experiences with actual patients, 54% to 82%. When we examined more closely where responses differed on the 2 surveys, we found that for every item, significantly more schools answered “yes” on the LCME questionnaire and “no” on our survey than the other way around (P<.001 for each item; McNemar test).

**COMMENT**

A majority of US physicians and medical students are not adequately trained to treat nicotine dependence, the most costly and deadly preventable health care problem in the United States. The findings of our survey illustrate the disparity between the effort (measured in time and curricula content) spent teaching medical students about effective nicotine dependence treatment and the enormity of tobacco’s impact on health in the United States. To our knowledge, there has been no other survey of tobacco education in US medical schools in the past decade. Our survey is also the first to examine the content areas, type of clinical setting for smoking cessation training, and the number of hours devoted to tobacco curricula during each year of medical school.

The majority of medical schools have not incorporated the basic smoking-cessation guidelines of the AHCPR (1996)9 and of the NCI Expert Panel (1992)5 into their curricula. The recommendations of NCI’s Expert Panel are even more imperative in view of the failure to achieve the Healthy People 2000 goal to reduce the national smoking prevalence to 15%.16 To achieve the proposed Healthy People 2010 goal of 13%,17 undergraduate medical education must increase curricular attention to tobacco use prevention and smoking cessation skills.

Attention to tobacco content areas during the basic science years does not appear to be the major problem. This is not surprising since many chronic diseases covered in a required course, such as pathology, have their cause in tobacco use. However, the majority of medical schools (69.2%) do not provide adequate training for clinical intervention in the third- and fourth-year curriculum. We acknowledge the possibility that our data for the clinical years may reflect underreporting. Closer scrutiny of the academic experience during the third- and fourth-year rotations may reveal more smoking cessation skill instruction in informal settings than reported by survey respondents. For example, on the 1989-1990 LCME questionnaire, 18% of schools provided training in “other educational experiences” rather than in a required course.5

The variance in response to the LCME 1996-1997 questionnaire and ours deserves comment. While a high degree of similar responses was found between our survey and the 1996-1997 LCME questionnaire on instruction in clinical intervention and pharmacology (78.9%-84.5%), less similarity was reported for clinical training with patients (54%-82%). The possibility for bias exists if schools responded more favorably to the mandatory LCME questionnaire. The probability that a school would pick the same answer twice vs pick a “yes” answer more often on the LCME items was not due to random error. It is possible that the more favorable responses on the LCME survey reflect the approximate 6-month lag time between the 2 surveys, allowing for better identification of the presence of tobacco dependence prevention and intervention curricula when the later LCME questionnaire was completed. Still, the high response rate to both surveys and the similarity of responses on most items gave us confidence in the reliability of our results.

The 1989-1990 LCME survey results indicated 57.5% of schools included smoking cessation as a part of a required course; in our survey, the corresponding value was 67.2%. This trend must be viewed in light of the absence of data on the effectiveness of the curriculum to improve student knowledge and intervention skills, especially in the clinical years.

Effective models to teach tobacco intervention skills to medical students have been reported. Coultas et al18 found that training medical students with simulated patients resulted in an increase in the effectiveness of smoking cessation interventions. The importance of specific instruction and practice opportunity for development of clinical smoking cessation skills was emphasized by Allen et al,19 who found that students...
MEDICAL SCHOOL CURRICULA ON TOBACCO USE

without such experience were not able to translate knowledge into a successful clinical encounter.

We propose the development of updated core teaching materials that could be adapted by schools to meet their particular needs. Key faculty at each school should be recruited and trained to implement effective tobacco curriculum. Since nearly half of medical schools (49.2%) reported more than 5 hours of instruction during 4 years, it seems reasonable to expect a minimum of 2 hours per year of instruction for tobacco prevention and intervention skills at all US medical schools.

Inclusion of tobacco curricula questions on future LCMC questionnaires could bring the topic to the attention of the medical school administration and document trends in curriculum development and focus. We also suggest greater attention to tobacco prevention and intervention in future US Medical Licensing Examinations to reflect the importance of tobacco's impact on America's health.

Until all medical schools place sufficient emphasis on the knowledge base and intervention skills needed to prevent and treat chronic tobacco-related diseases, it is unlikely we will see a decline in tobacco-related morbidity and mortality. However, if medical schools provide universal training of medical students in nicotine dependence intervention, tobacco users will have access to the professional expertise they need to end the deadly cycle of nicotine addiction.

Funding/Support: This work was supported by the Loma Linda University Preventive Medicine Residency Program, Research Fund.

Acknowledgment: We gratefully acknowledge the contribution to the survey implementation by Michael C. Fiore, MD, MPH, chair, AHCPR Panel on Smoking Cessation and the National Cancer Institute Expert Panel on Applications of Smoking Cessation Research for Medical Schools. Thomas Houston, MD, MPH, from the American Medical Association, provided encouragement throughout the project. We would also like to thank Adrienne Booth, MPH, Butchaiah Garlapati, MD, MPH, and Kellie Williams, MD, of Loma Linda University School of Medicine for their aid with seemingly endless survey data collection. Our appreciation is extended to Floyd F. Petersen, MPH, who provided statistical consultation on survey design and analysis and Linda G. Halstead, MA, who prepared multiple versions of the article according to editorial standards.

REFERENCES