Perceived effectiveness of counselling patients about smoking among medical students in Amman, Jordan

R.M. Merrill,[1] H.N. Madanat,[1] E. Cox[1] and J.M. Merrill[1]

إدراك طلاب الطب في عمَّان، الأردن، لفعالية توعية المرضى حول التدخين

راي مريل، هالة مدانات، إرين كوكس، جيمس مريل

الخلاصة: تعرف الباحثون على معدَّل انتشار التدخين لدى 340 من طلاب السنتين الأولى والرابعة من كلية الطب في عمَّان في الأردن وإدراكهم لمدى فعالية توعية الأطباء لمرضاهم حول التدخين. ووجدوا أن معدَّل انتشار التدخين 26٪ لدى الذكور و7٪ لدى الإناث، وهو في ذلك يشبه ما لدى نظرائهم في عامة السكان. وقد بدا أن المدخنين والطلاب الذكور لديهم احتمال أقل للاعتقاد بأن من الخطأ أن يدخن الطبيب أمام المرضى، أو أنه يمكن لسياسات التدخين أو التفاعل المتبادل بين الأطباء والمرضى أن يؤثِّر على ممارسات التدخين. ويعتقد الطلاب أن بمقدور الأطباء أن يكونوا أكثر فعالية في اتقاء التدخين من التأثير على المرضى للإقلاع عن التدخين. ومن المفيد تدريب الطلاب على تقنية التوعية بشكل فعال للمرضى حول اتقاء التدخين والإقلاع عنه.

ABSTRACT We identified the prevalence of smoking and perceived effectiveness of physicians counselling patients about smoking among 340 1st and 4th year medical students in Amman, Jordan. Smoking prevalence was 26% for males and 7% for females, similar to that of their peers in the general population. Smokers and male students were less likely to believe it is wrong for physicians to smoke in front of patients or that smoking policy or physician interaction with patients can influence smoking practices. Students believed that physicians can more effectively prevent smoking than influence patients to stop smoking. Student training on how to effectively counsel patients about smoking prevention and cessation is warranted

Efficacité des conseils aux patients en matière de tabagisme selon les étudiants en médecine d'Amman (Jordanie)

RÉSUMÉ Nous avons déterminé la prévalence du tabagisme chez 340 étudiants en première et quatrième années de médecine d'Amman (Jordanie) et leur perception de l'efficacité des conseils sur le tabagisme dispensés aux patients par les médecins. La prévalence du tabagisme était de 26 % chez les garçons et de 7 % chez les filles, soit des chiffres semblables à ceux de leurs pairs dans la population générale. Les fumeurs et les étudiants de sexe masculin étaient les moins enclins à penser que les médecins ne doivent pas fumer en présence des patients ou que la politique relative au tabac ou la relation médecin-patient peut influencer les pratiques en matière de tabagisme. Les étudiants pensaient que les médecins peuvent plus facilement prévenir le tabagisme qu'inciter leurs patients à arrêter de fumer. Il y a lieu de former les étudiants aux méthodes permettant de prodiguer aux patients des conseils efficaces sur la prévention du tabagisme et l'arrêt du tabac.

[1]Department of Health Science, College of Health and Human Performance, Brigham Young University, Utah, United States of America (Correspondence to R.M. Merrill: Ray_Merrill@byu.edu).
Received: 07/01/07; accepted: 17/05/07

Introduction

Among adult smokers in the United States, approximately 70% see a physician and 50% see a dentist each year [*1–3*]. Studies show that patients often respond positively to their doctor counselling them about smoking, even after only brief and simple advice [*4–8*]. However, while doctors have a great opportunity to contribute to smoking prevention and cessation, many fail to counsel their patients about quitting smoking [*1,7,9,10*]. Lack of training and self-efficacy in patient counselling may explain this.

In Jordan, the prevalence of smoking among adults was 30% (51% in males, 8% in females) in 2002 [*11*]. In a study conducted that same year, only 43% of current smokers who had visited a health care professional in the preceding 6 months had received tobacco cessation counselling [*12*]. In 2005, smoking prevalence among obstetricians and gynaecologists in Jordan was approximately 38%, and only 54% of these health professionals provided smoking cessation counselling to their patients [*13*]. In addition, dentists in Jordan have been shown to have a general lack of understanding about the health consequences associated with tobacco use [*14*]. While these studies provide information about certain health specialties, little is known about smoking prevalence among future doctors in Jordan or their perceptions of smoking cessation policies.

The aims of this study were to determine the prevalence of smoking among medical students in Amman, Jordan, and to identify their perceptions about the effectiveness of anti-smoking policies and of physicians counselling patients to quit.

Methods

A cross-sectional questionnaire survey was administered to 1st and 4th year medical students aged 18 years or older who were studying at the University of Jordan Medical School in Amman, Jordan in the summer of 2006.

Setting and sample

Amman is the capital of Jordan and has around 38% of the country's population [*15*]. As the University of Jordan Medical School is the oldest and largest of the 4 medical schools in Jordan, with regional and international recognition for its medical training, its medical students were chosen as the target population for this study. Three classes required by all 1st and 4th year students were sampled. It is estimated that the medical school has approximately 900 matriculated students in its bachelor of medicine and surgery programme, from which our sample was derived. Approximately 60% of the medical students were male and 40% female. Students were attending classes during the summer term of 2006.

The study was approved by the University of Jordan Deanship for Students and the University President, after which coordination was done through the Faculty of Medicine. The study was also approved by the Institutional Review Board at Brigham Young University. Each of the professors contacted agreed to have their students participate in the survey.

Data collection

The survey instrument was based on a similar study conducted in Armenia, which drew on an instrument developed specifically for health care workers by the World Health Organization and the International Union Against Tuberculosis and Lung Diseases. This instrument was selected because of its use in the peer-reviewed literature [*16–18*]. The questions identify smoking habits, opinions concerning counselling patients about smoking and the perceived

effectiveness of smoking prevention and cessation.

The questionnaire consisted of 42 items. The 1st section contained 3 demographic questions (sex, age, year in medical school). The 2nd section asked about cigarette use and whether the students thought it was appropriate for physicians to smoke in front of patients. The 3rd section contained 19 questions measured on a scale from 1 (strongly agree) to 5 (strongly disagree) that assessed opinions about the health effects of smoking, about public policies to reduce smoking and about the role of physicians in smoking prevention and control. The 4th section asked about the perceived effectiveness of physicians' counselling patients.

The questionnaire was developed in English, translated unto Arabic by a native speaker, then independently back-translated by another native speaker. The face validity of the instrument was assessed by 3 health educators experienced in survey sampling and by 3 native Jordanians who were fluent in Arabic.

The questionnaire was administered to students at the beginning of 1 of 3 different class sessions between 20 July and 25 July 2006. An informed consent form accompanied the survey, indicating the general purpose of the study and that participation was voluntary and was anonymous. The response rate was approximately 98%.

Analysis

Data were entered into *Microsoft Excel* by 2 separate individuals. The data sets were then compared and discrepancies resolved. No question had more than 4 missing responses, with the exception of smoking status, which had 18 missing.

Frequency distributions were used to describe the data. Bivariate analyses were used to measure associations between selected variables, with statistical significance based on the chi-squared test for independent samples [*23*]. Adjusted odds ratios (OR) and 95% confidence intervals (CI) were estimated using logistic regression [*24*].

Factor analysis was used to describe covariance relations among the smoking prevention and cessation variables in terms of a few underlying, but unobservable, random quantities called factors [*25*]. Using each factor extracted from this model, an average score was derived and regressed, based on sex, smoking status and year in school, to see if any of these variables were significantly associated with the underlying factors identified in the data. The method used for factor extraction was principal component analysis. Factors were retained based on the Mineigen ≥ 1 rule. When more than 1 factor was identified, factors were presented according to an orthogonal varimax prerotation. Two-sided tests of significance were based on the 0.05 level against a null hypothesis of no association, unless otherwise indicated.

Analyses were performed using *Statistical Analysis System*, version 9.1.

Results

A description of the medical students in the sample is presented in Table 1. Only 1st and 4th year students were included in the study. Almost 60% were male and the mean age was 19.8 [standard deviation (SD 1.4)] years. Of the students 11.8% reported being current daily smokers and 7.1% occasional smokers; the mean time they had been smoking was 2.8 (SD 2.0) years and the mean number of cigarettes smoked per day was 11.2 (SD 8.5). The percentage of current smokers did not differ significantly between 1st and 4th year students. Among those who currently smoked, a majority (73.5%) indicated that they were think-

Table 1 **Selected demographic and smoking behaviour and attitude variables for medical students in Amman, Jordan (*n* = 340)**

Variable	No.	%
Sex		
Male	202	59.6
Female	137	40.4
Year in medical school		
1st	195	57.4
4th	145	42.6
Smoking status		
Never smoker	256	79.5
Former smoker	5	1.6
Current occasional smoker	23	7.1
Current daily smoker	38	11.8
How do you feel about quitting? (current smokers)		
Not ready	15	26.8
Thinking about it	21	37.5
Ready now	20	35.7
Do you believe it is wrong for doctors to smoke in front of patients?		
Yes	306	96.2
No	12	3.8
Smoking is harmful to your health		
Strongly agree	300	88.2
Agree	36	10.6
Other	4	1.2
	Mean (SD)	**Median (range)**
Age (years)	19.8 (1.4)	19 (17–26)
No. of cigarettes smoked/day by smokers	11.2 (8.5)	10 (1–25)
Duration of smoking by current smokers (years)	2.8 (2.0)	2 (0–9)

Data were missing for some items.
SD = standard deviation.

ing about or ready to quit smoking. High proportions strongly agreed that smoking is harmful to your health (88.2%); 86.2% for 1st year students and 91.0% for 4th year students. In addition, 96.2% believed that it is wrong for a physician to smoke in front of patients. The relationship between year in school and the belief that it is wrong to smoke in front of patients did not differ significantly between current smokers and nonsmokers (data not shown). There was also no significant relationship between year in school and how current smokers felt about quitting or the mean number of cigarettes smoked per day (data not shown).

Bivariate analysis showed that males were more likely than females to be current or former smokers (26.3% versus 7.1%) (Table 2). A mean of 12 (SD 8.2) cigarettes per day were smoked by male smokers compared with 4 (SD 5.1) by female smokers (χ^2 = 2.60, df = 49, P = 0.012). There was no

significant difference between males and females in age distribution, year in medical school, belief about whether it is wrong to smoke in front of patients and, among smokers, between duration of smoking and how they felt about quitting (data not shown).

Of the 12 medical students who felt it was acceptable for physicians to smoke in front of patients, 67% were smokers, whereas of the 306 students who felt it was not acceptable, 17% were smokers ($\chi^2 = 19.10$, $P < 0.0001$). The association between whether or not they considered it wrong to smoke in front of patients and their own smoking status was further assessed by adjusting for age, sex and year in school, based on a multiple logistic regression model. Only smoking status was statistically significant in the model (i.e. nonsmokers were significantly more likely to think it was wrong to smoke in front of patients than smokers) (OR = 10.2, 95% CI: 3.0–25.1).

Medical students were asked their level of agreement with 19 statements about the potential health consequences of secondhand smoke and whether smoking prevention and cessation could be influenced by smoking policies and physicians advising patients about smoking. The results are presented in Table 3. The statements with the strongest level of agreement were those related to smoking policy (a complete ban on advertising of tobacco products, higher prices on cigarettes and warning labels on cigarettes), followed by those related to physicians' involvement (giving advice, being a role model) and secondhand smoke (passive smoking increases the risk of heart disease, lung disease and neonatal death). The level of agreement was generally higher among females than males for each of the statements, albeit not significantly so. Nonsmokers had a higher level of agreement with each of the statements than smokers: the level of agreement was significantly higher in 15 of the 19 statements.

Factor analysis identified 3 factor groupings among 13 statements. Six statements were dropped because of low factor loadings. The 3 factor groupings were labelled: "Secondhand smoke", "Physician's role" and "Smoking policy" (Table 4). The mean level of agreement for statements in factor 1 (secondhand smoke) was 2.34 (SD 0.47). In a model containing sex, smoking status and year in medical school the mean level of agreement was not significantly different between sexes or 1st and 4th year students. On the other hand, the mean level of agreement was 2.10 for smokers and 2.40 for non-smokers ($F = 19.81$, df = 1, $P < 0.001$). The mean level of agreement for statements in factor 2 (physician's role) was 2.85 (SD 0.35). In the model there was no significant difference for sex or year in medical school, but there was for smoking status (2.52 for smokers versus 2.92 for nonsmokers) ($F = 71.22$, df = 1, $P < 0.001$). The mean level of agreement for statements in factor 3 (smoking policy) was 2.30 (SD 0.51). In the model there was no significant difference for sex, but there was for

Table 2 **Frequency distribution of medical students by smoking status and sex**

Smoking status[a]	Males		Females	
	No.	%	No.	%
Never smoker	138	71.1	118	92.9
Ex-smoker	5	2.6	0	0.0
Current occasional smoker	17	8.8	6	4.7
Current everyday smoker	34	17.5	3	2.4

$\chi^2 = 24.9$, df = 3, P < 0.0001.

[a]Respondents were not given definitions for the terms current, occasional or former smoker. Each respondent defined these terms individually.

Table 3 **Level of agreementa with statements related to smoking and health and physicians' responsibilities as role models for their patients by medical students (*n* = 340)**

Statement	% of students			Mean agreement score			Mean agreement score		
	Strongly agree	Agree	Other	Males	Females	*P*-value[b]	Smoker	Nonsmoker	*P*-value[c]
There should be a complete ban on the advertising of tobacco products	91.4	6.2	2.4	2.78	2.83	0.179	2.66	2.95	< 0.0001
The price of tobacco products should be increased sharply	90.9	7.1	2.0	2.78	2.78	0.944	2.62	2.94	< 0.0001
Health warnings on cigarette packages should be in big print	82.3	13.0	4.7	2.57	2.57	0.894	2.26	2.88	< 0.0001
Hospitals and health care centres should be smoke-free	71.3	19.5	9.2	2.45	2.54	0.248	2.27	2.72	< 0.0001
Patient's chances of quitting smoking are increased if a health professional advises him or her to quit	65.0	26.5	8.5	2.35	2.36	0.854	2.02	2.69	< 0.0001
Tobacco sales to children and adolescents should be banned	62.0	21.8	16.2	2.23	2.24	0.901	1.88	2.58	< 0.0001
Physicians who smoke are less likely to advise people to stop smoking	61.6	33.8	4.4	2.43	2.55	0.067	2.36	2.63	0.002
Physicians should routinely advise patients who smoke to avoid smoking around children	55.5	38.6	5.9	2.37	2.45	0.272	2.26	2.56	0.001
Passive smoking increases the risk of heart disease in nonsmoking adults	54.9	35.1	10.0	2.27	2.36	0.209	2.08	2.54	< 0.0001
Physicians should speak to lay groups about smoking	54.7	33.2	12.1	2.27	2.37	0.234	2.15	2.49	0.001
Physicians should routinely advise their smoking patients to quit smoking	54.6	37.8	7.7	2.40	2.42	0.647	2.31	2.51	0.031

Table 3 **Level of agreementa with statements related to smoking and health and physicians' responsibilities as role models for their patients by medical students (*n* = 340)** *(concluded)*

Statement	% of students			Mean agreement score			Mean agreement score		
	Strongly agree	Agree	Other	Males	Females	*P*-value[b]	Smoker	Nonsmoker	*P*-value[c]
Physicians should set a good example by not smoking	40.6	37.1	22.3	2.09	2.21	0.190	2.09	2.21	0.302
Physicians should get specific training on cessation technique	28.0	39.2	32.7	1.84	1.94	0.224	1.77	2.01	0.037
Maternal smoking during pregnancy increases the risk of sudden infant death syndrome	21.1	43.3	35.6	1.81	1.91	0.230	1.87	1.85	0.869
Physicians should routinely ask patients about their smoking habits	17.3	46.5	36.2	1.67	1.86	0.018	1.68	1.85	0.101

[a]3 = strongly agree, 2 = agree, 1 = other; [b]Means adjusted for smoking; [c]Means adjusted for sex.

the remaining variables: 2.16 for 1st year students and 2.32 for 4th year students ($F = 8.70$, df = 1, $P = 0.003$), 2.13 for smokers and 2.35 for non-smokers ($F = 9.21$, df = 1, $P = 0.002$).

Agreement levels with the 2 statements about perceived effectiveness of physicians counselling patients to stop smoking and not to start smoking are presented in Table 5. A higher proportion of students agreed that physicians can play an important role in influencing patients not to start smoking than in influencing patients to stop smoking ($\chi^2 = 53.67$, $P < 0.0001$). There were no significant differences in the level of agreement with either of the statements between males and females, 1st and 4th year students, smokers and nonsmokers or those who believed it was wrong for a physician to smoke in front of patients versus otherwise (data not shown).

Discussion

Smoking prevalence among medical students in the current study was 26.3% for males and 7.1% for females. Although the results are based on a convenience sample, these percentages are comparable with the smoking prevalence of medical students in Bahrain (27.5% for men and 2.3% for women) and Israel (18.4% for men and 12.5% for women) [*19–21*]. In a pilot study of 95 practising physicians in Amman, Jordan, smoking prevalence was 48.8% for males and 14.2% for females [unpublished pilot study, 2006]. Hence, the smoking prevalence among medical students was almost half that of physicians. The smoking prevalence of medical students has been shown to be lower than that of doctors in many countries [*22*].

The mean age of medical students in our study was about 20 years compared with

Table 4 **Factor analysis of level of agreement with statements related to smoking and health and physicians' responsibilities as role models for their patients by medical students (*n = 340*)**

Statement	Factor loading[a]		
	Secondhand smoke (factor 1)	Physician's role (factor 2)	Smoking policy (factor 3)
Physicians serve as role models for their patients	0.10	0.79	0.13
Physicians should set a good example by not smoking	0.12	0.76	0.03
Patient's chances of quitting smoking increased if a health professional advises him or her to quit	0.20	0.61	0.33
Physicians who smoke are less likely to advise people to stop smoking	0.17	0.54	0.13
Physicians should get specific training on cessation techniques	0.09	0.51	–0.06
Health warnings on cigarette packages should be in big print	0.18	0.23	0.77
There should be a complete ban on the advertising of tobacco products	0.11	0.02	0.76
The price of tobacco products should be increased sharply	0.06	0.06	0.84
Maternal smoking during pregnancy increases the risk of sudden infant death syndrome	0.59	0.36	–0.23
Passive smoking increases the risk of lung disease in nonsmoking adults	0.71	0.19	–0.06
Passive smoking increases the risk of heart disease in non-smoking adults	0.77	0.13	0.35
Paternal smoking increases the risk of lower respiratory tract illnesses such as pneumonia in exposed children	0.81	0.05	0.23
Physicians should routinely advise patients who smoke to avoid smoking around children	0.69	0.18	0.24

[a]*For each factor, the loadings listed under the factor heading represent a correlation between that item and the overall factor.*

Statements with factor loadings < 0.5 were excluded: Hospitals and health care centres should be smoke-free; Tobacco sales to children and adolescents should be banned; Physicians should speak to lay groups about smoking; Physicians should routinely advise their smoking patients to quit smoking; Neonatal death is associated with passive smoking; and Physicians should routinely ask patients about their smoking habits

41 years for physicians in the pilot study. Smoking prevalence in Jordan increases with age. For example, in a cross-sectional study in April 2005 of college students in Yarmouk University smoking prevalence was 23.3% for ages 17–19 years, 41.7% for ages 20–24 years, and 52.0% for ages 25–28 years [*23*]. Prevalence among physicians was similar to the general population of Jordan [*11*]. This also appears to be the case for medical students. If the prevalence of smoking among physicians is a good

Table 5 **Beliefs of medical students about the effectiveness of physicians' counselling patients about smoking to stop or not start smoking**

Belief	No.	%
How effective is physician counselling to help patients stop smoking?		
Very effective	43	12.8
Effective	128	38.0
Somewhat or not effective	166	49.3
How effective is physician counselling to help patients to not start smoking?		
Very effective	110	32.7
Effective	138	41.1
Somewhat or not effective	88	26.2

indicator of a society's willingness to recognize the smoking epidemic and related health problems, then Jordan has not come to grips with the problem of smoking [*24*].

Smokers comprised 67% of those who did not think it wrong for a physician to smoke in front of patients and 17% of those who agreed it was wrong. Hence, we can assume that students' smoking behaviour may influence the acceptance of this behaviour among physicians. Smokers had a significantly lower level of agreement with statements about smoking prevention and cessation policy and physicians' relationship with their patients than nonsmokers, and were less likely to believe that secondhand smoke was a health problem. This concurs with the 2003 American Smoking and Health Survey where 70% of smokers and 92% of nonsmokers believed that living in a home where smoking is allowed indoors is harmful to health [*25*].

Students in the 4th year of medical training had a greater level of agreement with statements about the harmful effects of secondhand smoke and that smoking was harmful to their health than 1st year students. This is consistent with medical training about the deleterious health effects of smoking. However, the percentage of current smokers did not significantly differ between 1st and 4th year students. Similarly, a summary of studies involving over 9000 medical students from 42 countries found that, as students progressed through their programme and acquired greater knowledge of smoking as a major cause of certain diseases, this increased knowledge did not lead to lower rates of smoking [*26*]. Further, knowledge of the adverse health effects of smoking among medical students is not necessarily associated with their willingness to counsel patients about smoking [*27*].

The strongest level of agreement was with statements about smoking prevention and cessation through smoking policy. The students strongly agreed that warning labels on cigarettes, a complete ban on advertising of tobacco products and higher prices for cigarettes can effectively reduce smoking prevalence. This is consistent with studies showing the efficacy of warning labels, limiting advertising and increasing prices in smoking prevention and control [*28–30*].

There was less agreement about physicians' involvement. While 65.0% of students strongly agreed that patients' chances of quitting smoking are increased if a health professional advises them to do so, only 40.6% strongly agreed that physicians should set a good example by not smoking and 28.0% that physicians should get specific training on cessation techniques. In addition, only 17.3% strongly agreed that physicians should routinely ask patients about their smoking habits. The items "Physicians should routinely advise their smoking patients to quit smoking" and "Physicians should routinely ask patients about their smoking habits" did not even have high enough factor loadings to be included in the factor "Physician's role." In the review

study cited above, most students claimed they would advise patients to quit, but only if the patient raised the subject [*26*]. Perhaps the students in our study likewise believed that patients must first show interest in quitting before physician counselling can be effective. They may also feel that physicians should avoid being imposing.

The results of our study support the idea that attitude change is needed for physicians before they can carry out effective interventions with their patients, as these go beyond just having knowledge of the adverse health effects associated with smoking. It has been shown that training physicians to counsel patients about smoking cessation can increase the level and quality of their advice to patients [*6*]. However, a barrier among those in this study was that almost a third did not strongly agree or agree that physicians should get specific training on cessation techniques. Similarly, a study of medical students in the Middle East found that 45% thought they had sufficient knowledge of smoking cessation techniques to counsel smokers [*26*].

The students in this study thought that physicians counselling patients to avoid starting smoking had greater potential than counselling to help patients stop smoking. Given these opinions, training in the area of smoking prevention counselling may be very effective.

Certain limitations of the study should be considered. Specifically, self-reported data on smoking behaviour and opinions among medical students may have been biased. Medical students may believe it is socially less acceptable for them to smoke than the general population, thereby leading to underreporting of their true smoking prevalence. Female students may also be less likely to report smoking than male students. While the extent to which this could have biased the responses is unknown, the anonymous nature of the survey was likely to limit such bias. In addition, because a large percentage of the population and health care workers in Amman are smokers, feelings of social unacceptability of smoking may be less common than elsewhere. There may have been response bias, but it would have been minimal given the response rate of 98%. Finally, the study population was a convenience sample, and generalizing the prevalence estimates of this group to all medical students in Jordan may not be appropriate.

Given the perceptions of the medical students in this study and the fact that these students represent the population of future physicians in Jordan, training on how to counsel patients effectively about smoking prevention and cessation is warranted.

References

1. Physician and other health-care professional counseling of smokers to Quit—United States, 1991. *Morbidity and mortality weekly report*, 1993, 42(44):854–7.
2. Hayward RA et al. Utilization of dental services: 1986 patterns and trends. *Journal of public health dentistry*, 1989, 49(3):147–52.
3. Tomar SL, Husten CG, Manley MW. Do dentists and physicians advise tobacco users to quit? *Journal of the American Dental Association*, 1996, 127(2):259–65.
4. Patkar AA et al. A comparison of smoking habits among medical and nursing students. *Chest*, 2003, 124(4):1415–20.

5. Cokkinides VE et al. Under-use of smoking-cessation treatments: results from the National Health Interview Survey, 2000. *American journal of preventive medicine*, 2005, 28(1):119–22.

6. Cornuz J et al. Efficacy of resident training in smoking cessation. A randomized, controlled trial of a program based on application of behavioral theory and practice with standardized patients. *Annals of internal medicine*, 2002, 136(6):429–37.

7. Eckert T, Junker C. Motivation for smoking cessation: what role do doctors play? *Swiss medical weekly*, 2001, 131:521–6.

8. Stead LF, Bergson G, Lancaster T. Physician advice for smoking cessation. *Cochrane database of systematic reviews*, 2008, Issue 2. Art. No.: CD000165.

9. Steinemann S et al. Impact of education on smoking cessation counseling by surgical residents. *American journal of surgery*, 2005, 189(1):44–6.

10. Vokes NI, Bailey JM, Rhodes KV. "Should I give you my smoking lecture now or later?" Characterizing emergency physician smoking discussions and cessation counseling. *Annals of emergency medicine*, 2006, 48(4):406–14.

11. *Country profiles: Jordan*. World Health Organization [website] (http://www.emro.who.int/emrinfo/index.asp?Ctry=jor, accessed 13 February 2009).

12. Shehab F, Belbeisi A. Prevalence of selected risk factors for chronic disease—Jordan, 2002. *Morbidity and mortality weekly report*, 2003, 54(43):1042–4.

13. Amarin ZO. Obstetricians, gynecologists and the anti-smoking campaign: a national survey. *European journal of obstetrics, gynecology, and reproductive biology*, 2005, 119:156–60.

14. Burgan, SZ. Smoking and health: opinions and awareness among general dentists in Jordan. *International dental journal*, 2001, 51(6):463–7.

15. *2004 population and housing census preliminary results*. Department of Statistics. Hashemite Kingdom of Jordan [website] (http://www.dos.gov.jo/dos_home_a/main/index.htm, accessed 11 February 2009).

16. Tessier JF et al. Attitudes and opinions of French cardiologists towards smoking. *European journal of epidemiology*, 1995, 11:615–20.

17. Hodgetts G, Broers T, Godwin M. Smoking behaviour, knowledge and attitudes among family medicine and nurses in Bosnia and Herzegovina. *BMC family practice*, 2004, 5:12.

18. Crofton J, Simpson D. *Tobacco: a global threat*. London, Macmillan, 2002.

19. Hamadeh RR. Smoking habits of medical students in Bahrain. *Journal of smoking related disorders*, 1994, 5:189–95.

20. Nachtigal D, Rishpon S, Epstein LM. Smoking among medical and engineering students. *Medical education*, 1989, 23:196–200.

21. Slater PE et al. Risk factor for coronary artery disease in 124 Jerusalem medical students. *European journal of epidemiology*, 1985, 1:313–8.

22. Crofton J, Tessier JF. A worldwide survey of knowledge and attitudes of tobacco among medical students. In: Richmond R, ed. *Educating medical students about tobacco: planning and implementation*. Paris, International Union against Tuberculosis and Lung Disease, 1997:271–80.

23. Khader YS, Alsadi AA. Smoking habits among university students in Jordan: prevalence and associated factors. *Eastern Mediterranean health journal*, 2008, 14(4):897–904.

24. Piko BF. Does knowledge count? Attitudes toward smoking among medical, nursing, and pharmacy students in Hungary. *Journal of community health*, 2002, 27:269–76.

25. *Secondhand smoke: youth exposure and adult attitudes. 2005. Results from three national surveys*. Washington DC, American Legacy Foundation (First Look Report 14).

26. Richmond R. Teaching medical students about tobacco. *Thorax*, 1999, 54:70–8.

27. Daudt AW et al. A first step incorporating smoking education into a Brazilian medical school curriculum: results of a survey to assess the cigarette smoking knowledge, attitudes, behaviour, and clinical practices of medical students. *Journal of addictive diseases*, 1999, 18(1):19–29.

28. Lindbolm E. *Campaign for tobacco-free kids. Raising cigarette taxes reduces smoking, especially among kids (and the cigarette companies know it)* [online article] (http://www.tobaccofreekids.org/research/factsheets/pdf/0146.pdf, accessed 11 February 2009).

29. Crawford MA, Balch GI, Mermelstein R. Responses to tobacco control policies among youth. *Tobacco control*, 2002, 11(1):14–9.

30. Willemsen MC, De Zwart WM. The effectiveness of policy and health education strategies for reducing adolescent smoking: a review of the evidence. *Journal of adolescence*, 1999, 22(5):587–99.