Opinions of South Carolina Dental Students toward Tobacco Use Interventions

Gabrielle F. Cannick, BS; Alice M. Horowitz, PhD; Susan G. Reed, DDS, DrPH; Thomas F. Drury, PhD; Terry A. Day, MD

Abstract

Objectives: *Tobacco use accounts for 75 percent of oral cancer deaths in the United States. One objective of Healthy People 2010 is to increase the percentage of dentists who provide smoking cessation counseling. However, studies of dentists have shown that the majority feel inadequately prepared to do so. The objective of this study was to determine the opinions of dental students at the Medical University of South Carolina (MUSC) regarding the provision of tobacco use interventions for patients.* ***Methods:*** *In 2002, 163 students were administered a written questionnaire which included questions about tobacco use interventions (response rate = 80 percent). Opinion items were analyzed using factor analysis, Fisher's Exact Test, and ANOVA (a ≤0.025).* ***Results:*** *While 89 percent of students agreed that dentists should be trained to provide tobacco cessation education, only 39 percent thought that they themselves were adequately trained. Students' opinions toward the role and training of dentists in providing tobacco use interventions differed by academic year. Only 14.1 percent of dental students were quite or very confident in their ability to help patients to stop smoking.* ***Conclusions:*** *This study indicates that although MUSC dental students support tobacco cessation training for dentists, the majority responded that they are not adequately trained and are not comfortable providing tobacco cessation education to patients. A comprehensive tobacco prevention and cessation program is indicated for the objective of Healthy People 2010 to be met.*

Key Words: students, dental; tobacco use cessation

Introduction

Tobacco use is the leading preventable cause of mortality in the US, yet an estimated 46.5 million adults and 21.9 percent of high school students are current smokers (1-3). The 2004 Surgeon General's report on the health consequences of smoking concluded that smoking is harmful to nearly every organ in the body, and quitting smoking has benefits that are both immediate and long-term (4). Dentists and dental hygienists are critical players in the success of tobacco use cessation and prevention methods. Brief cessation interventions by dentists have effectively helped patients to stop smoking (5). A comprehensive program of oral cancer screenings, cessation advice, provision of self-help materials, and brief cessation counseling by dentists has also been shown to promote smokeless tobacco cessation (6).

Greater than 50 percent of current smokers report having annual dental visits. However, a national survey of dentists found that while 66 percent of dentists advised current smokers to stop, less than 30 percent provided comprehensive tobacco use cessation services (7). Compared to physicians and other health professionals, dentists are less likely to provide tobacco use cessation advice and counseling, and feel inadequately prepared to provide tobacco cessation education to their patients (7-10). In response, Objective 3-10c of *Healthy People 2010* is to increase the percentage of dentists who provide smoking cessation counseling to 85 percent (baseline was 59%) (11).

Another aspect of tobacco use intervention is the prevention of tobacco use. This area is primarily targeted toward preventing the initiation of tobacco use in adolescents. While a variety of factors (gender, ethnicity, family factors, and genetics) may influence tobacco initiation (12), a systematic review of pediatric smoking prevention interventions has reported limited evidence to support the efficacy of smoking prevention interventions conducted in health care providers' offices. Although differences between the intervention and control groups were not significant, two studies conducted in dental and orthodontic offices found that the incidence of tobacco use was lower in the intervention group. However, another study conducted in primary care offices, found a significant reduction in self-reported smoking among those in the intervention group (13).

The causal association between tobacco use and both periodontal disease (14) and oral cancer (15) yields major support for the dentist's role in providing tobacco use interventions. More than 75 percent of oral cancer deaths are related to the use of tobacco products (15). Similarly, findings from the Third National Health and

Send correspondence and reprint requests to: Alice M. Horowitz, PhD, National Institute of Dental and Craniofacial Research, National Institutes of Health, 45 Center Drive, Room 4As-37A, Bethesda, MD 20892-6401 E-mail: alice.horowitz@nih.gov. Ms. Cannick and Dr. Reed are affiliated with the Department of Stomatology, College of Dental Medicine and Department of Biostatistics, Bioinformatics, and Epidemiology, College of Graduate Studies, Medical University of South Carolina (MUSC). Professors Horowitz and Drury are affiliated with the National Institute of Dental and Craniofacial Research, National Institutes of Health. Dr. Day is affiliated with Department of Otolaryngology Head and Neck Surgery, College of Medicine, MUSC. Manuscript originally presented at: The International Association for Dental Research General Session, March 10-13, 2004, Honolulu, HI. Manuscript received 6/10/04; returned to authors for revision 12/22/04; final version accepted for publication 10/31/05.

Nutrition Examination Survey (NHANES III) indicate that over 50 percent of periodontitis cases were associated with current or former cigarette smoking (16).

While the majority of dental schools instruct students in tobacco prevention and cessation practices (17), a 1998 survey of US dental schools found that only 47 percent included established tobacco cessation activities in student clinics (18). Results from two studies of US dental students indicate that while both incoming and senior dental students have positive attitudes toward tobacco prevention and control, they do not believe that such efforts are effective with patients in the dental setting (19, 20).

Dental students at the Medical University of South Carolina (MUSC) are in an ideal position to receive tobacco use intervention training. Among the fifty states, South Carolina has the fourth highest oral cancer mortality rate (21), and tobacco use rates in South Carolina are higher than national rates. The percentage of adults who smoke in South Carolina is above the national median (24.7 percent and 23.3 percent, respectively), and 41.5 percent of South Carolina adolescents grades 9-12 are current tobacco users (national = 34.5 percent) (22). Thus, tobacco cessation and prevention efforts by dentists may be helpful in reducing tobacco use and oral cancer incidence and mortality in South Carolina.

The objective of this investigation, which was part of a larger study about oral cancer prevention and early detection, was to determine the attitudes of MUSC dental students toward providing tobacco use interventions. Results of this study may help determine the need for developing and implementing a comprehensive tobacco cessation and prevention program.

Methods

The Institutional Review Board of the Medical University of South Carolina approved the South Carolina Dental Student Survey, 2002, to be used for data collection. First through fourth year dental students completed the in-class, self-administered questionnaire in April 2002 (n=163). Two authors (GC and SR) were present to collect the questionnaires from the students. No personal identifying information was obtained. Compared with male students, a greater percentage of females participated in the study. Although the overall response rate was 79.5 percent, the response rate for the senior class was only about 41 percent (Table 1). With faculty consent to use additional class time for survey administration, two attempts were made unsuccessfully to increase senior participation. However, time constraints associated with board licensure preparation and graduation requirements resulted in only 20 out of 49 seniors participating in the study. Double data entry was performed using Microsoft® Excel and data accuracy was checked using the Statistical Analysis System (Version 8, SAS Institute).

TABLE 1
Percentage of students participating in the study by gender and academic year

Gender	All Students	Academic Year 1	2	3	4
Both Genders	79.5 (n=163/205)	94.4 (n=51/54)	94.1 (n=48/51)	84.6 (n=44/52)	40.8 (n=20/49)
Men	71.7 (n=99/138)	88.2 (n=30/33)	93.9 (n=31/33)	76.5 (n=26/34)	40.0 (n=12/30)
Women	82.1 (n=64/78)	100 (n=21/21)	94.4 (n=17/18)	100 (n=18/18)	42.1 (n=8/19)

Source: South Carolina Dental Student Survey, 2002

Demographic questions and questions pertaining to oral cancer prevention and early detection knowledge were adapted from a previous survey used nationally with dentists (23). The results on oral cancer knowledge have been reported elsewhere (24). Additionally, nine Likert-type questions on tobacco use interventions were adapted from a survey of pediatric dentists (10). Dental students were assessed on their: 1) agreement with statements about training in tobacco cessation education; 2) perceived role conceptions for dentists concerning tobacco prevention and the effectiveness of smoking cessation counseling by dentists; and 3) confidence in their personal ability to assess and treat tobacco use and nicotine dependence.

Each Likert-type question had five response categories (coded 1 to 5, with a high score indicating a positive response). Five questions addressed the perceived role of dentists in providing tobacco use interventions and the training of dentists in tobacco cessation education. The other four questions concerned the students' confidence in their personal ability to provide tobacco use interventions to patients, and students' personal training in tobacco cessation education. A psychometric evaluation of the nine Likert-type questions was conducted using principal component factor analysis, with significant factor loading determined at 0.35. Following an orthogonal rotation, evaluation of the factor analysis identified two attitudinal factors underlying the nine questions. Cronbach's alpha coefficient was used to determine the reliability of the two factors because it verifies the reliability of hypothetical variables that are constructed from measured items in a questionnaire. A Cronbach alpha coefficient of 0.70 is considered an acceptable measure of reliability (25).

The first factor (PERCEPTIONS) was based on the five questions addressing the perceived role of dentists in providing tobacco use interventions and the training of dentists in tobacco cessation education (Cronbach alpha = 0.87). The second factor (CONFIDENCE) included the four questions about the students' confidence in their personal ability to provide tobacco use interventions to patients, and students' personal training in tobacco cessation education (Cronbach alpha = 0.83).

Unweighted data were analyzed by using SAS (Version 8, SAS Institute). Univariate descriptive statistics were generated, and the Fisher's Exact Test was used for bivariate analy-

ses. Analysis of variance (ANOVA) was used to model the association of selected variables with the PERCEPTIONS and CONFIDENCE factors. The two ANOVA models included either the PERCEPTIONS or CONFIDENCE factor as a continuous dependent variable, and nine independent categorical variables (gender, academic year, patient care involvement, four items concerning oral cancer and tobacco use knowledge, and two items about assessing tobacco use when taking a medical history). Two reduced models were constructed using the backward stepwise regression method. Multiple comparisons were performed using the Tukey-Kramer method for unbalanced designs. A modified Bonferroni alpha-level <0.025 was used for statistical evaluation of findings.

Results

Univariate and Bivariate findings. Responses to the Likert-type questions are given in Table 2. Overall, 87.7 percent of dental students *agreed or strongly agreed* that dentists should be trained to provide tobacco cessation education. While over 90 percent of first, third, and fourth year dental students agreed with this statement, only about 80 percent of second year students did (p=0.02, n=158).

Only 55.8 percent of dental students believed to a *considerable or great extent* that the dentist's role included assisting patients to stop smoking. While 74.5 percent of first year students thought that dentists should help prevent tobacco use among patients, 45 percent of second year and about 65 percent of third and fourth year students believed it to be a part of their role as a dentist (p<0.01, n=161). About 30 percent believed that a dentist could be *quite or very effective* in helping patients abstain from using tobacco products.

The majority of dental students (57.7 percent) *disagreed or strongly disagreed* that they were adequately trained to provide tobacco cessation education. Only 22.9 percent of first year and 29.6 percent of second year students *agreed* or *strongly agreed* that they were adequately trained. However, nearly 60 percent of third and fourth year dental students believed they were adequately trained to provide tobacco cessation education (p<0.01, n=156).

Of the 14.1 percent of dental students who were *quite or very confident* in their ability to help patients to stop smoking, over 93 percent also believed that the dentist's role included these aspects to a *considerable or great extent*. Less than 20 percent of the students were confident in their ability to treat nicotine dependence and to prevent patients from starting to use tobacco products.

ANOVA using selected variables. The results of the ANOVA analyses are given in Table 3. For the PERCEPTIONS factor, the nine variables in the full model explained 22.6 percent of the variance. Significant associations were found between the PERCEPTIONS factor and gender (p<0.01), academic year (p=0.01), and assessing tobacco use in a medical history (p=0.02). Multiple comparisons indicated that females had more positive attitudes about the role and training of dentists in tobacco use interventions when compared with males. Freshmen had more positive attitudes

TABLE 2
Responses to tobacco intervention statements

Training in tobacco cessation education	Strongly agree	Agree	Disagree	Strongly disagree	Don't Know
I am adequately trained	3.1%	35.0%	47.9%	9.8%	3.1%
Dentists should be trained	27.0%	60.7%	8.0%	1.2%	1.8%
To what extent do you think it is part of your role as a dentist to:	Not at all	Small	Moderate	Considerable	Great
Assist your patients to stop smoking tobacco products	0.6%	15.3%	27.0%	38.0%	17.8%
Help prevent patients from starting to use tobacco products	1.2%	11.7%	23.9%	39.3%	22.7%
How effective do you think smoking cessation counseling provided by a dentist can be in:	Not at all	A little	Moderately	Quite	Very
Helping an adolescent stop smoking	5.5%	28.8%	34.4%	25.2%	4.9%
Helping patients abstain from using tobacco products	3.7%	27.0%	38.7%	23.3%	6.1%
How confident are you in your ability to:	Not at all	Not very	Somewhat	Quite	Very
Assist your patients to stop smoking	3.1%	34.4%	47.2%	13.5%	0.6%
Prevent your patients from starting to use tobacco products	2.5%	25.2%	52.8%	16.6%	1.8%
Assess and treat nicotine dependence	13.5%	40.5%	33.7%	9.8%	1.2%

Source: South Carolina Dental Student Survey, 2002

TABLE 3
ANOVA results for PERCEPTIONS & CONFIDENCE factors

	PERCEPTIONS factor		CONFIDENCE factor	
	Full Model* (p-value)	Restricted Model† (p-value)	Full Model ‡ (p-value)	Restricted Model¶ (p-value)
Academic Year	0.30	0.01	0.84	-
Gender	<0.01	<0.01	0.21	0.05
Level of Patient Care Involvement	0.95	-	0.94	-
Tobacco use is associated with oral cancer	0.61	-	0.22	0.19
Tobacco use is an oral cancer risk factor	0.42	-	0.84	-
Assess patient's previous tobacco use when taking a medical history	0.45	-	0.76	-
Assess type and amount of tobacco used when taking a medical history	0.08	0.02	0.25	0.11
Cigarette smoking places person at higher risk for oral cancer than using smokeless tobacco	0.35	0.39	0.50	-
Smokeless tobacco lesions generally resolve after discontinuing use	0.34	0.35	0.87	-

*R^2=0.22, p=0.01; † R^2=0.21, p<0.01; ‡ R^2=0.11, p=0.66; ¶ R^2=0.07, p=0.02
Source: South Carolina Dental Student Survey, 2002

than sophomores. Although differences were not significant for juniors and seniors, they also responded more positively than sophomores, but more negatively than freshmen. Lastly, students who believed that the type and amount of tobacco use should be assessed when taking a medical history responded more positively to providing tobacco use interventions than those who did not think this was a part of the history taking process.

For the CONFIDENCE factor, the nine variables in the full model explained 11.4 percent of the variance. Although the association was not significant, males were more confident than females in the adequacy of their training in tobacco cessation education and their personal ability to provide tobacco use interventions (p=0.05).

Discussion

The current study parallels findings from previous studies of dental students (19-20, 26). The results indicate that although the majority of the responding dental students believed dentists should receive training in tobacco cessation education, less than 40 percent thought themselves to be adequately trained. Less than 20 percent of the students felt they could prevent patients from starting to use tobacco products, and over half did not feel confident about treating nicotine dependence. Although it is encouraging that higher percentages of third and fourth year dental students believed they were adequately trained when compared with first and second year students, whether or not this is a cumulative effect of educational instruction may be better understood by a review of the dental curriculum. Clearly, the findings support an opportunity to increase the numbers of students who respond as adequately trained and comfortable with providing tobacco use interventions for their patients.

Although this was a cross-sectional study of students in one dental school, the high response rate for three of the four classes strengthens support for the validity of our findings within that cohort of students because of the likelihood of a reduction in selection bias. However, the non-response of the fourth year students (59 percent) may create a form of selection bias, and the variability in the observed sample may be too high to detect statistically significant differences between the seniors and other classes. However, percent differences between the classes suggest that meaningful differences may exist.

The results of the ANOVA models explained little of the variance, suggesting that other factors may contribute to students' attitudes toward tobacco use interventions. This survey did not measure students' previous experience as a dental hygienist or as another preventive healthcare provider. Also, although the survey did not ask about students' tobacco use status, students who were former or current tobacco users may have been more likely to be exposed to tobacco intervention efforts. Lastly, yearly changes in the curriculum may influence students' training in tobacco cessation and prevention methods. These limitations in the study design should be considered in future studies.

With regard to the current dental curriculum in South Carolina, first-year dental students receive an invited lecture and video-presentation on tobacco cessation interventions based on the National Cancer Institute's training program "How to Help Your Patients Be Tobacco-Free" (27). The students are also given a copy of the current clinical practice guideline for treating tobacco use and dependence (28). Second to fourth year students are taught to ask about and document each patient's tobacco use status in the patient's medical chart.

However, a formal evaluation of the curriculum is necessary so that a comprehensive tobacco prevention and cessation program can be developed and implemented. Horowitz and Ogwell have identified a research agenda that incorporates both didac-

tic instruction on how tobacco use influences oral health, and clinical training in tobacco use interventions (29). A comprehensive program would be based on the U.S. Public Health Service guidelines for effective clinical treatment of tobacco use, and would incorporate elements of the National Cancer Institute-sponsored training program in tobacco use interventions for healthcare providers (27, 28). The implementation of this or a similar program at MUSC could increase students' preparedness to engage in tobacco use intervention practices with patients. This approach, combined with a dental school requirement that all students must provide cessation advice for tobacco users and that all students must be competent in doing so, would likely enhance these practices.

As South Carolina's only dental school, dental students and faculty at MUSC are charged with the mission of providing excellent oral health care for the state's population. Because South Carolina has the fourth highest oral cancer mortality rate in the United States and because South Carolina has high levels of tobacco use, it is critical that MUSC dental students learn how to provide tobacco prevention and cessation interventions to their patients. Including comprehensive tobacco prevention and cessation training in dental school supports the *Healthy People 2010* objective for increasing the percentage of dentists who provide smoking cessation counseling. Further intervention studies can be done to investigate the effectiveness of dentists and physicians in preventing tobacco use initiation. In addition, the provision of tobacco use interventions by dental providers may reduce the incidence of tobacco-related oral diseases.

Acknowledgements

The authors thank Tianxia Wu, Ph.D. for her contributions in statistical consulting and analysis.

Date and Place of Presentation

Originally presented at: The International Association for Dental Research General Session, March 10-13, 2004, Honolulu, HI.

References

1. Centers for Disease Control and Prevention. Annual smoking-attributable mortality, years of potential life lost, and economic costs- United States, 1995-1999. Morb Mortal Wkly Rep 2002;51(14):300-03.
2. Centers for Disease Control and Prevention. Cigarette smoking among adults- United States, 2002. Morb Mortal Wkly Rep 2004;53(20):428-31.
3. Centers for Disease Control and Prevention. Current cigarette smoking among high school students-United States, 1991-2004. Morb Mortal Wkly Rep 2004;53(23):499-502.
4. U.S. Department of Health and Human Services. The health consequences of smoking: A report of the surgeon general. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2004.
5. Warnakulasuriya S. Effectiveness of tobacco counseling in the dental office. J Dent Educ 2002;66:1079-87.
6. Gansky SA, Ellison JA, Kavanagh C, et al. Oral screening and brief tobacco cessation counseling: A review and findings. J Dent Educ 2002;66:1088-98.
7. Dolan TA, McGorray SP, Grinstead-Skigen CL, et al. Tobacco control activities in U.S. dental practices. J Am Dent Assoc 1997;128:1669-79.
8. Block DE, Block LE, Hutton SJ, et al. Tobacco counseling practices of dentists compared to other health care providers in a Midwestern region. J Dent Educ 1999;63:821-7.
9. Tomar SL, Husten C, Manley M. Do dentists and physicians advise tobacco users to quit? J Am Dent Assoc 1996;127:259-65.
10. Shenkin JD, Horowitz AM, Drury TF, et al. Attitudes of pediatric dentists towards tobacco intervention for children and adolescents: A pilot survey. Pediatr Dent 2003;25:53-60.
11. U.S. Department of Health and Human Services. Healthy People 2010. 2nd ed. Washington, D.C.: U.S. Government Printing Office, November 2000.
12. Vickers KS, Thomas JL, Patten CA, et al. Prevention of tobacco use in adolescents: review of current findings and implications for healthcare providers. Curr Opin Pediatr 2002;14:708-12.
13. Christakis DA, Garrison MM, Ebel BE, et al. Pediatric smoking prevention interventions delivered by care providers. Am J Prev Med 2003;25:358-62.
14. Gelskey SC. Cigarette smoking and periodontitis: methodology to assess the strength of evidence in support of a causal association. Community Dent Oral Epidemiol 1999;27:16-24.
15. Blot WJ, McLaughlin JK, Winn DM, et al. Smoking and drinking in relation to oral and pharyngeal cancer. Cancer Res 1988;48:3282-7.
16. Tomar SL, Asma S. Smoking-attributable periodontitis in the United States: Findings from NHANES III. J Periodontol 2000;71:743-51.
17. Weaver RG, Whittaker L, Valachovic RW, et al. Tobacco control and prevention effort in dental education. J Dent Educ 2002;66:426-9.
18. Barker GJ, Williams KB. Tobacco use cessation activities in U.S. dental and dental hygiene student clinics. J Dent Educ 1999;63:828-33.
19. Yip JK, Hay JL, Ostroff JS, et al. Dental students' attitudes toward smoking cessation guidelines. J Dent Educ 2000;64:641-50.
20. Victoroff KZ, Dankulich-Huryn T, Haque S. Attitudes of incoming dental students toward tobacco cessation promotion in the dental setting. J Dent Educ 2004;68:563-8.
21. Ries LAG, Eisner MP, Kosary CL, et al. SEER cancer statistics review, 1975-2001. Bethesda (MD): National Cancer Institute, Available at http://seer.cancer.gov/csr/1975_2001/. Accessed January 24, 2005.
22. Centers for Disease Control and Prevention. Tobacco control sate highlights 2002: Impact and opportunity. Atlanta, GA: Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2002:108-9.
23. Yellowitz JA, Horowitz AM, Drury TF, et al. Survey of U.S. dentists' knowledge and opinions about oral pharyngeal cancer. J Am Dent Assoc 2000;131:653-61.
24. Cannick GF, Horowitz AM, Drury TF, et al. Oral cancer knowledge among South Carolina dental students. J Am Dent Assoc 2005;136:373-8. .
25. Santos JRA. Cronbach's alpha: A tool for assessing the reliability of scales. J of Extension [on-line] 1999;37. http://www.joe.org/joe/1999april/tt3.html.
26. Koerber A, Crawford J, O'Connell K. The effects of teaching dental students brief motivational interviewing for smoking-cessation counseling: A pilot study. J Dent Educ 2003;67:439-47.
27. U.S. Department of Health and Human Services. How to help your patients be tobacco-free. National Cancer Institute, National Institutes of Health, Public Health Service, US Dept of Health and Human Services, 1997.
28. Fiore M, Bailey W, Cohen S, et al. Treating tobacco use and dependence. Clinical Practice Guideline. Rockville, MD: U.S. Department of Health and Human Services. Public Health Service, June 2000.
29. Horowitz AM, Ogwell EO. Where to from here? J Dent Educ 2002;66:1099-01.