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Elizabeth Applebaum, Tara N. Ruhlen, Frannie R. Kronenberg, Catherine Hayes and Edward S. Peters

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Oral cancer knowledge, attitudes and practices

A survey of dentists and primary care physicians in Massachusetts

Elizabeth Applebaum, DMD; Tara N. Ruhlen, MPH; Frannie R. Kronenberg, MD, SM; Catherine Hayes, DMD, SM, DMSc; Edward S. Peters, DMD, ScD

ABSTRACT

Background. The authors conducted a study to assess dentists' and primary care physicians' oral cancer knowledge, attitudes and practices in the Commonwealth of Massachusetts.

Methods. The authors mailed a 38-item, pretested questionnaire to a stratified sample of dentists and primary care physicians in Massachusetts. The sample population included all general medicine, internal medicine and family practice physicians listed with the Massachusetts Board of Registration in Medicine and all Massachusetts Dental Society members. The authors invited a random sample of more than 1,000 clinicians to participate in the survey. They assessed knowledge, attitudes and practices of respondents and performed a bivariate analysis of responses to questions by using statistical software.

Results. Forty-nine percent of physicians reported performing an oral cancer examination in patients aged 40 to 55 years, compared with 92 percent of dentists ($P < .001$). For patients 56 years or older, 54 percent of physicians reported performing oral cancer examinations, compared with 93 percent of dentists ($P < .001$). More than 96 percent of physicians reported that they asked patients about smoking and alcohol use. However, only 9 percent of physicians and 39 percent of dentists were able to identify the two most common sites on which oral cancer develops ($P < .001$). Fifty-seven percent of dentists and 24 percent of physicians correctly identified the most common symptom of early oral cancer.

Conclusion. This survey identified an existing gap in knowledge and practices among physicians and dentists and underscores the need to enhance oral cancer education among both professional groups.

Key Words. Mouth neoplasia; oropharyngeal cancer; diagnosis; etiology; clinical competence.

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Oropharyngeal carcinoma (OPC) is one of the 10 most common cancers worldwide.[1] The American Cancer Society estimated that 45,660 new cases of oral cancer would be diagnosed in the United States in 2007, and 11,210 deaths would have occurred.[2] The five-year survival rate for OPC is low and has remained relatively unchanged for the past three decades despite advances in treatment modalities: 59.1 percent for all stages combined.[3] Massachusetts ranks 15th among the states with regard to the incidence of oral cancer.[4] Between 2001 and 2005, 3,746 OPC cases were diagnosed in Massachusetts, accounting for 2.1 percent of all cancers diagnosed in the commonwealth.[5]

Established etiologic factors for OPC include both intensity and duration of alcohol and tobacco consumption,[6] with reported relative risks exceeding 100 among heavy smokers and heavy drinkers.[7] Tomar[8] reported that all forms of tobacco cause oral cancer and are responsible for more than 75 per-

Dr. Applebaum is a teaching assistant, School of Dentistry, The University of North Carolina at Chapel Hill.
Ms. Ruhlen is a research associate, Division of Epidemiology, School of Public Health, Louisiana State University Health Sciences Center, New Orleans.
Dr. Kronenberg is an adjunct assistant professor, Division of Health Policy and Systems Management, School of Public Health, Louisiana State University Health Sciences Center, New Orleans.
Dr. Hayes is a professor, Public Health and Community Service, School of Dental Medicine, Tufts University, Boston.
Dr. Peters is an assistant professor, Division of Epidemiology, School of Public Health, Louisiana State University Health Sciences Center, 1615 Poydras St., Suite 1400, New Orleans, La. 70112, e-mail "epete1@lsuhsc.edu". Address reprint requests to Dr. Peters.

cent of deaths caused by these malignancies in the United States. Although 80 percent of oral cancers are attributable to alcohol and tobacco exposure,[6] recent epidemiologic and experimental data have implicated infection with human papillomavirus (HPV) in the pathogenesis of oral cancer. Overall, approximately 35 percent of oral cancers are positive for HPV DNA,[9] with 90 to 95 percent positive for HPV-16.[10]

Mortality resulting from oral cancer is strongly correlated with the stage of diagnosis, as detection of earlier, lower-staged lesions is associated with significantly improved survival with lower morbidity.[11-14] The primary method for detecting OPC is a comprehensive oral cancer examination, which the American Cancer Society recommends annually for people 40 years or older.[15] However, only 20 percent of Americans 40 years or older reported having had an oral cancer examination in their lifetime. Among adults who reported having had a dental visit in the previous year, 26 percent mentioned ever having received an oral cancer examination. Among adults who had not visited a dentist in the previous year, only 9.2 percent reported ever having received such an examination.[16]

Dentists are in a unique position to examine patients for signs and symptoms of OPC because they see their patients relatively frequently and regularly compared with other primary care providers.[17] Even so, the population at greatest risk of developing OPC is more likely to visit a physician than a dentist.[18] Therefore, it is necessary to assess the knowledge, practices and opinions of both types of practitioners to determine where deficiencies may exist in oral cancer diagnostic knowledge. To accomplish this, we conducted a survey regarding OPC prevention and early detection among dentists and primary care physicians in Massachusetts.

SUBJECTS AND METHODS

We included in this study dentists identified as members of the Massachusetts Dental Society, Southborough, and physicians licensed by the Commonwealth of Massachusetts Board of Registration in Medicine, Wakefield, and practicing in the fields of general practice, family practice or internal medicine. We excluded physicians who were licensed to practice in a subspecialty of internal medicine and those from the surgical disciplines, because we hypothesized that these specialty physicians were less likely to be a patient's primary point of contact within the medical profession.

At the time of this study, there was a high penetration of managed care in Massachusetts, and the dominant practice involved primary care providers serving as as gatekeepers who controlled access to specialists. All of the dentists and physicians resided and practiced in Massachusetts. We chose a random sample of eligible dentists and physicians from each city and town in the commonwealth. The sample sizes were proportional to the number of dentists and physicians in each community. We compiled the initial sample to yield 500 physicians and 500 dentists. We excluded from the sample pool dentists and physicians residing in towns with fewer than four of either practitioner, because we could not maintain anonymity.

Survey. We developed a survey instrument from a 38-item questionnaire created by Horowitz and colleagues,[19] modified minimally for readability and layout. We refined the initial survey questions after pretesting them with a small sample of the dental directors of community health centers in Massachusetts. The survey questions encompassed the following: clinicians' demographic characteristics; clinicians' practices with regard to performing oral cancer examinations in patients and their assessment of patients' risk factors; clinicians' knowledge about the signs, symptoms and characteristics of oral cancer lesions; and clinicians' opinions of their knowledge level and training regarding the oral cancer examination.

Included with the survey were an introductory letter requesting participation, an opt-out postcard and a self-addressed and stamped envelope, which one of us (E.A.) mailed to dentists and physicians in our initial sample. Subjects had the option of choosing to decline participation in the survey or to mail back the completed survey in an enclosed return envelope. Randomly selected clinicians from the same region replaced clinicians who returned the postcard declining to participate in the study.

We mailed the survey in July 2003 and followed up with a reminder/thank-you letter two weeks later. In August 2003, we sent a second copy of the survey along with another letter requesting participation in the study. We did not

ABBREVIATION KEY. HPV: Human papillomavirus. **OPC:** Oropharyngeal carcinoma.

offer compensation as an incentive for participation. The institutional review board at Harvard Medical School, Boston, approved this study.

To develop an index of overall oral cancer knowledge, we used responses to 23 of the 38 questions concerning oral cancer risk and diagnosis. Two of us (E.A., E.S.P.) summed the correct answers to generate a knowledge index. On the basis of this index, which ranged from 0 to 23, we grouped the dentists and physicians into categories of oral cancer comprehensiveness; respondents receiving a score of 18 or greater were classified as having a high knowledge score.

Statistical analysis. We assessed knowledge, attitudes and practices of respondents and performed a bivariate analysis of responses to questions by using statistical software (STATA version 9, StataCorp, College Station, Texas, and SPSS version 12, SPSS, Chicago). In addition, we conducted χ^2 tests to determine whether a difference existed between the proportion of dentists' and physicians' responses regarding their knowledge of risk factors. We then used *t* tests to examine the mean difference between the opinions of dentists and those of physicians. We also performed *t* tests and χ^2 tests to determine the differences between dentists' and physicians' oral cancer practices. Using logistic regression, we subsequently examined the association of selected characteristics with the likelihood of receiving a high knowledge score.

RESULTS

From the 517 dentists randomly selected from a stratified sample of members of the Massachusetts Dental Society, four surveys were returned owing to an invalid address and 45 dentists reported that they were retired or not in practice. Of the remaining 468 dentists, 89 sent back the postcard refusing to participate, and we replaced each with another dentist from the same region of the state. A total of 274 surveys were returned, for a response rate of 58.5 percent.

We sent the survey to a sample of 531 general practice, family practice and internal medicine physicians listed with the Massachusetts Board of Registration in Medicine. Of the 531 surveys, 52 were returned because of an invalid address, and 22 physicians reported that they were retired or no longer in practice. Of the remaining 457 physicians, 91 sent back the postcard refusing to participate in the study, and we replaced each with another physician from the same region of the state. Of the 457 eligible physicians, 118 (25.8 percent) returned completed surveys.

Most of the respondents were male (77 percent of dentists and 53 percent of physicians) and they graduated from dental or medical school from 1944 to 2002, with a median year of 1982 for dentists and 1985 for physicians. The mean number of patients seen per week did not differ significantly between dentists and physicians (67 and 62 patients, respectively; $P = .325$).

Table 1 presents clinicians' practices related to oral cancer. Dentists reported providing almost double the number of oral cancer examinations as did physicians, despite an insignificant difference in the number of patients seen per week by each type of provider. During the preceding year, 88 percent of dentists and 72 percent of physicians reported having identified at least one patient with a suspicious oral lesion ($P < .001$). However, no physicians had identified more than 10 patients with suspicious oral lesions, whereas 24 percent of dentists reported that they had.

Knowledge of risk factors. Physicians were more proficient than dentists in assessing the risk factors for oral cancer when taking a medical history of their patients (Table 1). Ninety-six percent of physicians evaluated all eight risk factors for oral cancer, including past and present alcohol use, past and present tobacco use, type and amount of alcohol and tobacco used, and personal and family history of cancer. A significantly lower percentage of dentists than physicians reported that they reviewed their patients' oral cancer risk factors when taking a medical history. Although 99 percent of dentists and physicians correctly identified the use of tobacco as a high risk factor for oral cancer ($P < .001$), less than 50 percent of dentists and 80 percent of physicians could identify all four high-risk factors for oral cancer (tobacco use, alcohol use, previous oral lesion and advancing age).

Knowledge of oral cancer and examination process. We found no difference between dentists and physicians regarding identification of squamous cell carcinoma as the most common form of oral cancer ($P = .482$), and the fact that most patients with early oral cancer are asymptomatic ($P = .535$). However, only 34 percent of dentists and 10 percent of physicians could identify erythroplakia and leukoplakia as the two conditions most likely to be associated with oral cancer ($P < .001$). Less than 10 percent of physicians and 39 percent of dentists were able to identify the

TABLE 1

Clinicians' practices related to oral cancer.

PRACTICES	DENTISTS (N = 274)	PHYSICIANS (N = 118)	*P* VALUE
Patients Who Receive Oral Cancer Examination at Initial Visit (%)			
Aged 18-39 years	90	46	< .001
Aged 40-55 years	92	49	< .001
Aged 56 years and older	93	54	< .001
Edentulous Patients Who Receive Oral Cancer Examination at Initial Visit (%)	88	53	< .001
Patients Identified With Suspicious Oral Lesion in Past 12 Months, No. (%) of Respondents			
0	26 (9)	29 (25)	—*
1-2	40 (15)	50 (42)	—
3-5	80 (29)	29 (25)	—
6-10	56 (20)	6 (5)	—
11-15	19 (7)	0	—
16-20	13 (5)	0	—
21-25	13 (5)	0	—
26-30	9 (3)	0	—
31-35	1 (0)	0	—
36-40	2 (1)	0	—
41-45	2 (1)	0	—
46-50	6 (2)	0	—
	1 (0)	0	—
Missing data	6 (2)	4 (3)	—
Mean Number of Patients Identified With Suspicious Oral Lesion in Past 12 Months	9	2	< .001
Mean Number of Patients Receiving Biopsy/Referred for Diagnosis of Suspicious Oral Lesion in Past 12 Months	7	2	< .001
Assessment of Risk Factors When Taking a Medical History, No. (%) of Respondents			
Past alcohol use	125 (47)	114 (99)	< .001
Present alcohol use	147 (55)	116 (100)	< .001
Type and amount of alcohol used	89 (34)	111 (96)	< .001
Past tobacco use	208 (79)	116 (100)	< .001
Present tobacco use	247 (92)	117 (100)	.001
Type and amount of tobacco used	187 (72)	113 (97)	< .001
Patient's history of cancer	228 (85)	115 (100)	< .001
Family history of cancer	147 (56)	112 (97)	< .001

* Not applicable.

two most common sites in which oral cancer develops ($P < .001$).

The majority of dentists (96 percent) and physicians (91 percent) reported that they believed that dentists were qualified to perform oral cancer examinations ($P = .113$), while only 45 percent of dentists and 67 percent of physicians believed that physicians were qualified to perform such examinations ($P < .001$). Whereas 85 percent of dentists agreed or strongly agreed that they were adequately trained to examine patients for oral cancer, only 46 percent of physicians ($P < .001$) expressed that belief. Approximately 50 percent of dentists and only 5 percent of physicians agreed or strongly agreed that their knowledge about oral cancer was current ($P < .001$). However, 85 percent of physicians believed that they were adequately trained to provide their patients with tobacco-use cessation education and 75 percent believed they were adequately trained to provide alcohol-use cessation education. In contrast, only 24 percent of dentists believed that they were adequately trained to provide tobacco-use cessation education to their patients ($P < .001$), and only 12 percent believed they were adequately trained to provide alcohol-use cessation education ($P < .001$).

Knowledge index score. The mean knowledge index score among dentists was 14.0, with a range of 0 to 21; this compares with a mean score of 13.4 among physicians, with scores ranging from 1 to 19 ($P = .01$). Dentists were more than three times as likely to receive a high score on the knowledge index compared with physicians (odds ratio [OR] = 3.6; 95 percent confidence interval [CI], 1.5-8.6). Specifically, more than 89 percent of dentists received

medium or high scores on the index, while 92 percent of physicians received low or medium scores. Table 2 presents the results of the multivariate logistic regression.

We found that a number of provider characteristics were associated with a higher knowledge score: female providers, more recent graduation date and referral of more than 10 patients with suspicious oral lesions. Conversely, two attributes were associated with a lower knowledge index score: age, which was significantly inversely associated, and providers in solo practice compared with other practice models (that is, public health, partnership or employee). Also, graduation from dental or medical school after 1992 was associated with a fivefold greater likelihood of receiving a high knowledge score compared with graduation before 1972 (OR = 5.0; 95 percent CI, 1.2-19.7).

TABLE 2

Likelihood of receiving a high score on the oral cancer knowledge index.

VARIABLE	UNADJUSTED OR*	95% CI†	ADJUSTED OR‡	95% CI
Provider				
Physician	1.0§	—¶	1.0§	—
Dentist	2.2	1.1-4.7	3.6	1.5-8.6
Sex				
Male	1.0§	—	1.0§	—
Female	1.2	0.6-2.2	0.9	0.4-2.0
Graduation Year				
Before 1972	1.0§	—	1.0§	—
1972-1978	2.5	0.7-8.4	2.5	0.6-10.1
1979-1985	2.5	0.8-8.8	3.6	1.0-14.0
1986-1992	3.3	1.0-10.8	4.0	1.0-15.8
1993-2002	5.1	1.6-16.0	5.0	1.2-19.7
Practice Type				
Solo	1.0§	—	1.0§	—
Public health	1.9	0.2-16.6	1.8	0.2-17.9
Partnership	2.3	1.0-5.4	2.4	1.0-6.0
Employee	2.3	1.0-5.3	3.0	1.1-8.3
Other	1.4	0.5-3.5	1.4	0.5-3.8

* OR: Odds ratio.
† CI: Confidence interval.
‡ Adjusted for all other variables.
§ Reference.
¶ Not applicable.

DISCUSSION

The ability to routinely identify patients at high risk of developing oral cancer and to detect the disease at an early stage are challenges shared by the medical and dental professions in Massachusetts. The results of our study show that physicians were knowledgeable about the risk factors associated most highly with oral cancer and were diligent about assessing them when taking a medical history. Physicians in our study described themselves as capable of managing the behavioral risk factors through patient education regarding tobacco- and alcohol-use cessation.

Despite this finding, most physicians demonstrated poor knowledge of the signs and symptoms associated with oral cancer and reported that they did not feel adequately trained to perform oral cancer examinations. We suspect that the physicians in our study were performing routine comprehensive screening of their patients as part of their medical assessments—which happen to include a personal and family history of cancer and the use patterns for tobacco and alcohol, the risk factors for oral cancer—and not deliberately and specifically screening for oral cancer.

In contrast, dentists were more knowledgeable about oral cancer signs and symptoms than were their physician counterparts, and they considered themselves to be more proficient at performing oral cancer examinations and identifying oral cancer lesions. Our research suggests that dentists are the primary providers of oral cancer examinations, as they reported performing almost double the number of examinations as did physicians despite an insignificant difference in the number of patients treated per week by each type of provider. Most dentists reported feeling inadequately trained to provide education to their patients regarding tobacco- and alcohol-use cessation. These results are consistent with findings of low rates of tobacco- and alcohol-use cessation counseling among dentists in other reported studies.[8,20,21]

We believe there are missed opportunities in the dental office. First, with dentists' focus limited to the oral cavity, it is reasonable to believe that they might be able to easily obtain a focused medical and behavioral history, including the key risk factors for oral cancer. Second, multiple opportunities exist during a patient's visit to a dental office for tobacco-use intervention services, as it has

been established that dental patients traditionally are receptive to preventive health messages.[8]

On the basis of our findings, we believe that more education of dentists and physicians would serve to address the knowledge deficits and practice shortcomings with regard to oral cancer screening, prevention and early detection. Although dental students may receive focused training in risk factors and oral examinations, medical schools may be limiting such training because of a belief that oral cancer management is the responsibility of dentists. In a survey of 86 U.S. medical schools, Ahluwalia and colleagues[22] found that the curriculum covering oral cancer information and examinations was brief and incomplete. Just as it is critical for dentists to engage patients in risk factor counseling, it is imperative that a comprehensive examination of the mouth be included in the clinical curriculum for medical students.

Continuing education. In our survey of practicing clinicians, most dentists and many physicians expressed an interest in furthering their education regarding oral cancer. These findings generally are supported by a variety of published reports.[23-25] We contend that an offering of continuing dental and medical education programs would go a long way to enhance the prevention and early diagnosis of oral cancer. Optimally, educational programs should focus on risk factor screening; behavior modification counseling; physical examination of the oral cavity; and a review of the criteria for referral to a specialist for a biopsy, definitive diagnosis and treatment. We also believe that reimbursement by dental insurance providers for oral cancer screening examinations and soft-tissue biopsies performed by general dentists should be aligned with the goal of reducing morbidity and mortality associated with oral cancer.

For both dentists and physicians, we found that higher levels of knowledge about oral cancer risk factors and diagnosis were associated with more recent graduation from dental or medical school and working in a partnership. Patton and colleagues[26] found that the likelihood of achieving a high score on the knowledge index was associated most strongly with graduation year and previous knowledge of oral cancer diagnostic aids. They did not observe an association with practice type (comparing solo with all other types).

This is an intriguing finding, and we believe that the nonsolo practice environment might have several advantages: greater requirements and/or opportunities for continuing education, use of standardized screening protocols, availability of nondentist referral resources for patient counseling and peer education within the group practice environment when more recent graduates join the group. We also contend that solo practice may not be conducive to taking time from direct patient care to engage in continuing education, especially those programs that do not lead to reimbursable dental services such as behavior modification counseling. Further investigation might be needed to elucidate the differences we observed. We suspect that limited or nonexistent reimbursement for oral cancer screening examinations and soft-tissue biopsies performed by general dentists might deter their interest in seeking further education.

HPV. It is important to note that at the time of this study, the etiologic role of HPV in the pathogenesis of oral cancer still was being elucidated and, consequently, our survey of physicians and dentists did not include questions about knowledge of HPV as a risk factor. Today, we know that approximately 35 percent of oral cancers are positive for HPV-DNA,[9] with 90 to 95 percent of these positive for HPV-16.[10] Investigators should use this more recent knowledge to inform future studies, and it should be requisite in any curriculum on etiology, screening and detection of oral cancer for medical students, dental students, physicians and dentists.

Massachusetts has several institutions that are highly regarded as national leaders in dental and medical education. Consequently, the potential for increased knowledge regarding oral cancer may be greater among practitioners in Massachusetts relative to a national sample. Despite this, we have shown that a considerable opportunity for improvement exists among these clinicians. Investigators reported similar results from surveys of dentists and physicians in Illinois[27] and Maryland,[23,28] suggesting that knowledge deficits and practice issues exist in other regions of the country and our findings can, in large part, be extrapolated nationally.

Nonrespondents. Although the response rate for dentists in this study was fairly high (58.5 percent), the response rate for physicians was considerably lower (25.8 percent). To dismiss the possibility of nonresponse bias contributing to this difference, one of us (E.A.) telephoned a random group of approximately 50 nonrespondent physicians in October 2003 to ascertain their reasons

for nonparticipation. The results from this follow-up telephone survey indicated that the physicians selected initially were no longer at the addresses registered with the Massachusetts Board of Medicine. In these cases, the mailing presumably was discarded without reaching the intended recipient. Despite our lower response rate for physicians, the study contained enough statistical power for us to make significant conclusions that we believe can be generalized to our sample pool.

Possible alternate explanations for our observed results are selection bias, response bias or both, which are inherent potential weaknesses of survey design. Our randomized sample was unweighted and, as such, may not reflect the underlying distribution of dentists and physicians in the state; this may limit somewhat our ability to generalize the findings to a larger population. Likewise, those who did respond may not be representative of the source population, but might possess a greater oral cancer knowledge base, making them more inclined to respond than nonrespondents. Thus, our results may reflect a scenario in which the overall knowledge base in the study sample is higher than that in the source population; if so, the problem is greater than we have stated.

CONCLUSION

Our assessment of the knowledge, practices and attitudes of dentists and primary care physicians in Massachusetts revealed that opportunities exist for improved screening, intervention and early detection of oral cancer. Given that mortality resulting from oral cancer is correlated strongly with the stage of diagnosis, prevention and early diagnosis have the potential for significant impact. Further investigation may be required to fully understand the barriers to consistent oral cancer screening and detection practices in Massachusetts and across the United States. In the meantime, the inclusion of risk factor screening, physical examinations of the oral cavity and behavior modification intervention training in dental and medical school curricula, as well as access to continuing education programs on these subjects, would begin to address the deficiencies we observed. ■

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1. Parkin DM, Bray F, Ferley J, Pisani P. Global cancer statistics, 2002. CA Cancer J Clin 2005;55(2):74-108.
2. American Cancer Society. Cancer Facts & Figures 2008. Atlanta: American Cancer Society; 2008. "www.cancer.org/downloads/STT/2008CAFFfinalsecured.pdf". Accessed Feb. 25, 2009.
3. Jemal A, Siegel R, Ward E, Murray T, Xu J, Thun MJ. Cancer statistics, 2007. CA Cancer J Clin 2007;57(1):43-66.
4. U.S. Cancer Statistics Working Group. United States Cancer Statistics: 2004 Incidence and Mortality. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, and National Cancer Institute; 2007. "www.cdc.gov/cancer/npcr/npcrpdfs/US_Cancer_Statistics_2004_Incidence_and_Mortality.pdf". Accessed March 3, 2009.
5. Gershman S. Cancer Incidence and Mortality in Massachusetts 2001-2005: Statewide Report. Boston: Bureau of Health Information, Statistics, Research, and Evaluation, Massachusetts Department of Public Health; 2008. "www.mass.gov/Eeohhs2/docs/dph/cancer/registry_statewide_01_05_report.pdf". Accessed March 3, 2009.
6. Gillison ML. Current topics in the epidemiology of oral cavity and oropharyngeal cancers. Head Neck 2007;29(8):779-792.
7. Bosetti C, Gallus S, Garavello W, La Vecchia C. Smoking cessation and the risk of oesophageal cancer: an overview of published studies. Oral Oncol 2006;42(10):957-964.
8. Tomar SA. Dentistry's role in tobacco control. JADA 2001;132(suppl):30S-35S.
9. Kreimer AR, Clifford GM, Boyle P, Franceschi S. Human papillomavirus types in head and neck squamous cell carcinomas worldwide: a systematic review. Cancer Epidemiol Biomarkers Prev 2005;14(2):467-475.
10. D'Souza G, Kreimer AR, Viscidi R, et al. Case-control study of human papillomavirus and oropharyngeal cancer. N Engl J Med 2007;356(19):1944-1956.
11. Baatenburg de Jong RJ, Hermans J, Molenaar J, Briaire JJ, le Cessie S. Prediction of survival in patients with head and neck cancer. Head Neck 2001;23(9):718-724.
12. Kurokawa H, Zhang M, Matsumoto S, et al. The high prognostic value of the histologic grade at the deep invasive front of tongue squamous cell carcinoma. J Oral Pathol Med 2005;34(6):329-333.
13. Silveira EJ, Godoy GP, Lins RD, et al. Correlation of clinical, histological and cytokeratin profiles of squamous cell carcinoma of the oral tongue with prognosis. Int J Surg Pathol 2007;15(4):376-383.
14. Warnakulasuriya KA, Johnson NW. Strengths and weaknesses of screening programmes for oral malignancies and potentially malignant lesions. Eur J Cancer Prev 1996;5(2):93-98.
15. Smith RA, Cokkinides V, Eyre HJ. Cancer screening in the United States, 2007: a review of current guidelines, practices, and prospects. CA Cancer J Clin 2007;57(2):90-104.
16. Macek MD, Reid BC, Yellowitz JA. Oral cancer examinations among adults at high risk: findings from the 1998 National Health Interview Survey. J Public Health Dent 2003;63(2):119-125.
17. Victoroff KZ, Lewis R, Ellis E, Ntragatakis M. Patient receptivity to tobacco cessation counseling in an academic dental clinic: a patient survey. J Public Health Dent 2006;66(3):209-211.
18. Yellowitz JA. Goodman HS. Assessing physicians' and dentists' oral cancer knowledge, opinions and practices. JADA 1995;126(1):53-60.
19. Horowitz AM, Drury TF, Goodman HS, Yellowitz JA. Oral pharyngeal cancer prevention and early detection: dentists' opinions and practices. JADA 2000;131(4):453-462.
20. Cruz GD, Ostroff JS, Kumar JV, Gajendra S. Preventing and detecting oral cancer. Oral health care providers' readiness to provide health behavior counseling and oral cancer examinations. JADA 2005;136(5):594-601.
21. Dolan TA, McGorray SP, Grinstead-Skigen CL, Mecklenburg R. Tobacco control activities in U.S. dental practices. JADA 1997;128(12):1669-1679.
22. Ahluwalia K, Ro M, Erwin K, Treadwell H. Racial disparities in oral cancer risk and outcomes. J Cancer Educ 2005;20(2):70-71.
23. Canto MT, Horowitz AM, Drury TF, Goodman HS. Maryland family physicians' knowledge, opinions and practices about oral cancer. Oral Oncol 2002;38(5):416-424.
24. McCunniff MD, Barker GJ, Barker BE, Williams K. Health professionals' baseline knowledge of oral/pharyngeal cancers. J Cancer Educ 2000;15(2):79-81.
25. Horowitz AM, Siriphant P, Canto MT, Child WL. Maryland dental hygienists' views of oral cancer prevention and early detection. J Dent Hyg 2002;76(3):186-191.
26. Patton LL, Elter JR, Southerland JH, Strauss RP. Knowledge of oral cancer risk factors and diagnostic concepts among North Carolina dentists. Implications for diagnosis and referral. JADA 2005;136(5):602-610; quiz 82.
27. Lehew CW, Kaste LM. Oral cancer prevention and early detection knowledge and practices of Illinois dentists: a brief communication. J Public Health Dent 2007;67(2):89-93.
28. Horowitz AM, Siriphant P, Sheikh A, Child WL. Perspectives of Maryland dentists on oral cancer. JADA 2001;132(1):65-72.