

Influence of Continuing Education on Dental Hygienists' Knowledge and Behavior Related to Oral Cancer Screening and Tobacco Cessation

Margaret M. Walsh, RDH, MS, MA, EdD; Kathleen V. Rankin, DDS; Sol Silverman Jr, MA, DDS

Introduction

There are more than 35,000 new cases of oral and pharyngeal cancers (OPC) diagnosed each year.¹ OPC includes cancers of the lip, tongue, floor of mouth, oral cavity, tonsils, oropharynx and pharynx. Approximately 90% are squamous cell carcinomas. The most common intraoral sites for squamous cell carcinoma are the tongue, the floor of the mouth and oropharynx.¹

Early signs of OPC include erythroplakia (red patches), leukoplakia (white or red-and-white patches) and/or a sore (ulcer, growth). Such lesions that persist more than 2 weeks without a diagnosis must be considered potential cancer requiring biopsy and microscopic evaluation.²

Due to the absence of pain and/or minimal symptoms of early OPC lesions, there is often a delay in diagnosis. About two-thirds of OPC are diagnosed in advanced stages, requiring aggressive treatment, resulting in higher morbidity and mortality than when diagnosed early. Although the overall 5 year survival rate of OPC remains about 60%, the outcomes vary by stage and location of the disease.^{1,3} When diagnosed and treated early, OPCs have more than an 80% 5 year survival rate, compared with less than 30% for a late-stage cancerous lesion.⁴

Tobacco and heavy alcohol use are the chief modifiable risk factors for OPC. Low consumption of fruits and vegetables, a previous oral cancer, advancing age, human papillomavirus (HPV) infection and excessive unprotected sun exposure

(for lip cancer)⁵⁻⁷ are also risk factors for OPC.⁸ Assisting tobacco users to stop their tobacco use is essential to reduce the incidence of OPC. Objective 14 of the new long-range goals for Healthy People 2020 relating to preventive interventions in dental offices states:⁹

- Increase the proportion of adults who receive information from a dentist or dental hygienist

Abstract

Purpose: There are more than 35,000 new cases of oral and pharyngeal cancers (OPC) diagnosed each year. Most OPCs are diagnosed in advanced stages, requiring aggressive treatment and resulting in higher morbidity and mortality than when diagnosed early. The overall 5 year survival rate of OPC is about 60%. Early detection of OPC lesions are the key to survival. A major risk factor for OPC is chronic tobacco use. The purpose of this paper is to report changes in dental hygienists' knowledge, attitudes and behaviors 6 months after attending a standardized lecture format continuing education (CE) course on early OPC detection and tobacco cessation counseling compared to baseline values.

Methods: A total of 64 CE courses were given for dental professionals throughout the 10 U.S. public health districts to determine if OPC screenings and tobacco cessation counseling behaviors could be modified at 6 months post-training. Questionnaires were obtained at baseline and 6 months later using a pre-/post-test design.

Results: A total of 1,463 dental hygienists participated at baseline and 543 at a 6 month follow-up. Data showed a significant difference in knowledge and behavior compared to baseline values.

Conclusion: CE appeared to have a significant influence on participants' OPC and tobacco cessation knowledge and behavior, and could potentially make a difference on prevention, early detection and ultimately on OPC control.

Keywords: Oropharyngeal cancer, tobacco cessation, dental hygienists, continuing education

This study supports the NDHRA priority area, **Health Promotion/Disease Prevention:** Assess strategies for effective communication between the dental hygienist and client.

focusing on reducing tobacco use or smoking cessation in the past year (Objective 14.1)

- Increase the proportion of adults who receive an oral and pharyngeal cancer screening from a dentist or dental hygienist in the past year (Objective 14.2)

OPC screening and tobacco cessation counseling are very important components of dental hygiene care, since dental hygienists' focus is on oral disease prevention and health promotion.¹⁰ Studies have demonstrated the efficacy of using an OPC screening as a "teachable moment" to promote tobacco cessation.^{11,12} Many studies have also supported the need for continuing education (CE) courses for dental hygienists that focus on OPC prevention (e.g., tobacco cessation) and early detection.¹³⁻¹⁸ For example, findings from a 2001 national survey of licensed dental hygienists indicated the majority of respondents reported they needed to increase their knowledge of OPC risk factors and their skills for performing a thorough oral cancer screening examination and tobacco cessation counseling. Moreover, 93% expressed interest in attending an OPC CE course related to risk assessment and early OPC detection.¹³ The ideal method for the delivery of OPC and tobacco cessation CE is a source of controversy.^{19,20} The purpose of this paper is to report changes in dental hygienists' knowledge, attitudes and behaviors 6 months after attending a standardized lecture format CE course on early OPC detection and tobacco cessation counseling. Although both dentists and dental hygienists attended this course, results for only dental hygienists are reported.

Methods and Materials

Study Design

This group longitudinal case study had a pre-/post-test design. The study was approved by the American Dental Association (ADA) Institutional Review Board (IRB). Because this study proposed to survey practicing dental hygienists to evaluate how their knowledge, attitudes and behaviors were affected by attending an OPC screening and tobacco cessation education program, the IRB review stated that the proposed study qualified for an exemption.

Eligibility Criteria

Eligibility criteria for study participation were dental hygienists who worked in clinical practice, enrolled in the standardized CE courses on OPC screening and tobacco cessation offered from 2001

to 2005 and agreed to participate in the study.

Sample Selection, Recruitment and Survey Administration

The study involved a convenience sample of clinical dental hygienists recruited while attending 1 of 64 standardized CE courses on OPC screening and tobacco cessation. The courses were sponsored by the ADA, funded by the National Cancer Institute (NCI) and held in conjunction with state/local dental societies, as well as dental schools and other recognized dental organizations located throughout the U.S.

A coded pre-test was administered at the beginning of each course to establish participants' baseline knowledge, attitudes and practice behaviors regarding OPC screening and tobacco cessation. A mailed similarly coded post-test was administered 6 months post-training. The initial follow-up survey mailing included a cover letter, the coded survey instrument and a pre-addressed, postage paid return envelope. For non-respondents, the initial mailing was followed by a second mailing 2 weeks later, and a phone call 2 weeks later if no response was received from the second mailing. Both pre- and post-test surveys were coded for ease of follow-up and to ensure confidentiality.

Development of Course Content and Evaluation Materials

During year 1 of this 5 year study, the CE course content and the survey instruments were developed, assessed for feasibility and acceptability at 2 workshops held at the ADA headquarters and refined based on feedback.

Final Course Content

The final course content on OPC screening and tobacco use cessation was presented in lecture format and involved 5 clock hours. Two presenters conducted each course with 1 covering the early detection of OPC screening module and the other focusing on the tobacco cessation module. The faculty comprised a pool of 20 professional specialists who underwent standardized training for course presentation.

Tobacco Cessation

The tobacco cessation course content addressed the following topics: forms of tobacco, nicotine dependence and the 5 A's approach to initiating tobacco cessation counseling (Ask about tobacco use, Advise users to quit, Assess readiness to quit,

Assist with the quitting process based on readiness to quit and Arrange follow-up), similar to those presented in the 2008 update of the Clinical Practice Guideline for Treating Tobacco Use and Dependence.^{21,22} For counseling tobacco users ready to quit, topics covered were the quit date, triggers for tobacco use, pharmacotherapy, online cessation assistance and quitline referrals, and follow-up during the quit attempt.

For counseling tobacco users not ready to quit, the course addressed the 5 R's (Relevance, Roadblocks, Risks, Rewards and Repetition) to enhance motivation to quit.²¹ Although the core content in this regard was similar to that listed in the 2008 Guideline,²¹ the style in which the clinician and patient discussion of change was presented in the module was based on the practice of motivational interviewing.²³

The basic concepts of motivational interviewing are to express empathy by accepting patients as they are and respecting their point of view, help them to develop discrepancy between their current behavior and their desired behavior, avoid arguing with and lecturing them, redirect the conversation to avoid confrontation and support the belief in their ability to change. In this style, the provider employs the structure for the conversation using open-ended questions, affirming feedback, practicing reflective listening and using summary statements. Also, in this style of counseling, the majority of the input originates with the patient.

OPC Screening

The OPC screening module addressed the following topics: epidemiology and risk factors, differential diagnosis, early signs and symptoms, premalignant oral lesions and oral cancer, the OPC screening procedure, adjunctive techniques to accelerate biopsy and management of premalignant lesions to prevent malignant transformations.²⁴⁻²⁶

Survey Measures

The 20-item pre-test survey assessed general demographics and dental hygienists' baseline knowledge, attitudes and practices related to OPC screening and tobacco cessation counseling.

Demographic-related items (n=3)

Among these items, 1 each assessed gender, date of graduation from dental hygiene school (response options: <1980; 1980 to 1989 and ≥1990) and tobacco use status (never/only experimented, former user, current user).

Items related to tobacco cessation (n=6)

An attitude item assessed the importance of tobacco cessation counseling with 5 levels of response options ranging from "very unimportant" to "very important," and a knowledge item assessed contraindications to the nicotine patch. There were 4 performance measures. Item 1 asked about advising patients to quit tobacco (yes/no), item 2 addressed the percentage of patients for whom they update tobacco use status, ask about relapse, age of tobacco use initiation and the quantity used daily. Item 3 assessed the percentage of patients not ready to quit for whom they discuss personal relevance of quitting, roadblocks to quitting and rewards of quitting. Item 4 assessed the percentage of patients ready to quit for whom they discuss setting a quit date, identify tobacco use triggers, discuss pharmacotherapy options and provide follow-up during quit attempts.

Items related to OPC screening (n=11)

An attitude item assessed the importance of OPC screening/detection with 5 levels of response options ranging from "very unimportant" to "very important." One item asked if they understood what comprised an OPC screening (yes/no/not sure) and a knowledge item related to OPC risk factors. Among the 8 performance measures, 1 item asked about performing OPC screening on patients (yes/no), and 7 items assessed the percentage of patients for whom they screened for OPC at the initial dental hygiene visit and at the periodic dental hygiene care appointments post-initial visit for patients aged 13 to 17, 18 to 30, over age 30, over age 40 and for patients with a mucosal sore. The 7 items also assessed the percentage of patients for whom they performed a visual soft tissue exam, retracted the tongue to view lateral borders, palpated the neck and informed the patient of the procedure when doing the OPC screening. One item assessed use of adjunctive tissue diagnostic techniques related to toluidine blue staining, brush biopsy and Vizlite® (Zila Inc., Fort Collins, Colorado) chemiluminescence. Finally, 1 item assessed the number of patients they referred for a biopsy in the past 12 months.

Data Analysis

Data were coded without personal identifiers and entered into password protected computer files, and hard copies securely stored. Descriptive summaries were performed for all questionnaire variables. For items assessing attitudes on

a 5 point Likert scale ranging from “very unimportant” to “very important,” scores 1, 2 and 3 were collapsed into 1 group, and scores 4 and 5 were collapsed into another to create measures of “Somewhat Important/Very Important.” Analyses included frequency distributions, chi-square and Fisher’s exact tests when categorical variables were compared, t-tests and Mann-Whitney for continuous variables.

In addition, mean follow-up scores in dental hygienists attitudes and behaviors and positive change scores from baseline to follow-up were compared. Dichotomized change was computed as a positive difference between dental hygienists’ answers at follow-up and at baseline. The positive change variable was set equal to 0 if the change was negative or zero, equal to 1 if the change was positive and equal to missing if either value was missing. Only baseline data for subjects who returned the follow-up survey were used in the analysis.

Results

Demographics

Among the dental hygienists who attended 1 of the 64 standardized courses offered, 1,463 completed the baseline survey. Most were female (99%), and had never tried tobacco or only experimented with it (74%). Nearly half (49%) had graduated in 1990 or later. At follow-up, attrition was 63% (n=543).

Baseline Tobacco Cessation

Table I shows that at baseline over two-thirds reported tobacco cessation counseling was very or somewhat important. On the knowledge question about contraindications for use of the nicotine patch system, only about one-quarter knew the correct answer. Regarding the behavior variables, almost all advised tobacco users to quit using tobacco. Approximately two-thirds reported updating tobacco use status of continuing patients, asking about quantity of tobacco used daily and discussing personal relevance and benefits of quitting with tobacco users not ready to quit. Almost half reported asking former tobacco users about relapse, and about

Table I: Baseline Smoking Cessation-related Knowledge, Attitudes, and Behaviors of Participating Clinical Dental Hygienists (n=1,463)

Knowledge: Contraindications to Nicotine Patch Use	n*	%
Chose correct answer	340	23.2
Chose incorrect answer	1,123	76.8
Attitude: Importance of tobacco cessation		
Very important/ Somewhat important	1,120	81.8
Somewhat unimportant	207	15.1
Not at all important	42	3.1
Reported Behaviors (yes)		
Update tobacco use status of continuing patients	1,319	66.0
Ask former tobacco users about relapse	1,293	47.4
Ask tobacco users the age at which started tobacco	1,283	36.0
Ask tobacco users the quantity used daily	1,314	62.7
Advise patients to quit tobacco	1,322	94.3
For patients not ready to quit:		
Discuss personal relevance of quitting	1,308	62.6
Discuss roadblocks to quitting	1,258	46.1
Identify rewards of quitting	1,305	59.7
For patients ready to quit:		
Discuss setting a quit-date	1,259	24.7
Identify tobacco use triggers	1,248	22.7
Discuss pharmacotherapy options	1,275	40.8
Provide follow-up during quit attempt	1,229	8.9

*May vary due to missing data

one-third asked current tobacco users the age at which they started using tobacco. With users ready to quit, less than half discussed pharmacotherapy options (41%) and only one-quarter discussed setting a quit date and coping with tobacco-use trigger situations. Less than 10% provided follow-up during a quit attempt.

Baseline OPC Screening

Table II summarizes baseline results for OPC screening. Almost all reported OPC screening was very or somewhat important. Regarding the behavioral variables, almost all reported screening for OPC on patients by visually examining the soft tissue, including retracting the tongue to view lateral borders. Only three-quarters reported that they informed patients of the procedure when doing it and only about half reported palpating the neck for lymph node manifestations. Few reported using adjunctive tissue diagnostic techniques such as toluidine blue, brush biopsy or Vizilite®.

At least 80% reported conducting an OPC screening on smokers over age 40 at their initial visit and at periodic recalls, and on patients with mucosal le-

sions. At least 70% reported screening patients aged 18 to 30 years and patients over age 30. Slightly over half reported screening patients aged 13 to 17 years.

Changes from Baseline to 6 Month Follow-Up in Tobacco Cessation-Related Knowledge, Attitudes and Behaviors

Table III shows significant improvement in knowledge of contraindication to nicotine patch use for smoking cessation, in updating tobacco use status of continuing patients, asking tobacco users about age of tobacco use initiation and asking them the quantity they currently used daily.

Also, in counseling patients not ready to quit, there was significant improvement in discussing roadblocks to quitting and identifying benefits of quitting. In counseling patients ready to quit, there was significant improvement in discussing a quit-date, tobacco use triggers and pharmacotherapy options, and in following-up with those who made a quit attempt.

Changes from Baseline to 6 Month Follow-Up in OPC-Related Knowledge, Attitudes and Behaviors

Table IV shows significant improvement in performing visual exams of soft tissues, retracting the tongue to view lateral borders and in palpating the neck during oral cancer screening. In addition, there was significant improvement in the percentages of patients screened for OPC aged 13 to 17 years, smokers over age 40 and those with mucosal lesions. There was also significant improvement in informing patients of the procedure when doing an OPC screening and in using brush biopsy as an adjunctive tissue diagnostic technique.

Discussion

The ability to routinely identify patients at high risk of developing OPC and to detect the disease at an early stage is a challenge for all health pro-

Table II: Baseline Oral Cancer Screening-related Knowledge, Attitudes, and Behavior of Participating Clinical Dental Hygienists (n=1,463)

	n*	%
Knowledge: Factor not associated with oral cancer	1,185	81.0
Advancing age	246	20.8
Dental prostheses	194	16.4
Leukoplakia	79	6.7
Diets low in fruits and vegetables	666	56.1
Attitudes: Importance of early cancer detection	1,396	95.4
Very important/Somewhat important	1,356	97.1
Somewhat unimportant	26	1.9
Not at all important	14	1.0
Reported Behaviors (yes)		
Performs oral cancer screening on patients (yes)	1,253	93.6
Patient categories screened for oral cancer:		
Patients age 13-17, initial visit	1,166	64.6
Patients age 13-17, periodic recall after 6 months	1,145	59.8
Patients age 18-30, initial visit	1,230	80.9
Patients age 18-30, periodic recall after 6 months	1,245	77.4
Patients over age 30, initial visit	1,212	82.2
Patients over age 30, periodic recall after 6 months	1,234	79.5
Smokers over age 40, initial visit	1,233	85.2
Smokers over age 40, periodic recall after 6 months	1,255	84.0
Patients with mucosal sore, initial visit	1,229	85.8
Patients with mucosal sore, periodic recall after 6 months	1,252	85.6
Informs patients of procedure when doing oral cancer		
Screening	1,277	76.1
During oral cancer screening:		
Performs visual exam of soft tissue	1,299	92.7
Retracts tongue to view lateral borders	1,291	89.5
Palpates the neck	1,246	50.9
Adjunctive tissue diagnostic techniques used		
Toluidine blue	810	1.8
Brush biopsy	889	14.7
VizLite	815	2.2
Referred patients for biopsy in past 12 months	1,152	5.0

*May vary due to missing data

fessionals.^{13-15,27-29} Dental hygienists see their patients frequently and regularly, and therefore are available to perform routine OPC screening examinations and to encourage and support patient tobacco cessation attempts.

OPC Screening

At baseline, almost all of the dental hygienists in this study recognized the importance of OPC detection. Despite the high level of reported OPC screening, only about half were performing neck palpations. Therefore, even though almost

Table III: Changes in Smoking Cessation-related Knowledge, Attitudes, and Behaviors from Baseline to 6-month Follow-up among Clinical Dental Hygienists who Attended the Continuing Education Course (n=551)

	n	Baseline	Follow-up	Diff	p-value
Attitudes					
Importance of tobacco cessation	516				
Very or somewhat important		81.8%	85.0%	3.2%	0.0811
Somewhat unimportant		16.3%	13.6%	-2.7%	
Not at all important		1.9%	1.4%	-0.5%	
Knowledge					
Contraindications for nicotine patch	406				
Chose correct answer		28.3%	35.0%	6.7%	0.0289*
Reported Behavior					
Update tobacco use status of continuing patients	505	67.8%	72.6%	4.8%	0.0011*
Ask former tobacco users about relapse	495	50.3%	51.1%	0.8%	0.6561
Ask tobacco users the age at which started Tobacco	482	35.3%	40.5%	5.2%	0.0027*
Ask tobacco users the quantity used daily	501	64.2%	68.1%	3.9%	0.0042*
Advise patients to quit tobacco	537	95.5%	96.1%	0.6%	0.6020
For patients not ready to quit:					
Discuss personal relevance of quitting	496	64.3%	66.6%	2.3%	0.2031
Discuss roadblocks to quitting	467	48.3%	53.2%	4.9%	0.0058*
Identify rewards of quitting	489	61.8%	64.7%	2.9%	0.0737*
For patients ready to quit:					
Discuss setting a quit-date	475	25.5%	37.5%	12.0%	<0.0001*
Identify tobacco use triggers	466	24.5%	38.6%	14.1%	<0.0001*
Discuss pharmacotherapy options	482	43.0%	55.9%	12.9%	<0.0001*
Provide follow-up during quit attempt	453	8.3%	13.6%	5.3%	0.0001*

*Significant Improvement from baseline values; n varies due to missing data; only baseline data for subjects who returned the follow-up survey were used in the analysis

all thought they were performing comprehensive OPC screening, only half were doing so. At the 6 month follow-up, the CE participants reported a significant improvement compared to baseline values, in understanding what comprises a thorough OPC screening and in palpating the neck as part of the examination. There was also a significant improvement in the percentage of dental hygienists who informed patients of the OPC screening procedure while performing the examination. This finding is very important since public awareness about the risk factors and methods of early OPC detection is very low,^{30,31} and increased awareness can help both patients and health care providers detect lesions early.^{17,30-33}

The primary method for detecting OPC is a comprehensive screening examination which the American Cancer Society recommends annually for people 40 years or older.³⁴ Six months after being exposed to the CE course, there was significant improvement in the CE participants' report of

performing OPC screenings of patients over age 30 and patients with mucosal lesions, and of informing patients of the OPC screening procedure when performing it. Such improvement is very important since only 20% of Americans 40 years or older have reported having had an OPC examination in their lifetime.³³ Also, at the 6 month assessment, there was a slight improvement in the respondents' report of using brush biopsy as an adjunctive tissue diagnostic technique. The value of adjunctive techniques is to accelerate biopsy and to help select the best area for biopsy. They are non-invasive, cost-effective and quick to perform.

Disappointingly, there was no improvement in knowledge of OPC risk factors from baseline to follow-up, indicating a need for increased emphasis on these aspects of the CE curriculum offered. It is critical for dental hygienists to know the risk factors for OPC and to be proficient in assessing them when taking health histories, including as-

Table IV: Changes in Oral Cancer Screening-related Knowledge, Attitudes, and Behaviors from Baseline to Follow-up among Participating Clinical Dental Hygienists (n=551)

	n	Baseline	Follow-up	Diff	p-value
Knowledge: Factor not associated with oral cancer					
Advancing age		22.1%	21.1%	-1.0%	0.8212
Dental prostheses		15.9%	15.4%	-0.5%	
Leukoplakia		5.4%	8.1%	2.7%	
Diets low in fruits and vegetables		56.6%	55.4%	-1.2%	
Attitude: Importance of oral cancer detection					
Very or somewhat important		97.1%	98.1%	0.7%	0.2855
Somewhat unimportant		2.0%	1.5%	-0.5%	
Not at all important		0.6%	0.4%	-0.2%	
Reported Behaviors: (Yes)					
Performs oral cancer screening on patients	525	94.9%	96.2%	1.3%	0.1443
Perform oral cancer screening on:					
Patients age 13-17, initial visit	394	69.4%	76.7%	7.3%	0.0005*
Patients age 13-17, periodic recall after 6 months	384	65.9%	72.1%	6.2%	0.0011*
Patients age 18-30, initial visit	428	88.4%	90.9%	2.5%	0.1217
Patients age 18-30, periodic recall after 6 months	449	84.9%	86.4%	1.5%	0.2853
Patients over age 30, initial visit	420	89.6%	92.7%	3.1%	0.0207*
Patients over age 30, periodic recall after 6 months	447	86.6%	89.1%	2.5%	0.0538*
Patients over age 40, initial visit	439	91.7%	93.9%	2.2%	0.0783*
Smokers over age 40, periodic recall after 6 months	472	90.3%	92.6%	2.3%	0.0554*
Patients with mucosal sore, initial visit	436	92.5%	94.7%	2.2%	0.0780*
Patients with mucosal sore, recall after 6 months	468	91.7%	94.7%	3.0%	0.0112*
Informs patients of procedure when doing oral cancer screening	502	75.7%	78.9%	3.2%	0.0353*
During oral cancer screening:					
Performs visual exam of soft tissue	514	93.2%	95.4%	2.2%	0.0520*
Retracts tongue to view lateral borders	512	89.4%	92.6%	3.2%	0.0135*
Palpates the neck	486	49.6%	58.3%	8.7%	<.0001*
Uses adjunctive tissue diagnostic techniques:					
Toluidine blue	180	1.2%	2.1%	0.9%	0.2700
Brush biopsy	231	20.1%	25.1%	5.0%	0.0101*
VizLite	183	2.3%	3.3%	1.0%	0.4069
Referred patients for biopsy in past 12 months	416	7.2	5.8	-1.4	0.3525

*Significant improvement from baseline values; n varies due to missing data; only baseline data for subjects who returned the follow-up survey were used in the analysis

assessment of 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. Such information is essential for patient education and counseling to prevent OPC.

These findings are consistent with those of others supporting the need for CE courses in OPC to increase dental hygienists' knowledge of risk factors, to correct misinformation and to increase the translation of this knowledge into OPC screening and early detection.¹³⁻¹⁸

Another reason for only moderate improvement since 1973 in U.S. OPC early detection and survival rates is the public's lack of knowledge about risk factors and early signs of OPC. Effective behavioral risk reduction strategies must begin with personal risk awareness.³⁵ The American Cancer Society not only recommends that health care providers perform periodic OPC examinations, but that they also include health counseling about OPC risk factors, such as alcohol and tobacco use, unprotected excessive sun exposure, diet and nutrition, and high-risk sexual practices that may be related to HPV transmission.³⁴ The extent to which

health care workers actually provide this counseling is unknown.³⁰ With dental hygienists' broad focus on oral disease prevention and health promotion, they are well positioned to obtain a focused health and behavioral history that includes the key risk factors for OPC, to screen for OPC signs and symptoms and to counsel patients about their findings. Findings from focus groups of dental hygienists in 2 states report that they perceive their most important contribution to OPC control in the areas of patient education to increase OPC risk factor awareness, and of OPC screenings.^{16,18}

Tobacco Cessation

Since a major risk factor for OPC is tobacco use, the standardized CE course evaluated in this study focused on tobacco cessation counseling as well as OPC screening. With regard to tobacco cessation, over two-thirds of dental hygienists at baseline recognized the importance of tobacco cessation counseling, and almost all advised tobacco users to stop using tobacco. The high response observed at baseline produced a "ceiling effect," which was a limiting factor for this measure in course evaluation.¹⁹ Nevertheless, compared to baseline values, at the 6 month assessment course participants reported a significant 7% increase in specific knowledge of nicotine patch use. For patients ready to quit tobacco use, there was significant increase in course participants who discussed setting a quit date, identified tobacco triggers, discussed pharmacotherapy and provided follow-up during quit attempts. For patients not ready to quit, there was a significant increase in course participants who discussed personal relevance of quitting and rewards of quitting. It is important to note, however, that despite the significant positive change scores at follow-up compared with baseline values, no more than about one-quarter of the dental hygienists actually knew about nicotine patch contraindications, updated tobacco use status of continuing patients, discussed setting a quit-date and coping with tobacco use triggers or provided follow-up with patients making a quit attempt. These low response scores may be explained by the fact that the follow-up did not assess referral to quitlines or web-based cessation programs as methods of providing assistance to tobacco users. Dental hygienists are well versed in the "Ask, Advise and Refer" program, the primary aim of the American Dental Hygiene Association's educational campaign for tobacco cessation,³⁶ and it is likely that many of the respondents referred their patients for such cessation assistance rather than providing it directly to their patients as measured by outcome variables.

It is noteworthy that the 6 month assessment showed significant improvement in dental hygienists' report of applying the 5 Rs in counseling patients not ready to quit.²¹ Moreover, at follow-up, over half discussed personal relevance of quitting and rewards of quitting, and almost half discussed roadblocks with patients not ready to quit. In the dental hygiene care setting there are multiple opportunities for tobacco-use intervention services. Failure to provide a brief intervention is an important missed opportunity,²⁷ since there is evidence that dental patients are traditionally receptive to disease prevention messages.³⁷

Lecture Educational Format

Findings from our study suggest that the lecture format used in the CE course significantly increased performance of both OPC screening and tobacco use cessation counseling among the dental hygienists who attended the CE course compared to baseline values. These findings are consistent with those of a recent randomized controlled trial of approaches to translating the Clinical Practice Guideline for Treating Tobacco Use and Dependence into dental settings.³⁸ That study concluded exposure to either a workshop or mailed self-study materials improved practice behaviors on key tobacco use cessation outcomes compared to usual care. Positive change scores in dentists' attitudes and behaviors, however, were significantly better in the workshop-group that included some hands-on training compared to self-study.³⁸ Nevertheless, group education sessions using the lecture format have been reported to contribute significantly to increased performance of both tobacco use cessation and OPC screening behaviors among dentists exposed to the same standardized lecture format CE course compared to matched controls.^{19,20} The use of a lecture format session for large groups may be an efficient and cost-effective public health method of teaching dental professionals about the latest science of OPC screening and tobacco use cessation. Further study is needed in this area.

Moreover, it is critical that training in OPC and tobacco cessation counseling in lecture and/or hands on training formats needs to be included in all dental hygiene school curricula. In addition, CE courses need to be made available on a routine basis to maintain current knowledge about OPC and tobacco cessation and to improve practice shortcomings with regard to OPC screening, prevention and early detection. This recommendation is consistent with opinions expressed by dental hygienists in focus groups held in Maryland and North Carolina, wherein participants stated

that there is always a need for CE in OPC screenings and tobacco cessation, specifically for hands-on-courses.^{16,18} Moreover, some focus group participants recommended that updates on how to conduct an OPC examination be a requirement for licensure maintenance, as updates on infection control are now required in many states.¹⁶

Limitations. Our findings are limited to the dental hygienists attending the CE course under evaluation and may not be representative of all dental hygienists nationally. The generalizability of our findings is limited because in this study it was not possible to randomly select participants. A control group unexposed to the CE course would have been helpful for comparison. Therefore, secular trends may affect internal validity of study outcomes. Additionally, our findings are limited by the 37% response rate at follow-up. The study participants may have been more motivated to engage in cessation counseling and OPC screening than those who were not able to participate.

Conclusion

The findings support the theory that CE courses can improve dental hygienists' knowledge and behavior regarding OPC screening and tobacco cessa-

tion counseling. Such CE courses can be very useful to help ensure that dental hygienists are meeting their responsibilities for early detection and referral of possible OPC lesions as part of their commitment as professional oral health care providers.

Margaret M. Walsh, RDH, MS, MA, EDD, is a professor of Preventive and Restorative Dental Sciences, School of Dentistry at the University of California San Francisco. K. Vendrell Rankin, DDS, is a professor and associate chair in the Department of Public Health Sciences, Texas A&M University Baylor College of Dentistry. Sol Silverman, JR., MA, DDS, is a professor emeritus of Oral Medicine, School of Dentistry, University of California San Francisco.

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