Factors Affecting the Performance of Oral Cancer Screenings by Texas Dental Hygienists

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Introduction

Oral cancer ranks twelfth among all cancers.[1,2] Each year, approximately 30,000 U.S. residents are diagnosed with oral and pharyngeal cancers, and nearly 8,000 die from their cancers.[3] The American Cancer Society estimated the incidence of new cases of oral cancer in 2008 would be 35,310, with men showing more than twice the risk of women.[1] Although oral cancers are readily curable when diagnosed and treated early, the U.S. 5 year survival rate for oral cancer is only 52%.[4,5] From 1973 to 1996, the U.S. experienced little change in early detection techniques, such as oral cancer screenings (OCS) or in 5 year relative survival rates. Estimated deaths associated with oral cancer in 2008 were projected at approximately 7,590.[1] These findings suggest a deficiency in professional and public education regarding the early diagnosis of oral cancer.[6,7]

Oral Cancer Prevention

The Healthy People 2000 objectives for oral cancer prevention and early detection include education of the public as to risk factors for oral cancer, the availability of oral cancer screenings and the need for health care providers to provide oral cancer examinations routinely and competently.[8] Healthy People 2010 reports that only 13% of Americans reported having an oral cancer examination in the past year.[9] Early detection and risk prevention provided by the dental professional are

Abstract

Purpose: The 5 year survival rates for oral cancer have not changed in the last 50 years. A simple intra– and extra–oral examination provided by health care professionals could help to reduce morbidity and mortality of oral cancer. This study focused on Texas dental hygienists' performance of oral cancer screenings (OCS) and factors that influenced their performance of this examination.

Methods: A 33 question survey of 608 randomly selected Texas dental hygienists was conducted. Frequency, chi–square and Spearman correlation tests were performed.

Results: Three hundred and six hygienists replied and provided the data for this study. The data indicated that 45.8% "always" performed OCS, 23.5% performed OCS at the initial appointment and 47.4% at the recall appointment. Experience and comfort level were the greatest influences on OCS performance. Dental hygienists practicing for 16 or more years performed OCS 51.2% of the time, while those with only 0 to 5 years of experience performed OCS 25.5% of the time. A statistically significant correlation ($\rho=0.15$, $p<0.007$) was found between years of experience and performance of OCS. A significant correlation ($\rho=0.18$, $p<0.001$) was found between the identification of a suspicious lesion and the performance of OCS. Forty–nine percent of dental hygienists reported feeling "very comfortable" with intra–oral examinations, but only 26.5% felt "very comfortable" with extra–oral examinations. A statistically significant correlation ($\rho=0.16$, $p<0.001$) was found between comfort level in the performance of an OCS and reported frequency of OCS. The majority of subjects performed poorly on the knowledge portion of the survey (mean=53%). There was a significant correlation ($\rho=0.22$, $p<0.001$) between attendance at OCS continuing education courses and the performance of OCS.

Conclusion: Dental hygienists' knowledge about oral cancer was not current and comfort levels with performing OCS were low. These indicate a need for a stronger emphasis on the importance of OCS for students during dental hygiene education and a more thorough continuing education for practicing dental hygienists.

Keywords: Oral cancer, screening, dental hygienists, knowledge, education

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the 2 best public tools to reduce morbidity and mortality of oral cancer.[10] Early detection of oral cancer lesions is complicated by the fact that they are typically asymptomatic in nature. Clinical lesions may appear as ulcers, leukoplakia, erythroplakia, a combination lesion called erythroleukoplakia, soft tissue masses, lesions that will not heal and radiolucencies of unexplained origin. All of these lesions remain suspect until proven otherwise by biopsy.

An important part of oral cancer prevention and detection is the recognition of risk factors. A review of the literature reveals several risk factors and populations at most risk for oral cancer. Risk factors include the use of tobacco products, alcohol abuse, excessive unprotected exposure to sun, lack of consumption of fruits and vegetables, use of marijuana and viruses.[8,11,12] Increased oral cancer and esophageal cancer risk have been associated with high meat intake, low consumption of fruit, low levels of particular vitamins and a poor nutritional status.[12] Males are more likely than females to develop oral cancer, although these numbers are changing due to the increasing incidence of smoking in females and the elderly female population. Age is also a significant risk factor – 90% of oral cancers occur in people older than 45 years of age.[5] Among older populations, there is also an increased incidence of oral cancer in edentulous or partially edentulous elderly. This has to do with the lack of care or access to care contributing to risk factors, such as poor oral hygiene and broken teeth.[13]

The human papilloma virus (HPV), specifically HPV 16 and 18, is a newly identified oral cancer risk factor more frequently found in younger populations, both male and female. HPV 16 is more commonly associated with oral cancer, and HPV 18 is much less so. There is a significant association of HPV in the oral tissues with oral cancer independent of smoking and drinking habits.[14–16] Behavior, a subject's immune status and contributing risk factors do not indicate a predisposition to HPV oral cancer.[17] HPV can appear as an innocuous lesion on the lips, tongue and soft palate. The more posterior the location of the HPV, the more likely it is to be a serious risk factor for oral cancer. Testing for HPV 16 and 18 is currently a subject of research along with the use of the Gardasil vaccine as a preventive measure.[17]

Role of Dentists and Dental Hygienists

The dentist and dental hygienist are trained to detect oral cancers and identify risk factors so that the mortality and morbidity of oral cancer can be reduced by early detection. The American Cancer Society recommends that people aged 40 years or older, or anyone at high risk of developing cancer, should receive an annual oral cancer examination.[18–20] Early detection and evaluation of the oral environment can have a major impact on minimizing debilitating treatment and improve cure rates.[6] Early detection refers to a tumor that does not exceed 4 centimeters in its largest diameter and has not spread to adjunct structures or tissues.[10] Also, with early detection there is no detectable metastasis to regional cervical lymph nodes or other organs.[21]

Dentists and dental hygienists can play a crucial role in the early detection and prevention of oral and pharyngeal cancer.[2] A thorough intra– and extra–oral cancer screening using visual and tactile senses takes only 90 seconds to complete.[21] Ideally, dental practitioners should provide a full head and neck examination for all patients, as well as a risk factor assessment and clinical and radiographic examinations.[21]

A survey of dentists practicing in Texas reported that 86% were providing OCS for all patients, and 43% were performing complete intra– and extra–oral examinations on all patients. Twenty–two percent of Texas dentists reported feeling that there was no time during regular appointments for oral cancer examinations, even though the exam takes only 90 seconds.[22] A survey of dentists along the Texas–Mexico border reported that, while 99% agreed that dentists were qualified to perform oral cancer examinations, only 54% were of the view that dental hygienists were qualified to perform oral cancer examinations.[23]

Dental hygienists have long been recognized as playing an important role in health promotion and disease prevention. Dental hygienists focus on primary prevention – they provide oral cancer examinations and related health education as part of dental hygiene care and play a critical role in helping patients attain and maintain good oral health.[24–27] While dental hygienists cannot diagnose oral cancer, they can be instrumental in detection and referral. Standard quality health care mandates thorough oral, head and neck examinations, and oral disease risk factor assessment for all patients on a routine basis.[28] Dental hygienists need to be familiar with oral cancer risk factors, because some risk factors are synergistic in nature, and the elimination of only 1 risk factor can greatly decrease their patients' overall risk for oral cancers. Dental hygienists also need to be confident in their performance of comprehensive oral cancer screenings.

A national survey conducted in 2001 showed that dental hygienists were seriously uninformed on several key aspects of oral cancer risks and diagnostic procedures.[29] While 99% of dental hygienists identified tobacco as a risk factor for oral cancer, only 19% knew that most oral cancers are diagnosed in patients 60 years or older.[29] While 85% knew the correct examination of the tongue, only 18% correctly identified erythroplakia as first and leukoplakia as second as the 2 most likely conditions closely related to oral cancer.[29]

Forrest et al found that 98% of dental hygienists agreed oral cancer examinations should be provided annually for adults over the age of 40, yet only 66% reported doing so every time. The survey also showed that only 25% indicated they routinely palpated the necks of their adult patients to assess their lymph nodes.[30] A 2006 study conducted in New York reported that 78% of dental hygienists indicated they provided oral cancer screenings on 80% of their patients 40 years and older.[2] One 2002 qualitative study conducted on dental hygienists in Maryland reported that the top 2 reasons for not routinely performing oral cancer screenings were limited time during the appointment and dentists not wanting them to perform the screenings.[27]

A study conducted to assess Maryland dental hygienists' confidence in the performance of OCS reported that 77% felt their training was adequate to perform the screenings.[31] In a North Carolina study, 75% reported feeling adequately trained to examine patients for oral cancer, 64% percent reported being adequately trained to palpate lymph nodes and 62% reported feeling comfortable with this procedure.[25]

A 2001 national survey reported that 39.75% of dental hygienists had attended an oral cancer continuing education course in the last year, and 44.9% within the last 5 years.[29] A North Carolina survey of dental hygienists reported that 21% had attended an oral cancer continuing education course within the last year, 47% within 2 to 5 years and 15% at 5 years or more.[25] Surveys conducted in Maryland in 2001 and North Carolina in 2006 also showed that recent graduates of a dental hygiene program were more knowledgeable about oral cancer and risk factors for oral cancer, supporting the belief that there is a need for continuing education classes for practicing dental hygienists.[25,31] In a 2001 national survey, dental hygienists indicated their preferred format for oral cancer continuing education. Eighty percent preferred a lecture format, 49% were interested in clinical participation during the course and 30% preferred continuing education journals or booklets with a self–test. These studies of dental hygienists strongly suggest that oral cancer prevention and early detection need to be addressed by continuing education programs. The format of these courses should emphasize hands–on training in conducting a comprehensive oral cancer examination.[29]

The purpose of this study was to assess whether Texas dental hygienists are performing oral cancer screenings and to identify factors that influence their performance of screening. To date, there has been no assessment of Texas dental hygienists' knowledge and practice of OCS. The research questions of this survey consisted of the following:

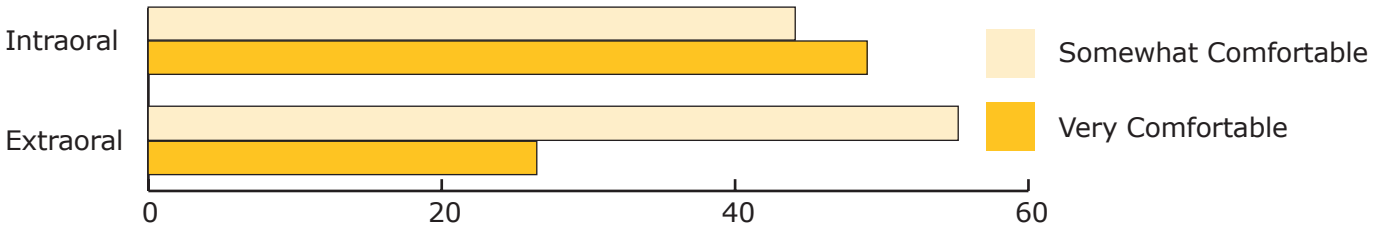
1. Do Texas dental hygienists perform oral cancer examinations?
2. What was their knowledge of oral cancer and risk factors?
3. Did knowledge of oral cancer, practice experience and formal and post graduate education influence performance of OCS?
4. What type of continuing education did they prefer for oral cancer training?

Understanding gaps in knowledge and practices is essential in planning educational programs in dental hygiene curricula, as well as for continuing education courses.

Methods and Materials

The population for this study consisted of 7,055 registered dental hygienists who were practicing in Texas. Using website information from the Texas State Board of Dental Examiners, addresses were obtained and participants were identified as to the status of their license. A random sample of 365 was selected based on an error rate of +5% using Dillmans' sampling formula.[32] Estimating an expected response rate of 60%, the necessary sample size was increased to 608. A survey instrument consisting of 33 questions was created using components from similar surveys conducted in Maryland and North Carolina.[25,31] Questions included demographics, performance, comfort level, oral cancer and risk factor knowledge, experience and continuing education preferences. The survey was pilot tested twice and received approval from Texas A&M Health Science Center Baylor College of Dentistry Internal Review Board. The survey was conducted via the postal service using 2 separate mailings to maximize response rate. Descriptive, chi–Square and Spearman rank order correlation tests were performed on the data received using SPSS version 15 software.

Figure 1: Comfort Level in the Performance of Oral Cancer Screenings



Results

A total of 340 surveys were returned, and 306 were acceptable for data analysis, resulting in a 50% response rate. Table I illustrates the demographics for the respondents. The majority (53.6%) had been in practice for 16 or more years, were employed in a general practice setting (84.6%) and held an associate degree (74%).

Dental hygienists reported they "always" performed OCS 45.8% of the time, and 33.7% reported "most of the time." Dental hygienists performed OCS at the initial appointment 23.5% of the time and 47.7% during recall appointments. However, 49.9% reported they did not perform extra–oral palpations during the OCS at initial or recall appointments.

As illustrated in Figure 1, dental hygienists indicated they were more comfortable with the performance of intra–oral examination (49% "very comfortable") than with extra–oral examination (26.5% "very comfortable"). A statistically significant correlation ($\rho=0.16$, $p<0.001$) was found between comfort level in the performance of an OCS and reported frequency of OCS.

Common reasons why dental hygienists did not perform OCS are shown in Table II. The most frequent reasons were the "dentist performs the examination" (23.2%), followed by "takes too much time" (13.1%), "not adequately trained" (7.5%) and "not necessary or needed" (4.9%).

Table III shows how well dental hygienists felt their dental hygiene program prepared them to perform OCS. Only 38.9% reported their program was "very thorough." There was a significant correlation ($\rho=0.26$, $p<0.001$) between dental hygienists view of how well their dental hygiene program prepared them for the performance of OCS and their comfort level in performing an intra–oral examination. The same was true for their comfort with performing the extra–oral examination ($\rho=0.33$, $p<0.001$).

Length of time in practice was significantly related to performance of OCS. Approximately 50% of dental hygienists practicing 6 or more years reported they "always" performed OCS, while those practicing 5 years or less reported they "always" did

Table I: Demographics

	n	Percentage
Years in Practice		
16+ years	164	53.6%
11–15 years	38	12.4%
6–10 years	49	16.0%
0–5 years	55	18.0%
Total	306	100.0%
Practice Type		
General Practice	259	84.6%
Specialty	35	11.4%
Public Health	10	3.3%
Other	2	0.7%
Total	306	100.0%
Degree Type		
Associate Degree	227	74.2%
Bachelor Degree	79	25.8%
Total	306	100.0%

Table II: Most Important Reason Why Dental Hygienists Did Not Perform OCSs

	n	1st Reason Percentage
Dentist does it	71	23.2%
Takes too much time	40	13.1%
Not adequately trained	23	7.5%
Not necessary/Needed	15	4.9%
Unsubstantiated by research	3	1.0%
Not cost effective	1	0.3%
Total	153	50.0%

Table III: Dental Hygienists' Perception of Preparedness to Perform OCS

	n	Percentage
Very thorough	119	38.9%
Somewhat thorough	89	29.1%
Adequate	38	12.4%
Very inadequate	38	12.4%
Not sure	21	6.9%
Total	305	99.7%

Table IV: Questions Most Often Answered Incorrectly

	Correct	Incorrect	Don't know	Correct answer
Lesion type most suspect for OC ranked 1st	26.2%	57.8%	15.7%	Erythroplakia
Male or female greater risk for HPV	14.2%	57.7%	28.1%	Male
Lesion type most suspect for OC ranked 2nd	34.6%	43.5%	1.6%	Leukoplakia
Increased risk of OC by HPV location	14.2%	33.4%	52.3%	Oropharynx
Most common site for HPV	23.8%	30.0%	46.2%	Posterior

so only 25.5% of the time. There was a significant correlation ($\rho=0.15$, $p<0.007$) between years of experience and performance of OCS. Chi square analysis indicated that the association between years of experience and performance of OCS was real and more than could be expected by chance ($\chi 2=18.9$, $p<0.026$). This indicates that the longer a dental hygienist was in practice, the more likely they were to always perform an OCS.

The identification of a suspicious lesion and a positive diagnosis of oral cancer also significantly influenced performance of OCS. Approximately 82% reported they had identified a suspicious lesion that later was referred for biopsy. Of these cases, 46.4% came back with a positive diagnosis for oral cancer. A significant correlation ($\rho=0.18$, $p<0.001$) was found between the identification of a suspicious lesion and the performance of OCS. A significant correlation ($\rho=0.16$, $p<0.001$) was also identified between a positive diagnosis of oral cancer and the performance of OCS. Experiences of identifying lesions and discovering oral cancer were associated with an increased frequency in the performance of OCS by dental hygienists.

Concerning knowledge about oral cancer and risk factors, scores ranged from 14 to 94%, with a mean score of 52.6%. The majority of respondents scored at or below 70% on the oral cancer test. Table IV shows questions most frequently answered incorrectly or "don't know" on the test portion of the survey. Questions concerning HPV were answered incorrectly or "don't know" at least 50% of the time. Only 26.2% correctly identified erthroplakia as the highest suspect lesion, and only 34.6% identified leukoplakia as the next highest suspect lesion.

Attendance at a continuing education course on oral cancer was the only other significant factor associated with the performance of OCS, with 20.3% indicating they had taken an oral cancer continuing education (OCCE) course within the past year, 53.3% within 2 to 5 years and 19.6% more than 5 years (Table V). Also, 5.9% never attended an OCCE and 1% had yet to attend any continuing education classes. There was a significant correlation ($\rho=0.22$, $p<0.001$) between attendance at an OCCE and the performance of OCS. The more often they attended OCCE, the more often they performed OCS. Regarding format, the largest group of dental hygienists (40%) preferred a lecture format for OCCE, followed by professional meetings (22.9%) and clinical demonstrations (19.9%).

Table V: Last Oral Cancer Continuing Education Taken

	n	Percentage
Within the past year	62	20.3%
2–5 years	163	53.3%
More than 5 years	60	19.6%
Never	18	5.9%
Have yet to attend any CE	3	1.0%
Total	306	100.0%

Discussion

The 5 year survival rates for oral cancer have not changed in the past 50 years. Dental hygienists, as a part of the dental team, have the opportunity to greatly improve this statistic. The performance of a simple intra– and extra–oral examination and the evaluation of a patient's risk for oral cancer are a part of the dental hygiene assessment and should be performed at every visit. Dental hygienists have a legal and ethical obligation to perform oral cancer screenings on all patients. Standard of care practices include a complete head and neck examination once a year. Legal ramifications for failure to identify abnormal lesions do apply to dental hygienists.

The purpose of this study was to assess whether dental hygienists were performing OCS and what influenced this performance. The study also investigated interest in continuing education and format preferences for oral cancer classes.

Dental hygienists in this survey reported that less than 25% performed an OCS at the initial appointment, and less than 50% did so at the recall appointment. When specifically asked how often they

performed OCS, less than 50% reported "always." Almost all of the dental hygienists reported they did not perform extra–oral palpation. One–third performed OCS at the initial and recall visits on all patients regardless of the patient's age, indicating that patient age did not influence the performance of the OCS.

The top 3 reasons dental hygienists reported for not performing OCS were "their dentist does it," "takes too much time" and "not adequately trained." Regarding their training, the dental hygienists' perception of their preparation influenced whether or not they performed OCS. Approximately 33% of dental hygienists reported "very thorough" or "somewhat thorough" in how well they felt their program prepared them to perform OCS. This could point to a need for changes to the dental hygiene curriculum as to training in OCS. Consistent with dental hygienists reporting that OCS took "too much time" is a current lack of a mechanism for reimbursement for this procedure. Generally, practitioners are concerned with production, so that if OCS were billable, they might be performed more frequently.

When asked how comfortable they felt in performing OCS, a little less than 50% reported feeling "very comfortable" in performing an intra–oral examination, and only 25% felt "very comfortable" for the extra–oral examination. As indicated by the significant association between the performance of OSC and comfort level in performing intra– and extra–oral examinations, the more comfortable dental hygienists felt performing OCS, the more likely they were to perform them. This lack of comfort possibly explains the low level of OCS performance, especially with the extra–oral exam.

The responses of Texas dental hygienists in this study closely mirrored studies conducted on a national and state level. In a national study, 66% of dental hygienists reported providing OCS and 25% routinely palpated extra–orally as compared to approximately 20% in this study.[11] As in this study, national studies indicated that dental hygienists were uninformed about risk factors such as age and appearance of lesions.[29] A qualitative study conducted in Maryland indicated that one of the top reasons dental hygienists did not perform OCS was limited time during the appointment.[26] Additionally, dental hygienists in New York felt that OCS was out of their scope of practice.[2]

This survey indicated that years of experience significantly influenced the hygienist's performance of OCS. Dental hygienists practicing 6 or more years reported "always" providing OCS about 50% of the time, while only 25% of dental hygienists, practicing 5 years or less, reported "always." This could have been due to increased confidence, attendance at oral cancer continuing education courses and/or an improvement of instrumentation skills over time, leaving more time during the appointment for assessment procedures. An alternate reason could be that OCS training in the past was more extensive than it is presently. Another explanation for the increase in OCS performance could be that the longer dental hygienists are in practice, the more opportunity they may have to actually identify a suspicious lesion. Approximately 82% of those surveyed reported they had identified suspicious lesions and referred those patients for biopsy. Within that group, almost 50% indicated that the biopsies of lesions came back positive for oral cancer. In this study, both the identification of a suspicious lesion and a positive diagnosis were significantly correlated with the performance of OCS. Dental hygienists may have been more inclined to perform OCS on patients and suspect abnormalities if they had previous experience with such discoveries.

Half of the dental hygienists reported attending a continuing education course on oral cancer in the last 2 to 5 years, with less than 25% attending within the past year. In this study, attendance at an OCCE significantly influenced the performance of OCS. This indicates that dental hygienists who had recently attended an OCCE were more likely to perform an OCS.

The respondents in this study performed poorly on the knowledge question, with an average score of about 50%. The majority of questions missed concerned newer information about oral cancer, its risk factors and HPV. Dental hygienists who had not attended continuing education courses on oral cancer or read professional journals may not have been aware of this newer information. Other questions missed more than 50% of the time were about the identification of risk factors for patients and the appearance of suspect lesions. If dental hygiene practitioners do not have the correct information about these topics, they will not correctly assess or recognize the risk for oral cancer in their patients. This suggests that dental hygiene programs and/or continuing education programs should be more focused on awareness of oral cancer risk factors, such as age and HPV, and the appearance and common sites of lesions.

Education & Professional Recommendations

Clearly there was a lot of important information that dental hygienists were misinformed about or did not remember about OCS, indicating a need to improve their education. With a stronger empha-

sis on OCS and risk factors during dental hygiene school, new graduates may be less inclined to bypass this important assessment to save time. This added emphasis could in turn bolster preparation and comfort level for dental hygienists. A rotation to a clinic or hospital for cancer patients would also help to make an indelible impression on students and give them an opportunity to work with these patients.

Hands–on clinical demonstrations are needed to improve comfort level and performance of extra–oral palpation. These factors are good arguments for considering oral cancer refresher courses as mandatory for licensure. Currently, dental hygienists in Texas are required to maintain CPR certification bi–annually, an ethics and jurisprudence course every 3 years and 12 hours of continuing education every year to maintain licensure. Considering that an oral cancer screening is an assessment procedure a dental hygienist can perform that may save a patient's life, it should be considered as important as CPR training that is required every 2 years.

Nearly all respondents indicated that they would be interested in attending an OCCE course. In this survey, almost 50% were interested in a lecture format at professional meetings, the usual format for OCCE courses. Although the respondents did not prefer clinical demonstrations, they need to do hands–on examinations in order to learn how to perform them. Current OCCE courses should be changed to address deficiencies in dental hygienists' knowledge.

Another adjunctive measure to increase knowledge could be online discussion groups or blogs dedicated to oral cancer risk assessment. A dedicated online chat room, blog or Facebook page could be supported by the American Dental Hygienists' Association. On a local level, study clubs could offer OCCE and demonstrations to aid in comfort level and education of practicing dental hygienists.

In addition to professional and ethical obligations, there are legal concerns. Dental hygienists can be held legally liable for missing lesions or incomplete documentation. Updates to the current CODA standards would reinforce the importance of OCS. More questions about oral cancer and its risk factors could be added to the Dental Hygiene National Board Examination and jurisprudence tests for state licensure. Finally, further OCCE should address the legal aspect of performing an OCS and documentation of findings and referrals to help protect patients and dental hygienists. There is currently no mechanism for billing OCS. Efforts should be undertaken to create a code to bill for this potentially life–saving screening.

Conclusion

This study found that almost 50% of dental hygienists were performing OCS, and less than 50% were palpating extra–orally. Reasons for not performing OCS were the dentist did the exam, felt it took too much time and they were not adequately trained. Respondents with the most experience in terms of years or the identification of suspicious lesions were most likely to perform OCS. Comfort level also had a significant influence on the performance of OCS. The more comfortable respondents felt with their technique, the more likely they were to perform the exam.

While knowledge level did not affect the performance of oral cancer screenings, the respondents were misinformed or unaware about oral cancer and its risk factors, especially HPV, patient age and appearance of lesions. This poor performance indicates a need to strengthen education about the importance of OCS, new risk factors and the recognition of lesions. Greater emphasis on the importance of oral cancer assessment and screening of each patient is needed while students are in dental hygiene school and throughout their careers. Continuing education courses in oral cancer screening and risk factors could also decrease the morbidity and mortality rate of oral cancer.

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