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Perspectives, Challenges, and Oral Cancer Screening Practices of Primary Care

Providers at Nebraska Medicine

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Abstract

Background

High mortality and morbidity associated with oropharyngeal cancer (OPC) are due to delayed diagnosis. Early detection of OPC is possible by incorporating oral cancer screening (OCS) in the annual screening examination protocol of primary care providers (PCPs). The study was aimed to understand the perspectives and barriers of PCPs in screening their patients for OPC.

Objectives

1) To understand challenges PCPs' face in performing OCS, 2) To determine the factors that influence PCPs' decision to complete OCS, and 3) To determine if PCPs who received education on OCS are more likely to perform the screening compared to PCPs who did not receive the education.

Methods

We used Sequential exploratory mixed methods for this research. Both qualitative and quantitative data from PCPs working at Nebraska Medicine were obtained. We conducted one-on-one in-depth interviews to identify PCPs perceptions and challenges in performing OCS. Themes identified in the qualitative study and the participant's responses were used as a guide in the development of survey questionnaire. The survey was emailed to all the PCPs (N=100), whose information was available on the Nebraska Medicine public accessible website in 2017.

Results

The response rate was 34%. Approximately 60% of the participants mentioned that they currently perform OCS, but only 3.8% of the providers answered that they were performing comprehensive OCS hundred percent of the time. Forty-eight percent of the providers identified

time as the biggest challenge in performing OCS during the annual comprehensive examination. Over 35.3% of the providers answered that they perform screenings for patients with a history of tobacco (i.e., smoking) or alcohol use. The providers who received education about the benefits of OCS in comparison to those who did not receive education during their medical training were equally performing the screening.

Conclusion

PCPs have an opportunity to detect OPC at a localized stage. However, PCPs mentioned that the time they have was insufficient and very few providers were performing comprehensive OCS during patients annual examination visit.

Keywords: oral cancer screening, primary care providers, oropharyngeal cancer

Introduction

Service Learning/ Capstone Placement Site

Placement site for service learning and capstone project was Creighton School of Dentistry. Creighton is a Catholic and Jesuit comprehensive university committed to excellence in its selected undergraduate, graduate and professional program (Creighton University School of Dentistry, 2018).

Creighton education embraces several colleges and professional schools and is directed to the intellectual, social, spiritual, physical and recreational aspects of students' lives and promotion of justice (Creighton University School of Dentistry, 2018).

Creighton faculty members research to enhance teaching, to contribute to the betterment of society, and to discover new knowledge. Faculty and staff stimulate critical and creative thinking and provide ethical perspectives for dealing with an increasingly complex world (Creighton University School of Dentistry, 2018).

Creighton School of Dentistry provides comprehensive dental care to the local community through patient care, community service, and research. The School of Dentistry has been recognized for its excellence in research of dental materials. Also, faculty and staff work together to provide oral health services in Omaha, NE. Creighton has multiple oral health programs, designed to serve different communities in the society.

Literature Review

Overview of Oropharyngeal Cancer (OPC)

OPC accounts for a significant proportion of head and neck cancers (Surveillance, Epidemiology, and End Results Program, National Cancer Institute, n.d.). It includes cancer of the lip, oral cavity and pharynx and these forms of cancers are among the most debilitating and disfiguring cancers (Horowitz, Drury, Goodman, & Yellowitz, 2000; Moyer & U.S. Preventive Services Task Force, 2014). Adults older than 40 years and from lower socio-economic groups are at higher risk of OPC (Horowitz et al., 2000; Patton, Epstein, & Kerr, 2008). Alcohol consumption and smoking are significant risk factors in developing OPC (Ford & Farah, 2013). The preferred treatment for OPC at a localized stage is surgery, and both surgery and chemotherapy are recommended at advanced stages (Ford & Farah, 2013).

Incidence & Mortality of OPC

Globally, OPC has been responsible for 529,500 incident cases and 292,300 deaths in 2012, accounting for 3.8% of all cancer cases and 3.6% of cancer deaths (Sankaranarayanan, Ramadas, Amarasinghe, Subramanian, & Johnson, 2015). In the United States, OPC accounts for 3% of all cancers diagnosed and 1.6% of all cancer deaths (American Dental Association, 2018). The American Cancer Society estimated new cases and deaths due to OPC in 2018 at 51,540 and 10,030 respectively (American Cancer Society, 2018). Incidence rates of OPC are 17.4 average

annual rate per 100,000 for males and 6.4 annual average rate per 100,000 for females, age-adjusted to the 2000 U.S standard population (American Cancer Society, 2018). In Nebraska alone, about 3.8 to 6.1 annual average rate per 100,000 males and about 0.7-1.4 annual average rate per 100,000 females are diagnosed with OPC (Centers for Disease Control and Prevention, 2015).

Reasons for High Mortality & Morbidity of OPC

Delayed diagnosis is one of the reasons for the high mortality and morbidity associated with OPC. The 5-year survival rate for OPC diagnosed at an early stage is 83%, compared to advanced stage diagnosis which is only 36% (American Dental Association, 2018). The purpose of oral cancer screening (OCS) is to detect OPC at a localized stage. Despite the oral cavity being the accessible site, over 50% of OPC goes undiagnosed at a localized stage (American Dental Association, 2018).

Screening Policy

Although the diagnosis at an early stage is critical, implementation of population-wide screening is not recommended (Brocklehurst et al., 2013). There are many rationales for this, including lack of evidence on benefits in performing population-based screening, expenses associated with it, and low prevalence of the disease. Instead, opportunistic screening in primary care or dental settings is recommended (Brocklehurst et al., 2013). Opportunistic screening by primary care providers (PCPs) has been shown to be effective at diagnosing OPC at a localized stage (Santana, Delgado, Miranda, & Sanchez, 1997).

Role of PCPs in OCS

High-risk patients do visit PCPs more often compared to dentists (Sohn, Ismail, & Kolker, 2005). Therefore, PCPs have more opportunities to perform OCS. The American Cancer Society

recommends an OCS of adults at the age of 40 years and older (Sohn et al., 2005). Also, the U.S Preventive Service Task Force recommends OCS for alcohol and tobacco users (Sohn et al., 2005). Incorporating OCS in a PCPs comprehensive annual examination protocol and screening patients who use tobacco, alcohol, and adults over the age of 40 years could promote detection of OPC at an early stage (Sohn et al., 2005).

PCPs have a significant opportunity in detecting asymptomatic OPC during the annual examination of the patient. However, studies have documented that PCPs do not regularly screen for OPC, and most patients are diagnosed at advanced stages (Macpherson, McCann, Gibson, Binnie, & Stephen, 2003). It was found that more than 77% of patients who have been diagnosed with advanced OPC were under the routine care of physician's in the preceding 3-24 months and 94% of the patients diagnosed with advanced OPC visited their physician in the preceding year (Macpherson et al., 2003).

Problem Statement

Although there are procedures available to control OPC, the prognosis of the disease depends on the stage at which diagnosis is made (Langevin et al., 2012). Early detection of OPC gives an opportunity to treat the disease at a localized stage, which has a survival rate of 5-years (Langevin et al., 2012). However, the survival rate drastically diminishes when it is detected at an advanced stage (Langevin et al., 2012). Patients with more medical problems and high risky lifestyle visit their PCPs more often compared to dentists. Thus, it emphasizes the importance of PCPs performing opportunistic OCS (Macpherson et al., 2003). Unfortunately, the majority of PCPs do not perform OCS.

Impact of the project

The results of this study are helpful to understand the perceptions of PCPs' in performing OCS and the challenges they have in incorporating OCS in their annual examination protocol. In addition, this study also provides insight into an association between the education received on OCS during the providers medical training and their current OCS practice.

Methods

Design

The institutional review board at the University of Nebraska Medical Center approved the study (IRB#558-17-EX) in September 2017. Sequential exploratory mixed methods were selected. This approach was used due to the lack of pre-existing data to build a close-ended survey necessary to answer the research questions. We began collecting qualitative data first to explore PCPs perceptions, challenges and their education on OCS using a semi-structured interview guide (Appendix B). It was followed by the quantitative phase, in which qualitative study themes were used as a guide in developing the close-ended survey. The survey was sent electronically to all PCPs (N=100) displayed on the Nebraska Medicine website as their PCPs (<https://www.nebraskamed.com/primary-care>) in 2017. Data collected from the survey was analyzed to answer below research questions:

- What are the most significant challenges for PCPs' in performing OCS?
- What factors influence PCPs' decision to perform OCS?
- To determine if PCPs who received education on OCS are more likely to perform the screening compared to PCPs who did not receive the education.

Study Sample

The study sample included PCPs limited to physicians (internal medicine and family physicians), nurse practitioners and physician assistants employed at Nebraska Medicine in 2017, and who are involved in the physical examination of adult patients.

Phase 1: Qualitative Study

Purposive homogenous sampling was done to obtain data from PCPs who were practicing exclusively primary care and not associated with any specialty medicine. The PCPs have more scope to perform OCS compared to providers associated with any specialty. The name, email, and phone numbers of PCPs practicing at Nebraska Medicine were obtained from the Nebraska Medicine website in 2017 (<https://www.nebraskamed.com/primary-care>). Providers who met all the study criteria were selected and sent recruitment letters (Appendix A) through an email. A second email was sent to non-respondents one week after the original email. Finally, a phone call was made to PCPs who did not respond after two emails. Recruitment letters were sent to 30 PCPs asking them to participate in the study. The recruitment phase ended after we reached saturation. The data obtained on providers perspectives and their challenges in performing OCS are no more different after we interviewed the eighth participant. However, we interviewed two more participants to ensure no new information was obtained.

All interviews were conducted between September and November of 2017. The interviews were audio recorded after obtaining written consent (Appendix C) from the participants. Interviews were conducted in the participant's office. Each interview lasted approximately 20-40 minutes. The semi-structured interview guide (Appendix B) was used to facilitate the interviews. Verbatim transcription of the recording was done after finishing each interview.

Questionnaire design. Results of the qualitative study were used as a guide in developing a 24-item survey questionnaire. One-on-one interview participants mentioned multiple

challenges for why they may not perform OCS. All the challenges were incorporated in the survey to determine the variable that most of the participants identify as a challenge. Results of the qualitative study found an association between the education received on OCS and current OCS practice of the providers. Questions regarding PCPs education on OCS and their current OCS practice were added to determine if there is an association between these two variables. Additionally, comprehensive screening steps in OCS were included to estimate the percentage of providers performing comprehensive OCS. Demographic questions were also included.

Phase 2: Quantitative Study

In phase 2, Institutional Review Board material was resubmitted to obtain approval for the survey (Appendix E) and cover letter (Appendix D) used for quantitative data collection. Study data were collected and managed using REDCap (Research Electronic Data Capture) electronic data capture tools hosted at UNMC. REDCap is a secure, web-based application designed to support data capture for research studies. REDCap at UNMC is supported by the Research IT Office funded by the Vice Chancellor for Research and receives partial support from the Great Plains IDeA-CTR grant. This publication's contents are the sole responsibility of the authors and do not necessarily represent the official views of the Vice Chancellor for Research and National Institutes of Health.

All the PCPs (N=100) who were identified on the Nebraska Medicine website (<https://www.nebraskamed.com/primary-care>) received the survey (Appendix E) along with the cover letter (Appendix D). Of the 100 PCPs', 78 were physicians, 12 were physician assistants, and 10 were nurse practitioners. Three reminders were sent with five days gap between each reminder to increase the response rate. Previous studies have proven that the reminders that were sent reasonably soon, ideally between 2-5 days increased response rate (Manzo & Burke, 2012).

Analysis

Qualitative data. The verbatim transcription of the one-on-one interview was done using the online transcription software ‘Trint’ (<https://trint.com>). We uploaded audio files directly into Trint’s web-based artificial intelligence transcription software. Once we uploaded the files, Trint used artificial intelligence to transcribe the recordings. The transcript was manually read to check for the accuracy by a single investigator. Coding was done using three pre-determined categories from the interview guide (Appendix B): challenges in performing OCS in PCPs practice, education received on OCS during PCPs medical training and current OCS practice. The coded data were then analyzed to identify the themes and were arranged corresponding to the research objectives and questions.

Quantitative data. Retrieved data via University of Nebraska Medical Center Research Electronic Data Capture (REDCap) System database and transferred to excel sheet for clean-up and coding. Data analysis was performed using IBM SPSS Statistics for Windows (Version 22.0, IBM Corporation, Chicago, IL, USA). SPSS is an abbreviation of Statistical Package for Social Sciences. SPSS is one of the most popular statistical packages used to analyze complex data with simple instructions.

Fischer’s exact test was used to check significance in the relationship between binary variables, i.e., PCPs education on OCS and their current OCS practice. Chi-Square test was used to check significance between polytomous variables, i.e., education on OCS and critical steps in comprehensive OCS, visual examination of the oral cavity, visual examination of the extra-oral cavity, inspection of the oropharynx, palpation of soft tissues in the oral cavity, and palpation of the neck. Descriptive statistics, i.e., frequency and percentages of all the variables collected in the survey were done to determine the primary challenge in performing OCS and what PCPs

consider as risk factors for OPC. Descriptive analysis was also done to understand participants characteristics and work styles.

Results

Qualitative Results

A total of 10 providers participated in one-on-one interviews. Saturation during the analysis part reached after the eighth participant, but two more were recruited to ensure no more new data produced. Out of 10 participants, 80% were females, and 20% were males. Around 50% of the participants were physicians, 30% were physician's assistants, and 20% were nurse practitioners.

Theme 1: Education on OCS during PCPs medical training. Some providers mentioned that they received training in performing oral examination to detect abnormalities, but they did not receive any specific education on OCS during their medical training. Some PCPs explained that they check the mouth, but it never occurred to them that they should screen for OPC. Some PCPs does not exactly remember what kind of training they received.

However, some providers (Participant 1, and Participant 10) mentioned that they received training on OCS during their medical education.

"I cannot say for sure. We always examine the mouth but we are looking for like tonsil problems, we are more interested in the back of the throat. We are looking for post nasal drip rhinitis kind of things. But, I don't think I ever said that you don't have oral cancer or I'm screening for oral cancer" (Participant 6, Physician).

"I don't remember exactly what I would have gotten. Specifically, I know in the health assessment course we were asked to feel inside of the cheeks to make sure everything is normal"

or to feel for abnormality. But, we were never trained to screen specifically for oral cancer or how to screen it” (Participant 10, Nurse practitioner).

“Yeah, I think I do. I think that I have enough training and I have a lot of experience in oral cancer screening” (Participant 1, Physician).

Theme 2: Barriers to implementing OCS in PCPs practice. Participants identified multiple challenges in performing oral cancer screening for their patients. Some of the obstacles cited include lack of time, lack of equipment required to perform screening, and providers considering OCS as dentist’s responsibility. Among all the challenges mentioned, inadequate time is considered as a primary challenge by most of the participants. However, all the participants who mentioned that they received education on OCS during their medical training were performing screenings on their patients. The providers who regularly perform screenings could not identify any challenges in performing OCS, and they explained that OCS consumes only a few minutes. On the other hand, the providers who are not performing OCS mentioned that it is difficult to incorporate OCS in their protocol due to lack of time.

“Taking time to do an adequate oral cancer exam is a big thing. Unless the patient would come in complaining about an oral concern, probably would not perform the due process. I don’t think; people don’t know how to do a good oral assessment. It’s just you know the time is a big barrier” (Participant 3, Nurse practitioner).

“I think for us like anything in family medicine or general practice is the time we have is very little, and we are forced to do even more screenings. Right now, we have to screen for falls, and we have to screen for depression, and we have to screen for a thousand other things that we have to go through” (Participant 6, Physician).

“I don’t know because it seems pretty easy to do. I guess just implementing change into their routine if they are not doing it. The other thing is it does take a few minutes to explain the patient, like why are you putting gloves and why do you feel in the mouth”? (Participant 9, Physician Assistant).

Theme 3: Current OCS practice. When we asked PCPs about oral cancer screening in their practice, most of them mentioned that OCS is not in their protocol. They said they depend on dentists to perform OCS. However, some providers indicated that they discuss oral cancer with alcoholics and with patients who smoke tobacco. When they were asked to describe the process of OCS, providers mentioned that they visually examine for abnormalities. Only two providers mentioned performing comprehensive OCS including palpation of soft tissues and lymph nodes.

“We don’t do a great job. I think I rely more on dentistry to do that, but a lot of my patients don’t see dentists. I do a good job of looking in their mouth, often comment on the tooth decay or the repair of the teeth, but I don’t think we always do a good manual palpitation exam. I certainly don’t ask to lift the tongue up or stick out the tongue” (Participant 5, Physician).

“No, I have never really screened for oral cancer. When we used to do full physicals, we used to look in the mouth. But, I think it was a very brief examination mainly to look at tonsils may be a periodontal disease. Just take a quick glance, I don’t think we did a full-scale examination of the mouth with palpation. We do look for lymph nodes in the neck routinely but not inside the mouth. So, I never did put on the gloves and checking in the mouth” (Participant 6, Physician).

“So yeah, the easiest thing is I use the light to just look into their mouth and examine. Next thing is I put gloves and usually run my fingers like along the inside of their mouth on their

jaw line. And then also externally making sure that I'm feeling their cervical lymph nodes. If I suspect oral cancer, I refer them directly to ENT specialist" (Participant 9, Physician Assistant).

Questionnaire Design

Questions on participants demographics such as age, gender and work characteristics such as years of experience and their practice type were included to understand characteristics of the participants. The one-on-one interview participants identified four significant challenges to perform OCS, inadequate time, lack of equipment, lack of knowledge, and not considering OCS as PCPs responsibility, incorporated all those challenges in the survey to identify the primary problem. Also, qualitative data analysis showed that the providers who received education on OCS during their medical training are more likely to perform OCS. So, questions on providers education and their current screening practices were incorporated to determine the association between these two variables. The past studies were used as a guide to developing questions to assess current OCS practice behavior of PCPs (Marino et al., 2017).

Quantitative Study

Participants characteristics. Thirty-four participants completed the survey (34% response rate). Table 1 summarizes the characteristics of the participants. A majority (82.4%) of the participants were physicians. Most of them have an experience of more than 11 years, with 32.8% of the participants having more than 20 years of experience, and 29.4% of participants having expertise between 11-20 years. Around 67.6% of participants work both clinically and academically, and the rest of the participants work only clinically.

Table 1

Demographic and work characteristics of survey respondents

Variables	Frequency (<i>n</i>=34)	%
Gender		
Male	15	44.1
Female	19	55.9
Age in Years		
30-39	10	29.4
40-49	9	26.5
50-59	7	20.6
60 or above	8	23.5
Area of Practice		
Family Medicine	19	55.9
Internal Medicine	9	26.5
Physician's Assistant	4	11.8
Nurse Practitioner	2	5.9
Years of Experience		
0-5	6	17.6
6-10	5	14.7
11-20	10	29.4
>20	13	38.2
Practice Type		
Both academically & clinically	23	67.6
Only clinically	10	29.4

A total number of individual variables in practice type is less than 34 because of missing responses

Challenges in performing OCS. Table 2 summarizes the challenges identified by PCPs. Participants could select only one option, and around half (50.0%) of the participants identified lack of time as their primary challenge in performing OCS. Participants identified lack of knowledge as their second main obstacle (22.5%) and very few providers selected other challenges. Furthermore, no provider considered lack of equipment as their challenge.

Table 2

Challenges identified by PCPs in performing OCS

Challenges	Percent of providers agreed with the challenge n= 34
	<i>n (%)</i>
Lack of knowledge to perform OCS	8 (22.5)
Inadequate time to perform OCS	17 (50.0)
Not considering OCS as PCPs responsibility	5 (14.7)
None of them mentioned above	4 (11.4)
Total	34 (100.0)

PCPs, Primary care providers; OCS, Oral cancer screening

Factors that influence providers decision to perform OCS. Majority of providers mentioned that they screen for patients who have a history of tobacco/ alcohol use (35.3%). The least significant factor considered for screening was the age of the patient (2.9%). Furthermore, 17.6% of participants mentioned screening every patient regardless of the patient’s characteristics.

Table 3

Factors that influence providers decision to perform the oral cancer screening

Factors	Number of providers agreed with each variable as an important factor in deciding to perform OCS n=34	
	<i>n (%)</i>	
Patient complains of a problem	9 (26.5)	
Age of the patient	1 (2.9)	
Smoking/alcohol history	12 (35.3)	
I do it on every patient	6 (17.6)	
I do not screen for OCS	6 (17.6)	
Total	34 (100.0)	

Providers could select only one option
 Providers include Physicians, Physician’s Assistants, and Nurse Practitioners
 OPC, Oropharyngeal cancer

Association between the education received on OCS and current OCS practice.

Analyzed the association between the education received on OCS and current OCS practice of PCPs with Fischer’s exact test (Table 4). The providers who received education and who did not receive the education on OCS during their medical training were equally performing OCS in their current practice (P=0.665).

Table 4

Association between the education received on OCS and current OCS practice of PCPs

Variable	Providers received training on OCS		Total	<i>n</i>	P-value Sig (2-sided)
	Yes	No			
	Yes	11 (78.5)	8 (66.7)	19 (73.1)	
				26	0.665

Providers performing OCS	No	3(21.4)	4 (33.3)	7 (26.9)
	Total	14 (73.0)	12 (27.0)	26(100.0)

Participants who did not respond to both the questions were excluded while analyzing the association between variables

Participants who indicated they did not receive education on OCS and who mentioned they do not remember if they received an education were combined while analyzing the data

PCPs, Primary care providers; OCS, Oral cancer screening

P-value from Fischer’s exact test

Current OCS practice. Table 5 presents the data on the current OCS practice behavior of PCPs comparing to their education received on OCS. Although 60% of the providers answered that they perform OCS, only 3.8% mentioned that they perform comprehensive OCS hundred percent of the times.

Furthermore, 26.9% of the participants said that they never perform comprehensive OCS on their patients. Visual examination of the oral cavity is the only step performed very frequently, and all other steps are performed very rarely on hundred percent of the patients. Moreover, no participant mentioned palpating soft tissues of the oral cavity hundred percent of the time, more than 60% of participants are performing on less than 25% of their patients.

Analyzed data to check if education influenced PCPs to perform any of the critical steps in comprehensive OCS. However, unable to find any significance expect for neck palpation which shows certain trend towards significance with p value of 0.064.

Table 5

Primary care providers OCS behavior related to the education they received on OCS during their medical training

Current OCS behavior	PCPs received education OCS			
Screening Practices	Yes (n=14) %	No (n=12) %	Total (n=26) %	P- value
How often do you perform comprehensive OCS?				
100% of the patients	7.1	0.0	3.8	0.438
75% of the patients	7.1	0.0	3.8	
50% of the patients	14.3	8.3	11.5	
< 25% of the patients	57.1	50.0	53.8	
Do not perform	14.3	41.7	26.9	
How often do you discuss risk factors of OPC with patients?				
100% of the patients	14.3	0.0	7.7	0.260
75% of the patients	14.3	0.0	7.7	
50% of the patients	14.3	8.3	11.5	
<25% of the patients	50.0	66.7	57.7	
Do not discuss	7.1	25.0	15.4	
How often do you perform visual inspection of oral cavity?				
100% of the patients	28.6	16.7	23.1	0.856
75% of the patients	42.9	41.7	42.3	
50% of the patients	21.4	16.7	19.2	
<25% of the patients	7.1	25.0	15.4	
Do not perform	0.0	0.0	0.0	
How often do you palpate soft tissues in the oral cavity for lumps and bumps?				
100% of the patients	0.0	0.0	0.0	0.944
75% of the patients	14.3	8.3	11.5	

50% of the patients	7.1	8.3	7.7	
<25% of the patients	57.1	66.7	61.5	
Do not perform	21.4	16.7	19.2	
How often do you perform visual inspection of the oro-pharynx?				
100% of the patients	14.3	16.7	15.4	0.650
75% of the patients	35.7	33.3	34.6	
50% of the patients	35.7	25.0	30.8	
<25% of the patients	7.1	25.0	15.4	
Do not perform	7.1	0.0	3.8	
How often do you perform neck palpation?				
100% of the patients	35.7	16.7	26.9	0.064
75% of the patients	42.9	58.3	50.0	
50% of the patients	21.4	0.0	11.5	
<25% of the patients	0.0	25.0	11.5	
Do not perform	0.0	0.0	0.0	
How often do you perform extra-oral visual exam of the oral cavity?				
100% of the patients	14.3	0.0	7.7	0.188
75% of the patients	21.4	25.0	23.1	
50% of the patients	14.3	0.0	7.7	
<25% of the patients	21.4	58.3	38.5	
Do not perform	28.6	16.7	23.1	

Primary care providers included Physician's, Physician's Assistants, and Nurse Practitioners
 Providers could select only one option
 OCS, oral cancer screening; OPC, oropharyngeal cancer
 Yes, primary care providers who received education on OCS

No, primary care providers who did not receive education and who mentioned that they do not remember if they received education on OCS
P-value from Chi-Square test

Discussion

OCS is a two-step process which includes discovery and diagnosis (Centers for Disease Control and Prevention, 2015). Discovery is a process of visual and manual examination of the oral cavity and surrounding tissues to identify abnormalities. The diagnosis could be only be made with a biopsy of the tissue. PCPs are expected to perform the first step, visual examination with mouth mirror and palpation of all the soft tissues and lymph nodes surrounding the oral cavity.

In the survey, 60% of participants answered that they perform OCS. However, only 3.8% of participants mentioned performing comprehensive OCS hundred percent of times. When they were asked about each step in the OCS, no provider answered that they palpate soft tissues for lumps and bumps 100% of the times. Only 26.9% perform neck palpation on 100% of the patients. These two discovery procedures are essential aspects in the detection of OPC, and the study results indicate that only a few providers are performing them.

Participants identified lack of knowledge as a second most prominent challenge in performing OCS. Probably inadequate skills and knowledge to perform OCS might be a reason for not completing comprehensive OCS. This result is comparable to the study conducted in Massachusetts, where PCPs demonstrated poor knowledge in identifying symptoms associated with OPC and self-reported that they are not adequately trained to perform OCS (Applebaum, Ruhlen, Kronenberg, Hayes, & Peters, 2009).

A high proportion of participants (35.5%) mentioned that they perform OCS when patients have a history of smoking and alcohol and consider them as significant risk factors for

OPC. However, very few participants (2.9%) mentioned that they consider the age of the patient while screening for OPC. Furthermore, patients who have a previous cancer history are more prone to develop cancers, but none of the participants identified patient's medical history as a vital factor to consider for screening. However, in a previous study conducted with dentists and physicians, physicians identified risk factors with OPC proficiently, where 100% of physicians identified patient's oral cancer history is a risk factor and essential factor to consider for screening (Applebaum et al., 2009). In the current study, instead of the patient's oral cancer history, patient's medical history was provided as an option. If the present study would have used the same wording as oral cancer history, then probably more PCPs' would have identified it as a risk factor.

Results showed that the providers who received education on OCS during their medical training and the providers who did not receive any education are equally performing the screening. This finding undermines the importance of providing education for providers on OCS. These results are consistent with the previous study, where traditional education methods did not improve providers knowledge or did not influence their screening behavior (Sohn et al., 2005). Instead, the evidence presents that small group's discussions and workshops were more effective in changing PCPs' behavior (Sohn et al., 2005).

Limitations

The study has multiple flaws. The sample size of the study is small and may not represent all the PCPs at Nebraska Medicine. Non-respondents were excluded from the study to minimize the bias. Sixty percent of the providers who participated in the survey were already performing OCS, which indicates there is a selection bias and responses are from providers who have an interest in the topic of discussion.

Also, these results may not be generalized to all providers, because Nebraska Medicine is an educational institution and 67% of the participants work both clinically and academically with the university. Teachers functioning as a role model for their students may often strive to incorporate a significant amount of the guidelines recommended by health promotion organizations like WHO or the United States Preventive Task Force. Also, the providers who are not academically involved might be influenced by their colleagues or from the results of the research conducted in the organization. All these factors may influence the way providers develop their perspectives and the way they provide care. Therefore, the results derived may not be generalized to non-academic institutions, or the organizations that practice exclusively clinical medicine.

The study was focused on understanding PCPs perceptions about their knowledge, barriers, and their OCS screening practices. Accordingly, the study collected subjective data. For instance, data were collected to analyze if PCPs think they have enough knowledge to perform OCS. In fact, objective data were not collected to assess their actual knowledge. Similarly, the study collected data directly from PCPs' about their screening practices but didn't evaluate patients charts to determine how many patients PCPs actually screened. Consequently, there is a possibility of participants overreporting about their knowledge and OCS practices.

Future research

In the future, a study can be conducted addressing gaps and limitations identified in this research. A large sample size including participants from academic, non-academic, public health, and private organizations should be recruited. The generated results could be generalized to all PCPs. In addition, the questionnaire can include inquiries on OPC and OCS to test the knowledge of PCPs, and the results can be compared with their educational background to determine if

providers who received education on OCS are more knowledgeable than the providers who did not receive the education.

Human papilloma virus (HPV) associated OPC increased from 16.3% in 1989 to 71.7% in 2003 (Satish, Wang, & Yuan, 2014). It is also estimated that patients with HPV associated OPC will surpass the patients with cervical cancer by 2020. Besides, it occurs in patients below 50 years and who have no history of smoking/alcohol use (Satish et al., 2014). In current study it showed that only 17.6% of the PCPs screen all of their patients, remaining providers screen patient with risk factor for OPC. Therefore, it is important to determine effective strategies to address HPV associated OPC.

Conclusion

Comprehensive OCS is essential for detection of early cancers. However, the study indicates that PCPs are not performing comprehensive OCS which could be a reason for missed OPC detection in the past. Although, around 75% of the participants specified that lack of knowledge was not their challenge, not performing soft tissue and lymph nodes palpation and not considering the age of the patient as a risk factor indicate that there is a gap in their knowledge on OCS. Therefore, planning educational programs to emphasize the importance of performing comprehensive OCS, and to address skill gaps are necessary to develop competence in this area.

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Service Learning/Capstone Experience Reflection

A summary of the activities performed for the service-learning project:

- Literature review
- Organized data of study done in 2009 to prepare for the manuscript.
- Written literature review and methods section of the research paper.
- Performed data entry
- Observed and assisted in coordinating school-based oral health program
- Sorted consent form into a routine, early and urgent to take further steps.
- Inventory count was done and submitted for updating in the system.

For service learning/Capstone project, I took the opportunity to work with the Creighton School of Dentistry which prepares dental students to prevent and control dental diseases through health promotion and organized community efforts. Creighton School of Dentistry partners with local schools and multiple agencies to provide much-needed care for the underserved population. Creighton offers preventive oral services to school students through the ‘Healthy Smiles Sealant Program’ which is funded by ‘Building Healthy Futures.’ Dental students under the supervision of faculty, perform screening, provide education, fluoride varnish, and dental sealants twice a year at 10 Omaha public schools. If they diagnose a child with untreated tooth decay, who needs to see a dentist, the dental care coordinator contacts the family and assists them in getting a dental appointment at the provider of their choice.

While working for ‘Healthy Smiles Sealant Program’ I wrote follow-up letters at the conclusion of child’s appointment, notifying parents of the outcome of the school-based appointment and any necessary steps parents should take to follow up. The data were collected on the oral health status of the students and the services provided. Ideally, at the conclusion of the

dental program's visit, the program will have a quantitative list of services that were delivered to the student body. Observing and working on site not only provided me with an understanding of the policy and regulations for a school-based oral health program but, I also learned to maintain high standards of infection control with minimal equipment. Furthermore, entered data to record teeth that needed sealants, and the sealants placed for every student. Data tracking was done to know the estimate of students in each school, how many consents were returned, and the number of affirmative consents. Moreover, sorted treatment forms based on routine, early, and urgent needs and coordinated with families to get appointments with dentists.

Also, assisted with writing a manuscript of NIH funded study. As part of the paper, I performed a literature review on oral cancer-related studies, which provided me with an understanding of prevalence & incidence of oropharyngeal cancer and primary care providers role in detecting oropharyngeal cancer at a localized stage. This service learning component was helpful in identifying the gaps in oropharyngeal cancer screening and was useful in designing a research study for the capstone project.

For the capstone project, I collaborated with faculty members to design a mixed method study to investigate 'Perspectives of primary care providers in implementing oral cancer screening in their annual screening protocol.' Qualitative data was collected using one-on-one interviews. Building from the results of qualitative data, I developed a survey to answer the research question and performed analysis using SPSS. The project provided me with first-hand experience of designing and implementing a research study. The recruiting participants for the qualitative phase took more time than I expected and one of the reasons for that is my study population being health care providers, which helped to understand the importance of considering the characteristics of participants and study method while developing a timeline for the study.

Transcription of interviews was one the challenges I faced during my capstone project. On an average, recordings were around 30 minutes, and it took more than 4 hours to transcribe one recording. Due to lack of funding, it was not possible to hire a professional transcriptionist. So, I explored different software's and found 'Trint' to be more accurate compared to others. Once trint transcribed, I compared each transcript with recording to check for accuracy.

Service learning/capstone experience helped to understand that literature review is the most crucial step of the research and intervention program. Past researches are very helpful in providing insight on challenges associated with research based on study participant's, study design and multiple other factors. The analysis will allow us to consider the pros and cons associated with each model and implement a study that is practically feasible at given resources.

The ethical principles learned in 'Foundations of Public Health' course including case discussion was helpful in writing IRB protocol for the research. I continuously monitored the study to make sure it is conducted according to the approved protocol. During the second phase research, we incorporated survey and cover letter. Both materials were submitted to IRB to get approval before recruiting participants for the second phase of the study. Also, the confidentiality of participants was maintained while disseminating the results.

All these experiences have prepared me to become a better public health professional, and I am excited to learn more as I continue to work in the field.

Acknowledgment

The Service learning/Capstone project was an intensive learning period for me, not only professionally but also at a personal level. Several people have supported me through this period. It is a pleasure to acknowledge the support of individuals who significantly contributed to this project. Being a first-time researcher, it would have not possible to complete this project without their guidance.

First, I would first like to thank my committee chair Dr. Lea Pounds, College of Public Health, University of Nebraska Medical Center. Dr. Pounds skillful guidance, innovative ideas, and patience are much appreciated. She suggested necessary resources useful in every step of the research, helped with developing plans and steered me in the right direction. Especially thank you for providing much-needed guidance on the qualitative part of the study and in writing the paper.

I want to thank my preceptor Dr. Alvin Wee, who gave me an opportunity to work with the Creighton School of Dentistry. Dr. Wee's with expertise in oral cancer research was a great resource in guiding me while conducting the study. Thank you for helping me collaborate with Ashley Aubrey's team. I truly enjoyed the time I spent working at Creighton.

My committee member Dr. Lorena Baccaglioni Department of Epidemiology was helpful from the time I started looking for the capstone project. I'm very obliged for your invaluable advice on data analysis.

I also would also like to thank Laura Vinson and Teresa Hartman for their support and advice. A special thank you to my husband Krishna Ailneni for his support.

Appendix A

Email recruitment letter for one-on-one interviews

Dear Dr. XXX,

The purpose of this study entitled “Perspectives of health care providers on implementation of oral cancer screening in daily practice” is to determine methods to improve implementation of oral cancer screening in a regular physical examination. Results from this study may help us learn how to promote early stage detection of oral cancer in our community.

Oral cancer is usually detected at a late stage, mainly because it is non-symptomatic at an early stage and not all patients see a dentist annually who carries out the screening, but patients do see other healthcare providers annual. Unfortunately, busy healthcare providers do not always conduct annual oral cancer screenings. As shown in the literature, opportunistic oral cancer screening by medical health care providers will result in a “downstaging” of oral cancer in the region.

Please consider participating in this study. Your participation involves an estimated 30 - 40 minutes or less in a one-on-one interview. Our goal is to make this experience convenient and comfortable for you. The date, time and venue will be decided based on your convenience. The venue can be either participant’s office or one of the study location, i.e., University of Nebraska Medical Center (UNMC) College of Public Health, Nebraska Medicine, and Creighton University Medical University. Your participation is voluntary. You have been approached because you are health care provider from UNMC or Creighton University who examines adult patients in daily practice.

Thank you for considering helping to improve implementation of oral cancer screening. Please contact investigators through e-mail or phone call for further questions and to discuss the best date and time for participation.

“This research study has been approved by the University of Nebraska Medical Center IRB (402-559-6463)”.

Sincerely,

*Alvin G. Wee, DDS, PhD, MPH
Special Associate Professor in Prosthodontics*

*Lorena Baccaglini, DDS, MS, PhD
Associate Professor*

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Appendix B:

Semi-structured interview guide

Questionnaire:

Introductory Question:

What is the first thing that comes to mind when you think about your own practice and oral cancer screening? What one thing stands out to you about these statistics?

Transition Question:

What is the next thing that comes to mind when you think about incorporating oral cancer screening in primary care practice? What experiences have you had with oral cancer screening in your practice?

Key Questions:

Please describe the process for oral cancer screening in your practice setting?

What barriers are you facing to incorporate oral cancer screening?

You mentioned this barrier, in your opinion how can this barrier be addressed? (Probes: elaborate ask, why and how the solution would help)

Do you feel that you have enough training to identify signs and symptoms of oral cancer?

Does continuing education curriculum cover oral cancer screening?

(Probes: hand on practice, PowerPoint presentations, seminars)

What other strategies could we use to improve oral cancer screening in your practice?

Ending Questions:

All things considered, do you think we can increase the rate of oral cancer screening in primary care settings?

Thinking back on this session, have we missed anything? Is there anything that we should have talked about but didn't?

Thank you

Appendix C

Consent for a one-on-one interview

IRB PROTOCOL # 558-Ex

ADULT CONSENT - SOCIAL SCIENCE AND BEHAVIORAL

One-on-one interview

Invitation

You are invited to take part in this research study. You have a copy of the following, which is meant to help you decide whether or not to take part:

- Informed consent form
- "What Do I need to Know Before Being in a Research Study?"
- The Rights of Research Subjects

Why are you being asked to be in this research study?

You are being asked to be in this research study because you are a primary care provider at UNMC or Creighton University who examines adult patients in daily practice.

What is the reason for doing this research study?

The primary purpose of this study is to understand the best methods to improve the implementation of oral cancer screening during regular physical examinations.

The secondary purpose of the study is to identify the challenges/ barriers faced by health care providers in the health care settings regarding screening for oral cancer.

What will be done during this research study?

You are being asked to participate in a one-on-one interview which is held for 30-40 minutes. The interview will focus on the opinions and perspectives of primary health care providers on various methods to improve oral cancer screening in daily practice. The interviews will be audio recorded and transcribed for further analysis. Subject identifiers such as audio recordings, name, telephone number, and email address will be maintained till the study is published and will be destroyed as soon as feasible but no later than 12 months of manuscript publication.

What are the possible risks of being in this research study?

The study involves a healthy open discussion with the participants about what according to them are the best methods to improve the implementation of oral cancer screening in daily practice. There is a potential risk of loss of confidentiality of participants as some of the HIPPA identifiers like name; e-mail address would be recorded for recruitment purpose. Audio recordings will be collected during the discussion. A breach of confidentiality has a very low likelihood of occurrence. Should a breach of confidentiality occur, the potential severity of harm/discomfort is minimal?

What are the possible benefits to you?

You are not expected to get any benefit from being in this research study.

What are the possible benefits to other people?

The short-term benefit of the study will be to understand the perspectives and opinions of health care providers regarding various barriers faced by health care providers, gaps in current guidelines regarding oral cancer screening and implementation of these guidelines in daily practice. The long-term benefit of the study will be to increase the survival of oral cancer patients by improving early detection through implementing better oral cancer screening.

What are the alternatives to being in this research study?

Instead of being in this research study you can choose not to participate.

What will be being in this research study cost you?

There is no cost to participate in this research study.

Will you be paid for being in this research study?

You will not be paid to be in this research study.

What should you do if you have a problem during this research study?

Your welfare is the major concern of every member of the research team. If you have a problem as a direct result of being in this study, you should immediately contact one of the people listed at the end of this consent form.

How will information about you be protected?

All necessary steps will be taken to protect your privacy and the confidentiality of your study data.

Who will have access to information about you?

By signing this consent form, you are allowing the research team to have access to your research data. The research team includes the investigators listed on this consent form and other personnel involved in this specific study at the Institution.

Your research data will be used only for the purpose(s) described in the section What is the reason for doing this research study?

You are also allowing the research team to share your research data, as necessary, with other people or groups listed below:

- The UNMC Institutional Review Board (IRB) •
Institutional officials designated by the UNMC IRB
- Federal law requires that your information may be shared with these groups:
 - The HHS Office of Human Research Protections (OHRP)

How will the results of the research be made available to you during and after the study is finished?

In most cases, the results of the research can be made available to you when the study is completed, and all the results are analyzed by the investigator. The information from this study may be published in scientific journals or presented at scientific meetings, but your identity will be kept strictly confidential.

If you want the results of the study, contact the Principal Investigator at the phone number given at the end of this form or by writing to the Principal Investigator at the following address: [REDACTED]
[REDACTED]

What will happen if you decide not to be in this research study or decide to stop participating once you start?

You can decide not to be in this research study, or you can stop being in this research study ("withdraw") at any time before, during, or after the research begins. Deciding not to be in this research study or deciding to withdraw will not affect your relationship with the investigator or the Institution. You will not lose any benefits to which you are entitled.

Will you be given any important information during the study?

You will be informed promptly if the research team gets any new information during this research study that may affect whether you would want to continue being in the study.

What should you do if you have any questions about the study

You have been given a copy of "What Do I Need to Know Before Being in a Research Study?" If you have any questions at any time about this study, you should contact the Principal Investigator or any of the study personnel listed on this consent form or any other documents that you have been given.

What are your rights as a research participant?

You have rights as a research subject. These rights have been explained in this Consent form and in The Rights of Research Subjects that you have been given. If you have any questions

concerning your rights or want to discuss problems, concerns, obtain information or offer input, or make a complaint about the research, you can contact any of the following:

- The investigator or other study personnel
- Institutional Review Board (IRB)
 - Telephone: (402) 559-6463.
 - Email: IRBORA@unmc.edu
 - Mail: UNMC Institutional Review Board, 987830 Nebraska Medical Center, Omaha, NE 68198-7830
- Research Subject Advocate
 - Telephone: (402) 559-6941/li>
 - Email: unmcrsa@unmc.edu

Documentation of informed consent

You are freely making a decision whether to be in this research study. Signing this form means that:

- You have read and understood this consent form.
- You have had the consent form explained to you.
- You have been given a copy of The Rights of Research Subjects
- You have had your questions answered.
- You have decided to be in the research study.
- If you have any questions during the study, you have been directed to talk to one of the investigators listed below on this consent form.
- You will be given a signed and dated copy of this consent form to keep.

Signature of Subject _____ Date

My signature certifies that all the elements of informed consent described on this consent form have been explained fully to the subject. In my judgment, the participant possesses the legal capacity to give informed consent to participate in this research and is voluntarily and knowingly giving informed consent to participate.

Signature of Person Obtaining Consent _____

Date _____

Appendix DCover letter for survey

IRB # 558-17-EX: Perspective of health care providers on the implementation of oral cancer screening in daily practice.

Title of this Research Study:

Perspectives of health care providers on implementation of oral cancer screening in daily practice

Dear Health Care Providers,

Thank you for taking the time to read this. We are currently carrying out a study entitled "Perspectives of Health Care Providers on Implementation of Oral Cancer Screening in their daily practice" for my UNMC MPH Capstone project.

This survey will only take 5-10 minutes to complete. You are receiving this email because you are listed as an either General Physician, Physician Assistant, or Nurse Practitioner on UNMC/Nebraska Medicine website.

Purpose of the study is to determine methods to improve implementation of oral cancer screening in Primary care provider's regular practice. Results from this study may help us learn how to promote early stage detection of oral cancer in our community.

Your participation is voluntary, and you will receive no benefit from this research. Your responses will remain confidential; only unidentified group data will be reported. Your participation and insightful responses would be greatly appreciated.

Thank you for your time.

Appendix ESurvey QuestionnaireBiographic Information

What is your gender?

- a) Male
- b) Female

Which category below includes your age?

- a) 18-20
- b) 21-29
- c) 30-39
- d) 40-49
- e) 50-59
- f) 60 or older

Which of the following category best describes your race?

- a) White
- b) Black or African-American
- c) Asian
- d) Native Hawaiian or another Pacific Islander
- e) From multiple races.
- f) Some other race (please specify)

Which of the following category describes your ethnicity?

- a) I'm not Spanish, Hispanic, or Latino
- b) Mexican
- c) Chicano
- d) Puerto Rican
- e) Cuban
- f) Cuban-American
- g) Some other Spanish, Hispanic, or Latino group.
- h) From multiple Spanish, Hispanic, or Latino group.

Please select the area of your practice

- i) Family Medicine Physician

- j) Internal Medicine Physician
- k) Physician Assistant
- l) Nurse Practitioner
- m) other

Please select one from below which best matches your years of experience:

- a) 0-5 years
- b) 6-10 years
- c) 11-20 years
- d) > 20 years

Currently, you are affiliated with

- e) UNMC/ Nebraska Medicine
- f) Creighton University Medical Center
- g) Other:

Do you have experience

- a) Only academically
- b) Only clinically
- a) Both academically & clinically

Education received

Did you get education on oral cancer screening while you were trained to be Physician, Physician's Assistant or Nurse Practitioner?

- a) Yes
- b) No
- c) Do not remember

Did you take any continuing education courses on oral cancer in the last 5 years?

- a) Yes
- b) No
- c) Do not remember

Did you take any continued education course on oral cancer screening in the last 5 years?

- a) Yes
- b) No
- c) Do not remember

Did you take any continued education course on oral cancer screening in your career?

- a) Yes
- b) No
- c) Do not remember.

Current Screening Practices:

Do you perform oral cancer screening on your patients?

- a) Yes
- b) No

How frequently do you complete a comprehensive oral cancer screening?

- a) On 100% of the patients.
- b) On 75% of the patients.
- c) On 50% of the patients.
- d) Less than 25% of the patients.
- e) I do not perform comprehensive oral cancer screening

How often do you discuss risk factors for oral cancer with your patients?

- f) With 100% of the patients.
- g) With 75% of the patients.
- h) With 50% of the patients
- i) With less than 25% of patients.
- j) I do not discuss risk factors for oral cancer with patients.

What factors influence your decision to perform an oral cancer screening examination?

- a) Patient complains of a problem
- b) Age of the patient
- c) Smoking history/ Alcohol history
- d) Medical history.
- e) I do it on every patient.
- f) I do not perform oral cancer screening.

Screening examination

How often do you perform an extra-oral visual examination of the oral cavity?

- a) On 100% of the patients.
- b) With 75% of the patients
- c) With 50% of the patients
- d) Less than 25% of the patients.
- e) I do not perform extra oral, visual examination of the oral cavity.

How often do you perform a visual inspection of the oral cavity?

- a) On 100% of the patients.
- b) With 75% of the patients
- c) With 50% of the patients
- d) Less than 25% of the patients.
- e) I do not perform a visual inspection of the oral cavity

How often do you perform an inspection of oro-pharynx?

- a) On 100% of the patients.

- b) With 75% of the patients
- c) With 50% of the patients
- d) Less than 25% of the patients.
- e) I do not perform inspection of oral- pharynx

How often do you palpate soft tissues in the oral cavity for lumps and bumps?

- a) On 100% of the patients.
- b) With 75% of the patients
- c) With 50% of the patients
- d) Less than 25% of the patients.
- e) I do not perform palpation of soft tissues in the oral cavity

How often do you perform neck palpation?

- a) On 100% of the patients.
- b) With 75% of the patients
- c) With 50% of the patients
- d) Less than 25% of the patients.
- e) I do not perform a visual inspection of the oral cavity

Challenges:

In general, what do you think are barriers to implementing oral cancer screening in your practice (Check all that apply)

- a) Lack of knowledge to perform oral cancer screening
- b) Lack of equipment necessary to perform oral cancer screening.
- c) Inadequate time to perform oral cancer screening.
- d) Not considering oral cancer screening as a health care provider's responsibility
- e) Other, please specify

In general, what do you think is the main barrier in implementing oral cancer screening in any medical practice? Select one:

- a) Lack of knowledge to perform oral cancer screening
- b) Lack of equipment necessary to perform oral cancer screening.
- c) Inadequate time to perform oral cancer screening.
- d) Not considering oral cancer screening as a health care provider's responsibility.
- e) Other, please specify

