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DENTAL HYGIENE STUDENTS' KNOWLEDGE OF HUMAN PAPILLOMAVIRUS AND ITS RELATION TO OROPHARYNGEAL CANCER

By

Julia Forsmark

A thesis

submitted in partial fulfillment

of the requirements for the degree of

Master of Science in Dental Hygiene

Idaho State University

April 2014

COMMITTEE APPROVAL

To the Graduate Faculty:

The members of the committee appointed to examine the thesis proposal of Julia Forsmark find it satisfactory and recommend that it be accepted.

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October 1, 2013

Julia Forsmark, RDH, BS
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RE: Your application dated 9/30/2013 regarding study number 3971M: Dental Hygiene Students' Knowledge of Human Papillomavirus and Its' Relation to Oropharyngeal Cancer

Dear Ms. Forsmark:

I agree that this study qualifies as exempt from review under the following guideline: 1. Research on educational practices in educational settings. This letter is your approval, please; keep this document in a safe place.

Notify the HSC of any adverse events. Serious, unexpected adverse events must be reported in writing within 10 business days.

You are granted permission to conduct your study effective immediately. The study is not subject to renewal.

Please note that any changes to the study as approved must be promptly reported and approved. Some changes may be approved by expedited review; others require full board review. Contact Patricia Hunter (208-282-2179; fax 208-282-4529;
email: humsubj@isu.edu) if you have any questions or require further information.

Sincerely,

Ralph Baergen, PhD, MPH, CIP
Human Subjects Chair

DEDICATION

This thesis document is dedicated to Joe VanGorden, my family, and in loving memory of my father Everett Cartwright for their support and sacrifices. Thank you for understanding my goals and dreams.

ACKNOWLEDGEMENTS

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ABSTRACT

The impact of a web-based self-study human papillomavirus (HPV) training module on the knowledge level of entry-level dental hygiene students was explored. Participants (N=37) took an initial knowledge test (pre-test) on HPC and OPC. The experimental group viewed the self-study prior to the post-test and the control group was able to access the self-study following the post-test. There was a statistically significant main effect of knowledge (pre- to post-test) for the combined control and experimental groups ($F=28.1$, $p < .001$). No significant interaction between groups (control versus experimental) and the pre-/post-test was identified. There was no statistically significant main effect between group means when averaged across the pre-test and post-test. Although this study showed no effect between the experimental and control groups, it did show a significant increase in knowledge for both groups from pre- to post-test indicating an augmentation of current curricula may be warranted.

CHAPTER 1

Introduction

Head and neck cancers, including throat, larynx, and oral cancers (OC), and excluding brain cancer, are associated with severe morbidity and mortality. Cancer can affect any part of the oral cavity, including the tongue, lips, throat, and mouth. There are two types of OCs: those in the oral cavity itself and those in the throat behind the oral cavity (American Cancer Society, 2007e). The more prevalent of the second kind is oropharyngeal cancer (OPC), which develops in the part of the throat behind the oral cavity (American Cancer Society, 2007e).

Annually, over 640,000 new OCs and OPCs are found worldwide (Oral Cancer Foundation, 2012). According to the National Cancer Institute (2012d), the yearly worldwide occurrence of OC alone is estimated at 275,000 with higher rates in South and Southeast Asia, France, and Brazil; men are also more likely than women to develop OC. From 1996 to 2006, OPC doubled in the United Kingdom, attributed to the high-risk human papillomavirus (HPV) (Mehanna, Oaleye & Licitra, 2012). In 2013, an estimated 40,250 new cases of OC were diagnosed in the United States alone; the overall annual incidence was expected to be 10.4 per 100,00 men and women, and an estimated 7,850 people will succumb to the disease each year (National Cancer Institute, 2012d). Although the incidence of OC has been falling in both men and women since 1980,

recent findings show that the incidence of OCs related to high-risk HPV is rising (National Cancer Institute, 2012d).

There are multiple factors associated with OCs and the two most common include tobacco and alcohol. More recently there has been greater attention to HPV infection as a major risk factor for OPC. From 1999-2008, HPV related OPC was listed as a cancer with increasing incidence trends in the U.S. (American Cancer Society, 2012a). HPVs' are small, double-stranded DNA viruses that can infect oral mucosa and genital tracts; they are categorized into two main types, low- and high-risk HPV (Durzynska et al., 2011). Statistics in the United States and Europe have identified an increasing prevalence of oral carcinoma among young adults who may not be aware of the relationship of high risk HPV to OPC (Shiboski, Schmidt, & Jordan, 2005). Given the lifestyle behaviors of society today, people need to be educated and aware of the impact of HPV infection on health and oral health. Oral health professionals need additional educational training to help patients reduce cancer risk and diminish the morbidity, mortality, and economic burden associated with OCs.

Statement of the Problem

A dental office is more likely to perform an OC examination than a physician's office; overall only 20% of Americans receive an OC examination (National Cancer Institute, 2012d). OC occurs in a region of the body that health care professionals can exam visually; visual examination is the most common method used in detection (National Cancer Institute, 2012d). The National Cancer Institute (2012d) stated that routine oral examination can lead to detection of earlier stages of cancers and

premalignant lesions. In agreement, the American Cancer Society (2012a) stated that regular screening examinations can result in the detection and diagnosis of cancer at an early stage, when the treatment is less extensive with greater chance of survival. According to the Oral Cancer Foundation (2012), if OC is treated in the early stages patients have little treatment disfigurement as opposed to later stages that could result in reconstruction of their oral cavity or facial features.

If cancer goes undetected, it can metastasize and increase mortality and morbidity. Education is critical and necessary for oral health care providers worldwide; however, little is known about the extent of content that is taught in dental hygiene programs concerning this topic. Dental hygienists have an opportunity to assess patients for signs of HPV infection and oral cancer, and to educate them about HPV related OCs and disease prevention strategies. Teaching entry-level dental hygiene students this information will allow them to provide health promotion and disease prevention for OPC.

Purpose of the Study

The purpose of this study was to determine the impact of a web-based self-study HPV training module on the knowledge level of entry-level dental hygiene students within Michigan, United States.

Professional Significance of Study

The WHO Global Oral Health Program has established a global surveillance system targeting oral cavity cancer in order to assess risk factors and help the planning of

effective national intervention programs (Peterson, 2008). In 2007, the World Health Assembly (WHA) passed the following resolution on oral health prevention.

> To take steps to ensure that prevention of oral cancer is an integral part of national cancer-control programs, and to involve oral-health professional or primary health care personnel with relevant training in oral health in detection, early diagnosis and treatment. (p. 459)

During the past decade, federal agencies followed world health agencies and focused on reducing the incidence of oral and pharyngeal cancers, and to increase the five-year survival rate. For example, Healthy People 2020 (2012b), included the following oral health interventions and among its topics and objectives.

> OH-14 (Developmental) Increase the proportion of adults who receive preventive interventions in dental offices.
>
> OH-14.2: (Developmental) Increase the proportion of adults who received an oral and pharyngeal cancer screening from a dentist or dental hygienist in the past year.

In addition, the significance of the study is reflected by the American Dental Hygienists' Association (ADHA) National Dental Hygiene Research Agenda: evaluate the extent to which current dental hygiene curricula prepare dental hygienists to meet the increasingly complex oral health needs of the public (ADHA, 2007b, p. 3).

Over the past few decades, the OC survival rate has not changed (Rosenquist, 2007). It is a dental hygienist's legal and ethical obligation to perform OC screening on

all patients. The standard of care includes a complete head and neck examination once a year; failure to identify abnormal lesions can lead to legal ramifications (Cotter, McCann, Schneiderman, Wald, & Campbell, 2011). Yet, in the document Healthy people 2010 (2009a) it was reported that only 13% of Americans had an OC examination in the past year. Based on dental hygiene research in the state of Texas, Cotter et al. (2011) explained that dental hygienists' knowledge about OC was not current, and due to comfort levels a low number of OC screenings were being performed.

Focusing on prevention and educating dental hygiene students, future oral health professionals will be able to help people gain knowledge on HPV's and its role in OPC's; education to promote safer sexual practices and available HPV vaccines for male and females, along with reducing use of tobacco and alcohol (American Cancer Society, 2012a). Using a web-based teaching module to educate college students has been shown to be an effective teaching strategy: literature reviews on teaching modules have shown that students do gain knowledge, positive attitude, build skills, and confidence levels (Carpenter, Carlini, Painter, Mikko & Stoner, 2012; Dark & Perrett, 2007; Snyder, Meyer, McGivney & Smith, 2010). Based on interventional programs, personal lifestyle changes have been reported within several studies (Baker, Gilley, James, & Kimani, 2012; Jonsson, Ohrn, Lindberg, & Oscarson, 2010; Meyer, Geurtsen, & Gunay, 2010; Yazdani, Vehkalahti, Nouri, & Murtomaa, 2009). Offering health education will empower people to make decisions to protect and improve their own health and that of their families.

Research Questions

1. What is the current level of dental hygiene students' knowledge of high-risk HPV and its role in OPC?
2. After participation in a web-based training module, is there an increase in dental hygiene students' knowledge concerning HPV and OPC?

Hypothesis

The null hypothesis for this study was that there is no difference in the knowledge of dental hygiene students after completing a web-based self-study HPV training module as measured by pre and post-test scores.

Definitions

Dental hygiene students: An individual who is engaged in an accredited entry-level dental hygiene program that prepares graduates for the clinical practice of dental hygiene (ADHA, 2012a).

Knowledge level: Knowledge is the fact or condition of knowing something with familiarity gained through experience or association (Merriam-Webster Dictionary, 2013). For the purpose of this study, knowledge level will be measured by performance on web-based pre and post-tests.

High-risk human papillomavirus (HPV): HPV types that have great potential for causing cancer (National Cancer Institute, 2012c).

Oropharyngeal cancer (OPC): Cancer that forms in tissues of the oropharynx; most oropharyngeal cancers are squamous cell carcinomas (National Cancer Institute, 2012c).

Self-study training module: PowerPoint-driven, web-based, self-paced training tool designed to improve knowledge of HPV and OPC.

Oropharyngeal: Related to the posterior part of the throat at the posterior of the mouth behind the oral cavity; includes the posterior third of the tongue, the soft palate, the side and posterior walls of the throat and the tonsils (National Cancer Institute, 2012c).

Oral cavity: Cavity of the mouth; tissues of the oral cavity include the lips, the lining inside the cheeks and lips, the front two thirds of the tongue, the upper and lower gingiva, the floor of the mouth under the tongue, the palate, and the retromolar pads and maxillary tuberosity (National Cancer Institute, 2012c).

Summary

Cancer is the general name for a group of more than one hundred diseases. Oral cancer causes severe morbidity and mortality. Major risk factors of OC include tobacco, alcohol and a rising rate of HPV infection. It is suspected that most dental hygiene programs lack a training module available for students that increase awareness and knowledge of the role of high-risk HPV and OPC. Global Oral Health programs are focusing on effective national intervention programs, preventive strategies on risk factors, and the training of oral-health professionals in detection and early diagnoses. This study was designed to determine the impact of a web-based self-study HPV training module on the knowledge level of entry-level dental hygiene students.

CHAPTER 2

Literature Review

Worldwide, head and neck cancer (HNC) is diagnosed in approximately 650,000 patients each year, making it the sixth most common malignancy. In the United States, it accounts for three percent of malignancies with an estimated 53,000 Americans developing head and neck cancer annually and nearly 12,000 dying from the disease (National Cancer Institute [NCI], 2013b). The term *head and neck cancer* refers to a group of similar cancers originating from the upper aerodigestive tract including the lips, oral cavity, nasal cavity, sinuses, pharynx and larynx. Oropharyngeal cancer (OPC) includes all the structures of the mouth and pharynx and oral squamous cell carcinoma (OSCC) is the most common form. Seventy five percent of OSCCs are attributed to tobacco and alcohol use (NCI, 2013b). According to the Substance Abuse and Mental Health Services Administration (SAMHSA, 2006), the prevalence of cigarette smoking has decreased among Americans, and alcohol use has declined since the 1970s. Despite these decreases, OPCs have increased, especially in younger people. These trends have led researchers to investigate other potential risk factors.

New studies suggest that there may be an alternative pathway for the development of OPC. The human papillomavirus (HPV) is a sexually transmitted virus passed through genital or skin-to-skin contact. Infections resulting from HPV occur only in keratinocytes of the skin or mucous membranes (CDC, 2013). While there are over one hundred types

of HPV, approximately a dozen of these strains are considered high-risk because they can lead to certain types of cancer; namely cervical, anal, vulvar, and penile. High-risk types of HPV are now thought to be potential etiologic agents in the occurrence of OPC (Zush et al., 2011; Feller et al., 2010). Most recently, HPV 16 virus type has been predominantly associated with OPC and HPV oral infection increasing the risk for development of an HPV positive (+) OPC (D'Souza et al., 2007; Ramqvist & Dalianis, 2010). Most HPV infections are asymptomatic, unrecognized, or subclinical (CDC, 2013b); making OC screening an important part of OPC prevention.

A dental hygienist, as a healthcare professional, serves many roles in the prevention and treatment of oral diseases: clinician, educator, advocate, manager, researcher and health promoter. Dental hygienists are responsible and accountable for their dental hygiene practice, conduct, and decision making, and are expected to follow dental hygiene standards. In 2008, the American Dental Hygienists' Association (ADHA) published Standards for Clinical Dental Hygiene Practice. Specifically, the dental hygiene process of care section states:

> The purpose of the dental hygiene process of care is to provide a framework where the individualized needs of the patient can be met; and to identify the causative or influencing factors of a condition that can be reduced, eliminated, or prevented by the dental hygienist. There are five components to the dental hygiene process of care (assessment, dental hygiene diagnosis, planning, implementation and evaluation). (ADHA, 2008c, p. 6)

Therefore, dental hygienists are in a unique position not only to detect oral precancerous and cancerous lesions, but also to counsel and educate patients to avoid known risk

factors that could cause OPC. Moreover, numerous studies have demonstrated low public awareness about perceived risks and knowledge of potential health consequences of HPV infection (Chan, Chan, & Wong, 2012; Marek et al. 2011; Wong, 2011). Hence, dental hygienists play a key role in prevention of OPC. However, few dental hygienists are preforming oral cancer screening examinations on a routine basis (Cotter et. al., 2011; Healthy People, 2009a: National Cancer Institute, 2012d; Soriano & Williams, 2004).

To provide a data-driven context for this investigation, the author conducted a search of EBSCOhost, A-Z journal list, CINAHL, Cochrane library, PubMed, and Google Scholar data bases using the search terms: human papillomavirus, oral cancers (OC), OC risk factors, healthcare professionals, dental hygienists, patient education, effectiveness of a teaching module for health care, and dental hygiene students. The following review of the literature discusses cancer in general, OPC, primary risk factors, HPV, HPV as a risk factor for OPC, demographics, OPC sites within the oral cavity related to HPV, prognoses, and oral healthcare providers' (including dental hygienists'), awareness, knowledge and perception of HPV.

Cancer

Carcinogenesis is a multistep process by which normal cells are transformed into malignant cells. It is characterized by a progression of cellular and genetic changes that eventually reprogram a cell toward uncontrolled division, ultimately resulting in the formation of a malignancy (ACS, 2011b). A mass of tissue, or tumor, can either be benign (cannot spread or invade) or malignant (high potential to invade and metastasize) (NCI, 2013b). By nature of their ability to invade and spread to distant sites in the body, malignant tumors are more harmful than benign. Most benign tumors are rarely a threat

to life, can be readily surgically removed, do not invade tissues around them, and do not spread to other parts of the body (NCI, 2013b). Malignant tumors may be a direct threat to life, can grow back after removed, invade tissues and organs, and spread to other parts of the body (NCI, 2013b).

Staging of the disease follows a diagnosis of cancer. Staging of cancer is based on whether the tumor has spread to other areas of the body and the size of the primary tumor (ACS, 2012a). A number of different staging systems are used to classify tumors. Once the cancer is classified, a stage of I-IV is assigned, with stage I being early and stage IV being advanced disease (ACS, 2012a). Therefore diagnosing cancer at its earliest, most treatable stage gives patients the greatest chance of survival (ACS, 2012a). Effective preventive and screening procedures necessitate all healthcare professionals be knowledgeable about primary risks factors.

Several factors contribute to a normal cell transforming into a cancer cell, and the ACS (2011d) identified several factors known to contribute to the process of carcinogenesis: genetic (including family history); lifestyle such as tobacco/alcohol use, diet and lack of physical activity; certain types of infections (HPV and Epstein-Burr virus); and environmental exposures to different types of chemicals and radiation. Based on these risk factors, cancer cells can originate in any area of the body. Cancers are named from the site of origination. Even with metastasis, the specific primary tumor characteristics remain the same (ACS, 2011c). For example; breast cancer that has metastasized to the lungs is still considered Stage IV breast cancer.

In the United States, half of all men and one-third of all women will develop cancer during their lifetime (ACS, 2011c). People can reduce their risk of cancer by changes in their lifestyle (e.g. quitting smoking, eating a better diet, changing sexual behaviors, and being physically active). The earlier cancer is identified and treated, the better the survival rate (Kademani, 2007; ACS, 2012a).

Oral Cancer

Head and neck cancer affects the entire head and neck region (excluding the brain), whereas OC, also called mouth cancer, involves the floor of the mouth, lips, tongue, oral mucosa, gingiva, and palate. OPC specifically affects the oropharynx. In 2013, the estimated new cases and deaths from OC in the United States are 41,000 and 8,000, respectively (NCI, 2013b). Reimers et al. (2007) indicated that head and neck squamous cell carcinoma (HNSCC) is the sixth most common cancer worldwide. Among the different types of cancers, the five-year survival rate for OC falls between thirty and forty percent; this rate has shown no major improvements over the course of the past few decades (Rosenquist, 2007). Abreu, Kruger, and Tennant (2010) suggested that OC, on a global scale, affects upwards of 410,000 people annually.

Abreu et al. (2010) studied differences and trends in OC prevalence and mortality in Western Australia. The study evaluated data based on area of residence, gender, age, and indigenous status over a twenty-five year period. (Western Australia is home to about one tenth of the country's population even though it covers the largest geographical area (Abreu et al., 2010).) Over the 25-year period, results showed 4,409 new OC cases (3103 males, 1306 females), 88% of the new cases occurred over the age of 40 years and with trends showing a slight increase in women but stable among men.

In comparison, Shiboski et al. (2005) conducted a study focusing on the growing trend of increased tongue and tonsil carcinoma in the United States population for individuals 20 to 44 years of age. The authors reported that in the United States, among the most common cancers, oral cavity and pharyngeal cancers among men ranked 7th. Among African American men OPC was the 4th most common cancer and the tenth among the most common causes of death. The authors also stated that investigators in the United States and Europe have reported increasing incident rates of oral carcinoma, with a 5.5% increase of tongue squamous cell carcinoma for young adults 20 to 39 years of age from 1960 to 1994. This is a five-fold increase among young men and six-fold for young women. From 1973 to 2001, researchers observed a distinct parallel between the increase in tonsillar cancer and a rise in tongue cancer cases (Shiboski et al., 2005).

Fortunately, regular screening tests can improve morbidity and mortality odds by detecting cancer at early stages when treatment is most effective (ASC, 2011b). Components of an OC screening examination include: extraoral (inspection of the head and neck, palpation cervical lymph nodes and salivary glands), and intraoral (inspection and palpation) of the lips, buccal mucosa, attached gingiva, floor of the mouth, tongue, hard and soft palate, oropharynx and salivary glands (Kademani, 2007). OC in its early stage can be asymptomatic however; the most common symptom is a sore in the mouth that bleeds easily and does not heal, or pain that does not go away (ACS, 2007e). Other signs and symptoms include:

- A lump or thickening in the cheek;
- White (leukoplakia) or red (erythroplakia) patches on the gingiva, tongue, tonsil, or oral mucosa;

- Loose teeth;
- Bleeding;
- An earache that doesn't go away;
- Numbness of lower lip and chin;
- A sore on the lip or inside of the mouth that doesn't heal;
- A chronic sore throat or feeling that something is caught in the throat; and,
- Difficulties in chewing, swallowing, or moving the tongue or jaw (ACS, 2007e, para. 2; NCI, 2013b, p. 8).

OC symptoms are not dependent on disease stage; however, familiarity of the most common risk factors and recognition of these signs and symptoms during a routine oral screening may help with identification of OC or OPC at an earlier stage (NCI, 2013b).

Risk Factors

Several risk factors have been associated with OPC, but the two most important risk factors, and the most controllable, are tobacco and alcohol use. The most recently related risk factor, which is sexually transmitted, is high-risk HPV (HPV16). Most studies conducted in the last century have focused on alcohol and tobacco use as the primary risk factors, but more recently, high-risk HPV has been identified as a risk factor, specifically in OPC (Klozar et al., 2008; Shi et al., 2009; Shiboski et al., 2005).

A clinical study by Klozar et al. (2008) comparing patients diagnosed with OC/OPC (N=86) to a control group (N=75) with only identified risk factors, showed tobacco and alcohol as the primary factors contributing to the diagnosis of cancer. However, HPV DNA was detected in sixty-two percent of primary tumors from participants in the experimental group. A review of the literature by Greco and Greco (2010) showed that

head and neck cancers are most commonly caused by tobacco and alcohol use; though high-risk HPVs are associated with twenty-five to thirty-five percent of throat and posterior tongue cancers. Furthermore, the same HPV 16 found in cervical cancer had been identified in ninety percent of head and neck cancers, and fifty percent of OPCs (Greco & Greco, 2010).

Since the beginning of the last century, chewing tobacco has been suggested as a contributing factor for OC. Epidemiological research has illustrated most chewing tobacco-related OC involved men due to their higher incidence of tobacco use (Jayalekshmi et al., 2009). Because more women in India use tobacco, Jayaleskshimi (2009) and colleagues investigated women instead of men for OC risk related to tobacco use. Their study collected information on lifestyles from 71,674 households with women aged 30 to 84 from 1990 to 1997. By 2005, ninety-two OC cases were identified. Jayalekshmi et al. (2009) showed that tobacco chewing increased OC risk of the mouth and tongue by five-and-a-half fold in women. Tobacco and alcohol consumption are still considered to be the primary risk factors in the etiology of head and neck squamous cell carcinoma (HNSCC) although recent studies suggest high-risk HPVs play a noteworthy role as well (Klozar et al., 2008).

Human Papillomavirus (HPV)

According to the CDC (2013), approximately 79 million American are currently infected with HPV. Half are among adolescents and young adults, ages 15 through 24 years of age. HPV, also called genital HPV, is the most common sexually transmitted infection (CDC, 2013). HPV is so common that nearly all sexually-active men and women will get at least one type of HPV at some point in their lives (CDC, 2013).

HPV embodies a complex group of pathogenic viruses that include more than 200 different types, which are associated with a variety conditions such as epidermal warts, skin cancers, and skin lesions (Durzynska et al., 2011). The majority of known types cause no symptoms in most people. HPVs are small double-stranded DNA viruses that can infect the mucosal lining of the oral and genital tracts, and are categorized into two main types, low- or high-risk (Durzynska et al., 2010). Numerous studies have distinguished the pathogenic potential of high-risk versus low-risk HPV (e.g. Durzynska et al, 2010; Soriano & Williams, 2004; Sanchez-Vargas, Diaz-Hernandez & Martinez-Martinez, 2010). Durzynska et al. (2010), in a cross-sectional survey of children and adolescents in Poland, showed that low-risk HPV types are responsible for benign epithelial hyper-proliferation, while high-risk types are associated with premalignant lesions and invasive squamous cell carcinoma.

HPV types are detected in the normal oral mucosa of healthy individuals as well as malignant tissues, and are transmitted primarily by sexual contact (Durzynska et al., 2010). In the oral cavity, 24 HPV genotypes have been shown to be present in benign lesions and 12 HPV genotypes in malignant lesions (Durzyska et al., 2010). Yuan et al., (2011) identified 13 HPV genotypes to have high-risk characteristics, with HPV 16 and 18 the most prevalent high-risk genotypes found in cervical and oral carcinomas. Ragin et al., (2011) concurred that HPV is the main risk factor of cervical cancers; with HPV 16 most notably associated with 25% of head and neck cancers, and 36% with OPC.

HPV as a Risk Factor for Oral Cancer and Oropharyngeal Cancer

Fakhry and Gillison (2006) illustrated the role of high-risk HPV in OPC; types 16 and 18 are capable of transforming epithelial cells, the transformation is "…a result of the

function of two viral oncoproteins, E6 and E7, which functionally inactivate two human tumor-suppressor proteins, p53 and pRb, respectively" (p. 2606). The expression of E6 and E7, "…results in cellular proliferation, loss of cell cycle regulation, impaired cellular differentiation, increased frequency of spontaneous and mutagen-induced mutation, and chromosomal instability" (Fakhry & Gillison, 2006, p. 2606). For HPV to play a role in the pathogenesis of a tumor, demonstration of HPV genomic DNA in tumors is essential; indicating that HPVs are not known to function by a "hit-and-run mechanism" (Fakhry & Gillison, 2006).

According to Andrews, Seaman, & Webser-Cyriaque (2009), from 1973 to 2001 there has been a 3% annual increase of incidence of OPC. The authors found that one quarter of all OPC cases were not associated with typical risks of alcohol and tobacco. They further studied the presence of HPV in non-smoking/non-drinking OPC patients. The objective was to investigate if high-risk HPV was associated with the development of OPC in non-smokers/non-drinkers. The results showed high-risk HPV was detected in the tonsils and base of tongue in fourteen of the eighteen cancer cases, six of the twenty-two controls, and three of the ten cases in which individuals had previous history of OC.

In contrast with Andrews et al. (2009), a study by Siebers, Merkx, Slootweg, Melchers, Cleef, & Wilde (2008) showed no HPV detection in the primary tumors of seven consecutive non-smoking and non-drinking Dutch patients. Nevertheless, Andrews et al. (2009) and Sieber et al. (2008) were in agreement that there was an increase of patients with OPC of the tongue in the absence of tobacco and alcohol use. The purpose of the Sieber et al. (2008) study was to evaluate the role of HPV in non-smoking and non-

drinking patients from 2003 to 2006. Due to the low number of subjects and different testing methods, this study's accuracy could reasonably be questioned.

Another study aimed to identify the occurrence of HPV in women with certain oral sex practices and cervical lesions, as well as the presence of HPV in general (Sanchez-Vargas, Diaz-Hernandez, and Martinez-Martinez, 2010). Forty-six women, all non-smokers and non-alcohol users, completed questionnaires regarding oral sex practices. Results showed that seventy-two percent of participants who regularly practiced oral sex were HPV positive. Chaturvedi et al. (2011a) reported that patients diagnosed with HPV-positive OPC showed sexual-behavior-related risk factors, whereas HPV-negative OPCs were associated with tobacco and alcohol use. The authors also projected if the annual number of HPV-positive OPC cases continues to rise, it will surpass the annual number of diagnosed cervical cancers by the year 2020 (Chaturvedi et al., 2011a). Studies are showing OC increasingly being linked to the sexually transmitted high-risk HPV (Chaturvedi et al., 2011a; Klozar et al., 2008; Mehanna, et al., 2012; Sanchez-Vargas et al., 2010)

Demographics and Prognoses of HPV-related OPC

HPV positive OC may be altering the demographics of HNSCCs worldwide. Westra (2009) highlighted the impact of HPV on the epidemiology and pathology of OC and reported that the incidence of OPC was advancing even though the 1980s smoking trend had declined; proceedings from the 2009 North American Society of Head and Neck Pathology (NASHNP) companion meeting regarding this change in demographics were emphasized as well. The authors also alluded to the influence of non-traditional behavioral and environmental factors. Specific sexual behavior-related risk factors were

suggested: high number of sexual partners, history of oral-genital sex, and record of oral-anal sex (Westra, 2009). HPV-16 was linked as a factor in approximately seventy percent of OPC cases (Westra, 2009).

Shiboski et al. (2005) also confirmed an increased frequency of oral carcinoma among young adults in the United States and Europe. The authors compared age, race, and site-specific trends. During the time period from 1973 to 2001, 2,262 squamous cell carcinoma (SCC) of the oral cavity and 1,251 SCC of the pharynx were found in adults aged twenty to forty-four years. Over 28 years, the results showed a significant increase in the incidence of oral tongue SCC from .09 per 100,000 to .48 per 100,000 among Caucasian individuals. However, they noted a decrease in incidence in other oral cavity sites. Overall, the increase SCC of the tonsils corresponded with the increase in tongue SCC while all other oral cavity sites remained constant or decreased in prevalence.

Kingsley, O'Malley, Ditmyer, and Chino (2008) analyzed trends and identified specific populations from 1978 to 2008 with greater possible risk for morbidity and mortality from oral cancers. Kingsley et al. (2008) reported there had been a downward trend in oral cancer incidence and mortality in the United States, but that latter studies have shown an increase among certain demographic groups, which could be a result of different risks or risk behaviors. The authors concluded it was clear that OC had declined from 1978 to 2008, but then reversed from 2002 to 2008 among some demographic groups (including black females and white males). Eight states, including Nevada, North Carolina, Iowa, Ohio, Maine, Idaho, North Dakota and Wyoming, exhibited increasing rates of oral cancer deaths (Kingsley et al., 2008). Surprisingly, Kentucky and Wisconsin, two states with higher numbers of current smokers and heavy alcohol

consumers were not included (Kingsley et al, 2008). Although research has shown tobacco and alcohol consumption are primary risk factors for developing OC, HPV had emerged in the role of infectious agent for this particular disease. HPV may not only increase the risk of developing OC, but also may contribute to its progression (Kingsley et al. 2008).

Smoking and alcohol use are still recognized as major risk factors for OCs, however HPV-16 and -18 are gaining ground. The ACS (2012a) stated that HPV is related to OPC and, that prior infection with HPV 16 is associated with a nine-fold increase of OPC specifically involving the base of the tongue, tonsil, and epiglottis. The oropharynx area includes the posterior one-third of the tongue, the soft palate, the tonsils, and the side and posterior walls of the throat (ACS, 2012a).

Due to the different risk factors, Auluck et al. (2010) conducted a study to investigate the incidence at the two main cancer sites in the oral cavity that involved the frequency of HPV-related and unrelated HPV sites in multicultural populations. A total of 4,895 cases were analyzed. Two of the main cancer sites were oropharyngeal sites, which include the base of the tongue and tonsils, also incorporating the posterior of the throat. Non-HPV associated oral cavity cancer sites encompass other oral sites. Subjects were identified through the British Columbia cancer registry from 1980 to 2006. Results from Auluck et al. (2010) showed a decrease in the oral cavity cancer sites for the general population and an increase in oropharyngeal cancer sites, with men having a higher incidence than women. Ethnic differences were found as well: Chinese women and South Asian men had the highest incident rates for oral cavity cancer while women in the

general population and Chinese men had highest OPC. The results also showed that the incidence of OPC in British Columbia's male population has surpassed OC cancer.

Another study confirmed the relationship with HPV and OPC sites. Chaturvedi, Engels, Anderson, and Gillison (2008b) investigated the impact of HPV in the United States from 1971 to 2004. The authors assessed the differences in patient characteristics, incidence, and survival potential between HPV-related (N=17,625) and HPV-unrelated (N=28,144) OC sites. The results showed that the incidence rates for anatomic sites most strongly associated with HPV were the tonsils and base of the tongue. The study observed an increasing incident for HPV-related OPC, accompanied by decreasing incidence for HPV-unrelated sites; with HPV-positive patients having an improved prognosis.

Survival rates for HPV-related (HPV-positive) OPC are generally higher than those for HPV-unrelated (HPV-negative) OPC (ACS, 2012a). According to the ACS (2012a), the five-year survival rates for HPV-related OPC have increased over time for each stage of diagnosis. Also, people with advanced tumors have poorer survival rate than those with localized tumors (ACS, 2012a).

Results of a phase II clinical trial (patients with stage II or IV of OPC) were presented in the NCI cancer bulletin, "HPV Status Can Predict Outcome in OPC", and presented at the 2009 annual meeting of the American Society of Clinical Oncology (NCI, 2010a). The results revealed that patients with advanced forms of OPC had a better outcome if their tumors were HPV-positive. Two years after treatment, eighty-eight percent of the HPV-positive patients were still alive, compared with sixty-six percent of HPV-negative patients (NCI, 2010a).

The prognoses of differences between HPV-related OC and other OCs have been the focus of some studies. With gender and tumor size as predictive factors, Klozar et al. (2008) found that HPV positive patients had significantly better overall survival rates than those with HPV negative results. A study by Reimers et al. (2007) showed similar results regarding HPV-related OCs. In addition, the five-year overall survival rate for HPV positive patients was seventy-nine percent, versus thirty-eight percent for those who were HPV negative.

Fakhry & Gillison (2006), Chaturvedi, Engels, Anderson & Gillison (2008b) and Cheturvedi et al. (2011a) found that patients with HPV-positive tumors have improved prognosis when compared with patients with HPV-negative tumors. These studies suggested that HPV-positive patients may have as much as 60% to 80% reduction in risk of dying compared with HPV-negative patients. These studies suggested a better prognosis with HPV-related OCs.

Early detection tests and screenings can reduce death rates for most cancer-related diseases. Routine tests used today have increased cancer survival rates (e.g. mammograms for breast cancer). Clearly, HPV screening is emerging as a valid process and a variety of detection methods are currently becoming commonplace within dental offices. Due to HPV prognostic implication in patients with OPC, screening for HPV should be part of the routine clinical care of healthcare professionals.

Oral Health Care Provider's Awareness

The dental profession shares an important responsibility for screening, education, referral, and treatment of OC. Therefore, dental professionals need to be acutely aware of risk factors for OC including oral infection by high-risk HPVs; OC content is part of the

federal standards for dental and dental hygiene programs. Yet, several studies have shown that dentists' and dental hygienists' awareness of the potential health consequences of HPV infection are low; and that dentists and dental hygienists are not as knowledgeable of all OC risk factors or diagnostic procedures as they should be (Cotter, J. C., McCann, A. L., Schneiderman, E. D., Wald, J. P. & Campbell, P. R., 2011; Kumar, V. & Suresan, V., 2012; Maybury, C., Horowitz, A. M., Yan, A. F., Green, K. & Wand M. Q., 2012).

According to Maybury et al. (2012), there are gaps in dentists' knowledge of risk factors and procedures for diagnosing OCs. The aims of their study were to: 1) examine the association between Maryland dentist's background characteristics and their knowledge of risk factors and procedures used to diagnose OCs, and 2) to investigate the association between dentists' knowledge of risk factors and diagnostic procedures and their perception of their OC education, training, and the accuracy of their knowledge. The Maryland State Dental Association randomly surveyed general dentists' knowledge of OPC risk factors, screening procedures and most commonly associated lesions. Results showed 88% of participants correctly identified HPV as a risk factor, 85% correctly identified the procedure for examining the tongue, but only 42% knew the two lesions most commonly associated with OC (erythroplakia and leukoplakia). Only seven percent of dentists agreed that their knowledge or OC was current, and 94% indicated interest in attending continuing education courses for increasing knowledge of OCs. However, results cannot be generalized to the entire population of practicing dentists and the survey relied on self-reported knowledge. The authors concluded that dental school curricula should be modified to place greater emphasis on OC prevention and early detection.

Cannnick, G., Horowitz, A. M., Drury, T., Reed, S. G., & Day, T. A. (2005) conducted a survey of 163 dental students in South Carolina, assessing OC knowledge. Knowledge variables for OC were grouped into three categories: (1) risk factors, (2) screening procedures, and (3) significant signs/symptoms. Results showed that (a) 80% of dental students surveyed correctly identified HPV as a risk factor, (b) 89% knew that SSC is the most common form of OC, (c) 75% knew the clinical appearance of an early OC lesion, but (d) only 58% knew all the components of a tongue examination. Surprisingly, nearly one-half of the students did not know that the tongue and floor of the mouth are the two most common OC sites. The authors concluded a need for improvements in the OC curricula and clinical training in dental schools as well as more instructional time be devoted to prevention and detection of the disease.

Five hundred physicians and 500 dentists practicing in Massachusetts were surveyed to assess their OC knowledge, attitudes and practices. Results showed that dentists were the primary providers of OC screenings compared to physicians surveyed; they performed almost double the number of examination. Results also showed that most physicians were more knowledgeable about the risk factors associated with OC than dentists, but demonstrated poor knowledge of the signs and symptoms. The overall findings suggest that more education, of both dentists and physicians, would serve to address the knowledge deficits and practice shortcomings with regards to OC screening, prevention, and early detection (Applebaum, Ruhlen, Kronenberg, Hayes and Peters, 2009).

Additionally, a survey of a random sample of dental practitioners in one Indian city assessed OC knowledge, attitudes and screening practices. Survey topics included

the OC risk factors tobacco and alcohol use, unprotected exposure to sunlight, age, and poorly fitting dentures. Surprisingly, knowledge of HPV as an OC risk factor was excluded from the survey. Nearly all participants identified alcohol as major risk factor, 59% identified age as a contributing factor, and 57% agreed that their knowledge about OC was not up-to-date. Only one-third of participants routinely screened for OC, educated their patients about high-risk behaviors or provided cessation information. The researchers concluded that participating dentists' knowledge and opinions related to OC suggested that educational interventions for practitioners and dental students were necessary (Kumar & Suresan, 2012).

These studies illustrate that dental and medical students, dentists, dental hygienists, and physicians are not as knowledgeable about OC as they should be. Further, they do not perform preventive and early detection procedures on a uniform basis.

Dental Hygiene Students' Knowledge and Perceptions of HPV

Very little research has been conducted assessing dental hygienists' or dental hygiene students' knowledge of HPV and its role as a risk factor in OPC. Bigelow, et al. (2007) qualitatively assessed North Carolina dental hygienists' views regarding OPC prevention and early detection. Sixteen registered dental hygienists participated in two focus groups that were taped, transcribed, and analyzed for content. At the end of the session, the final question asked was: "what they felt was the most important thing they could do to help control oral cancer" (Bigelow, et al, 2007, p. 11). Education was the most common answer, due to that being considered a primary professional responsibility.

Four major themes arose from the results:

1. The charge of the dental hygienist was not necessarily to diagnose cancer, but to recognize abnormalities and initiate referral when necessary.
2. Dental hygienists are only helpful in the tobacco cessation process if patients have a desire to quit.
3. The dental hygienist is most effective if the patient believes the provider is genuine and truly cares about their well-being.
4. There is always a need for continued education in oral cancer screenings and tobacco cessation, specifically for hands-on courses (Bigelow, et al., 2007, p. 1).

Reported barriers to OC screening included: lack of time, employer support, and resources as well as difficulty with patient communication. It was concluded there is always a need for continued education in OC screening and tobacco cessation, specifically for hands-on courses (Bigelow, et al., 2007).

Daley et al. (2011) qualitatively evaluated dentists' and dental hygienists' awareness, attitudes, and perceived role regarding HPV-related OC. Five focus groups included twenty-one hygienists and seventeen dentists. Data collected was framed around three general areas regarding HPV-related OPC and HPV vaccines, including: (a) knowledge, (b) attitudes, and (c) perceived roles. Participants' responses regarding knowledge of the HPV-OPC link ranged from complete lack of knowledge to understanding *some* details of the link. Patient-provider discussions of HPV-OPC links showed comfort levels varied among providers, along with their perceived roles. Although there were a disproportionate number of females compared to males in this

small sample of dental professionals, the authors clearly addressed that further training is needed among oral healthcare providers. It was concluded, as identified by the participants, that in order for dentists and hygienists to be effective and comfortable communicating with their patients regarding the HPV-OPC link, they need to increase knowledge of the HPV-OPC link and HPV vaccines available.

Cotter et al., (2011) studied factors' affecting the performance of OC screenings by Texas dental hygienists. A survey was mailed to 306 practicing dental hygienists asking the following questions:

1. Do Texas dental hygienists perform oral cancer examinations?
2. What is their knowledge of oral cancer and risk factors?
3. Does knowledge of oral cancer, practice experience and formal and post-graduate education influence performance of oral cancer screening (OCS)?
4. What type of continuing education did they prefer for oral cancer training? (p. 328)

Results revealed the top three reasons dental hygienists did not perform an OCS were their employing dentist performs the screening, takes too much time and they were not adequately trained. Less than 50% of the participants felt "very comfortable" performing OCS. It was concluded that dental hygienists' knowledge and comfort levels with performing OCS were low (Cotter et al., 2011).

Soriano and Williams (2004) evaluated OCS methods used among dental hygienists in West Virginia. Three hundred participants were randomly selected and surveyed from 687 registered dental hygienists in West Virginia. Results showed the majority of the dental hygienist provided intraoral cancer screenings, but only fifty-seven

percent provided extraoral examinations. Also, the majority of the dental hygienists' felt they had adequate time to provide thorough OCS, along with confidence in providing OC risk factors counseling and education.

Alternately, Hein et al., (2007) studied patient perspectives of dental hygienists' practice behaviors. A random sample of adult patients from thirteen dental hygiene programs were surveyed to determine patients' perceptions of dental hygienists' scope of practice and educational qualifications, screening for OC and quality of care provided. The results showed there was no discrepancy in the consumer/patients' perception of dental hygienists' scope of practice and educational qualifications, but only half of the patients surveyed recalled being screened for OC (Hein, Kunselman & Frese, 2007). Although patients were not specifically asked about the education and screening provided that was specific to HPV and OC, this study demonstrated a need for more emphasis in dental hygiene curricula regarding OC in general and specifically HPV-related OPC.

To investigate health education for dental hygiene students, the effectiveness of teaching modules was investigated. Carpenter, Carlinis, Painter, Mikko and Stoner (2012) researched the impact of a web-based skills training on tobacco intervention and quitline referrals by using a quasi-experimental study design. Results showed that online education builds skills and improves knowledge, but would be more effective if combined with a face-to-face component.

Snyder, Meyer, McGivney & Smith (2010) conducted a pilot study focusing on the design and preliminary evaluation of web-based material to teach pharmacist-physician collaboration. Five internet-based education modules were developed with three containing video- and audio-recordings. Each module outlined the learning

objectives, a brief overview of the module, the amount of time estimated for completion of the module, and links to each assigned activity. The results revealed that the students were most satisfied with the module 3 and 4, stating that the video with voice over was key to their learning. Due to the small number participating in the study, the author suggested that further work is needed to know the impact of these modules on students learning and skill development. Also, the authors suggested considering the impact of technology limitations on perceived students learning.

Eskildsen (2010) developed an online exercise for medical trainees and students affiliated with Harvard Medical School, which guided them through the care transition process by using a hypothetical patient. The learners completed a 15-item true/false questionnaire before and after the online exercise to assess their knowledge of care transitions. The author highlighted that the module adds to existing curricula, is applicable to different learning levels, and offers learners and faculty member a simple and engaging case-based exercise.

One article reviewed the construction of a learning module on practice development by deconstructing first. Dark and Perrett (2007) discussed: (a) the important elements for learning; (b) incorporating educational theory into learning activities; and (c) constructing the modules on practice development. The authors stated that "…e-learning often presents students with an overwhelming amount of reading and fails to engage the participants in learning that has meaning" (Dark & Perrett, 2007, p. 201). The authors noted that an adult learns approximately 10% from reading and 20% from what they hear; and learn best when:

- The content is relevant and has meaning and purpose for everyday issues (identified need);
- The learner is actively involved (doing something);
- Objectives are clearly defined and goals set;
- Positive feedback is given; and,
- Reflection on the learning experience is encouraged (digestion of learning) (Dark & Perrett, 2007, p. 202).

Several literature reviews showed a gain in knowledge, attitude, interest and confidence level among health care professionals, but face-to face teaching is still the preferred teaching method (Bigelow, et al., 2007; Cotter et al., 2011; Daley et al., 2011). Most teaching modules included questionnaires with prior readings followed by discussions. Web-based training is less expensive and offers a more convenient way of educating and skill training.

Dental hygienists are in an excellent position to educate young people and parents as part of a thorough oral exam. However, dental hygiene students must be trained to inform patients about HPV-related OC and means of prevention, such as the HPV vaccine. Dental hygiene programs must teach OC screening due to the national accreditation standards, but there is insufficient evidence to show dental hygiene programs are including other risk factors beyond smoking and alcohol consumption in their curricula.

Summary

Head and neck cancer affects the entire head and neck region (excluding the brain). OC involves the floor of the mouth, lips, tongue, oral mucosa, gingiva, and palate,

whereas OPC affects the oropharynx. The production of cancer is called carcinogenesis, which is a multistep process by which normal cells are transformed into malignant cells. Several factors contribute to a normal cell transforming into a cancer cell.

Several studies illustrate the prevalence of HPV as a risk factor in OC, particularly in OPC. HPVs are DNA viruses that can infect the mucosal lining of the oral and genital tracts, and are categorized into two main types, low- and high-risk. HPV is transmitted primarily by sexual contact. Several studies showed that HPV positive OPC is altering the demographics of HNSCCs among the age of twenty to fifty years. In the last five years, research showed an increase in incidence of OC, mainly among the younger population with OPC. Over the past thirty years, studies have confirmed the main high risk factors for OC are alcohol consumption and smoking, but a new risk factor is emerging in the presence of high-risk HPV in the oral cavity.

Several studies illustrated a high prevalence of HPV-16 and -18 in OPC with these strains being the most carcinogenic. Earlier detection and public education may very well decrease the mortality rate. In order for dental hygienists to educate patients about HPV and OC, hygienists need to be knowledgeable. The detection of HPV lesions in the oral cavity is accomplished through a comprehensive OC screening by dentists and dental hygienists, if they are educated about the differences in location as compared to OC related to traditional risk factors. Head and neck cancer screenings are considered a standard of care procedure as part of a health assessment.

Assessing oral healthcare awareness of OPC, research shows that dentists and dental hygienists are lacking knowledge and clinical skills. A low percentage of oral healthcare providers routinely practice complete oral examinations and lack knowledge to

provide patient education. Yet, dental hygienists have a legal and ethical obligation to perform oral cancer screenings on all patients. Legal ramifications for failure to identify abnormal lesions do apply to the dental hygienist.

Dental hygienists play a major role in the control of OPC; they should be knowledgeable and comfortable in providing OPC exams as well as risk factor counseling. Dental hygiene programs have a responsibility to ensure they are providing adequate time and education regarding these practices. Yet, a thorough review of the literature showed few studies related to dental hygiene students education on HPV and OPC. Therefore, the purpose of this study was to determine the impact of a web-based self-study HPV training module on the knowledge level of entry-level dental hygiene students within Michigan, United States.

CHAPTER 3

Methodology

Healthcare professionals, in addition to the general population, are becoming progressively more aware of the growing persistence of HPV's carcinogenic role in OPC. The purpose of this study was to determine the impact of a web-based self-study HPV training module on the knowledge level of entry-level dental hygiene students within Michigan, United States. The following sections of this chapter include the research and context design, sample, data collection methods, statistical analysis, and limitations.

Design

Overview of study. This quantitative pilot study consisted of a two group quasi-experimental pre-test/post-test design. The primary intervention was a web-based self-study teaching module that was developed for second year dental hygiene students. A sixty minute power point presentation was presented with voice over approach.

A pre-test was available for participants through Qualtrics. The pre-test evaluated current level of knowledge of high-risk HPV and its role in OPC. Once the dental hygiene students completed the pre-test, the HPV and OPC DVD teaching module was sent to the schools. The dental hygiene students had two weeks to review the training module, followed by a post-test administered through Qualtrics.

Participants in the control group completed the pre-test and post-test at the same time as the experimental group. However, the control group did not receive the HPV and OPC teaching module. At the conclusion of the study, the control group participants were offered the teaching module for their knowledge and experience.

This two group quasi-experimental pre-test/post-test design is graphically presented as followed:

Experimental Group: O X O

O = Pre-test *before* HPV + OPC teaching module

X = Review teaching module

O = Post-test *after* teaching module

Control Group: O X O

O= Pretest (taken same time as experimental group)

X= No teaching module

O= Post-test (taken same time as experimental group)

Research Questions and Hypothesis. The following research questions were addressed in this study.

1. What is the current level of dental hygiene students' knowledge of high-risk HPV and its role in OPC?

2. After participation in a web-based training module, is there an increase in dental hygiene students' knowledge concerning HPV and OPC?

The null hypothesis for this study was that there is no difference in the knowledge of dental hygiene students after completing a web-based HPV training module as measured by pre-test and post-test scores.

Research Context

The context of the pilot study is based on HPV and OPC educational strategies for dental hygiene students. A learning module was developed in partnership with pathology and dental hygiene content experts at the University of Michigan and Idaho State University. Topics addressed were identified based on current demographics of HPV and OPC. The HPV and OPC teaching module topics included: fundamentals of HPV, HPV as an oral cancer risk factor, demographics, oral cancer sites related to HPV, prognoses, oral health care provider's awareness, current systematic review/randomized controlled trials, vaccines, and oral cancer screening methods and techniques.

Research Participants

Sample description. The dental hygiene program sites for the pilot study were chosen from Michigan, within the United States, based on positive interest in the pilot study. The selection of the two dental hygiene programs occurred by invitation and willingness of program directors to administer the pre-test and post-test to their students. (Appendices A & B). The participants in this study were second year dental hygiene students in an entry-level dental hygiene college. The sample selection was based on convenience.

The dental hygiene programs selected for the pilot study included: Baker College in Auburn Hills, Michigan; and Lansing Community College in Lansing, Michigan. The sample size was 44 dental hygiene students.

Human subject protection. Prior to implementation of this pilot study, approval was obtained from the Human Subjects Committee (HSC) at Idaho State University (ISU). According to the Human Subjects Manual for Investigators (Idaho State University Human Subjects Committee, 2008), this study qualified for exemption from review by the HSC at ISU. The investigator submitted an application for exemption upon approval of the thesis proposal. This study received approval from the HSC on October 1, 2013 (#3971M).

It was not anticipated that this study would cause any harm or risk to the research participants. The potential benefits for dental hygiene students were to gain knowledge about HPV and its relationship to OPC, as well as to learn diagnostic strategies and treatment options for managing HPV OPC. Participants were informed that participation in this study was voluntary, and the completion of the pre-test and post-test indicated consent. Pre-test and post-tests were not associated with any academic institution thereby protecting the anonymity of participants. The web based testing had all IP and email addresses removed from the Excel data file. The survey software tool used for the pre-test and post-test data collections was Qualtrics. Qualtrics data is private, safe and secure. All data from this study is maintained in a locked file cabinet in the Department of Dental Hygiene at ISU for a period of seven years.

Data Collection

Instruments. The research instrument was a self-designed 14 question pre-test and post-test with identical questions concerning HPV OPC. (Appendix C). The test items were designed based on current literature and the format standards presented on the National Board Dental Hygiene examination. The test items were multiple choice using three to four distracters and one or more correct answers.

The experimental instrument was a web-based self-study teaching module consisting of power point slides with voice over information. This instrument was self-designed based on current research and content experts.

Validity for this study was content driven and relied on experts. Four subjects matter experts evaluated the module content, pre-test and post-test. These experts included a pathologist and program director from the University of Michigan, as well as two pathology experts from Idaho State University. These experts offered changes to improve accuracy and clarity.

Statistical measure of internal consistency was used to establish reliability. The internal consistency alpha number was 0.972, which is considered excellent.

Procedure and protocols. Once approved by ISU's HSC, program directors were contacted to initiate the pilot study among the dental hygiene students. A link to the pre-test via Qualtrics was provided. Prior to the directors initiating the pilot study, the Principal Investigator (PI) visited each college to review the process, consent forms, HPV and OPC teaching module, students incentives, and to answer any questions. The directors were instructed to provide each student with a consent form and a letter of

introduction of the study asking for their participation. (Appendices D & E). The pre-test was administered to the participants in both the control and experimental groups. Student's response to the pre-test and post-test survey was linked using an assigned numeric code to maintain anonymity; the control group had even numeric codes and the experimental group had odd. Names were kept separate from the data; two files were generated one with names and codes and the second file had codes and data. Participants were provided one week to complete the pre-test.

Upon the pre-test results, the program directors did receive the teaching module, which was then loaded into the college course web-site. (Appendix F). The participants in the experimental group were given two weeks to review the module. The post-test was administered to both the experimental and control groups. Participants were given one week to complete this instrument. Upon completion of this study, the control group was provided the same module on HPV OPC for their knowledge and experience. Also, students who completed the pre-test and post-test had their numeric code entered into a drawing for one Kindle Fire and two Amazon gift cards. A timeline of the conduct for this pilot study appears in Table 1.

Proposed Statistical Analysis: All data for the pre-test and post-test was entered online using the web-based tool Qualtrics and placed in an Excel spreadsheet by the PI. The quantitative study used continuous and ratio level data with 15 possible scores from the tests (0-14). To analyze data, the repeated measures of analysis of variance (RMANOVA) was used to test differences within subject factors based on the pre-test and post-test, and between subject factor experimental and control groups. Normality was assessed using the Shapiro-Wilk test. The statistical analysis was set at $p \leq 0.05$ level.

Limitations: Several limitations were identified for this pilot study. The teaching module and pre-test and post-test were self-designed. To address this limitation, current literature was used to create these tools followed by review by a panel of experts to ensure accuracy in content and test item design, and content validity. Preliminary data from this pilot study is expected to be used for future research, therefore results cannot be generalized. Finally, there may be a learning curve by taking the pre-test and post-test. A control group was used to correct for this learning curve and to increase the likelihood that results were based on knowledge gained from the treatment intervention.

Summary

Healthcare professionals, in addition to the general population, are becoming more aware of the carcinogenic role of HPV and OPC. This study determined the impact of a web-based self-study HPV teaching module on the knowledge level of entry-level dental hygiene students. This quantitative pilot study utilized a two group quasi-experimental pre-test/post-test design. The primary intervention was a web-based self-study teaching module that was developed for the dental hygiene students. The research instrument was a self-designed pre-test post-test that was available through Qualtrics.

The context of the pilot study was based on the prevention and management of HPV and OPC. Validity for this study was content driven and relied on experts, but several limitations were identified. Statistical measure of internal consistency was used to establish reliability.

Results and discussion are reported in the form of a manuscript submitted for publication in the Journal of Dental Hygiene. The remaining sections of the thesis reflect

the manuscript specifications outlined in the author guidelines contained in the Appendix G.

MANUSCRIPT

DENTAL HYGIENE STUDENTS' KNOWLEDGE OF HUMAN PAPILLOMAVIRUS AND ITS RELATION TO OROPHARYNGEAL CANCER

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ABSTRACT

Purpose*:* Human papillomavirus (HPV) is a common and increasing cause of oropharyngeal cancer (OPC). The purpose of this study was to determine the impact of a web-based self-study HPV training module on the knowledge level of second year dental hygiene students.

Methods*:* This pilot study utilized a two-group quasi-experimental pre-test/post-test design. Participants, second year dental hygiene students from two entry-level dental hygiene programs, took an initial knowledge test (pre-test) on HPC and OPC. The experimental group viewed the self-study prior to the post-test and the control group was able to access the self-study following the post-test. Data were analyzed using repeated measures ANOVA. Normality was assessed using the Shapiro-Wilk test. Statistical significance was set at $p \leq 0.05$.

Results: Forty-four students were asked to participate in the study, and 37 completed both the pre- and post-test. There was a statistically significant main effect of knowledge (pre- to post-test) for the combined control and experimental groups ($F=28.1$, $p \leq .001$). No significant interaction between groups (control versus experimental) and the pre-/post-test was identified. There was no statistically significant main effect between group means when averaged across the pre-test and post-test.

Conclusion: An HPV-knowledge base is highly relevant to the dental hygiene profession, and its alarming growth makes a strong justification for a curriculum that examines HPV, its transmission and association with OPC. Although this study showed no effect between the experimental and control groups, it did show a significant increase

in knowledge for both groups from pre- to post-test indicating an augmentation of current curricula may be warranted.

Key Words: Dental hygiene students, knowledge level, high-risk human papillomavirus (HPV), oropharyngeal cancer (OPC), self-study training module, oral cancer (OC)

This study supports the NDHRA priority area, **Professional Education and Development:** Evaluate the extent to which current dental hygiene curricula prepare dental hygienists to meet the increasingly complex oral health needs of the public.

DENTAL HYGIENE STUDENTS' KNOWLEDGE OF HUMAN PAPILLOMAVIRUS AND ITS RELATION TO OROPHARYNGEAL CANCER

INTRODUCTION

Worldwide, head and neck cancer (HNC) is diagnosed in approximately 650,000 patients each year, making it the sixth most common malignancy. In the United States, it accounts for three percent of malignancies with an estimated 53,000 Americans developing head and neck cancer annually and nearly 12,000 dying from the disease.[1] Although the incidence of oral cancer (OC) has been falling in both men and women since 1980, recent findings show that the incidence of OCs related to high-risk human papillomavirus (HPV) is rising.[2] High-risk HPV's are associated with premalignant lesions and invasive squamous cell carcinoma.

The World Health Organization's (WHO) Global Oral Health Program has established a global surveillance system targeting oral cavity cancer in order to assess risk factors and help the planning of effective national intervention programs.[3] In 2007, the World Health Assembly (WHA) passed the following resolution on oral disease prevention: "To take steps to ensure that prevention of oral cancer is an integral part of national cancer-control programs, and to involve oral-health professionals or primary health care personnel with relevant training in oral health in detection, early diagnosis and treatment".[3]

During the past decade, U.S. federal agencies have followed world health agencies and focused on reducing the incidence of oral and pharyngeal cancers and increasing the five-year survival rate. For example, Healthy People 2020, includes oral

health interventions, and among its topics and objectives are to: (1) Increase the proportion of adults who receive preventive interventions in dental offices, (2) Increase the proportion of adults who received an oral and pharyngeal cancer screening from a dentist or dental hygienist in the past year.[4] In addition, the significance of this study is reflected by the American Dental Hygienists' Association (ADHA) National Dental Hygiene Research Agenda under priority areas: (a) professional education and development, and (b) clinical dental hygiene care.[5]

There are multiple factors associated with OCs however the two most common include tobacco and alcohol. New studies suggest that there may be an alternative pathway for the development of oropharyngeal cancer (OPC). Human papillomavirus is a sexually transmitted virus passed through genital or skin-to-skin contact. Infections resulting from HPV occur only in keratinocytes of the skin or mucous membranes.[6] According to the Centers for Disease Control and Prevention (CDC), approximately 79 million Americans are currently infected with HPV.[6] Half of those are among adolescents and young adults, ages 15 through 24 years of age. Human papillomavirus, also called genital HPV, is the most common sexually transmitted infection.[6] It is so common that nearly all sexually-active men and women will get at least one type of HPV at some point in their lives.[6]

Oral cancers that are HPV-positive may be altering the demographics of head and neck squamous cell carcinomas (HNSCCs) worldwide. Statistics in the United States and Europe have identified an increasing prevalence of oral carcinoma among young adults who may not be aware of the relationship of high-risk HPV to OPC.[7] Westra highlighted the impact of HPV on the epidemiology and pathology of OC and reported that the

incidence of OPC was advancing even though the 1980s smoking trend was declining; proceedings from the 2009 North American Society of Head and Neck Pathology (NASHNP) companion meeting regarding this change in demographics were emphasized as well.[8]

Fortunately, regular screening tests can improve morbidity and mortality odds by detecting cancer at early stages when treatment is most effective.[9] In its early stage, OC can be asymptomatic; yet, the most common symptom is a sore in the mouth that bleeds easily and does not heal, or pain that does not go away.[10] Symptoms are not dependent on disease stage; however, familiarity of the most common risk factors and recognition of these signs and symptoms during a routine oral screening may help dental hygienists with identification of OC or OPC at an earlier stage.[1]

Survival rates for HPV-related (HPV-positive) OPC are generally higher than those for HPV-unrelated (HPV-negative) OPC.[11] According to the American Cancer Society, the five-year survival rates for people with HPV-related OPC are higher than for those with non-related types of OC.[11] Results of a phase II clinical trial (patients with stage II or IV of OPC) were presented in the National Cancer Institute (NCI) cancer bulletin, “HPV Status Can Predict Outcome in OPC”, and presented again at the 2009 annual meeting of the American Society of Clinical Oncology.[12] The study revealed that patients with advanced forms of OPC had a better outcome if their tumors were HPV-positive. Two years after treatment, eighty-eight percent of the HPV-positive patients were still alive, compared with sixty-six percent of HPV-negative patients.[12]

The dental profession shares an important responsibility for screening, education, referral, and treatment of OC. Therefore, dental professionals need to be acutely aware of risk factors for OC including oral infection by high-risk HPVs. OC content is part of the national standards for dental and dental hygiene programs. Yet, several studies have shown that dentists' and dental hygienists' awareness of the potential health consequences of HPV infection are low; and that dentists and dental hygienists are not as knowledgeable of all OC risk factors or diagnostic procedures as they should be.[13-15]

Daley et al. qualitatively evaluated dentists' and dental hygienists' awareness, attitudes, and perceived role regarding HPV-related OC.[16] Five focus groups included twenty-one hygienists and seventeen dentists. The data collected was framed around three general areas regarding HPV-related OPC and HPV vaccines, including: (a) knowledge, (b) attitudes, and (c) perceived roles. Participants' responses regarding knowledge of the HPV-OPC link ranged from complete lack of knowledge to understanding some details of the link. Patient-provider discussions of HPV-OPC links showed comfort levels varied among providers, along with their perceived roles. It was concluded, as identified by the participants, that in order for dentists and hygienists to be effective and comfortable communicating with their patients regarding the HPV-OPC link, they need to increase their knowledge of the HPV-OPC link and HPV vaccines available.

Cotter et al. studied factors affecting the performance of oral cancer screenings (OCS) by Texas dental hygienists.[13] Results revealed the top three reasons dental hygienists did not perform an OCS were; their employing dentist performs the screening, takes too much time and they were not adequately trained. Less than 50% of the

participants felt “very comfortable” performing OCS. It was concluded that dental hygienists’ knowledge and comfort levels with performing OCS were low.[13]

If cancer goes undetected, it can metastasize and increase mortality and morbidity. Education is critical and necessary for oral health care providers worldwide; however, little is known about the extent of content that is taught in dental hygiene programs concerning this topic. Dental hygienists have an opportunity to assess patients for signs of HPV infection and oral cancer, and to educate them about HPV related OCs and disease prevention strategies. Teaching entry-level dental hygiene students this information will allow them to provide health promotion and disease prevention for OPC.

The purpose of this study was to determine the impact of a web-based self-study HPV training module on the knowledge level of entry-level dental hygiene students. The research questions of this pilot study were:

1. What is the current level of dental hygiene students’ knowledge of high-risk HPV and its role in OPC?
2. After participation in a web-based training module, is there an increase in dental hygiene students’ knowledge concerning HPV and OPC?

METHODS AND MATERIALS

Prior to implementation of this pilot study, approval was obtained from the Human Subjects Committee (HSC) at Idaho State University (ISU) and qualified for exemption from full Board review (#3971M).

A purposive sample of second year dental hygiene students from two entry-level dental hygiene programs in Michigan were chosen for this pilot study. The selection of

the two dental hygiene programs occurred by invitation and willingness of program directors to administer the pre-test and post-test to their students. The principal investigator (PI) attended each college to review the pilot study and to answer any questions from the program directors and students. Student's incentives were offered. Upon completion of pre-test and post-test each participant's numeric code was entered into a drawing for one Kindle Fire and two $50.00 Amazon gift cards.

Students from each participating dental hygiene program were assigned to either the control or experimental group. Each student's response to the pre- and post-course survey was linked using an assigned numeric code to maintain anonymity; the control group had even numbers 2-40 and the experimental group had odd numbers 1-45. The code was assigned to compare pre- and post-test scores, not to identify the students.

The primary intervention was a web-based self-study teaching module that consisted of power point slides with voice over information. The context of the pilot study was based on the prevention and management of HPV and OPC. A learning module was developed in partnership with pathology and dental hygiene content experts at the University of Michigan and Idaho State University. Topics addressed were identified based on current demographics of HPV and OPC. The HPV and OPC teaching module topics included: fundamentals of HPV, HPV as an oral cancer risk factor, demographics, oral cancer sites related to HPV, prognoses, oral health care provider's awareness, current systematic review/randomized controlled trials, vaccines, and oral cancer screening methods and techniques.

The pre-test and post-test consisted of 14 knowledge-based test items. All students in both the control and experimental groups were asked to complete the same

pre-test. The experimental group was given the web-based self-study teaching module and a two week period of time to review the module. At the completion of this time frame, both the control and experimental groups took the post-test. Both the pre-test and post-tests were administered online using Qualtrics©. Upon completion of this study, the control group was provided the same teaching module on HPV OPC to offer the same information and experience. The answer key to the pre- and post-test was provided for both groups.

Continuous and ratio level data with 15 possible scores from the tests (0-14) were used for measurement in this quantitative study. Data were analyzed by repeated measures of analysis of variance (RMANOVA) to test differences within subject factors based on the pre-test and post-test, and between subject factors for the control and experimental groups. Normality was assessed using the Shapiro-Wilk test. Statistical significance was set at $p \leq 0.05$ level.

RESULTS

Demographic Characteristics

A total of 37 dental hygiene students completed both the pre-test and post-test, resulting in an overall response rate of 84%. All students in the total population (N=44) completed the pre-test and 42 students finished the post-test. Five students did not use their numeric code on the post-test (Table I). Since there was only one male in the entire sample, the gender composition could not be compared between the two groups. The majority of respondents were females (97%); the mean age was 27 (standard deviation=6.56) with age ranging from 21 years to 46 years of age. No significant

differences were found between experimental and control groups in average age ($p=.619$).

Knowledge Scores

Participants' pre-test scores showed a mean score of 63 and a median of 60 with a standard deviation of 11.4.There was no significant interaction between group membership (experimental versus control) and the pre- and post-test ($F=2.035$, $p=.163$) (Table II). Thus, there was no statistically significant difference between the group that did not receive the educational module and the group that did receive the module in terms of how much their knowledge scores increased. There was a statistically significant main effect of pre- to post-test for the combined control and experimental groups ($F=28.1$, $p \leq .001$) (Figure I). The main effect of the groups, ($F=2.02$, $p=.164$), showed no significant difference between the two groups' means when averaged across the pre-test and post-test.

Repeated measures analysis of variance (RMANOVA) indicated a difference in mean pre-test and post-test knowledge scores averaged across both the control and experimental groups ($p \leq .001$) (Table II). However, no significant interaction was found between the groups ($p=.163$). The Shapiro-Wilk and Kolmogorov-Smirnov tests of normality detected no violations of the normality assumption (Table III).

DISCUSSION

This pilot study was conducted to determine the impact of a web-based self-study HPV training module on the knowledge level of second year dental hygiene students.

Education is critical and necessary for oral health care providers worldwide; however, little is known about the extent of content that is taught in dental hygiene programs concerning this topic. Dental hygienists have an opportunity to assess patients for signs of HPV infection and oral cancer, and to educate them about HPV related OCs and disease prevention strategies. Teaching entry-level dental hygiene students this information will allow them to provide health promotion and disease prevention for OPC. As a first major step, bring dental hygiene programs curriculums within the United States up to the current knowledge level by addressing HPV and OPC. One way to teach students is through a combination of distance learning and traditional classroom instructions.

Head and neck cancers, including throat, larynx, and OC, and excluding brain cancer, are associated with severe morbidity and mortality. Oral health professionals need additional educational training to help patients reduce cancer risk and diminish the morbidity, mortality, and economic burden associated with OCs. A dental office is more likely to perform an OC examination than a physician's office; overall only 20% of Americans receive an OC examination.[2] OC occurs in a region of the body that health care professionals can exam visually; visual examination is the most common method used in detection.[2] The National Cancer Institute states that routine oral examination can lead to detection of earlier stages of cancers and premalignant lesions.[2] In agreement, the American Cancer Society concurs that regular screening examinations can result in the detection and diagnosis of cancer at an early stage, when the treatment is less extensive with greater chance of survival.[11] Although increased knowledge about HPV and OPC and OC screening is indicated by the literature, the methodology used for this study did not show a significant benefit with respect to increase in knowledge by study participants.

Several limitations were identified for this pilot study. The teaching module and pre-test and post-test were self-designed. To address this limitation, current literature was used to create these tools followed by review by a panel of experts to ensure accuracy in content and test item design and content validity. Given the nature of the pilot study and small sample size, results cannot be generalized. Also, there may be a learning curve by taking the pre-test and post-test. A control group was used to correct for this learning curve and to increase the likelihood that results were based on knowledge gained from the treatment intervention. Due to the low number of students; however, there was insufficient data to address this learning curve.

CONCLUSION:

Given the lifestyle behaviors of society today, people need to be educated and aware of the impact of HPV infection on their overall health. Oral health professionals need additional educational training to help patients reduce cancer risk and with an ultimate goal of reducing morbidity, mortality, and economic burden associated with OCs.

This study did not produce statistically significant data to support the use of a web-based self-study HPV training module with entry-level dental hygiene students in the United States. However, due to the rise of HPV and OPC, dental hygiene students need to be knowledgeable to assess risk and identify signs of HPV infections and oral cancer, and to educate them about HPV related oral cancer and disease prevention strategies. It is suggested to research the knowledge level of HPV and OPC among practicing dental hygienist and dental hygiene students within the United States; along

with surveying dental hygiene programs to assess the content level in their current curriculum on this topic. Since this was a pilot study, future studies should incorporate a larger sample size to better identify knowledge improvement.

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Table I: Mean Scores on Pre- and Post-Knowledge Test

		Mean	Std. Deviation	N
PreKnowPC	Control group	62.00	9.73	18
	Experimental group	63.37	13.08	19
	Total	62.70	11.43	37
PostKnowPC	Control group	68.67	7.03	18
	Experimental group	74.95	7.76	19
	Total	71.89	7.97	37

Table II: Test of Within-subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
prepost	Sphericity Assumed	1538.55	1	1538.55	28.07	.00
	Greenhouse-Geisser	1538.55	1.00	1538.55	28.07	.00
	Huynh-Feldt	1538.55	1.00	1538.55	28.07	.00
	Lower-bound	1538.55	1.00	1538.55	28.07	.00
prepost * Q2	Sphericity Assumed	111.52	1	111.52	2.04	.16
	Greenhouse-Geisser	111.52	1.00	111.52	2.04	.16
	Huynh-Feldt	111.52	1.00	111.52	2.04	.16
	Lower-bound	111.52	1.00	111.52	2.04	.16
Error(prepost)	Sphericity Assumed	1918.32	35	54.81		
	Greenhouse-Geisser	1918.32	35.00	54.81		
	Huynh-Feldt	1918.32	35.00	54.81		
	Lower-bound	1918.32	35.00	54.81		

Table III: Tests of Normality

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Standardized Residual for PreKnowPC	.12	37	.20*	.96	37	.14
Standardized Residual for PostKnowPC	.12	37	.20*	.98	37	.71

FIGURE I

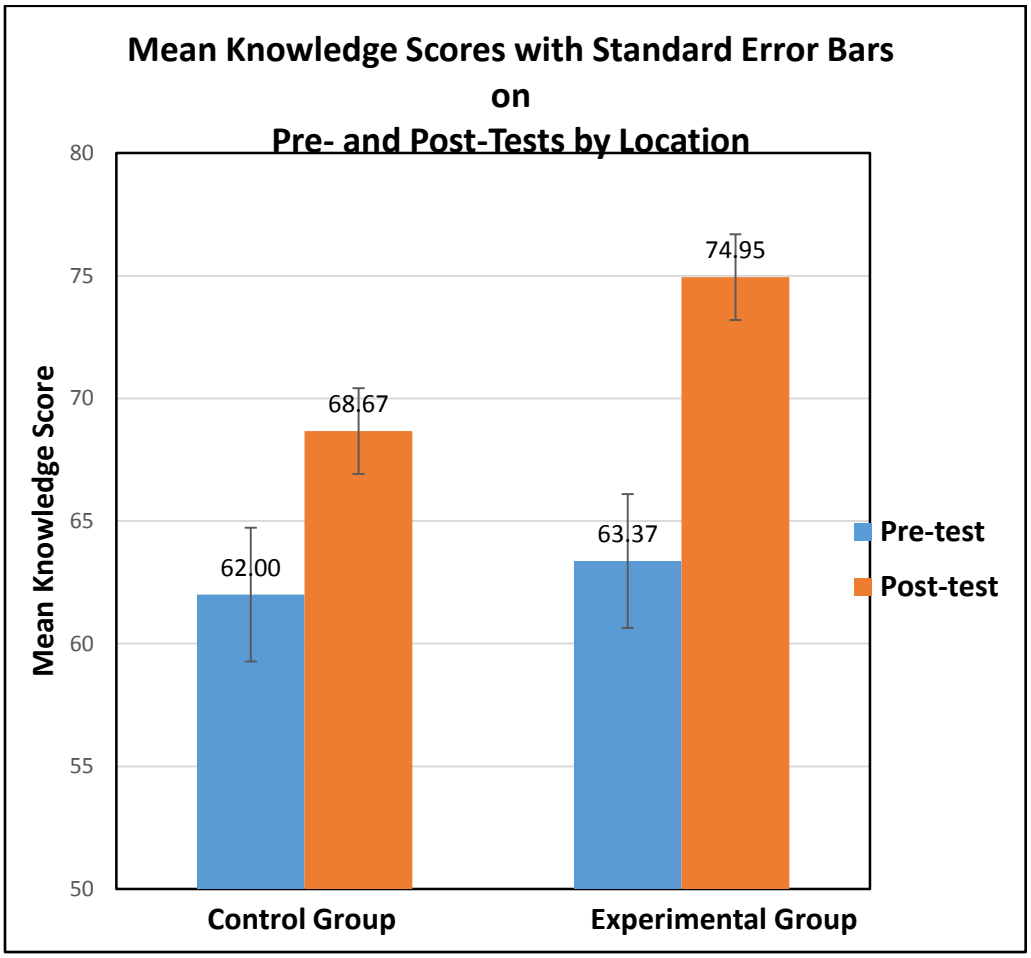
Mean Knowledge Scores with Standard Error Bars
on
Pre- and Post-Tests by Location
Mean Knowledge Score
80
75
70
65
60
55
50
62.00
68.67
63.37
74.95
Control Group
Experimental Group
Pre-test
Post-test

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TABLE 1: Timeline for Pilot Study

DATE	**PROCEDURE**
Monday January 27, 2014	Pre-test through Qualtrics Available one week for both experimental and control group
Monday February 2, 2014	Power point teaching module with voice over Available two weeks for Experimental group only
Monday February 17, 2014	Post-test through Qualtrics Available one week for both experimental and control groups

APPENDIX A: Letter for Dental Hygiene Program Directors

January 17, 2014

Dear Dental Hygiene Program Director,

I am writing to request your participation in administering a quantitative pilot study to the second year dental hygiene students within your program. I am a student of the Master of Science in Dental hygiene program at Idaho State University and am currently working on my thesis under the guidance of Dr. JoAnn Gurenlian and Dr. Tara Johnson. The purpose of this study is to explore the knowledge of dental hygiene students pertaining to the rising incidence of high-risk human papillomavirus (HPV) and its role in oropharyngeal cancer (OPC), as well as to explore the effectiveness of a self-study, web-based training module on this topic.

The universities/colleges will be divided into either the treatment groups or control groups. Your participation in the administration of this pilot study is voluntary; there will be no negative consequences for declining to participate or for dropping out of the study early.

The tentative time frame for administration of this study appears below.

1. Monday, January 27th – Sunday 2nd (one week) the pre-test (14 questions multiple choice) will be available for both the experimental and control groups through Qualtrics;

2. Monday, February 3rd – Sunday February 16th (two Weeks) the teaching module will be available for the experimental groups;

3. Monday, February 17th – Sunday 23rd (one week) the post-test (14 questions multiple choice) will be available for the experimental and control groups through Qualtrics. After, the post-test has been completed by the experimental and control groups and information is collected, the HPV and OPC teaching module will be available for the control groups.

If you agree to participate, please reply to my message by an e-mail indicating your willingness to participate in the study. Also, please let me know: (1) the number of senior dental hygiene students; (2) when the pathology course is taught within the program; and (3) whether or not the topic of HPV has been taught in the curriculum. Also, I would like to set up a time to meet with you in January to review the pilot study information. After receiving your e-mail, I will send the appropriate materials to be distributed to the students.

Thank you for supporting this research investigation. If you have any questions please e-mail or call.

I look forward to hearing from you.

Julia Forsmark, RDH, BS
(231) 420-4178
Email: forsjuli@isu.edu

APPENDIX B: Dental Hygiene Program Directors E-mail Response

Baker Community College

Nicole Greco <ngreco01@baker.edu> 6:43 AM (9 hours ago)

to me

Julia,

I would love to!!! Actually this topic is taught by me throughout the curriculum because it is near and dear to my heart. My sister and I published an article in Access on HPV.

There are 20 senior students. I am looking forward to helping out in any way I can.

There is a new salivary diagnostic test to tell patients their risk of developing OPC from strains 16 & 18
Despite my beliefs I feel this test is beyond our scope of practice but it's interesting because we did have patients biopsies come back as HPV.

Nicole Greco
Great topic!

Sent from my iPhone

Lansing Community College

Sheree Duff, MSA, MA

Dental Hygiene Program Director

Lansing Community College

duffs2@lcc.edu

Hello Julie.

I am in receipt of the pilot study forms you just sent and look forward to working with you. I am sending these forms to the faculty member (Betsy Burger) who will be administering them in her "Board Review" course, as it is the most applicable place (course) for us to have time to discuss and take part in the study.

I would like to take you up on your offer to come out to LCC and meet the students to discuss your project. The course meets on Tuesday's from1-4 pm. I would think you want to come out and discuss the study so your visit would be prior to the pretest…..that would make your visit on Tuesday, January 28th, within your time frame. If this does not work for you, we can explain the process and you can visit the students any other time you feel would work.

Also, will you be making copies of these documents to bring with you should you come on the 28th?

Please advise.

Have a nice weekend.

Sheree

APPENDIX C: Pre-test/Post-test Tool

Pre- and Post-test for HPV and Oropharyngeal Cancer Teaching Module

1. Please enter your student code? _____
2. Please identify your College?

    A. Baker College

    B. Lansing Community College

3. According to the Centers for Disease Control and Prevention (CDC), approximately how many new cases of cancers of the oral cavity and pharynx will be diagnosed in the United States for 2013?

    A. 25,000

    B. 30,000

    C. 40,000

    D. 50,000

    E. 60,000

4. Some characteristics of Human Papillomaviruses (HPV) are?

    A. Small double-stranded DNA viruses

    B. Complex group of pathogenic viruses that involve less than 10 different strains

C. Can infect oral mucosa and genital tracts

D. A and B

E. A and C

F. A, B and C

5. HPV is grouped into cutaneous and mucosal strains. The mucosal strain high-risk HPV 16 and 18 are the most prevalent strains in cervical and oral carcinomas.

   A. Both statements are TRUE

   B. Both statements are FALSE

   C. The first statement is TRUE, the second is FALSE

   D. The first statement is FALSE, the second is TRUE

6. HPV is transmitted:

   A. Only when lesions are present

   B. By sexual contact

   C. By air borne droplets

   D. Through autoinoculation

7. Common oral cavity and oropharyngeal cancer risk factors include all of the following EXCEPT one. Which one is the EXCEPTION?

   A. Smoking/tobacco

   B. HPV's infections

   C. Alcohol

   D. Bacterial infection

8. Approximately 79 million people are currently infected with HPV in the United States. Half of these infections are among adolescents and young adults, ages 15 through 24 years of age.
    A. Both statements are TRUE
    B. Both statements are FALSE
    C. The first statement is TRUE, the second statement is FALSE
    D. The first statement is FALSE, the second statement is TRUE

9. According to the CDC, black men and women appeared to have higher rates of HPV-associated cancers of oral cavity and oropharynx. Asian and Pacific Islander men and women have higher rates of HPV's-associated cancers than white men and women.
    A. Both statements are TRUE
    B. Both statements are FALSE
    C. The first statement is TRUE, the second statement is FALSE
    D. The first statement is FALSE, the second statement is TRUE

10. Oropharyngeal sites of HPV include all the following EXCEPT one. Which one is the EXCEPTION?
    A. Base of the tongue
    B. Under the tongue

C. Tonsils

D. Back of the throat

11. Oral signs and symptoms of high-risk HVP infections are:

A. A sore that bleeds easily

B. A sore throat or a feeling that something is caught in the throat or jaw

C. Asymptomatic

D. A and B

E. A and C

F. A, B and C

12. From the following list, select the most common clinical characteristics of high-risk HPV lesions:

A. Attached by a stalk-like base or flat base

B. A sore that heals within 10 days

C. Well-circumscribed and raised

D. Exophytic

E. Blackish color

F. White, pink and/or red color

G. Cauliflower-like texture or finger-like projections

H. Flat with irregular borders

13. According to the CDC, there are routine screening tests recommended for high-risk HPV related health effects. High-risk HPV oropharyngeal cancers have a better prognosis than alcohol and smoking related oral cavity cancers.

    A. Both statements are TRUE
    B. Both statements are FALSE
    C. The first statement is TRUE, the second statement is FALSE
    D. The first statement is FALSE, the second statement is TRUE

14. The recommended treatment for a HPV cancerous lesion is:

    A. Laser removal
    B. Surgical excision
    C. Chemotherapy
    D. Radiation

15. High risk HPV oral carcinomas can be prevented. Both boys and girls can be vaccinated for high-risk HPV.

    A. Both statements are TRUE
    B. Both statements are FALSE
    C. The first statement is TRUE, the second statement is FALSE
    D. The first statement is FALSE, the second statement is TRUE

16. From the following list, select the two main roles for a dental hygienist in detecting oropharyngeal cancers:

    A. Performing patient education on prevalence of HPV and its relation to oropharyngeal cancers
    B. Preforming laser treatment to remove lesion
    C. Providing thorough oral examinations
    D. Determining the need for screening
    E. Documenting present of abnormalities

17. Please complete the demographic section for this pilot study.

    A. Female
    B. Male

18. Age _____ (please just enter numbers)

APPENDIX D: Consent Form

Dental Hygiene Students' Knowledge of Human

Papillomavirus and

Its' Relation to Oropharyngeal Cancer

We are asking you to be in a research study.
You do not have to be in this study.
If you say yes, you may quit the study at any time.
Please take as much time as you want to make your choice.

Why is this study being done?

This study is being conducted to identify the knowledge of dental hygiene students pertaining to the rising incidence of high-risk human papillomavirus (HPV) and its role in oropharyngeal cancer (OPC). In addition, this study will explore the effectiveness of a self-study, web-based training module to increase knowledge and awareness of HPV and OPC.

What happens if I say yes, I want to be in the study?

If you say yes, we will randomly assign you to either a control or experimantal group. Once you have consented to this study, you will take a pre-test through Qualtrics that includes 14 questions regarding HPV and OPC.

After completing the pre-test, if you are in the treatment group, you will be provided a self-study web-based teaching module to review that includes a power point presentation with voice over. This review will take approximately 60 minutes to complete.

Several weeks after reviewing this module, you will be asked to complete a post-test through Qualtrics. If you are assigned to the control group, you will be asked

to complete the post-test at the same time as the experimental group. Once the study has been completed, you will receive the web-based teaching module for your learning purposed.

How long will the study take?

This study will take about one hour and forty minutes. This includes the time needed to review the learning module and taking both the pretest and post-test.

Where will the study take place?

The study will take place at your College using a web-based Qualtrics and your school's online web-site.

What happens if I say no, I do not want to be in the study?

No one will treat you any differently. It is your choice to participate in the study and there are no penalties for not participating. Declining to participate will have no effect on your course grade or course standing in the program.

What happens if I say yes, but change my mind later?

You may stop being in the study at any time. There are no penalties to discontinuing the study and your relationship with your school will not change.

Who will see my pretest and posttest answers?

Results of this study will be presented to the study investigators in group form only. You will not be identified through this process. Your survey answers and a copy of this document will be locked in the files at the Department of Dental Hygiene at Idaho State University.

Results of this study will be presented in group form only and summarized in a manuscript for publication in a professional journal. Individual responses will not be presented or shared.

Will it cost me anything to be in the study?

There are no costs to participating in this study other than the time you invest to review the module and complete the pretest and post-test.

Will being in this study help me in any way?

Being in this study will help you by increasing your awareness and level of knowledge of HPV and OPC. In addition, as future oral healthcare professionals you will be able to help patients gain knowledge of HPV and its role in OPC's; as well as education to promote safer sexual practices and HPV vaccines for males and females.

Will I be paid for my time?

No payments will be made for participating in this study. At the completion of the study, a drawing will be done for one Kindle Fire and two $50.00 Amazon gift cards, but students must complete the pre-test and post-test to have your name in the drawing.

Is there any way being in this study could be bad for me?

While this study cannot cause any harm, there may be photos or images included in the module that may cause you to feel sad or upset.

What if I have questions?

Please call the head of the study Julia Forsmark (231-420-4178) or

JoAnn Gurenlian, Major Thesis Adviser (208-240-1443) if you:

- Have questions about the study.
- Have questions about your rights.
- Feel you have been injured in any way by being in this study.

You may also call the Idaho State University Human Subjects Committee office at 208-282-2179 to ask questions about your rights as a research participant.

Do I have to sign this document?

No. Completion of the pre-test and post-test indicates consent.

What should I do if I want to be in the study?

You need to complete the pre-test and post-test. Also, if you are in the treatment group you will review the teaching module before taking the post-test. If you are in the control group, you will receive the teaching module after taking the post-test. We will give you a copy of this document to keep.

By signing this document and/or completing the pretest post-test you are saying:

- You agree to be in the study.
- Your questions have been answers.

_____

Your Name (please print)

_____ _____

Your Signature Date

_____ _____

Principle Investigator Date

Completion of the pre-test and post-test indicates consent for the participating dental hygiene students.

APPENDIX E: Letter for Dental Hygiene Student's

January 21, 2014

Dear Dental Hygiene Student,

I am a graduate student of the Master of Science in Dental Hygiene program at Idaho State University and am currently working on my thesis. I am writing to request your participation in my pilot study.

The purpose of this study is to explore the knowledge of dental hygiene students pertaining to the rising incidence of high-risk human papillomavirus (HPV) and its role in oropharyngeal cancer (OPC), as well as to explore the effectiveness of a self-study, web-based training module on this topic.

If you volunteer to participate in this study, what will happen?

1. You will be assigned a numeric code to link the pre- and post-test data.
2. You will take a pre-test through Qualtrics with 14 questions regarding HPV and OPC.
3. After completing the pretest, one group of students will review a self-study web-based teaching module that includes a power point presentation with voice. This module is approximately 60 minutes long.
4. Post-test will be administered two weeks later through Qualtrics with 14 questions.
5. The control group will receive the web-based teaching module after all participants have completed the posttest.
6. All students that complete the pre-test and post-test will be entered into a drawing; the gifts include one Kindle Fire and two $50 Amazon gift cards.

The pilot study's total time will take approximately one hour and forty minutes. The potential benefits for you, as a dental hygienist, is to gain knowledge about HPV and its relationship to OPC, as well as to learn diagnostic strategies and treatment options for managing HPV and OPC.

Participation in this study is voluntary, and the completion of the pretest and posttest indicates consent. The pretest and post-test data collection is through Qualtrics, a safe and

private web-site. There will be no negative consequences for declining to participate or for dropping out of the study early. Attached is an informed consent to review for procedures. If you agree to participate in this study, please use the following link to the Pretest and your numeric code:

https://isudhs.qualtrics.com/SE/?SID=SV_3n1XofLmAawJ0wd

- The pretest will be available Monday January 27th – Sunday, February 2nd. (One week)
- For the experimental groups the teaching module will be available Monday, February 3rd - Sunday, February 16th (for two weeks)
- Control groups will receive teaching module upon completion of posttest.
- The posttest will be available Monday, February 17th – Sunday, February 23rd. (one week)

Please review the constant form for a better understanding of the pilot study.

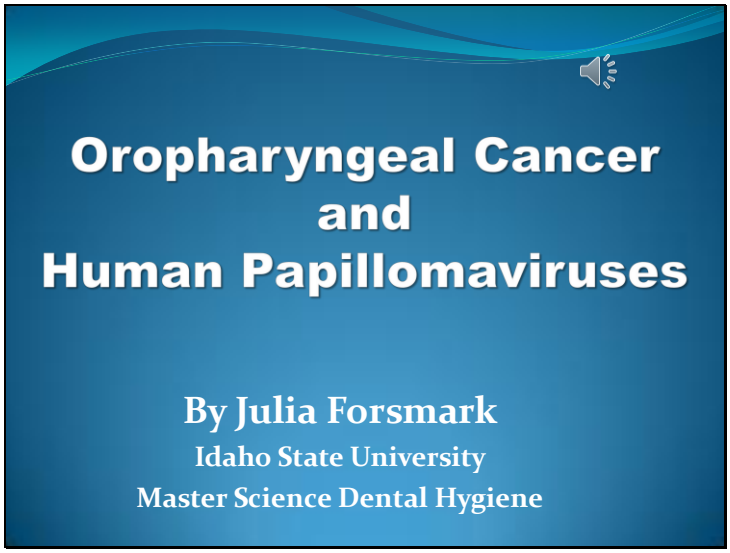
Your participation is greatly appreciated. If you have any questions please send me an e-mail at forsjuli@isu.edu.

Sincerely,

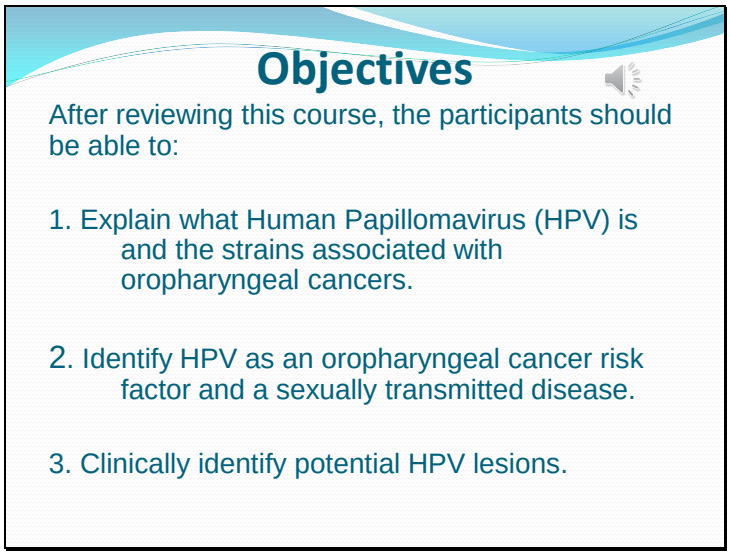
Julia Forsmark, RDH, BS

APPENDIX F: HPV and OPC Teaching Module

Slide 1



Slide 2


Objectives
After reviewing this course, the participants should be able to:
1. Explain what Human Papillomavirus (HPV) is and the strains associated with oropharyngeal cancers.
2. Identify HPV as an oropharyngeal cancer risk factor and a sexually transmitted disease.
3. Clinically identify potential HPV lesions.

Slide 3

Objectives cont.

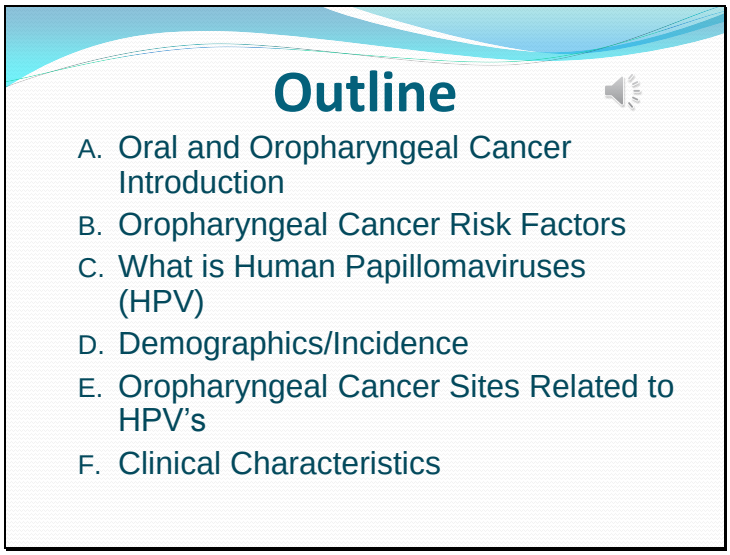
After reviewing this course, the participants should be able to:

4. Compare high-risk HPV incidence and demographics.

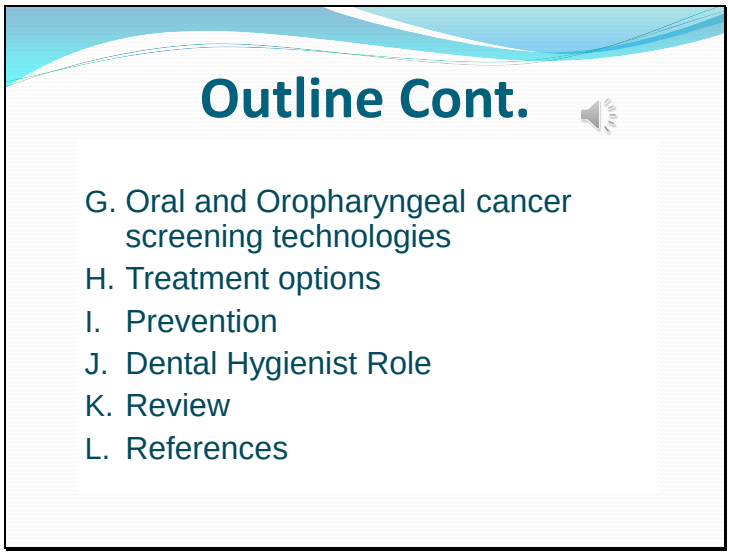
5. Explain the oropharyngeal cancer sites related to HPVs.

6. Develop a plan and demonstrate their role for early detection and treatment options for oral HPV.

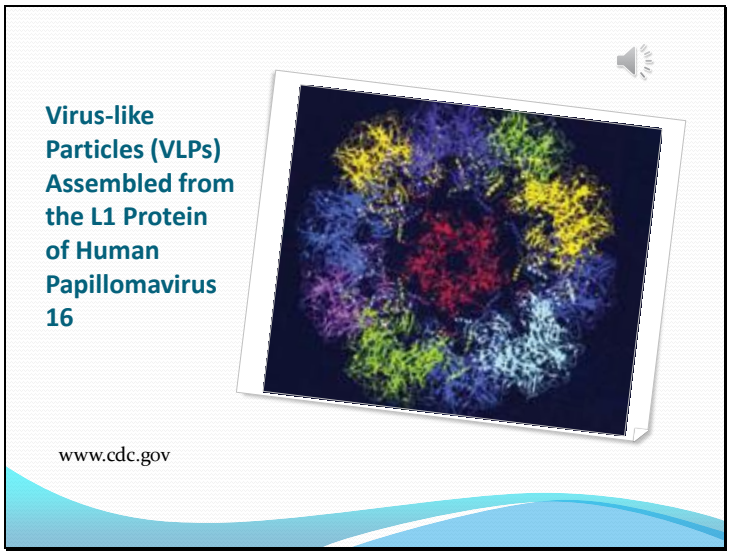
Slide 4


Outline
A. Oral and Oropharyngeal Cancer Introduction
B. Oropharyngeal Cancer Risk Factors
C. What is Human Papillomaviruses (HPV)
D. Demographics/Incidence
E. Oropharyngeal Cancer Sites Related to HPV's
F. Clinical Characteristics

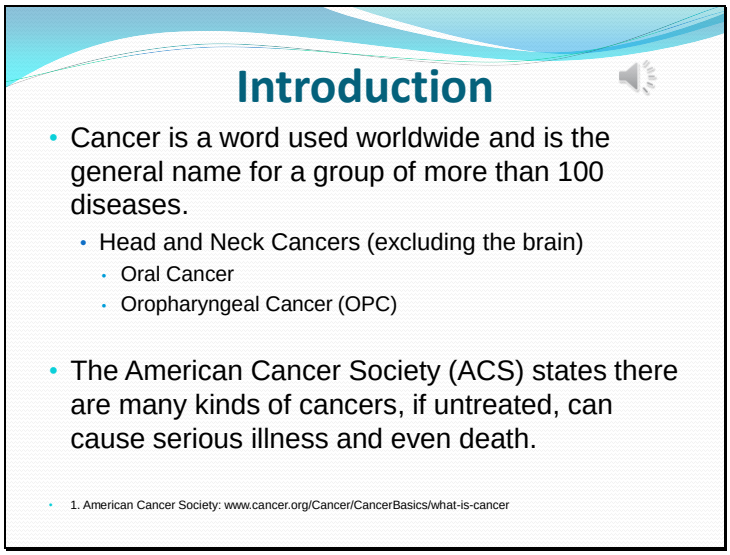
Slide 5


Outline Cont.
G. Oral and Oropharyngeal cancer screening technologies
H. Treatment options
I. Prevention
J. Dental Hygienist Role
K. Review
L. References

Slide 6


Virus-like Particles (VLPs) Assembled from the L1 Protein of Human Papillomavirus 16
www.cdc.gov

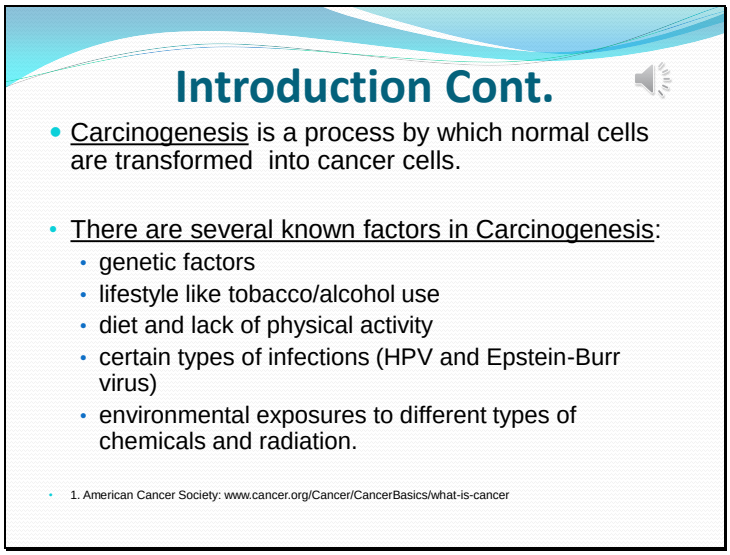
Slide 7



Oral cancer (mouth cancer) includes floor of the mouth, lips, front two thirds of the tongue, oral mucosa, gingiva, palate.

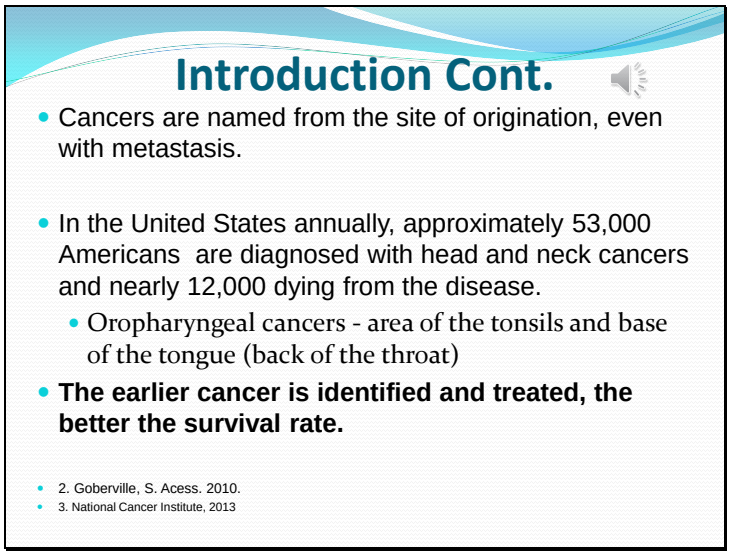
Oropharyngeal Cancer includes back third of the tongue, the soft palate, the side and back wall of the throat and the tonsils.

Slide 8



Carcinogenesis - Characterized by a progression of changes on cellular and genetic levels that ultimately reprograms a cell to undergo uncontrolled cell division, resulting in the formation of a malignancy.

Slide 9



Even with metastasis, the specific primary tumor characteristics remain the same. For example: breast cancer that has metastasized to the lungs is still considered stage IV breast cancer.

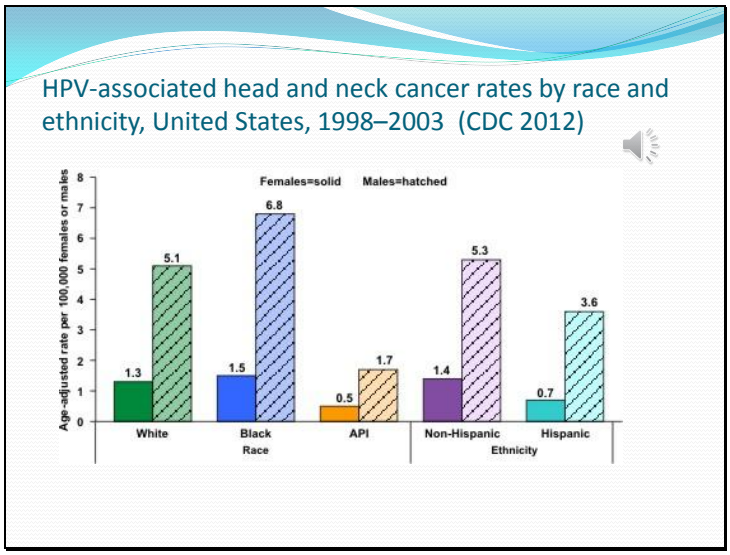
Slide 10

Introduction Cont.

- In the United States, HPV-positive Oropharyngeal cancers (tonsils and base of tongue):
  - 1988 to 2004- **increased by 225%**
- Recent systematic reviews of world literature confirmed the rise of Oropharyngeal cancers caused by high-risk HPV:
  - 2000 to 2005- **increased from 40.5% to 72%**

- 4. Chaturvedi et al., Journal of Clinical Oncology, 2011
- 5. Mehanna et al., Curr Opin Otolaryngol Head Neck Surg. 2012

Slide 11


HPV-associated head and neck cancer rates by race and ethnicity, United States, 1998–2003 (CDC 2012)
Females=solid
Males=hatched
Age-adjusted rate per 100,000 females or males
0
1
2
3
4
5
6
7
8
1.3
5.1
1.5
6.8
0.5
1.7
1.4
5.3
0.7
3.6
White
Black
API
Race
Non-Hispanic
Hispanic
Ethnicity

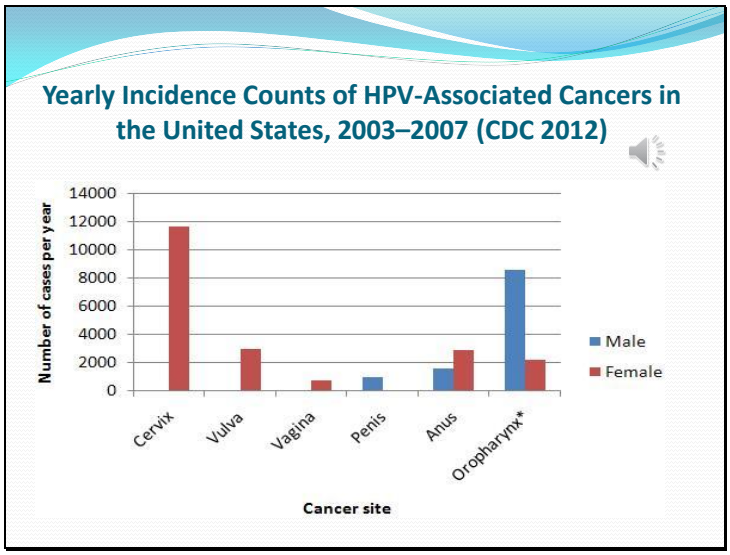
Slide 12

Incidence Counts and Rates of Potentially HPV-Associated Cancers by Sex and Site, 2003–2007

Cancer Site	Average Number of Cases per Year		Incidence Rate per 100,000 Persons	
	Male	Female	Male	Female
Cervix		11,607		7.78
Vulva		2,951		1.80
Vagina		691		0.42
Penis	987		0.76	
Anus	1,561	2,842	1.14	1.76
Oropharynx*	8,530	2,222	5.97	1.38
TOTAL	11,079	20,313	7.87	13.15

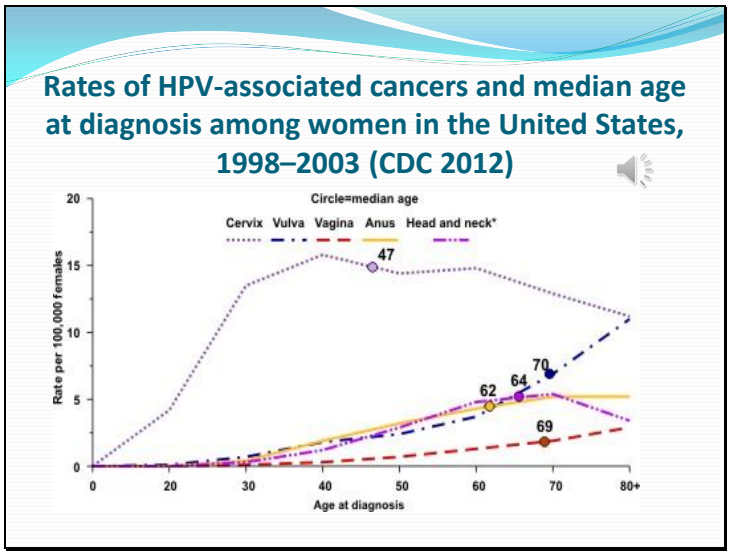
The male number of cases of oropharynx cancer sites is much higher in males than females by approximately 6,300.

Slide 13



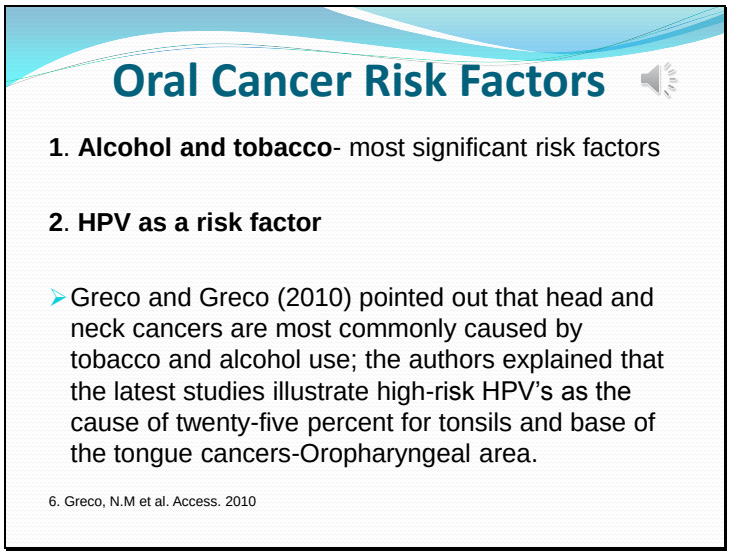
Looking at the number of cases for oropharynx cancers, males is much higher than females.

Slide 14



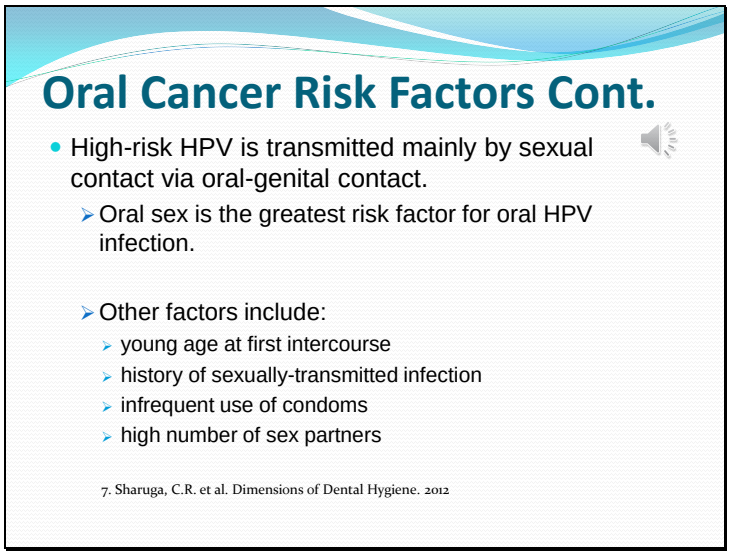
The purple line represents head and neck cancers associated with HPV, with median age at diagnosis among women at age 64.

Slide 15



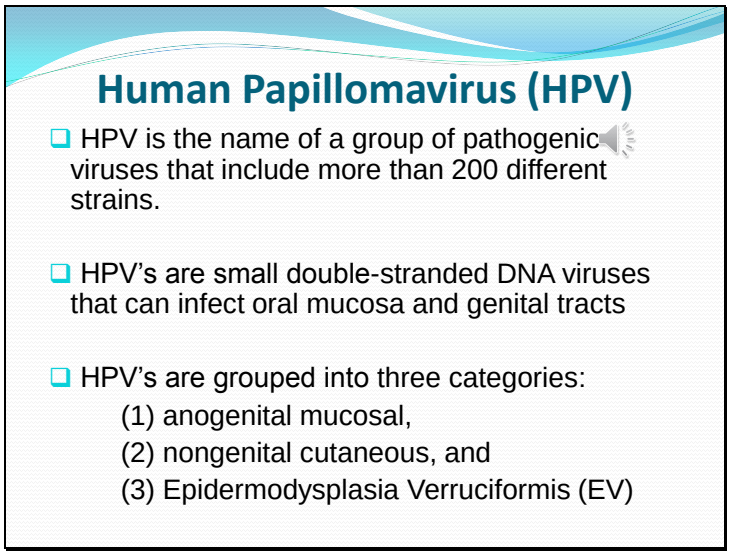
Several risk factors have been associated with OPC, but the two most important risk factors, and the most controllable, are tobacco and alcohol use. The most recently related risk factor, which is sexually transmitted, is high-risk HPV (HPV 16).

Slide 16



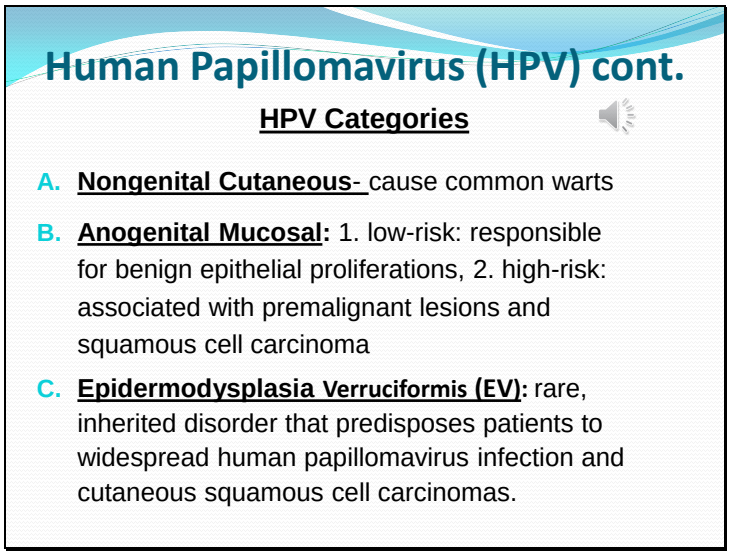
HPV can be communicable even when lesions are not present.

Slide 17



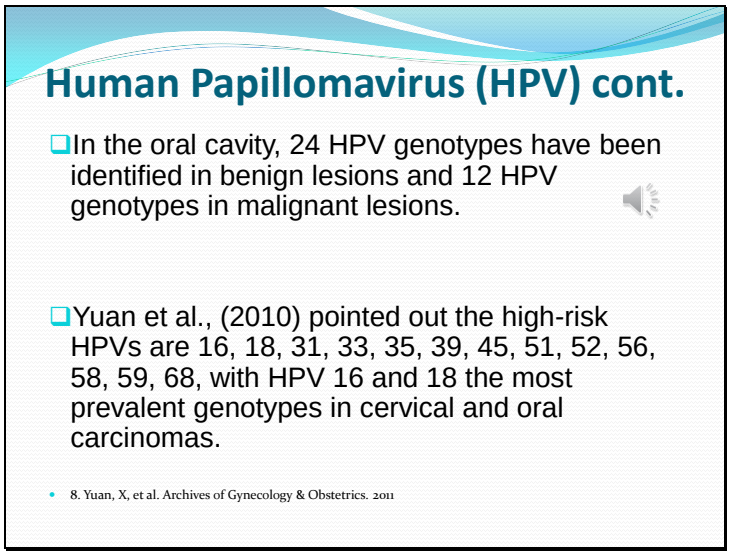
HPV's are associated with a variety of conditions such as epidermal warts, skin cancers, and skin lesions. The majority of known types cause no symptoms in most people.

Slide 18



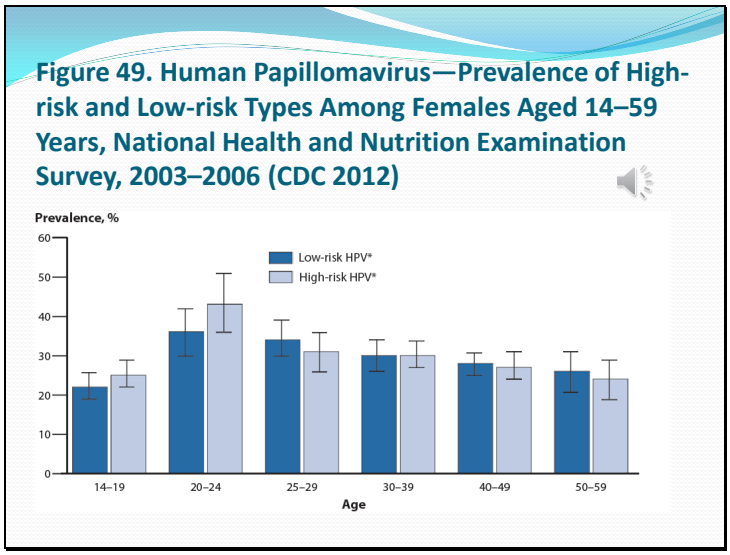
Epidermodysplasia verruciformis (EV) is a **rare,** autosomal recessive inherited skin disorder characterized by eruptions of wart-like lesions that may occur anywhere on the body. These lesions are caused by infection with the human papillomavirus (HPV). Clinical characteristics: flat, wart-like lesion that look like plane warts to slightly raised, brown colored lesions.

Slide 19



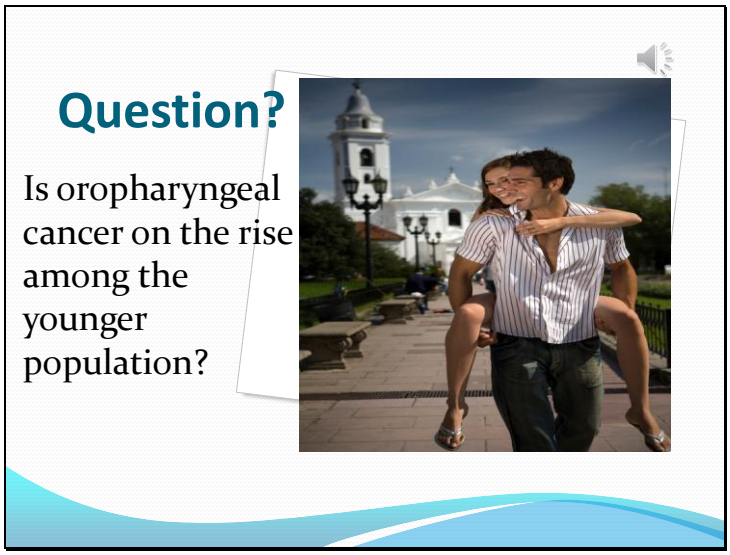
HPV types are detected in normal oral mucosa of healthy individuals as well as malignant tissues, and are transmitted primarily by sexual contact. HPV 16 is the main risk factor for cervical cancer.

Slide 20

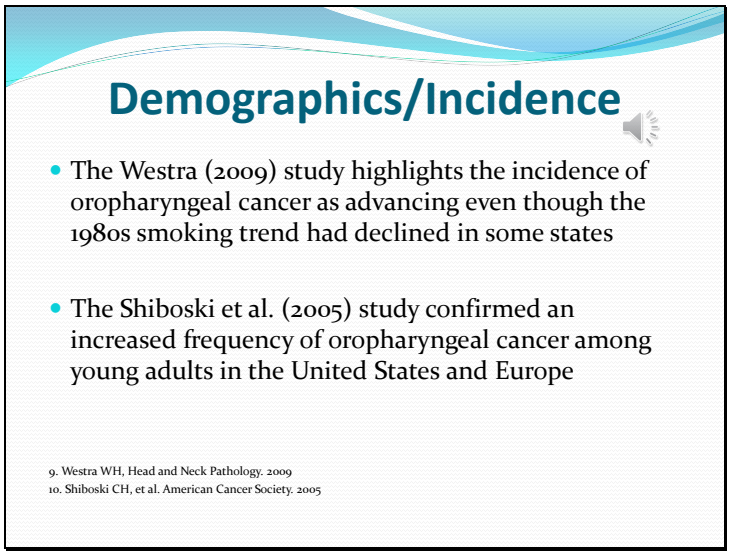


National population-based data were obtained from NHANES to examine the prevalence of both high-risk HPV and low-risk HPV—including types 6 and 11—in the civilian, non-institutionalized female population during 2003–2006 (Figure 49). HPV detection and typing were performed using the Research Use Only Linear Array genotyping assay (Roche Diagnostics), resulting in higher HPV prevalence than previously reported for NHANES 2003–2004 data

Slide 21


Question?
Is oropharyngeal cancer on the rise among the younger population?

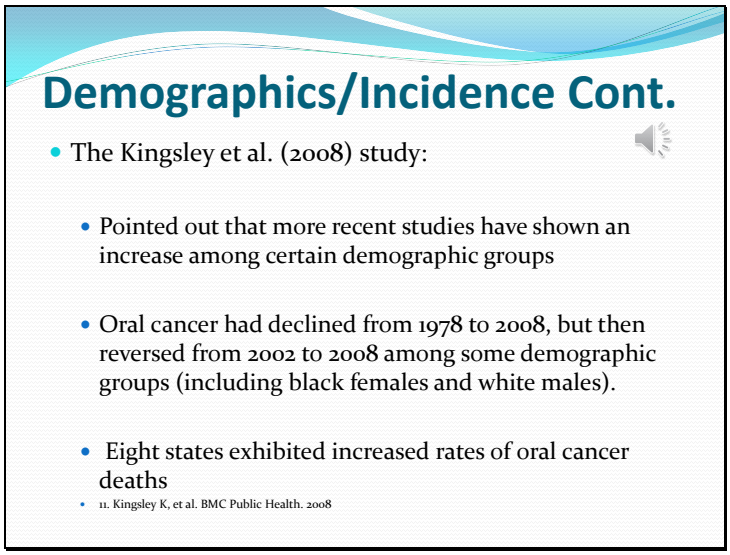
Slide 22



HPV positive OC may be altering the demographics of HNSCCs worldwide. The authors alluded to the influence of non-traditional behavioral and environmental factors. Specific sexual behavior-related risk factors were suggested: high number of sexual partners, history of oral-genital sex, and record of oral-anal sex. HPV-16 was linked as a factor in approximately seventy percent of OPC (Westra, 2009).

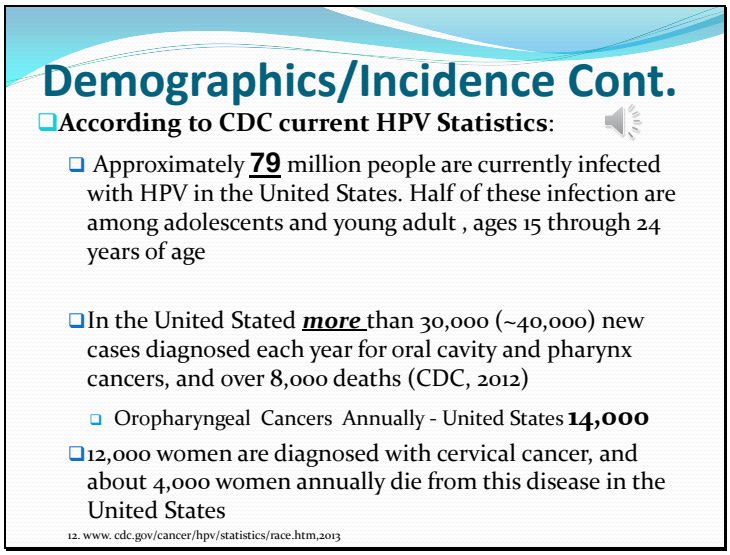
Shiboski (2005), the authors compared age, race, and site-specific trends. During the time period from 1973 to 2001, over 28 years, the results showed a significant increase in the incidence of oral tongue SCC. However, they noted a decrease in incidence in other oral cavity sites. Overall, the increase SCC of the tonsils corresponded with the increase in tongue SCC while all other oral cavity sites remained constant or decreased in prevalence.

Slide 23



-Pointed out that latter studies have shown an increase among certain demographic groups, which could be a result of different risks or risk behaviors
-Eight states exhibited increased rates of oral cancer deaths (Kentucky and Wisconsin were not included which have the higher numbers of current smokers and heavy alcohol consumers)

Slide 24



HPV, also called genital HPV, is the most common sexually transmitted infection (CDC, 2013).

HPV is so common that nearly all sexually-active men and women will get at least one type of HPV at some point in their lives (CDC, 2013).

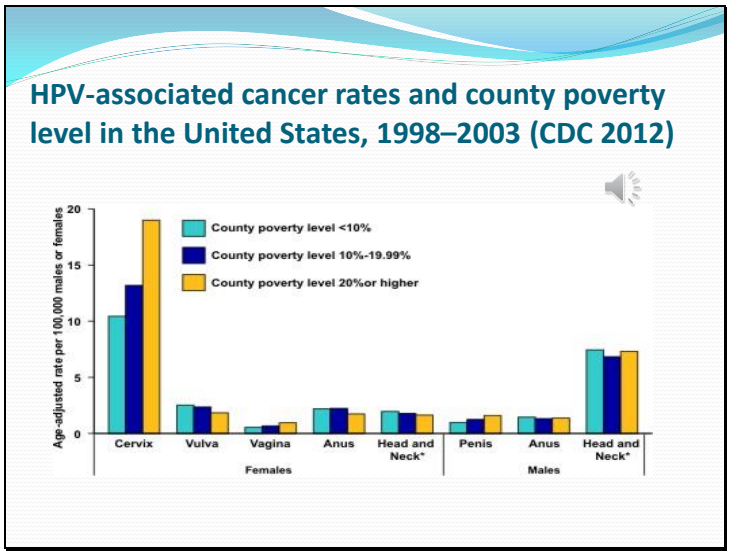
Slide 25

Demographics/Incidence Cont.

CDC chart for HPV-Associated cancers rates by race and ethnicity

- Overall, Asian and Pacific Islander men and women had lower rates of HPV-associated cancers than white men and women.
- Black and Hispanic women had higher rates of HPV-associated cervical cancer than white women (RECENT STUDY RE: CERTAIN POPULATIONS LESS ABLE TO "FIGHT OFF" HR-HPV)
- Black men and women appeared to have higher rates of HPV-associated cancers of oropharynx and oral cavity
- www.cdc.gov/cancer/hpv/statistics/race.htm

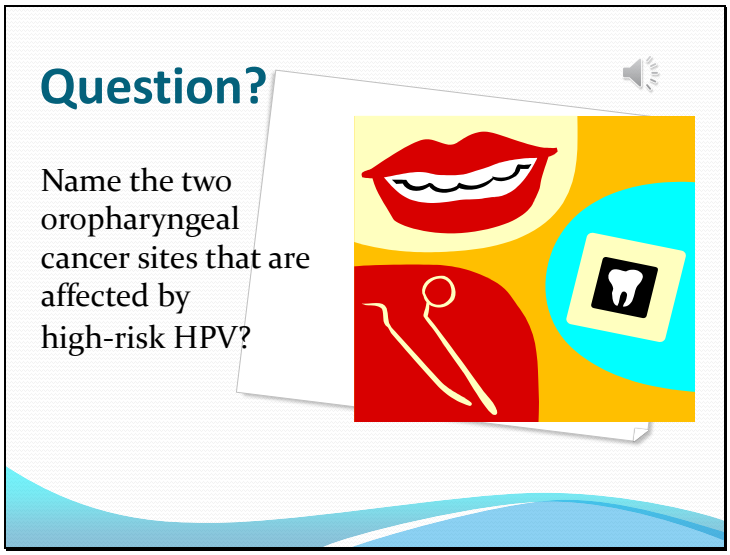
Slide 26



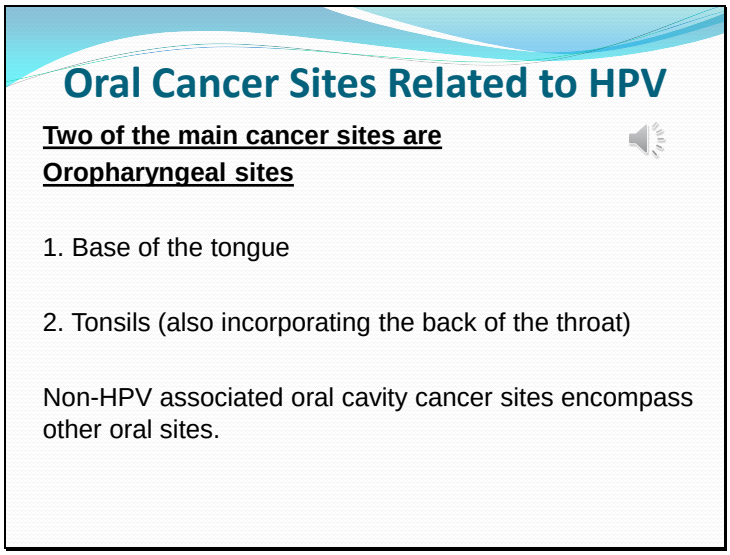
Females- cervix had highest age-adjusted rate per 100,000 females.

Males- head and neck cancer rate was highest among males.

Slide 27

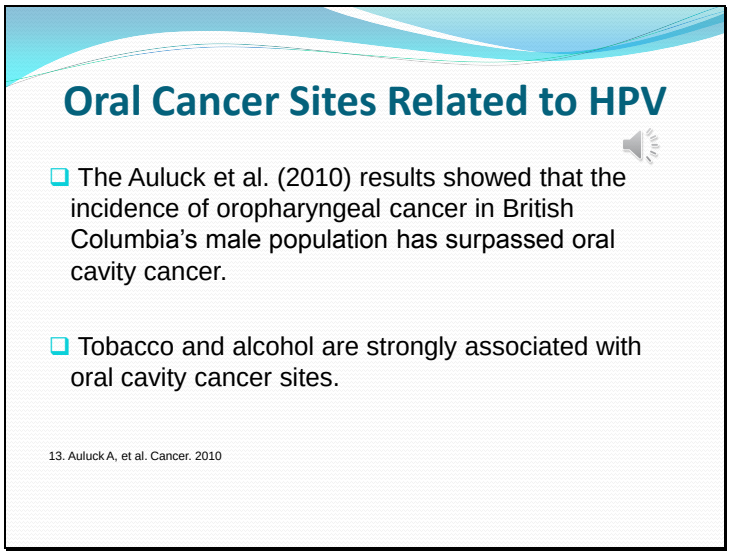

Question?
Name the two oropharyngeal cancer sites that are affected by high-risk HPV?

Slide 28



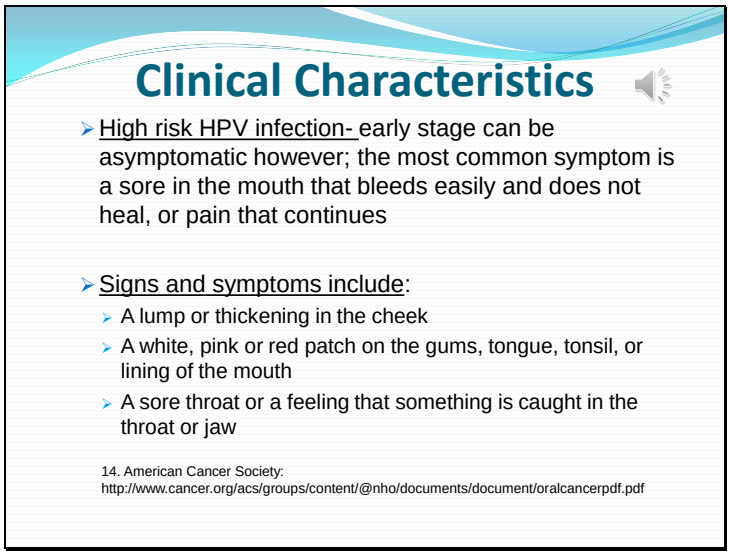
Oral cavity cancer sites are more related to alcohol and tobacco use.

Slide 29



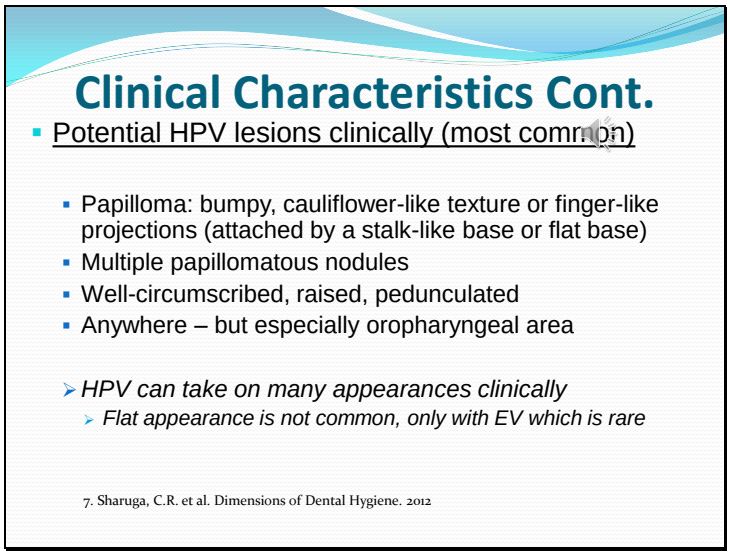
Auluck et al. (2010), conducted a study to investigate the incidence at the two main cancer sites in the oral cavity that involved the frequency of HPV-related and unrelated HPV sites in multicultural population. A total of approximately 5,000 cases were analyzed. Two of the main cancer sites were oropharyngeal sites.

Slide 30



Oral cancer symptoms are not dependent on disease stage; however, familiarity of the most common risk factors and recognition of these signs and symptoms during a routine oral screening may help with identification of OC or OPC at an earlier stage. Other signs and symptoms include: an earache that doesn't go away, numbness of lower lip and chin, and difficulties in chewing, swallowing, or moving the tongue or jaw (ACS, 2007).

Slide 31



HPV can take on many appearances clinically. Next few slides have photos of lesions.

Slide 32

Clinical Characteristics

Figure 1: Labial mucosa of a 21-year-old woman shows multiple slightly elevated papulonodular lesions, typical of oral lesions of focal epithelial hyperplasia due to human papillomavirus.

Figure 2: Lesions were also seen on the patient's lip mucosa and tongue.

1. Adapted from: Durso BC, et al. J Can Dent Assoc. 2005

Slide 33

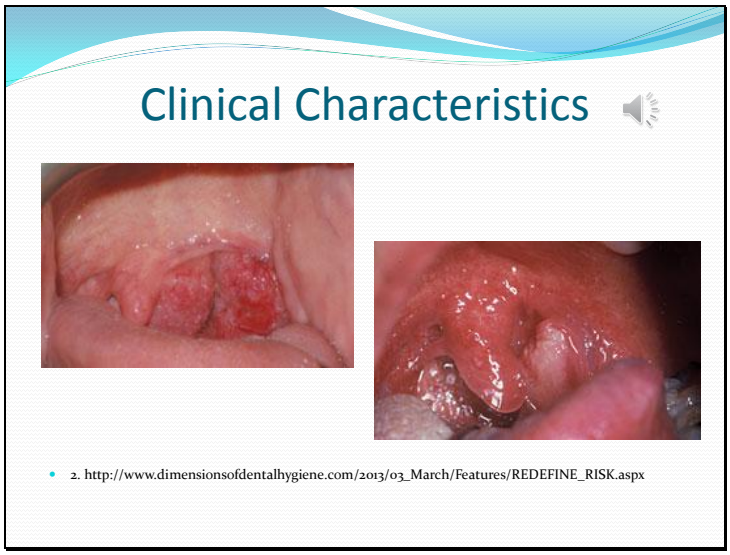


Photo on left: Cancerous lesion of the tonsils that is multilobular, large, and speckled.
Photo on right: Tonsillar cancerous lesion

Slide 34

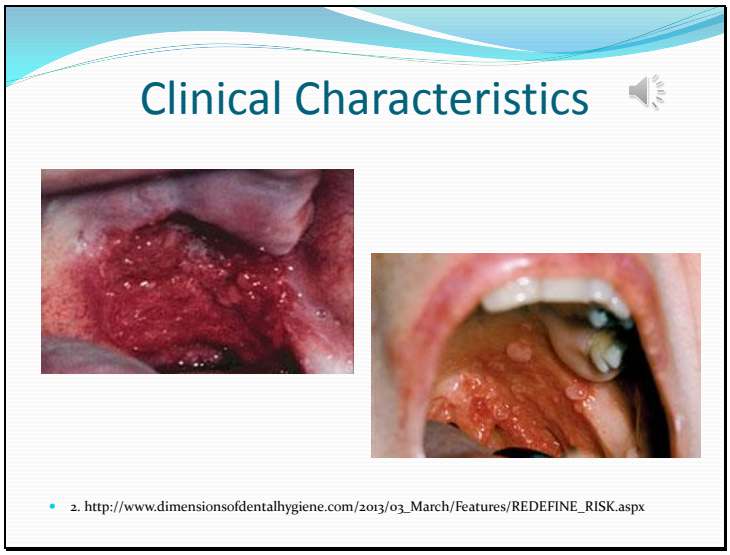
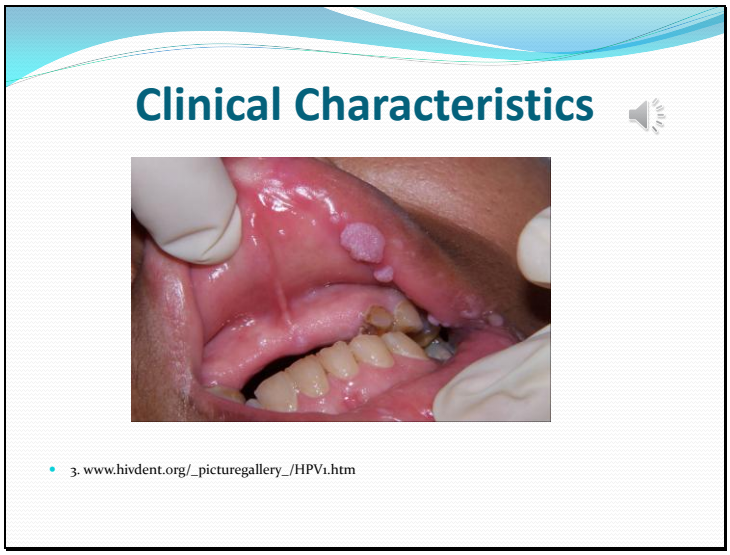


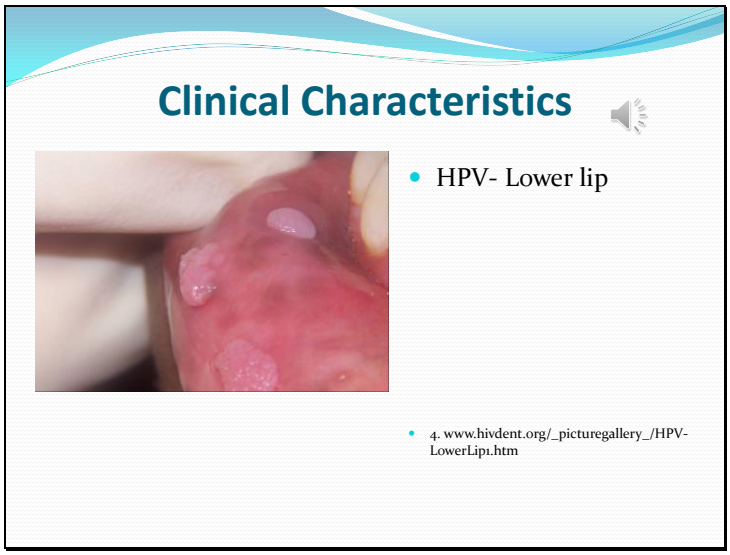
Photo on the left: Asymptomatic carcinoma of the soft palate and tonsillar area that appears pebbled and erythematous.
Photo on the right: Discrete, raised, scattered lesions on the tonsils, soft palate, and uvula.

Slide 35



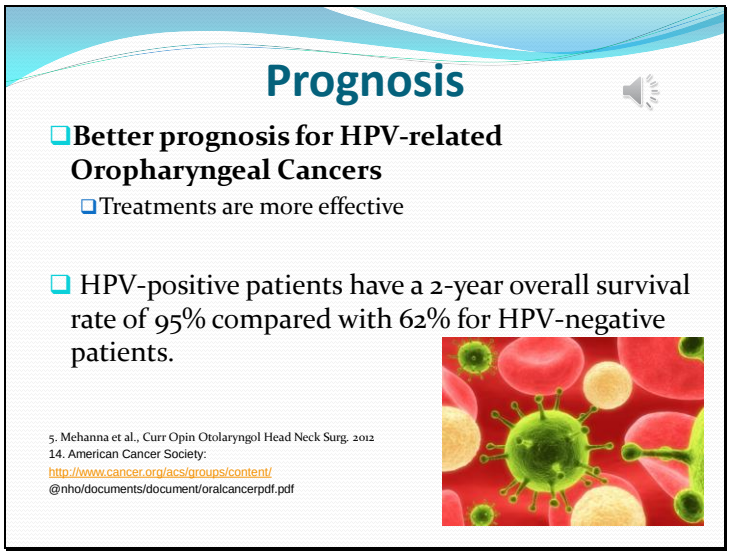
Multiple lesions on upper lip. Patient needs to be referred to an ears, nose and throat (ENT) specialist or oral surgeon.

Slide 36



This HPV lesion photo has similar characteristics as the last photo, but on the lower lip.

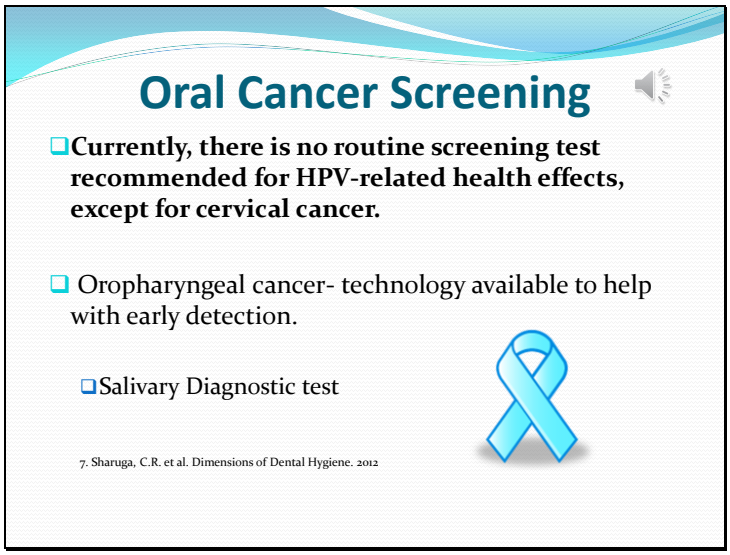
Slide 37



Compared to oral cancer (areas other than oropharyngeal), which the main risk factors are tobacco and alcohol.
Survival rates for HPV-related (HPV-positive) OPC are generally higher than those for HPV-unrelated (HPV- negative) OPC.

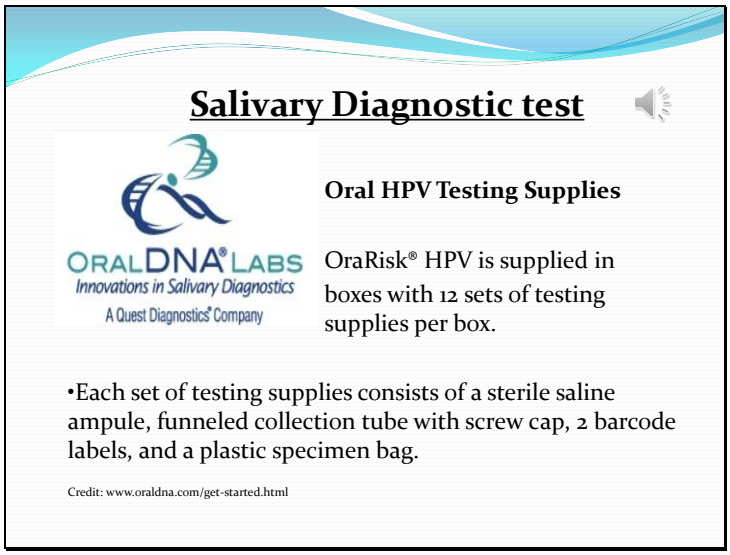
ACS (2012) states that the five-year survival rates for HPV- related OPC have increased over time for each stage of diagnosis. Also, people with advanced tumors have poorer survival rate than those with localized tumors.

Slide 38



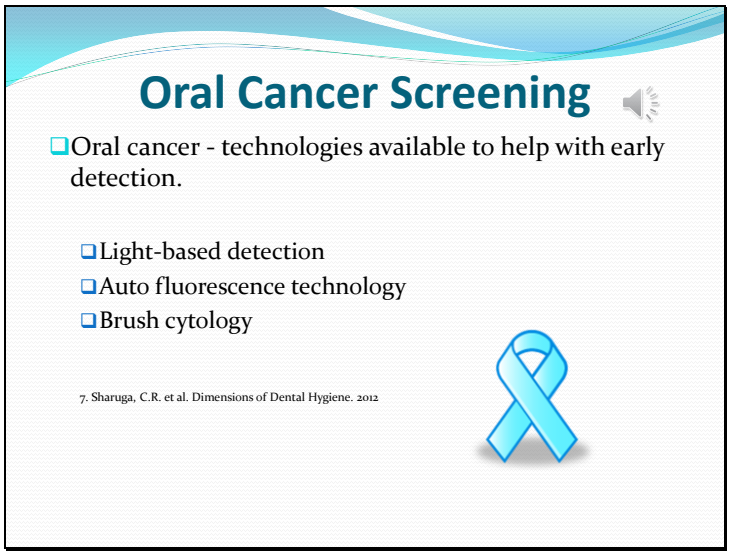
Salivary diagnostic test: test for HPV present in the saliva, but if HPV is present this does not mean the patient has cancer.

Slide 39



- Salivary Diagnostic test: test patients saliva to see whether human papillomavirus is present (OraRisk®). If HPV is present does not mean you have cancer

Slide 40


Oral Cancer Screening
Oral cancer - technologies available to help with early detection.
Light-based detection
Auto fluorescence technology
Brush cytology
7. Sharuga, C.R. et al. Dimensions of Dental Hygiene. 2012

Slide 41

- Light-based detection : light-based detection systems use acetic acid, used to improve keratin detection (microlux diagnostic light, adDent inc., ViziLite ® plus with Tblue, Zila)

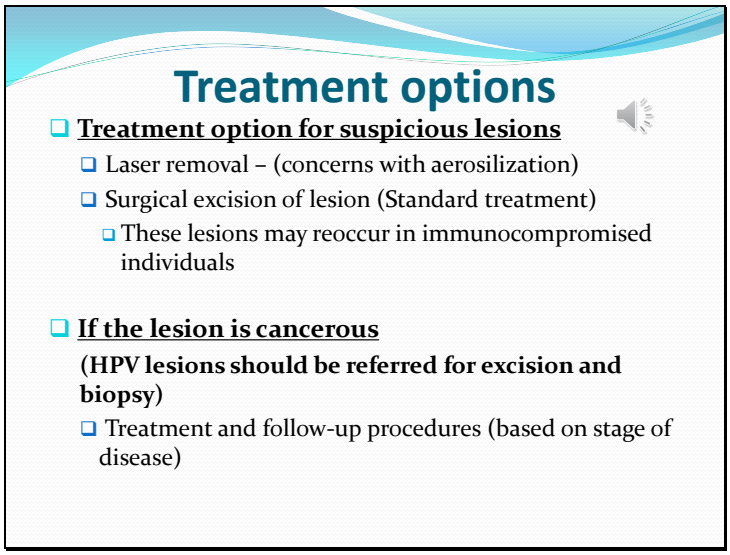
Slide 42

- Auto fluorescence technology: uses blue or violet light to highlight dysplasias in the oral cavity (Velscope ®, LED Dental inc., DentalEZ®, Identafi® 3000 ultra)

Slide 43

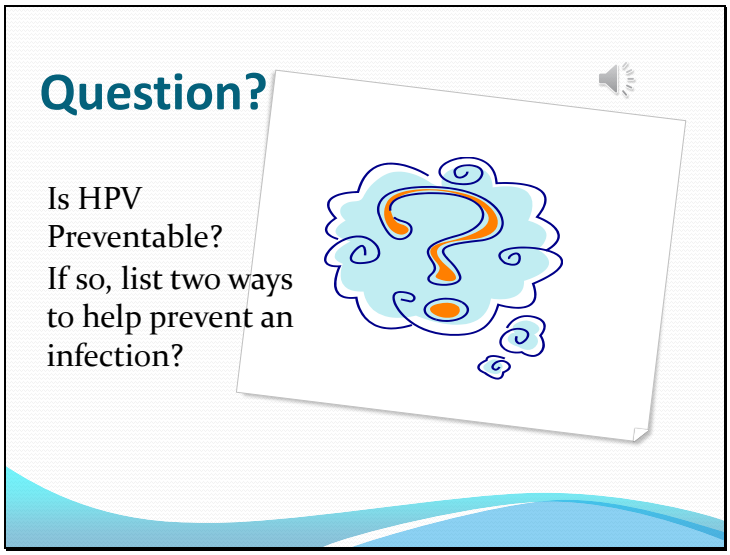
- Brush cytology: uses a tissue-sampling brush to collect cells which is sent to a lab (Oral CDx® brush test)

Slide 44

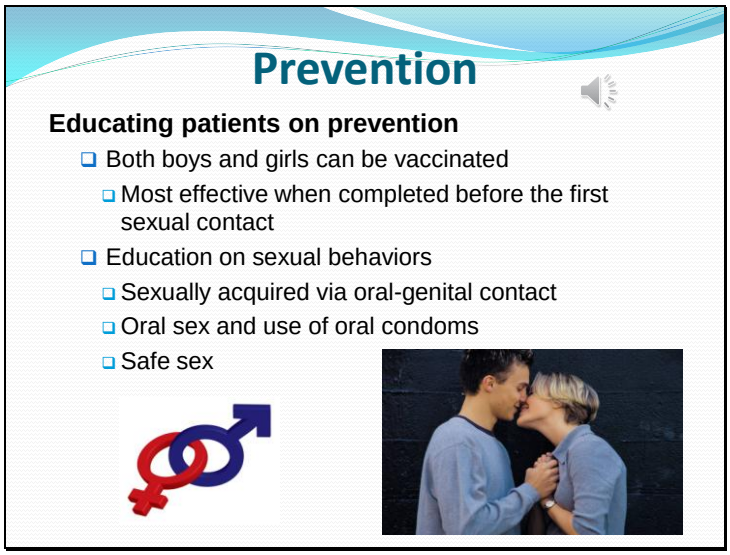


Excisions and biopsy of lesions are usually done by an ENT or oral Surgeon

Slide 45

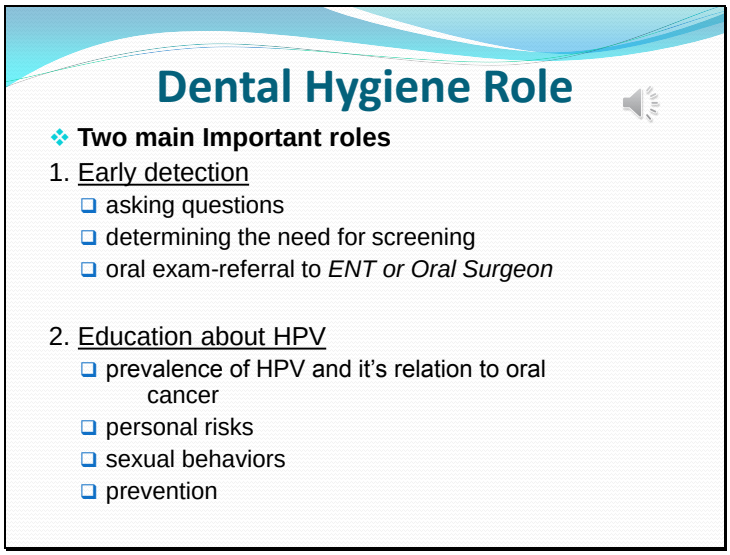

Question?
Is HPV Preventable?
If so, list two ways to help prevent an infection?

Slide 46



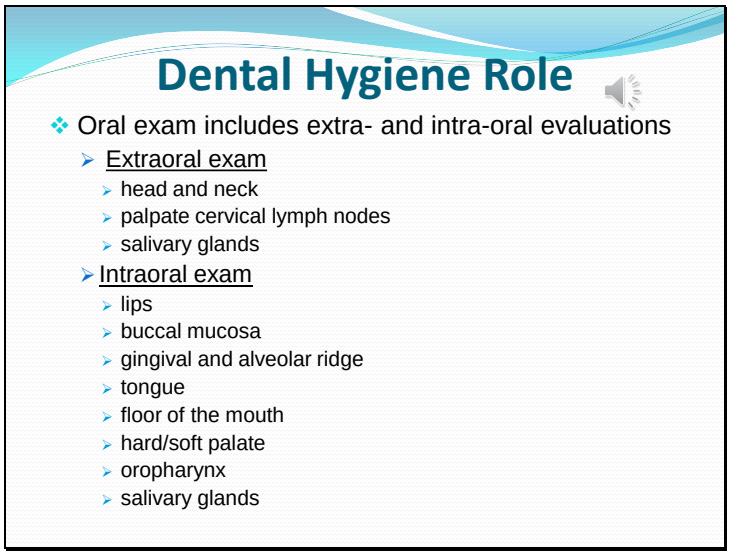
Two ways to help prevent an HPV infection is to educate patients; 1) sexual behaviors, and 2) vaccination for boys and girls.
Screening for HPV-16 has reduced the rate of cervical cancer.

Slide 47



Vaccinations for HPV are started at an early age for both boys and girls.

Slide 48



Intraoral exam: use gauze to help check the tongue by moving the tongue from side to side. Also, use mirror during the exam.

Slide 49

Steps to help educate and motivate patients for change

- 1. Get permission –
  - "Do you mind if we discuss oral cancer risks?"
  - "May I tell you what concerns me about questions you have answered on your health history form?"
  - "It's my role as a healthcare provider to educate you on oral cancer risks"

2. Ask open-ended questions
  - ask 1 to 3 questions so you don't overwhelm patients
  - approach the topic with respect and confidence
  - "What could you do to reduce your oral cancer risks?"
  - "How could you implement this change?"

Slide 50

Steps to help educate and motivate patients for change

- 3. Listen Reflectively
  - Use the patient's own words by saying "I hear you saying…"
  - offer statements to change direction of conversation
  - "That is a good point but how about looking at it from this point"

4. Summarize - offer suggestions and review prevention
- "So here are the steps that we agreed to…"
- "Let me know if I miss anything important"
- give the patient current information to take home on HPV and oral cancer (pamphlets, articles, etc.)

Slide 51

Review

- Approximately **79** million people are currently infected with HPV in the United States. Half of these infection are among adolescents and young adults , ages 15 through 24 years of age. (CDC, 2013)
- *National Cancer Institute*: ~**53,000** people annually in the U. S. are diagnosed with head and neck cancers.
- *CDC*: each year ~ **40,000** new cases of oral cavity and pharynx will be diagnosed in U. S. (OPC alone **14,000**)
- The earlier cancer is identified and treated, the better the survival rate.
- HPV complex group of pathogenic viruses that include more than 200 different strains.

Slide 52

Review

- HPV is grouped into three categories: anogenital mucosal, nongenital cutaneous and epidermodysplasia verruciformis. Mucosal HPV strains are classified into low- and high-risk.
- High-risk is associated with premalignant lesions and squamous cell carcinoma (HPV 16 & 18)
- Oral cancer most significant risk factors are alcohol and tobacco, but latest studies illustrate high-risk HPV's as the cause of twenty-five percent of tonsils and base of the tongue – oropharyngeal cancers.
- HPV is transmitted mainly by sexual contact via oral-genital contact.

Slide 53

Review

- HPV can be asymptomatic but the most common symptom is a sore that bleeds easily and does not heal.
- Two main oral cancer sites related to high-risk HPV are Oropharyngeal sites.
- Potential HPV lesions: papilloma, multiple nodules, and white or red patches.
- Current studies highlights the incidence of oropharyngeal cancer as advancing even though the 1980s smoking trend had declined.

Slide 54

Review

- Studies have shown an increase among certain demographic groups (younger population)
- Better prognosis for high-risk HPV-positive related oropharyngeal cancers
- Currently, there is no routine screening test recommended for HPV-related health effects, except for cervical cancer.
- Screening aids are available for early detection
- Several treatment options; most common surgical excisions.

Slide 55

Review

- Prevention: vaccines and patient education
- Dental Hygiene role is early detection and patient educations on high-risk HPV.

- Four steps to help educate and motivate patients for change:
  - get permission
  - ask open-ended questions
  - listen reflectively
  - summarize

Slide 56

References

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- 7. Credit: www.sopreventable.com/How2Use.htm:

APPENDIX G: Journal of Dental Hygiene Guidelines

Author Guidelines

Editorial Staff

Editor-in-Chief Rebecca Wilder, RDH, MS
Administrative Editor Randy Craig
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Editor Emeritus Mary Alice Gaston, RDH, MS

Statement of Purpose

The Journal of Dental Hygiene is the refereed, scientific publication of the American Dental Hygienists' Association. It promotes the publication of original creative work related to dental hygiene research, education and evidence-based practice. The Journal supports the development and dissemination of a unique dental hygiene body of knowledge through scientific inquiry in basic, behavioral, clinical and translational research.

Author Guidelines

Starting with the Summer 2004 issue, the Journal has been published online. The online format provides searching capabilities to Journal readers by establishing a link to dental hygiene research indexed through the National Library of Medicine and Medline.

Manuscript Requirements

Manuscripts are evaluated for quality, depth and significance of research, comprehensive evaluation of the available literature and the expertise of the author(s) in the given subject. Content must provide new information and be of general importance to dental hygiene. The Journal discourages submitting more than one article on related aspects of the same research. If multiple papers are submitted from the same project, significant differences in the papers must be evident.

Originality

Manuscripts must be original, unpublished, owned by the author and not submitted elsewhere. Authors are responsible for obtaining permission to use any materials (tables, charts, photographs, etc.) that are owned by others. Written permission to reprint material must be secured from the copyright owner and sent to ADHA when the manuscript is accepted for publication. The letter requesting permission must specifically state the original source, using wording stipulated by the grantor.

Disclosure

Authors are obligated to identify any actual or potential conflict of interest in publishing the manuscript. This includes association with a company that produces, distributes or markets any products mentioned, or with funding provided to help prepare the manuscript. Disclosures should appear at the beginning of the manuscript.

Manuscript Categories

The Journal publishes original scientific investigations, literature reviews, theoretical articles, brief reports, and special feature articles related to dental hygiene. Specific Categories of articles are as follows: Research, Critical Issues in Dental Hygiene, Innovations in Education and Technology, Literature Reviews and Short Reports. All submissions are reviewed by the editor and by members of the Editorial Review Board.

Original Research Reports – limited to 4000 words (excluding references and Tables/Figures)

Include reports of basic, behavioral, clinical and translational studies that provide new information, applications or theoretical developments. Original Research Reports include an Abstract, Introduction (including the review of the literature and ending with a statement of the study purpose), Methods and Materials, Results, Discussion and Conclusion.

Title Page: This page should include: 1) title of article, which should be concise yet informative, 2) first name, middle initial and last name of each author, with highest academic degrees, 3) each author or coauthor's job title, department and institution or place of employment if other than academic, 4) disclaimers/disclosures, if any, 5) name, address, all contact information of author responsible for correspondence about the manuscript and 6) funding sources for the project, equipment, drugs, etc.

Abstract: Approximately 250 words. Use the headings "Purpose" (purpose), "Methods" (design, subjects, procedures, measurements), "Re-

sults" (principal findings), and "Conclusion (i.e. Major conclusions.)" The abstract must be able to stand alone. References should therefore be avoided.

Keywords: Four to ten keywords should be chosen that are consistent with Medical Subject Headings (MSH) listed in Index Medicus. These key words will be used for indexing purposes. Keywords should be listed at the end of the abstract.

NDHRA: Identify how the study supports a specific topic area and related objective from the National Dental Hygiene Research Agenda. For example: This study supports the objective: Assess strategies for effective communication between the dental hygienist and the client, under Health Promotion/Disease Prevention. NDHRA statements can be found at: http://www.adha.org/downloads/Research_agenda%20-ADHA_Final_Report.pdf

Text: The body of the manuscript should be divided into sections preceded by the appropriate subheading. Major subheadings should be in capital letters at the left-hand margin. Secondary subheads should appear at the left-hand margin and be typed in upper and lower case and in bold face.

Introduction (including the literature review): Cite a variety of relevant studies that relate to the need for the current study and its significance. References should be as current as possible, unless a hallmark study is included. Compare findings of previous studies, clearly indicating all sources of concepts and data. When a source is directly quoted, use quotation marks. However, use of quotation marks should be limited. End this section with a clear statement of the purpose of the study, hypothesis or research objectives.

Methods and Materials: Describe the research design (e.g. randomized controlled trial) and procedures (e.g. IRB approval, target population, inclusion/exclusion criteria, recruitment, informed consent, variables to be tested, instruments, equipment, procedures and method of data analysis). Specify the measurements and statistical tests used as well as related levels of significance. Furthermore, assure an adherence to all pertinent federal and state regulations concerning the protection of the rights and welfare of all human and animal subjects.

Results: Summarize all relevant data and study findings. Do not repeat in the text the data reported in tables and figures verbatim, but do refer to the data and emphasize important findings (e.g. Table 1 shows that most of the subjects were African American and between the ages of 12 and 16).

Discussion: Evaluate and interpret the findings. Compare them with those of other related studies. Discuss how they relate to dental hygiene practice, profession, education or research. Include overall health promotion and disease prevention, clinical and primary care for individuals and groups and basic and applied science. Discuss study limitations; implications for dental hygiene practice, education, and research; and recommendations or plans for further study.

Conclusion: State the conclusions, theories, or implications that may be drawn from the study. This section should be 1-2 paragraphs or can be listed as bulleted points.

Acknowledgments: Be brief and straightforward. Example: "The authors thank Jane Smith, RDH, for her assistance in developing the survey instrument." Anyone making a substantial contribution to the conduct of the research or the resulting report should be appropriately credited as an author.

Literature Reviews – limited to 3000 words (excluding references and Tables/Figures)

A presentation of relevant and primary published material on a specific topic constitutes a comprehensive literature review. Such a review includes a summary and critique of the current status of the topic, and the aspects requiring further study.

Abstract: Literature reviews begin with a non-structured abstract—a brief statement of purpose, content summary, conclusions, and recommendations.

Keywords: At least four keywords should be listed following the non-structured abstract.

NDHRA: Identify how the literature review supports a specific topic area and related objective from the National Dental Hygiene Research Agenda. For example: This review supports the objective: Assess strategies for effective communication between the dental hygienist and the client, under Health Promotion/Disease Prevention.

Short Reports – limited to no more than 2000 words plus references and illustrations. Illustrations should be limited to a total of no more than 2 (e.g. 2 figures or 2 tables, or 1 figure and 1 table)

The Journal publishes short reports related to dental hygiene. Short reports are limited in scope and should begin with a brief, non-structured abstract that describes the topic. The abstract should contain at least four keywords. Identify how the report supports a specific topic area and related objective from the National Dental Hygiene Research Agenda. A concise introduction; literature review; detailed description of the topic or activity; and discussion, conclusion, and recommendations must also be included. References are necessary to support the rationale and methods presented.

A short report may describe a clinical case study, an educational innovation, a research method, a concept or theory, or other current topics.

Case Study: A report that describes a unique aspect of patient care not previously documented in the literature. Such reports usually focus on a single patient or groups of patients with similar conditions. Suitable topics include, but are not limited to, innovative preventive methods or programs, educational methods or approaches, health promotion interventions, unique clinical conditions or pathologies and ethical issues.

Theoretical Manuscript: A report that provides a well-supported explanation for natural phenomena that clarify a set of interrelated concepts, definitions, or propositions about dental hygiene care or processes. Such reports provide new knowledge, insight, or interpretation; and discussion, conclusions, and recommendations. These reports begin with a non-structured abstract. At least four keywords are listed at the end of the abstract.

Critical Issues in Dental Hygiene – limited to 4000 words

The purpose of this section is to highlight challenges and opportunities pertinent to the future directions of the profession of dental hygiene.

Innovations in Education and Technology – limited to 4000 words

The purpose of this section is to feature short reports of innovative teaching applications and techniques as well as new technologies available for increased communication and learning in dental hygiene education.

Manuscript Preparation and Style

Standard usage of the English language is expected. Manuscripts should be created in Microsoft Word with margins of at least 1 inch. Double spacing should be used throughout the manuscript. Font size is 12 point in Times New Roman style. All pages should be numbered, consecutively beginning with title page, to include references, tables and legends for illustrations. Begin each of the following sections on separate pages: title page, abstract and key words, text, acknowledgements, references, individual tables and legends. Do not embed tables and figures in the body of the text. If figures are large files, they can be submitted as separate documents. Clearly indicate who is willing to handle correspondence at all stages of the review process and publication. Ensure that telephone and fax numbers are provided for the corresponding author in addition to the email address.

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Example: Chlorhexidine (Peridex®; 3M ESPE, Minneapolis, MN) coded or abbreviated as CHX

Author Biography

Please include a brief biographical sketch of each author at the beginning of the manuscript. List names, credentials, titles, affiliations and locations. Example: "Mary B. Jones, RDH, MA, is assistant professor and clinic director, Department of Dental Hygiene; Bill R. Smith, DDS, MEd, is associate professor, Department of Pediatric Dentistry. Both are at the University of Minnesota in Minneapolis."

Visual Aids

Tables: All tables must have a title that is brief but self-explanatory. Readers should not have to refer to the text to understand a table. Also, the main body of text should not overly depend on the tables. Indicate explanatory notes to items in the

table with reference marks (*, #). Cite each table in the text in the order in which it is to appear. Identify tables with Arabic numbers (ex: Table 1).

Figures: Includes charts, graphs, photographs, and artwork. All should include a brief caption and use Arabic numerals (ex: Figure 1). Cite each figure in the text in the order in which it will appear.

Photographs: High-resolution digital photos are preferred, with a resolution of at least 300 pixels per inch. Submitting two positive prints of each quality photograph is also permitted. Color prints are preferred over black-and-white prints. Photographs are not returned unless requested by authors.

References

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Example Article in a Journal: Michalowicz BS, Hodges JS, DiAngelis AJ et al. Treatment of periodontal disease and the risk of preterm birth. N Engl J Med. 2006;355(18):1885-1894.

Smith MA, Jones BB. Curette sharpness: a literature review. J Dent Hyg. 1996;77:382-390.

Article from a Journal published online only: Hollister MC, Anema MG. Health behavior models and oral health: a review. J Dent Hyg [Internet]. 2004 [cited 2005 Feb 17];78(3):e6. Available from http://www.adha.org. Registration required for access.

Book citations: Spolarich AE, Gurenlian JR. Drug-induced adverse oral events. In: Daniel SJ, Harfst SA, Wilder RS, ed. Mosby's Dental Hygiene: Concepts, Cases and Competencies. 2nd ed. St. Louis, MO. Mosby/Elsevier Publishing. 2008. p. 259-276.

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Poole KE, Compston JE. Osteoporosis and its management. BMJ [Internet]. 2006 Dec 16 [cited 2007 Jan 4];333(7581):1251-6. Available from: http://www.bmj.com/cgi/reprint/333/7581/1251?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=&andorexactfulltext=and&searchid=1&FIRSTINDEX=0&sortspec=relevance&volume=333&firstpage=1251&resourcetype=HWCIT

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