Disparities in Oral Cancer: A Literature Review

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Abstract

Being one of the top ten most prevalent malignancies in the world, oral cancer has a poor prognosis, a delayed clinical diagnosis, and expensive treatment options. Oral cancer is becoming more common. Each year, thousands of people die from oral cancer, as the disease is associated with increased fatality due to late-stage identification. This paper summarizes findings from an in-depth literature review on the topic of oral cancer, specifically highlighting its disproportionate impact on specific demographic groups. The review first examines overall trends in the epidemiology of oral cancer. Thereafter, racial disparities are examined with a focus on differences in cancer screening, population-based trends in behaviors that serve as precursors to oral cancer (e.g., smoking), and disparities in treatment and affiliated outcomes. Finally, recommendations are offered to reduce identified disparities.

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Epidemiology of Oral Cancer

Oral cancer is predicted to be the cause of 11,230 fatalities in the United States this year (7,870 males and 3,360 women) (American Society of Clinical Oncology, 2023) In addition, more than 31,000 new instances of oral and oropharyngeal cancer are expected to be diagnosed annually in the United States (Sciubba, 2001). Oral cancers include malignancies arising on the lips, in the oral cavity, on gums, and within major salivary glands. Aside from loss of life, these diseases also have serious repercussions for those afflicted. For example, Barrios et al. (2015) found that both oral health-related quality of life and physical quality of life were decreased among those diagnosed with oral cancer, as compared to healthy controls. A striking trend across the literature characterizing the epidemiology of oral cancer is the existence of health disparities that demonstrate specific populations are more impacted by the disease than others. After reviewing trends in the distribution of oral cancer and associated mortality, an investigation of factors that may contribute to these disparities is provided.

Mortality Rate by Race, Ethnicity, & Sex

High-quality data and statistics on oral cancer incidence and survival are gathered and reported for the United States by the Surveillance, Epidemiology, and End Results (SEER) Program of the National Cancer Institute. Since registration opened, the SEER Program has gradually increased its coverage, with the registries from which they draw accounting for almost 48% of the U.S. population (National Cancer Institute [NCI], 2023a). These registries characterize vital statistics, as well as information on tumor origination site, patient demographics, and treatment (NCI, 2023a).

SEER data (NCI, 2023b) indicate that overall mortality rates from oral and pharyngeal cancer have been relatively stable over the past years, ranging from 2.6 deaths per 100,000 population in 2016 to 2.5 deaths per 100,000 population in 2020. As shown in Table 1, this has been accompanied by a trend such that age-adjusted mortality rates are higher among Non-Hispanic Black and Non-Hispanic White populations (as compared to Hispanic populations) and are elevated in males, as compared to females. Earlier studies demonstrated somewhat similar findings. Between the years 1998 - 2002, age-adjusted death rates for oral cancer were higher for men than women overall and were highest among black men (Morse & Kerr, 2006). Specifically, between 1998 and 2002, overall mortality for oropharyngeal cancer was 4.1 per 100,000 in Black men and women, with mortality in White men and women estimated at 2.6 per 100,000 (Morse & Kerr, 2006). Morse and Kerr (2006) attributed their findings to differences in behavioral risk factors, such as smoking, between populations studied at that time.

Table 1. U.S. Age-Adjusted Mortality Rates, 2016-2020

Year	Hispanic (any race)	Non-Hispanic Black	Non-Hispanic White	Female	Male
2016	1.5	2.7	2.7	1.4	4.0
2017	1.6	2.5	2.7	1.3	4.0
2018	1.4	2.6	2.6	1.3	3.8
2019	1.5	2.4	2.7	1.4	3.9
2020	1.4	2.4	2.8	1.4	3.9

Note. Age-adjustment conducted utilizing the U.S. Standard Million Population. Data obtained via SEER*Explorer (NCI, 2023b).

Incidence by Race, Ethnicity, & Sex

SEER data are also useful for examining trends in incidence or new cases of cancers of the oral cavity and pharynx. Between 2015 and 2019, the incidence rates for these forms of cancer

ranged from 11.4 per 100,000 to 11.6 per 100,000 (National Cancer Institute, 2023b). When rates are further parsed by ethnicity, race, and sex, trends are relatively reflective of previously reviewed mortality rates. As shown in Table 2, incidence is increased among Non-Hispanic Black, Non-Hispanic White, and male populations. Morse and Kerr's (2006) prior analysis of incidence rates is also largely reflective of similar trends. Between 1998 and 2002, oropharyngeal cancer incidence (per 100,000) ranged from 10.8 in Whites to 11.8 in Blacks; Black males demonstrated the highest rate at 19.5 (Morse & Kerr, 2006).

Table 2. Incidence Rate (per 100,000) of Cancers of the Oral Cavity and Pharynx

Year	Hispanic (any race)	Non-Hispanic Black	Non-Hispanic White	Female	Male
2015	6.9	8.8	13.5	6.5	17.6
2016	7.1	9.9	13.5	6.4	17.7
2017	6.9	8.3	13.3	6.3	17.2
2018	7.3	8.5	13.4	6.5	17.4
2019	7.2	8.3	13.4	6.3	17.2

Note. Age-adjustment conducted utilizing the U.S. Standard Million Population. Data obtained via SEER*Explorer (NCI, 2023b).

Table 3 provides a more detailed inspection of incidence rates when comparing trends by sex within the Hispanic, Non-Hispanic Black, and Non-Hispanic White communities. Overall, 5-year age-adjusted incidence rates (2015-2019) were highest among the Non-Hispanic White population (13.4 per 100,000), followed by the Non-Hispanic Black (8.6 per 100,000), and Hispanic (7.1 per 100,000) populations. Of note, incidence among Non-Hispanic Black males (13.2 per 100,000) seems to be particularly elevated as compared to Non-Hispanic Black females (5.0 per 100,000) (NCI, 2023b).

Table 3. Oral Cavity and Pharynx - 5-year Age-Adjusted Incidence Rates (2015-2019)

Race	Overall	Female	Male
Hispanic (any race)	7.1	4.3	10.4
Non-Hispanic Black	8.6	5	13.2
Non-Hispanic White	13.4	7.2	20.3

Note. Age-adjustment conducted utilizing the U.S. Standard Million Population. Data obtained via SEER*Explorer (NCI, 2023b).

There are also data to suggest that incidence varies by site of origin. According to the CDC's (2020) annual report on oral cancer, despite declines in some anatomic areas (e.g., nasopharynx, hypopharynx, lip, mouth floor), incidence of oral cavity and pharynx malignancies rose between 2007 and 2016. Looking at more recent data from SEER examining incidence rates of cancer by site (see Table 4), new cases of lip, tongue, salivary gland, floor of mouth, and gum cancers were relatively stable. However, oropharynx/tonsil cancer incidence (per 100,000) increased from 2.5 in 2015 to 2.9 in 2019. CDC (2020) recognizes these as sites that often host Human Papilloma Virus (HPV)-related malignancies.

Table 4. Cancer Incidence (per 100,000) by Site of Origin (2015-2019)

Year	Lip	Tongue	Salivary Glands	Floor of Mouth	Oropharynx/Tonsil
2015	0.7	3.6	1.3	0.5	1.6
2016	0.6	3.6	1.3	0.4	1.6
2017	0.5	3.6	1.3	0.4	1.5
2018	0.5	3.7	1.3	0.4	1.5
2019	0.4	3.6	1.3	0.4	1.6

Note. Age-adjustment conducted utilizing the U.S. Standard Million Population. Data obtained via SEER*Explorer (NCI, 2023b).

From the analyses presented above, the following conclusions are emphasized:

- New diagnoses of oral cancer will affect approximately 11.5 adults out of every 100,000.
- Males are much more likely than females to develop oral cancer.
- Black and White men are more likely than Hispanic men to develop oral cancer.
- New cases of cancer are increasing year-over-year in the oropharynx/tonsil region.
- Mortality rates indicate approximately 2.5 annual deaths from oral cancer per 100,000 population
- Mortality rates are increased among Non-Hispanic Black and Non-Hispanic White populations (versus Hispanic population) and among males (versus females)

Importance of Studying Oral Cancer

Aside from the loss of life attributed to oral cancer, the clinical signs of oral cancer and the side effects of treatment may also have a significant impact on the quality of life of people suffering from the disease. Significant speech, swallowing, physical appearance, sensory impairment, and persistent discomfort may all be experienced by patients. In addition, when such impacts are considered simultaneously, they may result in poor mental health (Valdez & Brennan, 2018). Throughout the diagnosis, treatment, and post-survival phases of oral cancer, patients' physiologic functions, physical attractiveness, and psychological well-being may be jeopardized; In addition, patients' families have struggled with psychosocial challenges as they adapt to the patient's diagnosis/treatment or seek to handle the financial implications of the disease (Valdez & Brennan, 2018). Recognizing the magnitude of impact on patients' quality of life, Dzebo, Mahmutovixc, and Erkocevic (2017) claim the success of the treatment plan for oral cancer should be determined by an assessment of the quality of life. Such assessments highlight physicians' recognition of the impact of this disease, which may result from associated issues such as pain, amputation, or tracheostomy, to name only a few (Valdez & Brennan, 2017).

The key to reducing the impact of oral cancer on society is early detection and diagnosis. Specifically, oral cancer screening should be used to identify mouth cancer early on when it is easiest to treat and most likely to be cured. This includes identifying precancerous lesions that may develop into mouth cancer (Sciubba, 2001). Warnakulasuriya and Kerr (2021) suggest that screening of high-risk groups may be particularly beneficial.

Recognizing that disparities in oral cancer exist in terms of populations impacted, attention must also be given to understanding why such disparities may occur. In the next section, a review of the risk factors, screening practices, and treatment options affiliated with oral cancer is provided to help identify instances in the cancer trajectory where disparities may begin to arise.

Risk Factors for Oral Cancer

Tobacco/Cigarette Use & Alcohol Consumption

According to the National Cancer Institute (2022), tobacco use and alcohol misuse are the two main risk factors for oral and pharyngeal cancer. NCI (2022) estimates that risks of current (versus never) smokers developing a form of oral cancer range from fourfold to tenfold, with increased product use associated with greater risk of disease. Henley et al. (2016) indicate that with 480,000 deaths, more than $300 billion in direct health care costs each year, and productivity losses of more than a quarter of a trillion dollars, tobacco smoking continues to be the number one preventable cause of oral cancer in the United States.

Similarly, alcohol intake is significantly linked to an increased risk of oral and pharyngeal cancer, albeit to a lesser extent than tobacco use (see NCI, 2022). Research has identified a dose-response relationship between the level of alcohol consumption and likelihood of developing oral cancer (Ogden, 2005). For example, when compared to non-drinkers, heavy drinkers had 5-fold greater risks of oral cancer and pharynx cancers and 2.6-fold higher risks of

larynx cancers. Moderate drinkers had 1.8- and 1.4-fold higher risks of the oral cavity (excluding the lips) and pharynx (throat), respectively (National Cancer Institute, 2018).

While tobacco and alcohol may be problematic in their own right, alcohol has an enhanced impact on malignancy development when combined with cigarette use. The American Cancer Society (2023) found that individuals who both smoke and drink heavily have an approximately 30 times greater risk of oral/oropharyngeal cancer as compared to those who do not use either substance. Others (Goldstein et al., 2010) have also supported the notion that combined alcohol and tobacco use increases likelihood of adverse health outcomes.

Studies on the estimated impact of alcohol and tobacco usage on the incidence of oral, head and neck cancer in the United States have found variations between Blacks and Whites (Voltzke, et al., 2018). Blacks who smoked cigarettes for more than 30 years had an odds ratio of 4.53 in terms of odds of developing head and neck cancer (as compared to non-smokers); among Whites, the odds ratio for this comparison was only 3.01 (Voltzke et al., 2018). Similarly, Voltzke et al. (2018) found that when comparing odds of developing head and neck cancer among those drinking 5+ drinks per day to those who did not drink, odds ratios were again higher among the Black (*OR* = 7.70), as compared to White (*OR* = 1.78), population.

Oral Sex

Another contributing behavioral risk factor to oral cancer is oral sex. Seventy percent (70%) of oropharyngeal malignancies are caused by the human papillomavirus (HPV) (Cedars-Sinai, 2023). About 40 of the 100 HPV strains that are known to exist can transmit through direct sexual contact to the mouth and genital regions, with HPV-16 and HPV-18 most commonly associated with oropharyngeal cancers (Cedars-Sinai, 2022). According to Drake et al. (2021) oral sex behaviors are significantly associated with diagnoses of HPV-positive oropharyngeal

cancers. Specifically, odds of performing oral sex were 8.5 times higher among those with HPV-oropharyngeal cancer versus controls (Drake et al., 2021). In addition, cases of HPV-positive oropharyngeal cancer had increased odds of a greater number of sexual partners, an early age of establishing sexual relationships, and a greater intensity of oral sex behavior (i.e., number of oral sex partners/10 years) (Drake et al., 2021).

Differences in oral HPV prevalence and associated risk-taking behaviors may offer another explanation for disparities in oral cancer. D'Souza et al. (2014) found that oral HPV prevalence among males ranged from 10.3% of Hispanics, to 10.8% of Whites, and 20.1% of Blacks. Among females, oral HPV prevalence trends were similar: 4.5% of Hispanics, 3.2% of Whites, and 3.5% of Blacks (D'Souza et al., 2014). When specifically examining behaviors, Black men reported an earlier age of sexual initiation and greater lifetime sexual partners than men from any other racial/ethnic group. However, White men specifically performed oral sex earlier and had a larger number of oral sex partners (D'Souza et al., 2014). As with Osazuwa-Peters et al. (2019), D'Souza et al. (2014) also found that men from all groups consistently reported a greater number of oral sex partners as compared to women.

Overall, when examining risk factors for oral cancer, the following patterns were observed:

- Tobacco use is more detrimental than alcohol use in promoting oral cancer; when tobacco and alcohol are combined, likelihood of developing cancer is magnified
- The association of tobacco and alcohol use with cancer is greater among Black individuals versus White individuals
- Oral sex may facilitate seropositivity for HPV-related oral cancers; men (particularly, White men) show increased frequency of risky oral sex-related behaviors

Screening for Oral Cancer

As noted earlier, screening/early identification of cancer/pre-cancerous lesions represents a primary method of addressing the impact of oral cancer on society. Reinforcing this claim, the 5-year survival rate for early-stage oral cancer (82.8%) is much higher compared to oral cancer that affects local tissues/lymph nodes (50%) or has metastasized (28%) (Sciubba, 2001).

Table 5 presents the 5-year relative survival rate for Black (including Hispanic) and White (including Hispanic) individuals (National Cancer Institute, 2023b) as documented by the year of diagnosis and stage of diagnosis. Results highlight two important findings: (a) early (i.e., localized diagnosis) seems to be affiliated with higher survival rates, and (b) at regional and distant sites, the survival rates seem to be higher among the Whites than Blacks.

Table 5. Five-year Relative Survival by Year of Diagnosis, Race, and Stage at Diagnosis

Year	Localized		Regional		Distant	
	Black	**White**	**Black**	**White**	**Black**	**White**
2010	80.8	79	52.4	66.3	26.1	41.9
2011	84.6	79.3	49.2	67.8	30.6	39.2
2012	76.1	79.6	53.8	67.6	27.5	44.2
2013	70.4	79.9	51.1	68.8	34.9	42.1
2014	79.2	80.2	57.9	70.3	30.3	41.5

Note. Data obtained via SEER*Explorer (NCI, 2023b).

In response to such trends, the American Dental Association recommends that oral healthcare professionals perform a noninvasive oral mucosal examination as part of their routine initial and follow-up examinations for all individuals (Gupta et al., 2019). As the early stages of oral cancer may lack physical symptoms, however, diagnosis can be challenging. Visible physical changes may resemble other illnesses like canker sores. Nonetheless, the progression

from dysplasia to malignancy happens over approximately 2 to 8 years and is typically preceded by a recognizable pre-malignant lesion (Oral Cancer Foundation, 2022a). Thus, oral cancer screening should be part of every dental visit for adults and young people alike, providing opportunities for early detection. Warnakulasuriya and Kerr (2021) specifically describe screening as an ongoing process aimed at referring individuals more rapidly for further investigation and testing.

Given the challenges with screening, it is perhaps not surprising that oral cancer screening has often focused on high-risk populations (Joseph, 2002). This approach is often seen as cost-effective (Warnakulasuriya & Kerr, 2021) and potentially effective. For example, when high-risk patients (i.e., those using large amounts of tobacco/alcohol) adhered to four rounds of an oral cancer screening program, oral cancer mortality was reduced by 80% (Sankaranarayanan et al., 2013). However, Netuveli, Sheiham, and Watt (2006) have found that high-risk populations often fail to report for standard dental appointments, thus reducing the likelihood of engagement in screening. Thus, others (see e.g., Warnakulasuriya & Kerr, 2021) have reviewed novel screening programs ranging from use of community health workers to screen for oral cancer to use of telemedicine.

Despite its benefits, oral cancer screening is another place where disparities can persist. In Gupta et al.'s (2019) study, 37.6% and 31.3% of participants underwent intraoral and extraoral oral cancer screening examinations, respectively. With intraoral exams, a patient's tongue and inside of the cheeks are explored, while extraoral exams explore the patient's neck. Gupta et al.'s (2019) findings indicate:

- Participants who were Mexican American, Hispanic, Black/Non-Hispanic, and Asian/non-Hispanic had a reduced likelihood of receiving an intraoral cancer screening examination, as compared to White/non-Hispanics.
    - Lower levels of education (versus high school graduates) and lack of insurance or use of Medicaid (versus private insurance) were also associated with lower likelihood of an intraoral exam.
- When considering extraoral exams, likelihood of receiving an exam was reduced among the less educated (compared to high school graduate or greater), uninsured and Medicaid-insured (compared to privately insured), low-income populations (compared to high income), and those who were Mexican American, Hispanic, or Asian/non-Hispanic.

Treatment Options

Early-stage oral cancer is treated with surgery or radiation therapy. A multidisciplinary approach to treating oral tumors is optimal and should involve the work of surgeons, radiation oncologists, chemotherapy oncologists, dental professionals, dietitians, and rehabilitation and restoration specialists. These specialists can create a comprehensive plan to help prevent metastasis and/or to make the cancer cells more sensitive to radiation (Oral Cancer Foundation, 2022b). Given the aforementioned quality of life issues (Alam et al., 2020) affiliated with cancer, access to early treatment may be critical, as it can help to prevent more aggressive approaches to disease management (e.g., disfigurement) (Oral Cancer Foundation, 2022b).

Another option for treatment is targeted therapy, a more recent form of cancer care that uses medicines or other chemicals to precisely locate and eliminate cancer cells. (National Institute of Dental and Craniofacial Research, 2018). The bioavailability and biodistribution of drugs at the site of the main tumor may be improved using these targeted drug delivery devices. While early

tumor diagnosis continues to be a priority, the creation of novel therapeutic approaches or adjustments of existing strategies is essential to improving personal health outcomes and survival (Ketabat, et al., 2019).

Despite advances in treatment overall, there are racial differences in how people with oral cavity cancer get access to care. For example, Nocon, Ajmani, and Bhayani (2019) indicate that non-Hispanic Black patients are less likely to be offered surgery for head and neck cancer and more likely to refuse surgery (as compared to non-Hispanic Whites). Related, Megwalu and Ma (2022) report that as compared to non-Hispanic white patients, black patients are less likely to receive treatment in high-quality hospitals. Even after adjusting for impact of insurance status and socioeconomic conditions, Megwalu and Ma's (2022) research indicated that black patients are less likely to receive treatment at a top hospital, as compared to white patients ($RR = 0.87$). As treatments for cancer at reputable facilities have been associated with higher survival rates and increased quality of care (see also, Alam et al., (2020), such differences must be modified.

In addition to challenges accessing treatment, issues with financing treatment also impact health disparities. According to Hollenbeak et al. (2015), African Americans had expenses for oral cavity and pharyngeal cancers that were $11,450 and $25,093 higher, respectively, than white patients did. Among patients with pharyngeal and oral cavity malignancies, the mean 5-year cumulative expenses increased further on the basis of number of comorbidities present, ranging from $13,342 (1 comorbidity) to $27,799 (3 or more comorbidities) (Hollenbeak et al., 2015). Given that Black patients have increased comorbidities in the context of head and neck cancer (see Zakeri et al., 2014), such findings suggest a magnified impact of race on treatment expense. Thus, evidence seems to highlight the fact that black individuals are likely to be referred for suboptimal care and to experience increased treatment expense.

Summary

Results of the current review paint a complex picture of oral and pharyngeal cancers. On one hand, incidence rates are particularly marked among white men (NCI, 2023b). In conjunction with HPV-positive origination sites increasing in years past (i.e., oropharynx/tonsil) and white males' sexual practices (see Drake et al., 2021), the pattern of findings may point to a particular impact of HPV in the White male population. In contrast, black individuals were impacted by lower survival rates when oropharyngeal cancer was diagnosed (NCI, 2023b). Among this subset of the population, rates may reflect trends such as increased impact of alcohol/tobacco use on cancer development (Voltzke et al., 2018), reduced surgical offerings (Nocon et al., 2019), increased treatment costs (Hollenbeak et al., 2015), and lower engagement in screening (Gupta et al., 2019). To resolve noted disparities, it is likely that a multi-level approach to change will be required, considering factors such as policy, access to healthcare, and education.

Recommendations for Practice

First, recognizing the benefit of continually screening high-risk patients for precursors to oral cancer (Ribeiro et al., 2022), insurance coverage for oral cancer screenings should be expanded. Building on Gupta et al.'s (2019) findings that lack of insurance coverage is affiliated with decreased receipt of intra- and extraoral screening, it appears that enhancing coverage would help to reduce some disparities. More people would be able to get screened and possibly detect the disease early if coverage were to increase. Toyoda et al. (2020) provide support for this idea. Their work examined insurance coverage and mammography screening in states that did/did not adopt the Medicaid eligibility expansion affiliated with the Affordable Care Act. In states utilizing the expansion, women from low-income households were more likely to obtain a

mammogram for breast cancer screening (Toyoda et al., 2020). Applied here, expanded coverage for oral cancer screening may result in greater use of the service.

Innovative Screening Sites

A 1992 survey indicated that only 15% of U.S. individuals 18 years of age or older had ever had an oral cancer examination, despite the American Cancer Society's recommendation that people age 40+ be screened annually (Yellowitz et al., 2000). Furthermore, the same work indicated that only 7% of those age 40 + had recently had an oral cancer examination/screening for oral cancer (Yellowitz et al., 2000). Moreover, Gupta et al. (2019) found that despite a recent dental appointment, people of lower socioeconomic status or individuals who were black or Hispanic were more likely to report they had not received a screening at their latest appointment. In addition to lack of participation in screening, surveys have also revealed a lack of knowledge about the risk factors and symptoms of this illness (Tomar & Logan, 2007).

Though some pose questions over the benefit of widespread oral cancer screening (Downer, Moles, Palmer, & Speight, 2006), other scholars claim that screening can reduce late stage diagnosis (Brocklehurst, Kujan, O'Malley, Ogden, Shepherd, & Glenny, 2012) – a factor that often plagues specific subsets of the population. Due to reduced access, knowledge, and failure to screen high-risk groups, alternate settings for screening (e.g., medical settings, workplaces, self-exam; Warnakulasuriya & Kerr, 2021) may be beneficial.

The availability of screenings at more public events, such as community health fairs, would potentially enable the early diagnosis of tumors that are easily visible and examinable, as well as promoting public awareness, timely treatment, and continued education of the general public on oral health in general. For instance, Burzynski et al. (1997) reported that at their health fair, 4.17% of attendees were judged to have oral pathologic conditions requiring professional

assistance, and 1.82% had clinical diagnoses of probable dysplastic or precancerous tumors. In this population, there was no evidence of clinical oral cancer. Warnakulasuriya and Kerr (2021) specifically point to the use of community health workers as a potential workforce to implement such screening programs, though they caution that such programs may need to be continually implemented (i.e., to provide routine screening), should provide for mobile access in rural destinations, and may need to be supplemented by social marketing efforts to enhance population knowledge of service availability.

Public Communication about Oral Cancer

Another important strategy for improving care and reducing inequities is to raise public awareness of oral cancer risks and symptoms. Many people are unaware of the dangers of mouth cancer or the warning signs (Tomar & Logan, 2007). For example, Patton et al. (2004) found that only 53% of adults surveyed could identify an early sign of oral cancer and 18% incorrectly believed that eating spicy food was a risk factor for cancer. Tomar and Logan (2007) highlight the impact of lack of knowledge and/or misperceptions about oral cancer; in their study, adults who were less able to identify signs of oral cancer also reported being less likely to have previously been screened.

A public awareness program has been recommended to encourage people with indications and symptoms to seek early primary care services to facilitate detection and treatment of oral cancer (see e.g., Warnakulasuriya & Kerr, 2021). Macpherson's (2018) commentary on oral cancer campaigns is informative in this regard. Macpherson (2018) suggested that campaigns may assist in raising awareness of symptoms of oral cancer, but also caution that such effects could be short-term. These findings are consistent with a larger meta-analysis examining the effectiveness of mass mediated health communication campaigns that identified larger effect sizes explaining the relationship between campaign exposure and knowledge, as compared to

campaign exposure and behavior (Anker, Feeley, McCracken, & Lagoe, 2016). Nonetheless, Ismail et al. (2012) provide evidence that a targeted campaign may be influential at reaching a high-need group. In their study, multiple forms of media (e.g., radio, newspaper, billboards) were used to promote awareness of oral cancer, particularly among black men. When compared with control communities, dentists in the target communities reported that patients had been more likely to directly mention relevant advertisements and ask questions about oral cancer. Most encouragingly, they also reported increased patient requests for screening. Thus, public education – particularly, skillfully designed health communication efforts that rely on techniques such as market segmentation (Slater, 1996) – could prove useful in battling some of the alarming disparities identified in the current review.

Reduction of Risk Factors

By supporting patients in the prevention and cessation of tobacco use and alcohol misuse, dentists, medical practitioners, and/or public health professionals can contribute to a decrease in the incidence and mortality of oral and pharyngeal cancer. In other words, increased adoption of tried-and-true methods to prevent the onset of tobacco use, encourage quitting, and discourage binge drinking – particularly in conjunction with tobacco use -- can help lower the incidence of oral cancer. Mangalath et al. (2014) suggest prevention of tobacco use can easily occur in the clinical setting. For example, dentists might urge those who use tobacco to quit. Such conversations are estimated to take only 2-3 minutes of time and can be supplemented with display/distribution of other educational products on the topic (Mangalath et al., 2014).

According to Maillet et al. (2010), another good example of interventions/evaluation that have reduced alcohol/tobacco use is the one carried out in Dalhousie. Senior dental hygiene students at Dalhousie University's Faculty of Dentistry provided tobacco-using customers with Tobacco Cessation Counseling (TCC) as a part of their instructional program. TCC contents encouraged all current smokers to stop, educated smokers about the numerous health dangers linked to tobacco use, gave smokers access to pertinent information, instructed smokers on how to perform self-exams for oral cancer, and offered follow-up care as necessary. These multi-factored interventions that address both prevention/screening and early diagnosis offer a method of integrating risk reduction into clinical practice.

Another opportunity to reduce oral cancer would involve efforts to improve adoption of the HPV vaccine. Daley et al. (2011) conducted five focus groups with dentists and dental hygienists to examine their perceptions of oral cancer screening and HPV vaccination. In order for effective and comfortable communication regarding the HPV-oral cancer link to occur, Daley et al. (2011) found that key areas must first be addressed among oral health providers, including: a) increasing knowledge of the HPV- oral cancer link and HPV vaccine; and b) clarifying screening procedures, role, and expectations. In addition, another possible opportunity may be approaching vaccination from the perspective of the public. By measuring and tracking the level of trust in the HPV vaccine over time, scholars may be able to identify potential barriers to vaccination and/or populations most resistant to adoption.

Expansion of Treatment Options

Enhancing outcomes for all oral cancer patients depends on research into fresh therapies, in addition to prevention efforts. That way, once diagnosed, options for treatment will be available to meet diverse patient needs. One such opportunity is that of drug delivery systems

where treatment can be directed toward only cancerous/tumor sites (Ketabat et al., 2019). Though these systems are in early stages of development, their cost-effective potential (Ketabat et al., 2019) may be particularly useful in the context of increased costs of treatment among black individuals (Hollenbeak et al., 2015). Another opportunity may involve increased access to/use of transoral robotic surgery. This type of surgery is minimally invasive and allows surgeons access to difficult to treat sites within the head/neck region. Practitioners indicate benefits including fewer complications than standard treatment, less risk of infection, and shorter recovery times (Trustees of the University of Pennsylvania, 2023). Others have documented the approach's long-term benefit on quality of life indicators such as speech pain, chewing pain, and activity levels (Choby et al., 2015). Choby et al. (2015) highlight the promise of the approach for a those with HPV-positive tumors, who tend to be younger. Similarly, given a reduction in recovery time (see Trustees of the University of Pennsylvania, 2023), one could envision the approach also offering benefit to those of lower socioeconomic status who may have concerns about lost time from work, assuming that financial costs of surgery could be addressed.

Conclusion

Oral cancer is a severe illness with a large impact on quality of life. It is imperative to promote access to care and raise public awareness of the disease in order to improve care and eliminate inequities. As some scholars pose that mass screening may not be cost effective (Van der Waal, 2013), screening specific high-risk groups would be a worthwhile early investment to address the devastating impact of oral cancer. By screening high-risk groups, practitioners may identify oral cancer at an earlier tumor stage, ostensibly lowering the morbidity and fatality rate. In addition, evidence points to the potential of short clinical interventions (see Maillet et al., 2010) to reduce engagement in risky behaviors that act as precursors to oral cancer development.

Extensive opportunities to reduce disparities in the context of oral cancer exist, if practitioners take careful action focused on public education, screening, and enhanced access to diagnosis and treatment options.

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