CHAPTER 12

ORAL CANCER

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ORAL CANCER

Oral cavity and oropharyngeal cancer (hereafter referred to as "oral cancer") is cancer of the lips, oral cavity, and pharynx and can occur on the tongue, floor of the mouth, soft palate, tonsils, salivary glands, oropharynx, mesopharynx, and hypopharynx. Although oral cancers comprise about 3% of all cancers in the United States, they are more common than leukemia, Hodgkin's disease, or cancer of the brain, liver, bone, thyroid gland, stomach, ovary, or cervix.[1] The signs and symptoms of oral cancer are shown in Table 12.1.

Approximately 90% of all oral cancers are squamous cell carcinomas—cancers of the epithelial cells—with the remainder being salivary gland tumors and lymphomas. Oral squamous cell carcinomas generally develop after a long latency period from precancerous red-colored erythroplakia or, to a lesser extent, white-colored leukoplakia lesions in the oral mucosa primarily caused by tobacco use alone or in combination with heavy alcohol use.[2] If not detected early at a localized stage, squamous cell carcinomas can extend into adjacent tissues and metastasize to regional lymph nodes in the head and neck. Once this extension takes place, oral cancer lesions and their treatment regimen can cause severe disfigurement, pain, and dysfunction affecting speech, chewing, swallowing, and general quality of life. The most common sites for oral cancer development are the ventrolateral (side of the tongue near the back) aspect of the tongue (30% of all oral cancers), lips (17%), and the floor of the mouth (14%).[3]

Individuals 45 years of age and over comprise more than 90% of all oral cancers with men more likely than women to develop these cancers.[4] Oral cancers account for 3.1% of all cancers in men compared with 1.6% of all cancers in women.[5] However, because of changing smoking patterns, the male to female ratio has decreased from 6:1 in 1950 to 1.8:1 in the present.[6] Further, oral cancers occur more frequently in blacks than in whites.[7] Blacks are disproportionately affected by oral cancer; it is the fourth most common cancer in black males compared to the tenth most common for all U.S. males, and fourteenth most common among all U.S. women.[8] Oral cancer mortality rates are also high for U.S. blacks, who experienced nearly twice the mortality rate of U.S. whites in 1998. Oral cancer is the seventh leading cause of cancer death in black men.[9]

Only 18% of blacks with oral cancer in the United States are diagnosed at a local stage compared to 38% for whites.[10] A comparison of regional staging shows higher rates in blacks (56%) than in whites (44%); for distant staging, blacks (13%) have nearly a twofold difference compared with whites (8%).[11] A comparison of cancer stage at diagnosis by race in Maryland and the United States is shown in Figure 12.1. Although clinically more visible than most other cancers, and amenable to detection through screening tools such as

Table 12.1
Signs and Symptoms of Oral Cancer

Early

- A sore in the mouth that does not heal (most common symptom)
- A white or red patch on the gums, tongue, tonsil, or lining of the mouth

Late

- A lump or thickening in the cheek
- A sore throat or a feeling that something is caught in the throat
- Difficulty chewing or swallowing
- Difficulty moving the jaw or tongue
- Numbness of the tongue or other area of the mouth
- Swelling of the jaw that causes dentures to fit poorly or become uncomfortable
- Loosening of the teeth or pain around the teeth or jaw
- Voice changes
- A lump or mass in the neck
- Weight loss

Source: American Cancer Society, 2003.

physical observation and palpation, most oral cancers are detected and diagnosed at advanced clinical stages.

Diagnosis of oral cancer at advanced stages is likely responsible for the low survival rate associated with oral cancers relative to other major malignancies. The five-year oral cancer survival rate (56%) has improved little over the past 30 years.[12,13] The five-year survival rate for early stage oral cancer is 82% but drops to 23% among persons diagnosed with advanced stage cancer. As shown in Figure 12.2, blacks in the United States have disproportionately lower five-year survival rates for oral cancer than whites (35% versus 59%).

Risk Factors

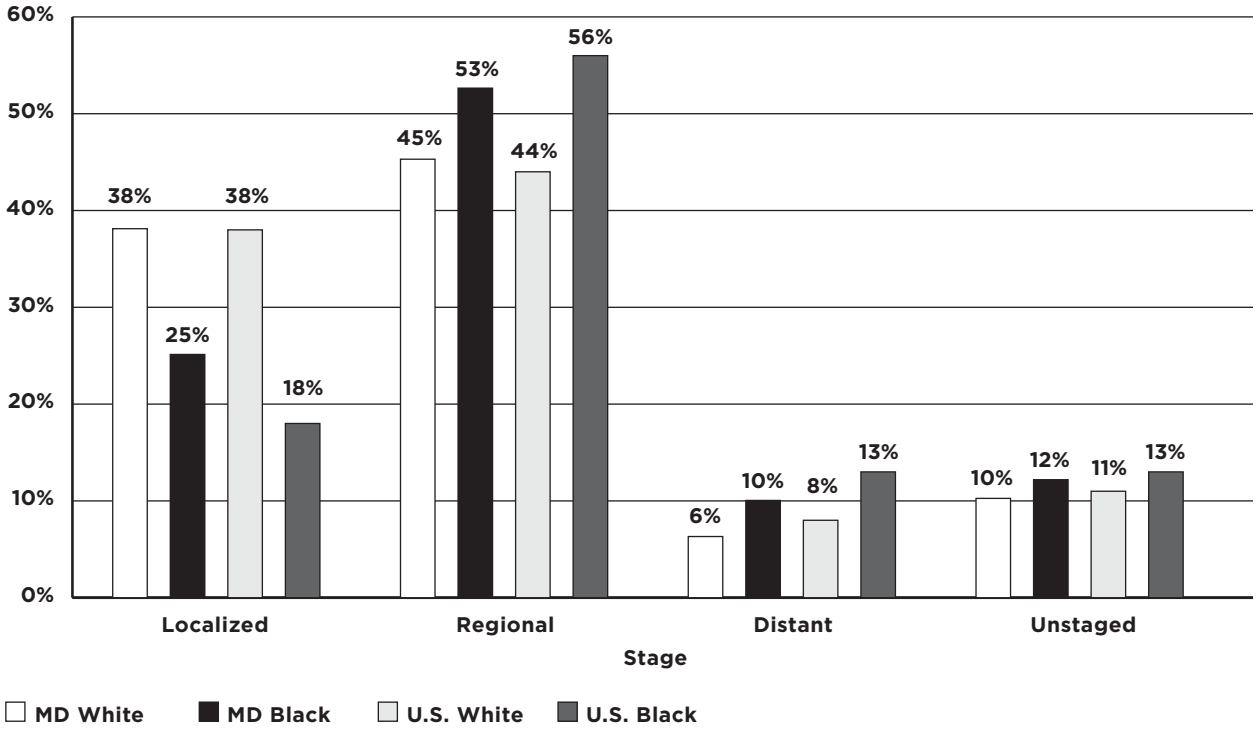
Certain risk factors may increase the chance of developing oral cancer, including the following:

Tobacco and alcohol use

The primary risk factors for oral cancer are past and present use of tobacco products (cigarettes, cigars, pipe and spit tobacco) and alcohol,[14,15,16] accounting for 75% of all oral cancers. Compared with nonsmokers, smokers have as much as an 18-fold risk of developing oral cancer. African Americans may be especially at risk for oral cancer because of tobacco use. Heavy drinkers who smoke in excess of one pack of cigarettes per day are 24 times more at risk for oral cancer than those who do not use tobacco and alcohol because alcohol is believed to act as a facilitator for the penetration of the tobacco carcinogens into the soft tissues of the mouth. In addition, recent evidence indicates that marijuana use may also increase the oral cancer risk.[17]

The role of spit tobacco in oral squamous cell carcinoma development is less clear than other forms of tobacco because of confounding factors from concurrent tobacco and alcohol use and the different patterns of spit tobacco use.[18,19] However, various national and international agencies and advisory committees have concluded that the many forms of spit tobacco, including snuff, do play a role in oral cancer development.[20] Paan, bidis, and betel or areca nut use, behaviors specific to Southeast Asia but growing in the United States,

Figure 12.1
Oropharyngeal Cancer Stage at Diagnosis by Race in Maryland and the United States, 1992–1997



Source: Maryland Cancer Registry, 1992–1997; SEER, National Cancer Institute, 1992–1997.

have been found to give rise to submucous fibrosis, a precancerous condition consisting of generalized fibrosis of the oral soft tissues.[21,22,23]

Sun exposure

Exposure to UV radiation increases the risk of lip cancer.[24]

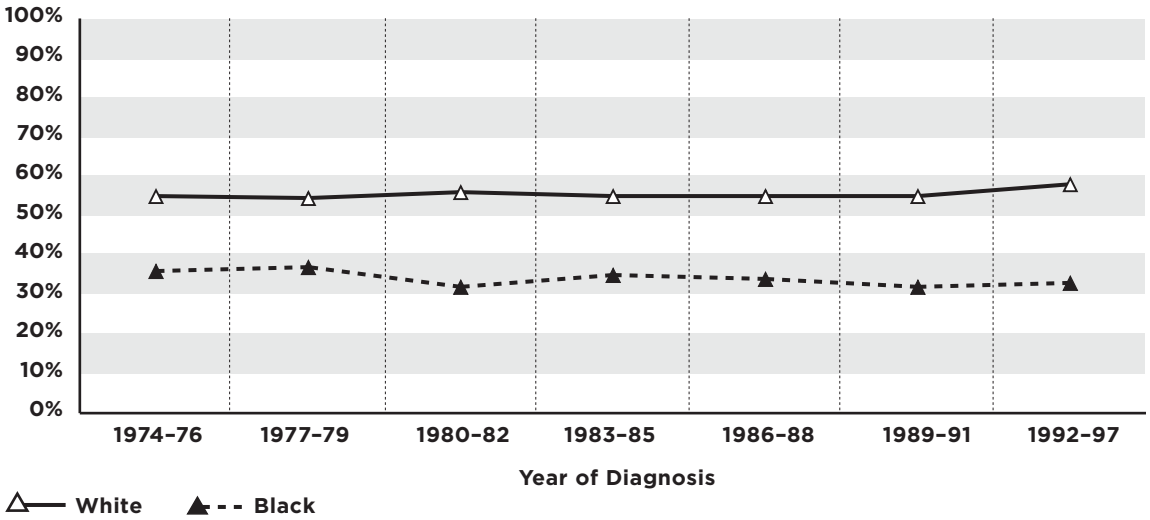
Viral etiology

Exposure to viruses such as human papillomavirus (HPV), herpes simplex type 1, and the Epstein-Barr virus (EBV) are also risk factors.[25,26] Viruses are capable of producing cancer-causing genes called oncogenes. Many oncogenes have been found in oral cancers and are thought to develop through an array of genetic mutations and alterations. HPV has been isolated in both oral precancerous and squamous cell carcinoma lesions and also is known to act as co-factor in carcinogenesis development in both cervical and oral cancers.[27,28] Various herpes virus types have been discovered in oral cancers including Kaposi's Sarcoma, a rare cancer found in AIDS patients that is often first detected in the oral cavity.[29,30] In addition to these viruses acting as etiologic agents in oral cancer development, fungal infection caused by strains of *Candida albicans* may possibly cause oral cancer through the development of carcinogenic nitrosamines in the oral soft tissues.[31]

Diet

Poor dietary intake of essential nutrients found in fruits and vegetables may also be a risk factor for oral cancer.[32] The intake of an appropriate amount of fruits, vegetables, and dietary fibers may afford a protective effect against early oral cancers and precancerous lesions, especially among smokers. For example, it is believed, that Plummer-Vinson syndrome, which causes iron deficiency anemia in women, may place women at risk for oral cancer.[33] In addition, the role of antioxidants, including vitamins A, C, and E, dietary selenium, folate, and certain carotenoid and retinoid compounds, is currently being studied. If such a link is definitively established, nutrient ingestion could play a major role in preventing oral cancer development.[34,35]

Figure 12.2
Five-Year Relative Survival Rates Following Diagnosis by Race for Oropharyngeal Cancer in the United States, 1974–1997



Source: SEER, National Cancer Institute, 1974–1997.

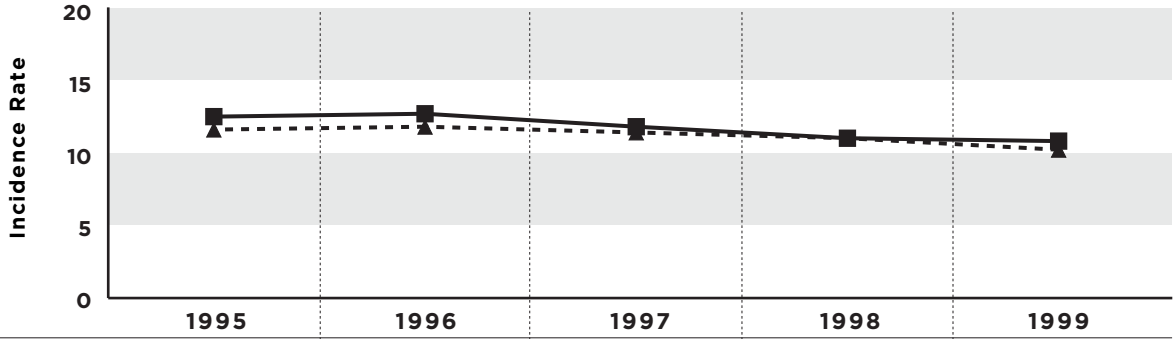
Burden of Oral Cancer in Maryland

The oral cancer mortality rate in Maryland is among the highest (eighth) in the United States and ranks fifth for black males. The rate of new oral cancer cases in Maryland has decreased since 1995 but remained higher than the national average in 1999 (Figure 12.3). Maryland's oral cancer death rate, which has historically been higher than the nation's, was still above the national rate in 1999, but has been decreasing slowly since 1995 (Figure 12.4). There were 539 new cases of oral cancer in Maryland in 1999 with 144 oral cancer deaths (Table 12.2).

In general, oral cancer incidence rates for all races and sexes in Maryland slightly decreased from 1995–1999 and are fairly comparable to national rates. Maryland blacks had a higher oral cancer incidence rate than Maryland whites in 1999 (11.7 versus 10.4 cases per 100,000 persons) and Maryland males have approximately a 2.5 times higher incidence rate than Maryland females (Table 12.2). As shown in Figure 12.5, black men in Maryland experience the highest oral cancer incidence rate of any racial and gender group. Blacks in Maryland are disproportionately affected by oral cancer, it being the fifth most common cancer in black males compared to the seventh for white males.[36] White and black males in Maryland have slightly lower incidence rates than the national average while the oral cancer incidence rates of women of both races in Maryland are slightly higher than the national average. Similar to national trends, the highest age-specific oral cancer incidence rates occur in a younger black age cohort (60–64 years old) than their comparable white age cohort (75–79 years old). Males and females 65 years and older experience the highest rates of new oral cancer cases in Maryland.[37]

Blacks experience the highest oral cancer mortality rates in Maryland. However, as shown in Figure 12.6, there was a considerable reduction in the oral cancer mortality rates for blacks between 1995 and 1999 and the Maryland rate for blacks is now lower than the national rate for blacks. While demonstrating less of an improvement than blacks, the oral cancer mortality rate for Maryland whites has also decreased and is nearing the national rate. Similar to national trends, Maryland's oral cancer mortality rates for males are about 2.5 times higher than those for females.[38] While Maryland mortality data by race and sex are not available due to small sample size, it is likely that the trend in death rates according to race and sex is similar to the national data. This indicates that black males have twice the oral cancer mortality rates than their white peers and have the highest oral cancer mortality rates of any racial or gender group (Figure 12.7) Similar to national trends, blacks in Maryland also appear to experience higher mortality rates at a younger age with almost a fivefold higher difference in mortality than

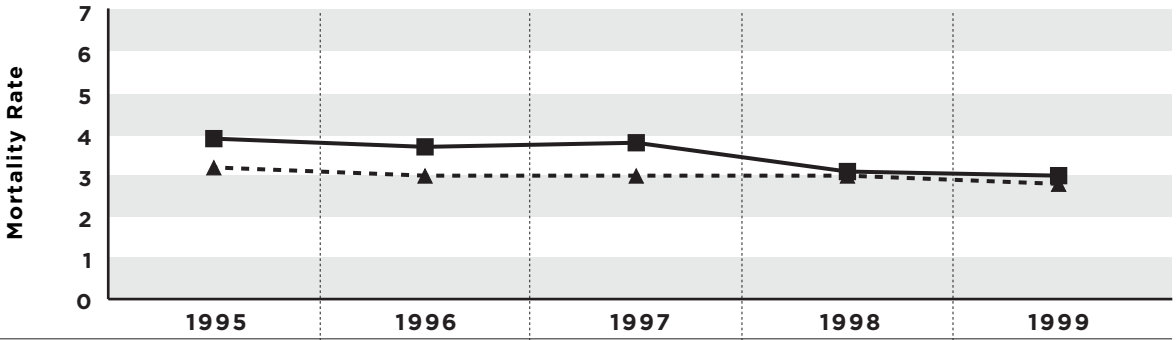
Figure 12.3
Oropharyngeal Cancer Incidence Rates in Maryland and the United States, 1995–1999



	1995	1996	1997	1998	1999
MD	12.6	12.8	11.9	11.1	10.9
U.S.	11.7	11.9	11.5	11.1	10.3

Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.
Source: Maryland Cancer Registry, 1995–1999; SEER, National Cancer Institute, 1995–1999.

Figure 12.4
Oropharyngeal Cancer Mortality Rates in Maryland and the United States, 1995–1999



	1995	1996	1997	1998	1999
MD	3.9	3.7	3.8	3.1	3.0
U.S.	3.2	3.0	3.0	3.0	2.8

Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.
Source: Maryland Division of Health Statistics, 1995–1999; SEER, National Cancer Institute, 1995–1999.

whites for the 50–54 age cohort.[39]

Oral cancer incidence and mortality rates varied by Maryland region in 1995–1999 (Table 12.3). The southern region, Eastern Shore, and Baltimore metropolitan area had the highest rates of new oral cancer cases. The oral cancer incidence rate for the Eastern Shore was statistically significantly higher than the Maryland rate, while the incidence rate for the national capital area was statistically significantly lower than the state's rate. The southern region, Eastern Shore, and Baltimore metropolitan area also had the highest mortality rates in the state but these rates were not statistically significantly higher than the Maryland rate.

Disparities

Blacks clearly bear a disproportionate share of the oral cancer burden in Maryland with respect to incidence, mortality, stage at diagnosis, and five-year survival rate when compared to their white peers. This disparity in oral cancer burden likely is related to the disparity in access to oral health care that exists between blacks and whites from Maryland. While access to oral health care in Maryland is not the focus of this chapter, it clearly looms as a significant impediment to this population receiving routine oral cancer examinations to facilitate early diagnosis and detection practices. Major disparities include:

Table 12.2
Oral Cancer Incidence and Mortality By Race and Sex in Maryland and the United States, 1999

Incidence 1999	Total	Males	Females	Whites	Blacks
New Cases (#)	539	372	167	381	132
Incidence Rate	10.9	16.5	6.2	10.4	11.7
U.S. SEER Rate	10.3	15.2	6.3	10.1	11.8
Mortality 1999	**Total**	**Males**	**Females**	**Whites**	**Blacks**
MD Deaths (#)	144	98	46	100	43
MD Mortality Rate	3.0	4.7	1.7	2.7	4.1
U.S. Mortality Rate	2.8	4.2	1.6	2.6	4.4

Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.
Source: Maryland Cancer Registry, 1999; Maryland Division of Health Statistics, 1999; SEER, National Cancer Institute, 1999.

- Oral cancer lesions in blacks are more likely to be diagnosed at a regional and distant stage than whites.
- Black men have the highest oral cancer incidence and mortality rates of any race and sex; black males have twice the oral cancer mortality rate than white males.

Primary Prevention

Primary preventive efforts in tobacco prevention and cessation are essential and should not be overlooked as preventive measures for oral cancer. These efforts are discussed in further detail in chapter 5, Tobacco-Use Prevention and Cessation and Lung Cancer.

Oral Cancer Examination

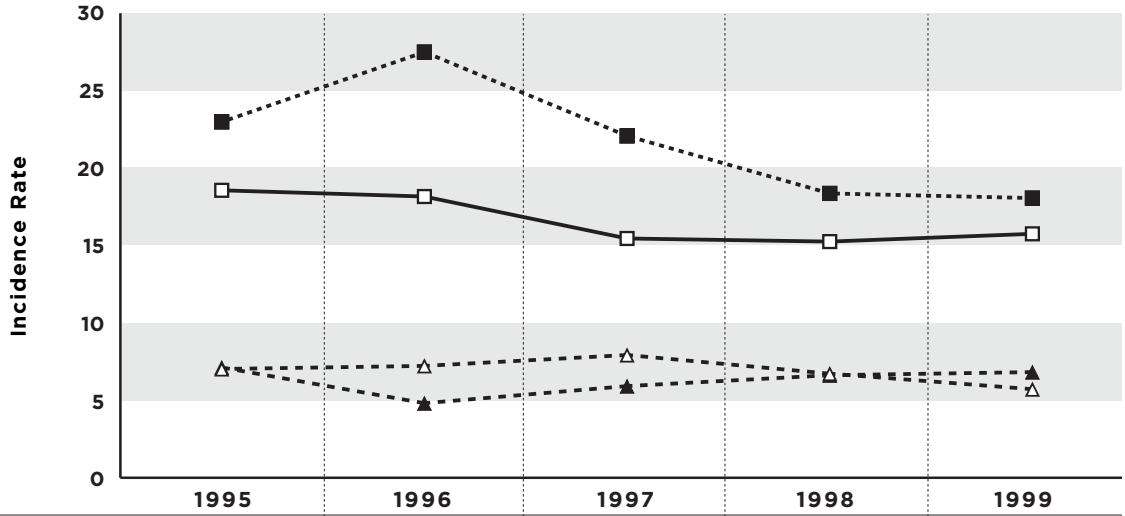
The incorporation of routine oral cancer examinations (and other screening methodologies for oral cancer) into the daily practice of health care practitioners can increase the likelihood of earlier detection of lesions at a more localized stage. However, there is no evidence that such early detection can decrease mortality[40] even though five-year survival rates are higher when lesions are diagnosed at an earlier stage. The American Cancer Society has determined that for the years 1992–1997, the five-year survival rate for oral cancer lesions diagnosed at a local stage was 82% compared to 46% and 21% survival for regional and distant staging, respectively.[41]

Thus, in the absence of science-based evidence from clinical trials which are difficult to implement in the U.S., routine early detection should still be recommended because:

- oral cancer is a serious yet treatable disease in its early stages
- treatment in the early stages of oral cancer is generally acceptable to asymptomatic patients and provides benefits compared with later treatment of symptomatic patients
- the screening examination is inexpensive and safe.[42]

Secondary prevention of oral cancer incorporates a number of screening tests but foremost among them is the oral cancer examination which entails the visual assessment and manual palpation of extraoral head and neck areas, perioral and intraoral soft tissues, and dental and periodontal tissues.[43] The oral cancer examination can be performed easily in no more than two minutes by a health care practitioner because the oral cavity and accompanying head and neck region is easily accessible.[44] Further, the examination is noninvasive and causes little discomfort and no embarrassment compared with other cancer screening interventions. Although dentists and dental hygienists are the ideal health practitioners to perform this type of examination, other health care providers (i.e. nurse practitioners, nurses, physician assistants, physicians) can assume more responsibility in providing oral cancer examinations as part of routine physical examinations. Non-dental health care providers may be critically

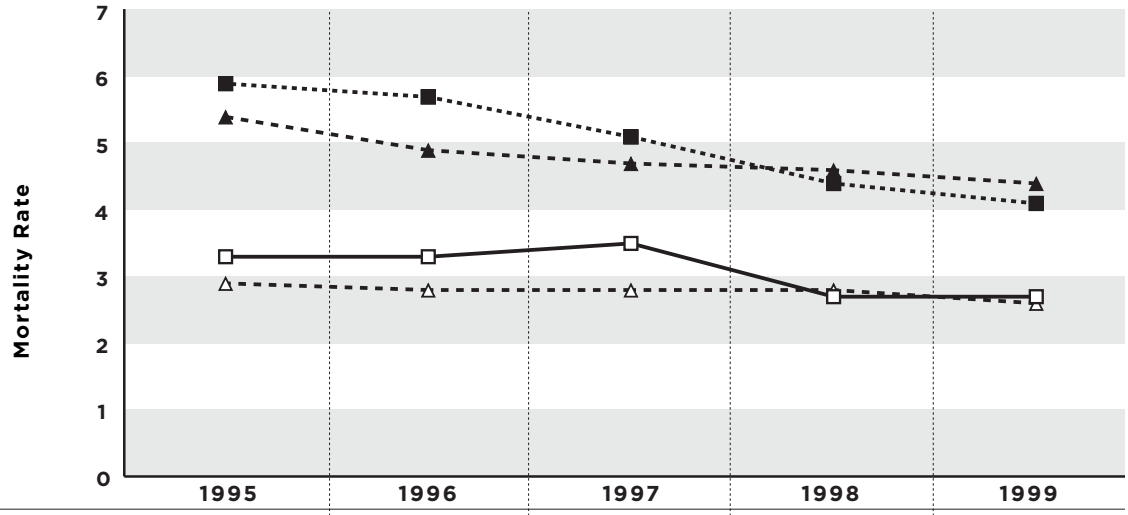
Figure 12.5
Oropharyngeal Cancer Incidence Rates by Race and Sex in Maryland, 1995–1999



	1995	1996	1997	1998	1999
WHITE MALE	18.5	18.1	15.4	15.2	15.7
BLACK MALE	22.9	27.4	22.0	18.3	18.0
WHITE FEMALE	7.0	7.2	7.9	6.7	5.7
BLACK FEMALE	7.1	4.8	5.9	6.6	6.8

Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.
Source: Maryland Division of Health Statistics, 1995–1999.

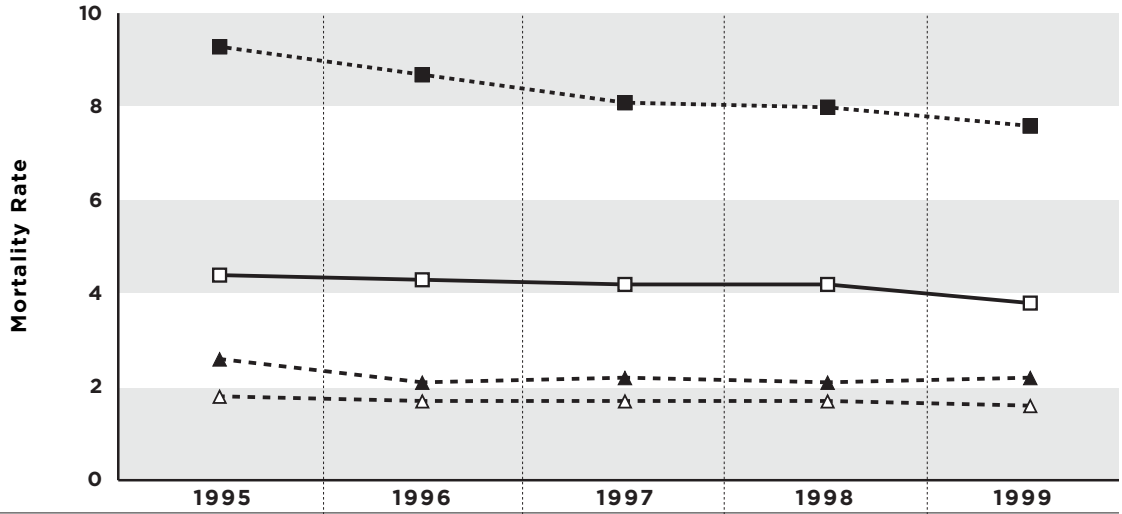
Figure 12.6
Oropharyngeal Cancer Mortality by Race in Maryland and the United States, 1995–1999



	1995	1996	1997	1998	1999
MD WHITE	3.3	3.3	3.5	2.7	2.7
MD BLACK	5.9	5.7	5.1	4.4	4.1
U.S. WHITE	2.9	2.8	2.8	2.8	2.6
U.S. BLACK	5.4	4.9	4.7	4.6	4.4

Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.
Source: Maryland Division of Health Statistics, 1995–1999; SEER, National Cancer Institute, 1995–1999.

Figure 12.7
Oropharyngeal Cancer Mortality Rates by Race and Sex in the United States, 1995–1999



	1995	1996	1997	1998	1999
WHITE MALE	4.4	4.3	4.2	4.2	3.8
BLACK MALE	9.3	8.7	8.1	8.0	7.6
WHITE FEMALE	1.8	1.7	1.7	1.7	1.6
BLACK FEMALE	2.6	2.1	2.2	2.1	2.2

Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.
Source: SEER, National Cancer Institute, 1995-1999.

important to these screening efforts because individuals at high risk for oral cancer are more likely to visit these providers than a dentist or dental hygienist.

First, a careful health history must be completed, assessing risk factors such as past and present tobacco and alcohol use, diet and lifestyle, prior cancer history, sun exposure experience and behaviors, surgeries and medications, and even sexual practices to discern possible HPV exposure.[45] Next, the examination should include the assessment of clinical signs of lesions and the presence and shape of palpable lymph nodes. The healthcare practitioner should assess any craniofacial abnormalities and then assess and palpate for lymph nodes in known head and neck areas as well as the many salivary glands that are present. In addition, extraoral and intraoral color, texture, size, contour, or symmetry change should be noted by the examiner.[46] This is accomplished by systematically assessing and palpating the lips, and then assessing the soft tissues of the mouth including upper and lower labial mucosa, buccal (cheek) mucosa, gingival tissues (gums) in both upper and lower jaws, tongue and floor of the mouth, hard and soft palate, and the tonsillar and oropharyngeal (throat) region. Special attention must be given to the high risk oral cancer areas of the mouth, that is, the lateral borders of the tongue, lips, and floor of the mouth.[47]

Two technologies which may aid identification and diagnosis of oral malignancies are toluidine blue stain and the chemoluminescent light.[48] Toluidine blue is a fast and easy office procedure used to stain suspected malignant tissue, especially when several surface abnormalities are present. Tissue that stains blue indicates either dysplasia or malignancy. The chemoluminescent light was recently approved for oral mucosal screening by the Food and Drug Administration based upon its successful use in cervical cancer screening.[49] The chemoluminescent light is directed to oral mucosal tissue previously rinsed with dilute acetic acid to detect an opaque-like alteration, which may be indicative of malignant change. These two agents may be very useful to identify lesions that may require biopsy.[50]

A subtle change in the areas examined may indicate an early suspicious lesion that should receive follow-up attention. Generally, early lesions are small (less than 1.0 cm) with minimal, if any, extension into the underlying tissues, ill-defined, not easily visible, and most importantly, asymptomatic.[51] If the practitioner believes that the lesion may be a possible malignancy, or if the patient is in need of a definitive diagnosis as

Table 12.3
Oral Cancer Incidence and Mortality by Region in Maryland, 1995–1999

Region	Incidence Rate	Mortality Rate
Maryland	11.8	3.5
Baltimore Metropolitan	12.6	3.7
Eastern Shore	13.9 +	3.8
National Capital	9.8 -	3.0
Northwest Region	10.7	3.1
Southern Region	13.8	4.4

"-" Denotes regions statistically significantly lower than the Maryland rate.
"+" Denotes regions statistically significantly higher than the Maryland rate.
Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.
Source: Maryland Cancer Registry, 1995–1999; Maryland Division of Health Statistics, 1995–1999.

soon as possible, the patient should be referred for scalpel or punch biopsy for diagnosis, and if malignant, the stage and grade. Another technology which has recently emerged to assist the health care practitioner more accurately discern whether a lesion may be a malignancy, or whether a punch or scalpel biopsy is indicated, is the brush biopsy.[52] The brush biopsy technique is relatively simple to perform in any health care environment using a small stiff-bristled brush to collect mucosal epithelial cells from a suspicious site and immediately place and fix the tissue on a slide. The slide is subsequently sent to a laboratory for computer analysis with the results sent back to the practitioner within a week. However, even with the use of these adjunctive measures, a definitive diagnosis through incisional biopsy is mandatory.[53]

Screening Recommendations of Professional Groups

A few prominent task forces and organizations have developed guidelines for oral cancer screening (Table 12.4) but the lack of consensus among these groups has failed to provide clear direction for health care practitioners and the public.[54,55,56] Since the appropriate clinical trials to assess the effectiveness of early detection in reducing oral cancer mortality have not been executed, the major preventive services task forces in the United States and Canada[57,58] have determined that there is not enough evidence to recommend routine oral cancer screenings except for those patients at high risk. It should be noted, however, that the most recent task force statement on this issue states clearly that this does not mean that such examinations are not effective.[59] The American Cancer Society recommends routine oral cancer screening for all patients as part of the periodic dental examination and also recommends that primary care physicians assess the oral cavity as part of their routine cancer examination.[60]

The American Cancer Society recommendations are important because they recognize that individuals at high risk for oral cancer, including those with low income, lacking health insurance, with less than a high school education, 65 years of age or older, and of minority group status, are more likely to visit a physician than a dentist.[65] This is because most state Medicaid programs do not provide comprehensive dental coverage for adults and Medicare does not cover routine dental services, including screening for oral cancer. Thus, there is less opportunity for routine inspection of the oral cavity for these high-risk groups, which in itself may exacerbate the problem.

The recommendations of the various U.S. and Canadian preventive task forces presume that health care practitioners readily and knowingly assess whether a patient is at high risk for oral cancer through a careful and comprehensive health history that requests information on high risk behaviors. All major health organizations, including the American Dental Association, encourage dental practitioners' assessment of high risk behaviors by including questions on tobacco use in their respective medical history forms. However, studies have shown that clinicians either do not adequately assess or are unaware of patients' high risk behaviors. For example, approximately one third of Maryland dentists did not ask about present use of alcohol and 23% of these respondents failed to inquire about past history of tobac-

Table 12.4
Oral Cancer Screening Guidelines of Professional Organizations[61,62,63,64]

Organization/ Taskforce	Effectiveness	Recommendation
American Cancer Society, 2003	Many cancers of the oral cavity and oropharynx can be found early, during routine examinations by a doctor or a dentist, or by self-examination.	Regular checkups that include an examination of the entire mouth are important in the early detection of oral and oropharyngeal cancers and precancerous conditions. The ACS also recommends that primary care doctors examine the mouth and throat as part of a routine cancer-related checkup.
Canadian Task Force on Preventive Health Care, 1999	The usefulness of screening is limited by the low prevalence and incidence of disease, the potential for false diagnosis, and the poor compliance with screening and referral. No studies have shown that screening intervention programs reduce mortality or morbidity due to oral cancer.	**Population Screening:** Fair evidence to exclude the general population for oral cancer by clinical examination. **Opportunistic Screening:** Insufficient evidence to recommend inclusion or exclusion of screening for oral cancer by clinical examination. For high risk patients, annual examination by physician or dentist should be considered. Major risk factors include a history of tobacco use and excessive alcohol consumption.
U.S Preventive Services Task Force, 1996	Despite the strong association between stage at diagnosis and survival, there are few controlled data to determine whether routine screening in the primary care setting leads to earlier diagnosis or reduced mortality from oral cancer.	There is insufficient evidence to recommend for or against routine screening of asymptomatic persons for oral cancer by primary care clinicians. Although direct evidence of a benefit is lacking, clinicians may wish to include an examination for cancer and precancerous lesions of the oral cavity in the periodic health examination of persons who chew or smoke tobacco (or did so previously), older persons who drink regularly, and anyone with suspicious symptoms or lesions detected through self-examination.

Table 12.4 (Cont.)
Oral Cancer Screening Guidelines of Professional Organizations[61,62,63,64]

Organization/ Taskforce	Effectiveness	Recommendation
Task Force on Community Preventive Services, 2001	No studies met the minimum quality criteria for assessing effectiveness in increasing detection of cancers and precancers, improving health status, or reducing mortality.	Insufficient evidence for community-wide, coordinated public education, professional education and training, professional examination of persons at high risk in various settings (e.g., home, health fairs, field clinics, usual source of care), and referral of persons with suspicious lesions (e.g., erythroplakia, leukoplakia, lichen planus, submucous fibrosis, and oral cancer) for follow-up and treatment.

co use and the types and amounts used.[66] Further, a study assessing health history forms used in U.S. and Canadian dental schools found that the health history did not adequately assess high risk behaviors linked to oral cancer.[67]

Examination Rates

A national survey conducted in 1992 (National Center for Health Statistics Cancer Supplement Survey) found that 13% of U.S. adults age 40 or older had ever received an oral cancer examination and only 7% had received one in the past year.[68] This study further found that those individuals least likely to receive an oral cancer examination were adults with lower educational backgrounds. Another national survey of dentists found that 19% did not provide an oral cancer examination to all their patients 40 years and above and that 88% of dentists did not provide an oral cancer examination to their edentulous patients (those without teeth), a group known to be at high risk for oral cancer.[69] Similar results were found for the rate of oral cancer examinations provided by dental hygienists.[70]

Maryland dentists reportedly provided an oral cancer examination for the vast majority of their patients ages 40 and above but only 6% reported conducting this examination for their edentulous patients.[71] Further, 40% of Maryland dentists did not perform a comprehensive oral cancer examination for the majority of their patients because they neglected to palpate for lymph node involvement.

A 1996 survey of Maryland adults age 40 and over found similarly low oral cancer examination rates, although they were somewhat higher than U.S. rates.[72] In addition, the survey found that those at high risk for oral cancer were least likely to have received an oral cancer examination. Approximately 20% of Maryland adults reported receiving an oral cancer examination in the past year and 28% reported that they had ever received such an examination in their lifetime. African Americans received significantly fewer oral cancer examinations (14.2%) than whites (32.2%), and those with more than a high school education (32.1%) were significantly more likely to receive an oral cancer examination than those with less than a high school education (23.2%). Finally, those who smoked cigarettes every day were significantly less likely to receive an oral cancer examination (16.4%) than those who smoked on some days (24.2%) and those who didn't smoke at all (31.4%).[73] The survey questions were comparable to those asked in the national survey and specifically asked if the patient recalled the health care practitioner pulling out their tongue with a piece of cotton gauze and inspecting it from side to side. While recall bias always plays a role in these types of surveys, the responses were likely valid given the vivid description of the tongue examination.

Recent data from the Maryland Cancer Survey sug-

gests that since 1996, the proportion of Marylanders who have received an oral cancer examination has improved significantly.

In 2002, 33.9% of Marylanders age 40 and over reported that they had received an oral cancer examination in the last year (Figure 12.8).[74] In addition, 42.8% of adults age 40 and over reported that they had received an oral cancer exam at least once in their lifetime.[75] Despite this progress, there remains considerable room for improvement regarding the proportion of Marylanders who receive oral cancer examinations.

Barriers to Oral Cancer Examination

In addition to the lack of consensus in oral cancer screening guidelines, the low examination rates described here are due to a number of significant financial, educational, and behavioral barriers. These barriers include lack of access to dental care services as well as a lack of oral cancer knowledge that likely affects behaviors of both the public and health care practitioners in the U.S. and Maryland.

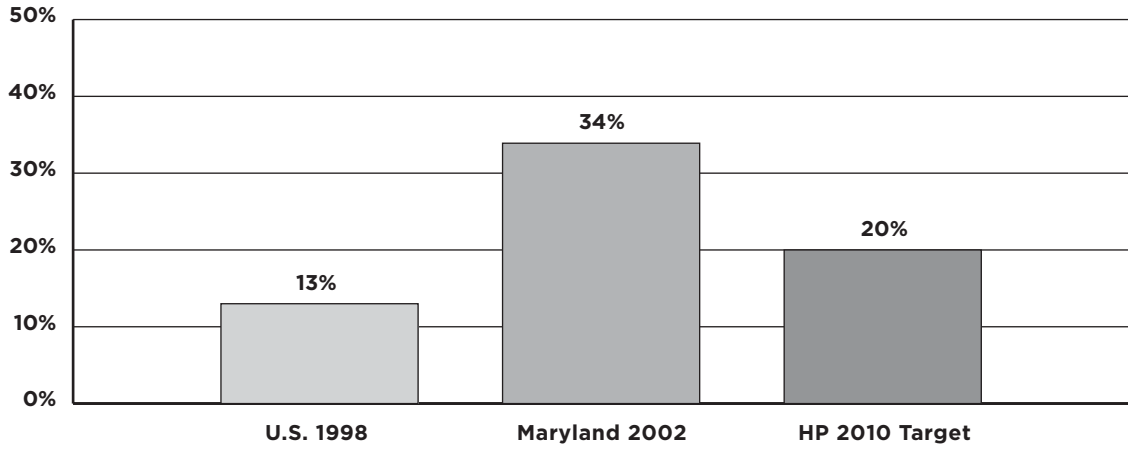
Lack of Access to, and Utilization of, Oral Health Services for High Risk Populations

Oral Cancer Early Detection and Diagnosis Services

For those at highest risk for oral cancer access to the health care system is limited in Maryland and is a critical issue in the receipt of timely and appropriate oral cancer examinations. It is well established that those populations with the highest oral cancer mortality rates experience the poorest access to the overall health care system.[76] Populations at high risk for oral cancer with restricted access to the health care system include the following characteristics: minority status, low income, low education, no health insurance, and 65 years of age or older. Unfortunately, their access to dental care services is even more limited.

Although Medicare covers costly surgical procedures for oral and pharyngeal cancer, it does not cover inexpensive and routine dental procedures *including oral cancer examinations*. Like most states, Medicaid dental coverage in Maryland for adults 65 years and younger is very limited and is unavailable to patients more than 65 years of age. As a result of these restrictions, populations at risk for oral cancer are more likely to visit a physician than a dentist and the frequency of visits to physician offices is far greater than it is to dental practices.[77] Therefore the best opportunity for these populations to receive an oral cancer examination may be during a routine visit to non-dental health care practitioners such as physicians, nurse practitioners, and physician assistants. Yet studies in Maryland show that non-dental health care practitioners are not using this occasion to provide oral cancer examinations to their high-risk patients. While 28% of Maryland residents reported receiving an oral cancer exam, 70% were provided by either a dentist (64%) or dental hygienist (6%) during a routine dental visit and only 22% were provided as part of a routine physical

Figure 12.8
Oral Cancer Screening Within the Past Year



Source: National Health Interview Survey (NHIS), 1998; Maryland Cancer Survey, 2002.
U.S. Department of Health and Human Services, Healthy People 2010.

examination.[78] Despite these findings, the studies showed that physicians diagnosed more oral cancers than dentists and that the majority of these malignancies were detected at a late stage in their development.[79]

Coverage of medically necessary dental procedures that could facilitate the provision of oral cancer examinations for adults with no dental insurance is generally difficult to obtain in most health care benefit packages. Often these claims are judged on a case-by-case basis and variably successful even with a strong physician advocate. While tertiary care for advanced oral cancer cases can be obtained through most medical insurance packages, the opportunity for cost-efficient primary or secondary preventive care for this disease is missed because of the lack of this coverage.

Oral Cancer Treatment and Referral Services

Generally, oral cancer treatment services can be accessed through private or public medical insurance packages. However, these services are usually unavailable for uninsured adults not yet eligible for Medicare. Further, once a lesion is detected or suspected of being malignant through oral cancer examination, many patients experience difficulties in obtaining more invasive diagnostic services such as scalpel or punch biopsy. The referral systems for these services are often small and random, if present at all, providing additional continuity problems for those patients who eventually will need treatment.

Lack of Oral Cancer Literacy among the Public, Health Care Practitioners, Policymakers, and the Media

Healthy People 2010 defines health literacy as "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions."[80] Based on studies assessing the knowledge and attitudes of the public and health care practitioners in the U.S. and Maryland, the oral cancer literacy of these groups appears to be less than what is needed for informed decisions and behaviors.

Studies conducted in the U.S. and Maryland show that the public is not well informed about oral cancer and its prevention. Only 23% of the Maryland public could identify an early oral cancer symptom and only 21% were aware that there was an examination or test for oral cancer.[81] While most respondents correctly identified tobacco as an oral cancer risk factor, only 13% knew that alcohol also was a major risk factor for this cancer. Similar low responses were given for other oral cancer risk behaviors.[82]

A pilot study conducted in Maryland found that dentists were not as knowledgeable regarding oral cancer prevention as they thought and that most physicians did not believe that their oral cancer knowledge was current.[83] The oral cancer knowledge base of these practitioner groups was found to play a significant role in their related examination behaviors. While the vast majority of dentists were providing oral cancer examinations, a high proportion of these examinations likely were not performed appropriately. Further, it was found that those physicians who did not believe their oral cancer knowledge to be current were less likely to provide routine oral cancer examinations.[84]

More representative, broad-based studies of Maryland dentists and dental hygienists corroborated the findings of the earlier pilot study. However, they also found that these health care providers did not feel adequately trained to palpate lymph nodes as part of their oral cancer examination and that providers were not examining high-risk edentulous patients.[85,86] While knowledgeable in other aspects of oral cancer prevention, only 16% of dental hygienists knew that the majority of oral cancer lesions were diagnosed in patients over the age of 60. The same low proportion of dental hygienists knew that erythroplakia and leukoplakia were the conditions most associated with oral cancer.[87] Similar findings of low oral cancer knowledge were found for non-dental health providers such as family physicians and family nurse practitioners.[88,89] They possessed a low knowledge base included oral cancer risk factors, signs and symptoms, and the most common sites where oral cancer lesions are found. The majority of family physicians (64%) were interested in enhancing their oral cancer knowledge base through continuing education courses while over 80% of family nurse practitioners reported that their oral cancer knowledge was not current.[90,91]

In addition to helping the Maryland public have greater knowledge and understanding about oral cancer, it is vital that the public become functionally literate in obtaining appropriate health services. All health-related intake forms (e.g., Medicaid and Medicare) must be written in plain language that can be understood by their intended audience. In addition, the use of "smart cards," which reduce paperwork for providers and increase the transfer of confidential information, will aid this process. Further, health

care providers must receive training to improve their communications skills so as to increase patient comprehension and encourage patients to play a more active role in their own health care and maintenance.

Although Maryland is fortunate to have several legislators who are keenly aware of the oral cancer problems in Maryland, generally, there is little awareness of oral cancer, relative to other cancers, among policymakers. The overall lack of knowledge and understanding among policymakers, the public, and the media impacts the development of oral cancer initiatives and programs.

Lack of Research

Evidence-based clinical trials for oral cancer prevention modalities that demonstrate a definitive impact on morbidity and mortality rates have not been conducted because of logistical concerns and lack of funding. Specifically, research that assesses screening effectiveness is critically needed if an institutional application of known oral cancer prevention modalities is to be accomplished. In the absence of such research, oral cancer prevention guidelines and protocols will continue to lack consensus and ultimately guidance for the public, health care practitioners, policymakers, and health care delivery systems.

More evidence-based information is needed to evaluate and compare the practice patterns of primary care and dental providers, and to assess the effectiveness of existing oral cancer prevention programs. Currently, funding to expand ongoing oral cancer research and the development of more sensitive and specific oral cancer screening tools is limited. Additional resources are needed for this and for research that aids our understanding of the etiologic pathways from potential viral, environmental, behavioral, and familial sources.

Ideal Model for Oral Cancer Control

An Oral Cancer Prevention, Early Detection, and Treatment Model was developed to increase the oral cancer literacy of specific groups. The end products of improving oral cancer literacy are more routine, timely, and comprehensive oral cancer examinations that are requested by an informed public and adequately provided by informed dental and non-dental health care practitioners. Further, an informed and engaged media will enhance oral cancer knowledge and awareness among all groups, including policymakers, who can craft their own impact on oral cancer prevention through legal, educational, scientific, fiscal, and curricular change. The increase in appropriate oral cancer examination, referral, follow-up, and related treatment efforts, coupled with expansion of media awareness and policy change, should lead to reduced oral cancer morbidity and mortality in Maryland and a significantly smaller disparity in these rates between African Americans and whites.

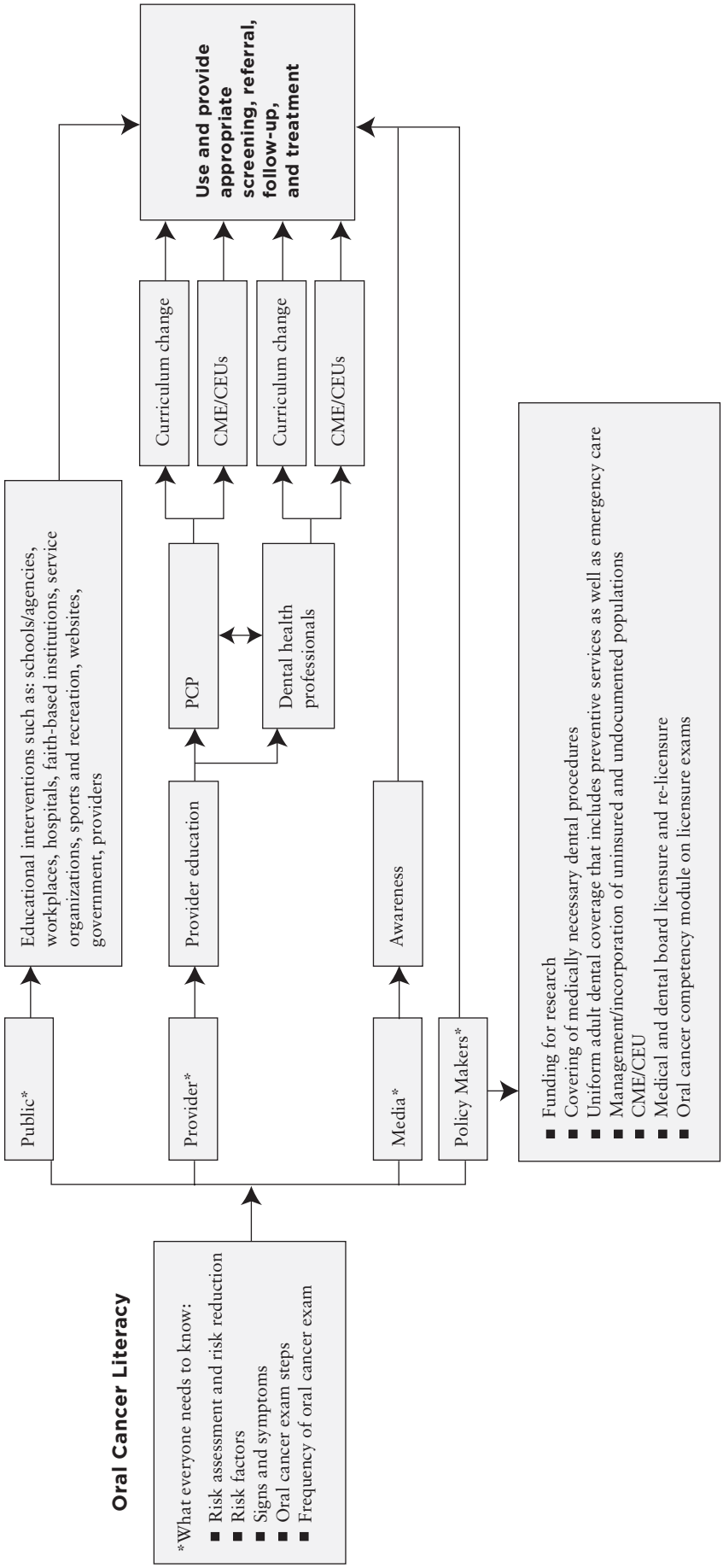
As described in Figure 12.9, oral cancer literacy entails the attainment of knowledge of oral cancer prevention measures by the target populations (the public, health care providers, the media, and policymakers). Such knowledge includes an understanding and awareness of oral cancer risk assessment and reduction, risk factors and behaviors, signs and symptoms, and the rudiments and frequency of adequate and timely oral cancer examinations. The public needs to be specifically targeted for these messages through appropriate venues while dental and non-dental provider education must be enhanced through wider availability of oral cancer continuing education courses and curricular change. These public and health care provider strategies should increase the number of appropriate oral cancer examinations and related referral, follow-up, and treatment modalities.

The oral cancer literacy of the media must be enhanced so it can facilitate awareness for other targeted groups and facilitate the provision of oral cancer prevention strategies. It is particularly important that the media (and other information systems) target policymakers as they can help achieve long-term change through direct influence on legal, educational, curricular, fiscal, research, and health service access issues that impact oral cancer literacy and its effects.

Current Efforts in Maryland

In recognition of many of the problems previously described, a small partnership of disparate groups developed in the early 1990s to attempt to reduce the high rates of oral cancer morbidity and mortality in Maryland and to reduce the disparity in oral cancer rates between whites and African Americans.[92] The partnership included the American Cancer Society; the National Institute of Dental and Craniofacial Research (NIDCR); the Department of Health and Mental Hygiene (DHMH); the University of Maryland Dental, Medical, and Nursing Schools; professional health organizations representing dentists, dental hygienists, family nurse

Figure 12.9
Oral Cancer Prevention, Early Detection, and Treatment Model



Source: Developed by the Oral Cancer Committee of the Maryland Comprehensive Cancer Control Plan.

Table 12.5
Action Steps for Oral Cancer Prevention and Early Detection

3 Phases:

Needs Assessment

- Review of state epidemiologic data.
- Surveys of knowledge, opinions, and practices of the public.
- Surveys of knowledge, opinions, and practices of health care practitioners.
  - Dentists
  - Dental Hygienists
  - Family Nurse Practitioners
  - Family Physicians
- Disseminate findings of surveys.

Develop and Pilot Test Educational Interventions

- Develop educational intervention(s) and pilot test public and health care providers.
- Develop, test, and produce educational materials.
- Implement educational interventions.

Program Evaluation

- Review of state epidemiologic data.
- Surveys of health care providers and public.
- Prepare publications/reports—disseminate.
- Readjust educational interventions based on program evaluation.
- Use findings for program revision and for establishment of needed policies.

Source: National Institute of Dental and Craniofacial Research, 2000.

practitioners, and family physicians; local health departments; local churches; and the Department of Veterans Affairs.[93]

The early efforts of this partnership encompassed educational, networking, and advocacy activities with many target populations throughout Maryland to enhance awareness, knowledge, and understanding about oral cancer. Their actions eventually led to two important outcomes that helped advance oral cancer awareness in Maryland: (1) inclusion of two oral cancer prevention objectives in the Maryland Health Improvement Plan and (2) inclusion of oral cancer as one of seven targeted cancers in the state's Cigarette Restitution Fund (CRF) program. For example, Baltimore City and Montgomery County have been very active in providing oral cancer screenings, training providers, and developing educational materials. The African American Health Initiative's Oral Health Coalition in Montgomery County has focused on providing training sessions for health providers on oral cancer and tobacco intervention and cessation.

The Oral Cancer Medical Advisory Committee of the Maryland state Department of Health & Mental Hygiene has developed "Oral Cancer—Minimal Elements for Screening, Diagnosis, Treatment, Follow-up, and Care Coordination" to provide guidance for public health programs that screen for oral cancer.[94] As of January 2004, 5,156 individuals had received oral cancer examinations through local CRF programs, and over 2,097 had received educational services.

Another major outcome of the partnership was the passage of legislation and related funding to the DHMH Office of Oral Health for a statewide Oral Cancer Prevention Initiative. The Maryland Oral Cancer Prevention Initiative is based on a series of steps (Table 12.5) and is a continuation of the strong partnership between DHMH, NIDCR, the University of Maryland Dental School, and their many partners throughout Maryland. These steps are based on a state model developed by NIDCR to address oral cancer prevention and early detection.

Table 12.6
Maryland Oral Cancer Prevention Initiative

Statewide prevention and education public health approaches encompass:

- oral cancer education for the public, including the need to receive oral cancer examinations and information about risks, signs and symptoms, and smoking cessation.
- education/training of dental and non-dental health care providers to properly examine, diagnose, and refer patients.
- screening and referral, if needed, for biopsy and treatment targeting underserved, high-risk populations coordinated by local health departments.
- producing targeted health educational activities and materials that address tobacco use.
- developing a statewide public relations oral cancer prevention campaign that is similar to those that target other well-known cancers.
- local health department sponsorship of didactic training programs for health care providers throughout Maryland.
- conducting an evaluation of the program and assessing outcomes.

Source: DHMH, Office of Oral Health, 2000.

In 2000, the Maryland General Assembly rewarded the partnership's efforts when it passed legislation entitled "Oral Health Programs—Reducing Oral Cancer Mortality" (SB 791/HB1184) which requires the DHMH Office of Oral Health to prevent and detect oral cancer in the state, with a specific emphasis on targeting the needs of high-risk, underserved populations. Funding for this initiative was allocated in Fiscal Year 2002. Using the steps described in Table 12.5 as a basis for this program, many oral cancer prevention activities took place throughout the state, including the designation of "Oral Cancer Awareness Week" in Maryland every June. Highlights of this program, which won a Meritorious Award in Community Preventive Dentistry from the American Dental Association, are described in Table 12.6.

As part of this initiative, "Reduce Oral Cancer Mortality" grants were awarded to 21 of Maryland's 24 counties, the majority of whom provided oral cancer education for the public and health care providers including a training program for practitioners in conducting an appropriate oral cancer examination. The Eastern Shore counties developed an Oral Cancer Coalition to address prevention initiatives in the region, which included development of a two-year action plan and involvement of the Del Marva Shorebirds minor league baseball team in its public relation campaigns.

Other efforts from this initiative include the creation of a public relations campaign via radio, television, print media, Baltimore Orioles and Ravens spokespersons, and Maryland Transportation Administration train posters; development of a toolkit to assist local jurisdictions in promoting and facilitating oral cancer prevention activities; and establishment of a Maryland Oral Cancer website (http://www.maryland-oralcancer.org/). Educational materials developed through the initiative consist of an "8 Steps of a Good Oral Cancer Exam" wallet card, "Having an Oral Cancer Exam" brochure for low-literacy populations, and Oral Cancer Awareness Week planning packets, lip balm, and prevention posters.

As a result of these efforts, thousands of Maryland residents have been screened for oral cancer and hundreds more have received oral cancer prevention messages and information. Others have been referred to smoking cessation programs. Finally, nearly 800 health care practitioners have received education and training regarding oral cancer prevention and examinations. Plans to evaluate the program to assess the needs of the public and health care providers are scheduled for the future.

Oral Cancer Goals, Objectives, and Strategies

Goals:

Reduce oral cancer mortality.

Reduce disparities in the incidence and mortality of oral cancer.

Healthy People 2010 Objectives

The following are the Healthy People 2010 objectives[95] related to oral cancer:

Objective:
Reduce the oropharyngeal cancer death rate to 2.7 deaths per 100,000 population.

The U.S. baseline was 3.0 per 100,000 in 1998 (age-adjusted to the 2000 U.S. standard population).

Objective:
Increase the proportion of oral and pharyngeal cancers detected at the earliest stage to 50%.

The U.S. baseline: 35% of oral and pharyngeal cancers (stage I, localized) were detected in 1990–1995.

Objective:
Increase the proportion of adults who, in the past 12 months, report having had an examination to detect oral and pharyngeal cancers to 20%.

The U.S. baseline: 13% of adults aged 40 years and older reported having had an oral and pharyngeal cancer examination in 1998 (age-adjusted to the 2000 U.S. standard population).

Targets for Change

By 2008, reduce the oral cancer mortality to a rate of no more than 2.4 per 100,000 persons in Maryland.

The Maryland baseline was 3.0 per 100,000 in 2000 (age-adjusted to the 2000 U.S. standard population).

Source: Maryland Division of Health Statistics.

By 2008, increase the proportion of adults 40 and older who have had an oral cancer exam in the past year to 48%.

The Maryland baseline was 33.9% in 2002

Source: Maryland Cancer Survey.

Objective 1:
Increase oral cancer literacy among Marylanders.

Strategies:

1. Provide education to promote an understanding and awareness of oral cancer risk assessment and reduction, risk factors and behaviors, signs and symptoms, and the rudiments and frequency of adequate and timely oral cancer examinations to the public, health care providers, the media, and policy makers.
2. Provide specific educational messages to individuals with risk factors and to individuals who may choose to engage in high-risk behaviors in the future.
3. Use the media to provide culturally relevant and age-specific oral cancer literacy messages to the public at large. Consider public service announcements, paid advertisements, as well as various forms of media coverage including television, radio, and print.

Objective 2:
Increase provider education and training related to oral cancer prevention and early detection.

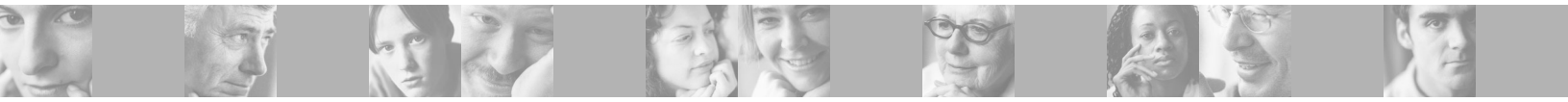
Strategies:

1. Require all currently practicing medical, nursing, and dental professionals to complete continuing education focused on oral cancer prevention and early detection (how to perform an oral cancer examination and tobacco cessation/intervention). This continuing education must be completed before the issuance of medical or dental licensure renewal.
2. Require all medical, nursing, and dental students to complete a cancer comprehension module that includes a test of proficiency in performing oral cancer examinations before receiving licensure.
3. Promote the inclusion of oral cancer prevention and examination training in all health care educational curricula.
4. Ensure that all health care providers adequately identify and assess patients with high-risk oral cancer behaviors.

Objective 3:
Increase public access to oral cancer prevention, early detection, and treatment services.

Strategies:

1. Provide an information clearinghouse for practitioners and patients regarding medical and/or dental coverage for smoking cessation, screening, testing, diagnosis, and treatment of oral cancer and related procedures.
2. Determine costs and payors for oral cancer treatments.
3. Develop a central state information resource for referral and case management of individuals with abnormal oral cancer examination results.
4. Provide uniform, functional dental coverage for adults within the Maryland Medicaid program that ensures an annual oral cancer examination and required follow-up care, if needed.
5. Provide case management and additional resources for uninsured and undocumented patients.
6. Promote coverage for all medically necessary dental procedures under private insurance plans, Medicare, and state Medicaid and managed care organizations.
7. Provide targeted education to individuals diagnosed with oral cancer or a pre-cancerous lesion regarding how to access services and the importance of decreasing risk behaviors.



8. Encourage private dental insurance companies, state Medicaid plans, and managed care organizations to honor coverage and adequate reimbursement of "Tobacco Counseling for the Control and Prevention of Oral Diseases."
9. Revise the current forms needed for accessing the health care system into a format that is easily understood by the majority of the general public by taking into account low literacy and language barriers.
10. Develop a model for oral cancer patient navigators to assist patients in navigating the health care system upon diagnosis with oral cancer.

Objective 4:
Increase scientific knowledge regarding oral cancer.

Strategies:
1. Provide funding for research into all aspects of oral cancer prevention, early detection, and treatment.
2. Promote research in the following areas:
   - Practice patterns
   - Screening efficacy
   - HPV and other viral etiology as risk factors for oral cancer
   - Evaluation of existing programs
   - Stage of disease at diagnosis
   - Diagnosis patterns
   - Treatment and cures

Objective 5:
Maintain a centralized, statewide mechanism for support of oral cancer initiatives.

Strategies:
1. Maintain and increase funding for the Maryland State Oral Cancer Prevention Initiative and the DHMH Office of Oral Health.
2. Promote collaboration among Maryland's professional schools to further oral cancer education and research.

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