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Cancer Prevention and Treatment: The Dental Hygienist's Role

By **Cathy Draper, RDH, MS**

Tremendous advances in cancer treatment have been made in recent years. Treatment modalities today include mono- or combination therapies encompassing surgery, radiation, chemotherapy, immunotherapy and hormone therapy. New directions in cancer research focus on gene activity, a paradigm shift from the traditional therapies focused on killing all rapidly dividing cells.

During the 1970s, only about half the people diagnosed with cancer survived past five years. Today, survival rates have vastly improved for certain types of cancers; there are more than 11 million cancer survivors in the U.S. alone.¹ The American Cancer Society recently released the estimated number of new cancer cases and deaths expected in the U.S. for 2010 along with the compilation of the most recent data regarding cancer mortality and survival (Figure 1).² When compared with data collected from 1990 to 2006, there are significant reductions in mortality rates for both men and women in the U.S. Drops in lung, prostate and colorectal cancer mortality account for nearly 80

percent of the total decrease for men, while decreases in breast and colorectal cancer mortality account for 60 percent of the reductions in women. Advanced screening methods and early detection are credited with lessening the mortality rates for these cancers.²

Despite reducing incidence and increasing survival rates, cancer still accounts for more deaths in the U.S. than heart disease in persons younger than 85 years of age.² Currently, one in four deaths in the U.S. is due to cancer.³

Cancer Prevention and Health Promotion

The dental hygiene appointment is an ideal opportunity to assess individuals' cancer risk and provide information on risk reduction. While oral cancer is generally the first type of cancer one might recognize within dental hygiene's purview, dental hygienists can also detect other cancers by means of the head and neck examination, and by screening for skin cancer, the most commonly occurring cancer today.⁴

Screening and Physical Examination

Screening is the evaluation of an asymptomatic individual to determine their likelihood of having or developing a condition. Screenings can target specific disease entities or malignancies in the general population as part of large community-based program or be part of the routine care provided by a health care professional.^{5,6} The screening should include a comprehensive health history followed by a visual and tactile physical examination.^{5,6} Dental hygienists are well educated to perform a variety of clinical assessments in collaboration with dentists and physicians as part of a cancer screening program. In many cases, the dental hygienist and the dentist may be the only health care providers performing examinations and screening for the early diagnosis of head and neck cancers.⁷

In a recent feature story in *Stanford Medicine*, Abraham Verghese, MD, MACP, is quoted as saying that the physical examination skills of internists have been declining for a number of years due to the exclusive use of multiple-choice tests for board certification and a heavy reliance on medical tests and technology rather than physical examination for disease diagnoses.⁸ Medical school curricula often exclude oral diseases, and assessments of comprehensive oral cancer screening programs are frequently found to be inadequate.^{7,9} There has been renewed interest on the part of medical educators to revive the physical exam,⁸ but in the meantime, the dental setting may be the main venue for head and neck

■ Cancer Prevention, Treatment and the RDH



- Perform regular head neck cancer examinations
- Screen and provide education for skin cancer
- Provide oral care for patients before, during and following cancer therapy
- Work collaboratively with physicians and nurses to care for patients undergoing cancer therapy

cancer screening. While the evidence is not conclusive that screening programs for head and neck cancer are effective in lowering mortality rates in the general population, such programs have been successful in increasing professional and public awareness of the disease as well as its risk factors, signs and symptoms.^{6,10}



Head and Neck Cancer

Head and neck cancers can be sorted into five main categories, named for their site of origin. Most begin in the epithelium as squamous cell carcinomas in situ. Once malig-

Estimated New Cases*

			Males	Females			
Prostate	217,730	28%			Breast	207,090	28%
Lung & bronchus	116,750	15%			Lung & bronchus	106,770	14%
Colon & rectum	72,090	9%			Colon & rectum	70,480	10%
Urinary bladder	52,760	7%			Uterine corpus	43,470	6%
Melanoma of the skin	38,870	5%			Thyroid	33,930	5%
Non-Hodgkin lymphoma	35,380	4%			Non-Hodgkin lymphoma	30,160	4%
Kidney & renal pelvis	35,370	4%			Melanoma of the skin	29,250	4%
Oral cavity & pharynx	25,420	3%			Kidney & renal pelvis	22,870	3%
Leukemia	24,690	3%			Ovary	21,880	3%
Pancreas	21,370	3%			Pancreas	21,770	3%
All sites	789,620	100%			All sites	739,940	100%

Estimated Deaths

			Males	Females			
Lung & bronchus	86,220	29%			Lung & bronchus	71,050	25%
Prostate	32,050	11%			Breast	39,840	15%
Colon & rectum	26,580	9%			Colon & rectum	24,790	9%
Pancreas	18,770	6%			Pancreas	18,030	7%
Liver & intrahepatic bile duct	12,720	4%			Ovary	13,850	5%
Leukemia	12,660	4%			Non-Hodgkin lymphoma	9,500	4%
Esophagus	11,650	4%			Leukemia	9,180	3%
Non-Hodgkin lymphoma	10,710	4%			Uterine corpus	7,950	3%
Urinary bladder	10,410	3%			Liver & intrahepatic bile duct	6,190	2%
Kidney & renal pelvis	8,210	3%			Brain & other nervous system	5,720	2%
All sites	299,200	100%			All sites	270,290	100%

* Excludes basal and squamous cell skin cancers and in situ carcinoma except urinary bladder.

Figure 1. Ten leading cancer types for the estimated new cancer cases and deaths by sex, 2010. Jemal A, et al. *Cancer statistics 2010. CA Cancer J Clin.* 2010 Jul 7.

■ Common Identifying Features of Skin Cancer

Basal Cell Carcinoma

- Open, bleeding crusted lesions that do not resolve over several weeks time
- Reddish, raised or itchy areas of skin
- Shiny pink, red, white or translucent nodules that do not resolve
- Pink or red bordered lesions with crusted craters

Squamous Cell Carcinoma

- Open, painless lesions that do not resolve within two weeks
- Wart-like growths
- Persistent, scaly red patches with irregular borders that may bleed easily
- Painless, elevated growths with a rough surfaces and a central depression

ABCDE Guide for Melanoma Screening

- Asymmetry
- Border
- Color
- Diameter
- Evolving: Change in size, shape, color, appearance, texture, bleeding or oozing

nant cells pass through the epithelium, the disease process becomes invasive and survival rates decrease significantly. Cancers originating in the salivary glands have different cellular origin and are usually classified as adenocarcinomas, adenoid cystic carcinomas or mucoepidermoid carcinomas.¹¹

Oral and Pharyngeal Cancers

Approximately 36,000 people in the U.S. will be diagnosed with oral cancer in 2010.² While the overall incidence of oral and pharyngeal cancers has decreased in recent years, the number of cases of squamous cell carcinoma of the tongue, oropharynx and tonsils has increased. Traditionally, the demographics for oral cancer have been highest in individuals over the age of 35; however, new cases are increasingly being identified in younger individuals. Risk factors include tobacco and alcohol use and HPV-16 exposure.¹² About 5 percent of the cases of oral cancer come from unidentifiable causes. In the past, oral cancer affected six males to every one female, with African American men having the highest incidence. Currently, the ratio is two men to every woman, probably as a result of the increasing similarity of women's risk exposures and lifestyle choices to those of men. Individual survival rates range from 81.8 percent for patients diagnosed with localized disease, to 52.1 percent for patients with regional lymph node involvement and 26.5 percent for patients with distant metastasis. Currently, only one-third of the oral and pharyngeal cases in the U.S. are diagnosed in the early stage of the disease.^{8,11}

Laryngeal and Hypo-laryngeal Cancers

In 2010, approximately 12,700 individuals will be diagnosed with laryngeal cancer, affecting the vocal cords and surrounding anatomic structures. Individuals at highest risk have a history of tobacco and alcohol use, as well a history of squamous cell carcinoma of the upper aerodigestive tract.² Early onset symptoms include chronic hoarseness (laryngeal lesions), difficulty swallowing (hypo-laryngeal lesions), referred ear pain, change in vocal quality and enlarged neck nodes. Cure rates depend on tumor site, size and degree of tissue infiltration.^{11,13}

Salivary Gland Cancer

Malignant salivary gland neoplasms account for approximately 3 percent to 5 percent of all head and neck cancers.² The highest frequency of malignancy occurs in the sublingual gland, followed by the submandibular and parotid glands. The majority of cases are in individuals 60 years old and older. Presenting symptoms include painless swelling of the affected salivary glands, numbness or weakness related to nerve involvement and persistent facial pain. Exposure to ionizing radiation has been identified as a possible risk factor for salivary gland cancer, although the etiology of most malignancies cannot be determined.¹¹

Nasal Cavity and Para-nasal Sinus Cancers

Malignancies of the maxillary sinus are the most common of the paranasal sinus cancers. The majority of the tumors associated with this disease are not diagnosed until they have reached an advanced stage and the overall prognosis is poor. Nodal involvement is infrequent, with most tumors metastasizing into the skull. Males over the age of 40 are at highest risk, along with tobacco users and people exposed to environmental or workplace chemicals and dust. Signs and symptoms include chronic sinusitis, an unresolved lump on the face, roof of the mouth or inside the nose and facial numbness or tingling.¹¹

Nasopharyngeal Cancer

Nasopharyngeal cancer does not appear to be linked to excess use of tobacco or moderate alcohol intake. Predisposing factors include Asian ancestry, Epstein Barr virus exposure, familial clusters and heavy alcohol intake. Presenting symptoms include cervical lymphadenopathy, nasal obstruction, hearing loss, tinnitus, ear infection, sore throat and headache.¹¹

Skin Cancer

More than a million people in the U.S. alone are expected to be diagnosed with non-melanoma skin cancers in 2010 with an estimated mortality rate of 2,000.¹⁴ Basal and squamous cell carcinomas are considered curable and not included in general cancer statistics. While the total number of non-melanoma mortalities has dropped by 30 percent since

1980, the incidence of skin cancer continues to increase.^{4,5} Of growing concern is the role of sunlight and ultraviolet radiation in the development of the potentially fatal malignant melanoma, as well as ongoing issues related to basal and squamous cell carcinomas. General skin assessment can be included as part of dental hygiene care. Patient education should encourage the routine use of sunscreen, particularly on the face and lips, as well as regular dermatology screening and evaluation of suspicious lesions (see sidebar).¹⁵

Malignant Melanoma

Melanoma is an often fatal form of skin cancer, particularly if the initial lesion is detected at an advanced stage. Melanomas frequently develop from or near an existing mole but can be found anywhere on the skin including the scalp, oral cavity, mucous membranes and eye. Incidence rates in the U.S. have risen at a rate of 2.4 percent annually since 2000, creating a mounting public health issue.⁴ Unfortunately, only limited health resources are dedicated to preventing or promoting early detection of this cancer, and the value of general screening programs is considered to be insufficient.⁵ While white males over the age of 50 have been targeted as the group most likely to benefit from early detection screening programs, all individuals should be educated about the signs and symptoms of melanoma.⁵ Dental hygienists are well positioned to provide this education.

Caring for Patients with Cancer

Dental hygienists also play a key role in caring for individuals with cancer. Individuals undergoing treatment for all types of cancer need ongoing support from their oral health care providers, as well as their oncology team, to minimize the side effects in the oral cavity that occur both during and following their treatment. A pretreatment evaluation can identify potential problems and establish the importance of good oral hygiene in minimizing potential side effects. While it makes sense to reinforce the ongoing need for good oral care throughout the cancer treatment process, oral hygiene can be overlooked by both the patient and multiple health care professionals when dealing with the complexities of cancer treatment.¹⁶ Current literature indicates that oral health education during cancer therapy is not regularly initiated in many clinical settings. Reports indicate that patients and their caregivers do not routinely receive information on the importance of oral care during cancer therapy.¹⁶ Recognizing this need, the National Institute of Dental and Craniofacial Research's (NIDCR) National Oral Health Information Clearinghouse initiated an information campaign in the late 1990s to educate oncology professionals, patients and caregivers about the oral complications of cancer therapy. In 2004, a group of physicians, oncologists and oral health professionals at the National Institutes of Health worked together to raise awareness in the oncology community about the potentially debilitating impact of oral complications, including their effect on the overall treatment outcome.¹⁷ Publications in the free informational series created by the NICDR's collaborative group were reviewed and updated in 2009 and made available on their Web site at www.nidcr.nih.gov. The NIDCR campaign emphasizes the

Common Oral Complications of Cancer Treatment

Chemotherapy

- Oral mucositis
- Xerostomia and salivary gland dysfunction
- Decalcification and dental caries
- Taste alterations
- Compromised nutrition
- Abnormal dental development in children

Radiation Therapy

- Xerostomia
- Radiation caries
- Trismus/tissue fibrosis
- Osteoradionecrosis of the jaw

ongoing need for a multidisciplinary approach to manage the oral complications of cancer therapy.

Oral Complications of Cancer Therapy

Oral Mucositis

Oral mucositis or stomatitis is a common side effect of chemotherapy and radiation treatment. On average, about 40 percent of all patients receiving cytotoxic chemotherapy report oral mucositis, as do close to 100 percent of all patients receiving bone marrow transplantation.¹⁶⁻¹⁸ Children are particularly affected, possibly due to the higher turnover rate of mucosal epithelium in pediatric oral tissue.¹⁸ The generalized ulceration and sloughing of oral as well as gastrointestinal mucosa can come from either direct injury to the tissues or the chemotherapy-induced bone marrow suppression and subsequent neutropenia. Oral mucositis is associated with significant clinical morbidity including severe pain and localized as well as systemic infections that can delay treatment, cause malnutrition and reduce quality of life. The painful and potentially infectious side effects of oral mucositis can be the dose-limiting factor for many treatment regimens, and, from the patient's perspective, one of cancer therapy's most debilitating side effects.¹⁶⁻¹⁸

Xerostomia

Xerostomia is a common side effect of radiation to the head and neck. Radiation therapy can cause the secretory cells to atrophy and die within days following treatment, depending on the intensity of the radiation and the direction of the beam. Serous cells are especially sensitive to the effects of radiation, changing the saliva to a thick, ropy consistency. Radiation-induced changes to salivary flow and consistency are permanent and often considered among the most debilitating long-term effects of the treatment.¹⁹ In some instances, the side effects can be reduced by using intensity-modulated radiation therapy. Research also continues in the area of salivary cell regeneration following radiation therapy.

Xerostomia is not usually associated with chemotherapy, and when it does occur, its duration is usually limited to the treatment period.

Caries

Dental caries is a common side effect during and following cancer therapy, especially for head and neck cancers. Changes in salivary flow and quality, in addition to dietary changes, dramatically increase the risk of caries. "Radiation caries" is the rapidly progressing decay commonly found at the cervical third of the tooth as a result of severe xerostomia, compromised nutrition and the inability to clear food from the oral cavity. Head and neck cancer patients who have undergone radiation therapy have a lifelong risk of rampant decay beginning within several months of ending treatment. It is recommended that these individuals be evaluated by the dental team every four to eight weeks for the first six months following radiation therapy.¹⁹

Candidiasis

Opportunistic *Candida albicans* fungal infections occur with increased frequency in individuals undergoing cancer therapy. Radiation therapy, xerostomia and a compromised immune system can exacerbate a candida infection.²⁰

Trismus

Individuals who have undergone radiation therapy for head and neck cancer are at increased risk of developing trismus, or loss of elasticity to the masticatory muscles. Decreased circulation due to radiation to the surrounding tissue leads to fibrosis and a limited ability to open and close the mouth. Stretching exercises during and post therapy can alleviate the effects of trismus.²⁰

Osteonecrosis/Osteoradionecrosis

Bone cells' ability to heal and regenerate can be compromised by either chemotherapy or radiation. In osteoradionecrosis, high doses of radiation impair the blood supply to the bone, putting the bone at risk for a non-healing, infectious wound. These wounds can occur spontaneously or after a dental extraction or insult to the tissue. In the case of chemotherapy-induced osteonecrosis, intravenous bisphosphonates are often used to slow destruction caused by metastatic skeletal lesions. Individuals can develop painful areas of exposed bone that may become secondarily infected. Lesions may occur spontaneously or due to trauma or manipulation of the teeth and or surrounding tissue.²⁰

Evidence-Based Clinical Practice Guidelines

In 2005, a panel of experts from the Multinational Association of Supportive Care in Cancer (MASCC) and the International Society of Oral oncology reviewed the literature to create evidence-based guidelines for preventing, evaluat-

ing and treating oral mucositis, a summary of which can be found at www.MASCC.org (see list of resources).

Caring for individuals with cancer and managing their oral side effects requires collaboration among physicians, nurses, dentists and dental hygienists. Appropriate oral care during cancer therapy supports the patient's overall oral health.²¹

Nurses are the primary care providers for oncology patients and performing oral assessments and providing oral care instruction is primarily a nursing responsibility.²¹ However, while many registered nurses demonstrate an informed commitment to oral health for their patients, research indicates that awareness of the MASCC guidelines for mucositis management and the implementation of oral health protocols is not consistent throughout the profession.²¹ Despite the acknowledged importance of oral care, it is often set aside when nursing workloads are busy.²² Studies have also indicated that nurses' provision of oral care may be based on factors including their individual training as well as beliefs and attitudes towards oral hygiene.²³ Looking at our mutual commitment to comprehensive patient care, dental hygiene has the opportunity to work together with nursing to improve patients' quality of life.

Colleges of nursing and dental hygiene or dentistry are beginning to form partnerships for collaborative education; for example, The College of Dentistry/College of Nursing Partnership at New York University. At another level, opportunities exist for dental hygienists to forge partnerships with oncology nursing units and cancer support groups in local and regional hospitals. Speaking at a support group or making an in-service proposal for oncology nurses is another avenue for dental hygienists to fully utilize our education. Moving outside of the private practice operator to collaborate with other health professionals, dental hygienists are well prepared to provide comprehensive health care ranging from cancer screening and public education to participating as members of the cancer care team.

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■ Cancer Information Resources

A selected list of scientifically vetted, evidence-based information for the health professionals and the public

The National Cancer Institute

www.cancer.gov/

Comprehensive information from the U.S. Government-supported institute, including a current list of clinical trials for cancer treatment and research

National Cancer Institute Cancer Research Bulletin

www.cancer.gov/ncicancerbulletin

Bi-weekly cancer research information bulletin from the NCI available electronically

The American Cancer Society

nccu.cancer.org/

Includes support group resources and information for patients as well as caregivers

The National Institute of Dental and Craniofacial Research

www.nidcr.nih.gov/OralHealth/Topics/CancerTreatment/

Features oral health, "cancer care and you" series of publications for patients and professionals

Multinational Association of Supportive Care in Cancer

www.MASCC.org

Association Web site featuring guidelines for management of the adverse effects of cancer and its treatment

The Oral Cancer Foundation

www.oralcancer.org

Public service, non-profit foundation Web site that offers prevention, education, research, advocacy, and patient support resources for the public as well as health care professionals

The Stanford Health Library

healthlibrary.stanford.edu/

Scientifically-based medical information to help people make informed decisions about their health and health care, including an online request form for customized research for medical or health-related questions