

A COLLABORATIVE TEAM APPROACH FOR SYMPTOM MANAGEMENT FOR HEAD AND NECK CANCER PATIENTS

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Abstract

Cancer is the second most common cause of death in the United States (U.S.). Some cancers are readily managed, but oral cancer is often diagnosed at a later stage, resulting in increased morbidity and mortality. Treatment of head and neck cancer can cause significant complications affecting morbidity. This article reviews complications associated with chemotherapy and radiation treatment for head and neck cancer and proposes a collaborative model for integrating healthcare providers, including both dental and medical professionals, to ensure the best possible outcome for the patient.

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Introduction

Many individuals in the U.S. will experience some form of cancer. The National Cancer Institute estimates that approximately 10.1 million Americans with a history of cancer were living in January of 2002. Almost 1,399,790 new cancer cases were expected to be diagnosed in 2006. In addition, more than a million cases of basal or squamous cell carcinoma are expected to be diagnosed this year. It is estimated that 564,830 Americans died of cancer in 2006, which is nearly 1,500 each day or more than 1 person per minute. Cancer is the second most common cause of death in the U.S. and accounts for 1 in every 4 deaths.¹⁻³

Certain cancers are readily managed, while others are more aggressive. Fortunately, technology and science offer increasing hope to those diagnosed with cancer. In general, the 5-year survival rate for all cancers diagnosed between 1995 and 2001 was 65%, an increase from 50% in 1974-1976.¹ The improvement in survival represents progress in early detection and diagnosis for certain cancers in addition to new and improved treatments. Nevertheless, it should also be noted that the cancer burden is expected to increase as the population ages, since age is the single most predictive risk factor for cancer. In fact, cancer rates could double from 1.3 million people in 2000 to 2.6 million in 2050, and the number of cancer patients aged 85 and older is expected to increase four-fold in this time frame.⁴

Some cancers are difficult to diagnose or are diagnosed at later stages, as is the case with some oral cancers, resulting in increased morbidity and mortality. An estimated 30,900 new cases are anticipated, and 7,430 deaths will occur from cancer of the oral cavity and pharynx this year. While death rates have decreased for both men and women, particularly in the last decade, the incidence of cancer remains high and similar to that noted in 1950. Five and 10 year survival rates of oral cancer are 59% and 48%, respectively.¹ These statistics could be improved with early detection and intervention.

Oral cancer treatment may also cause serious complications rendering the patient vulnerable to infection and fatality. Mucositis affects 85-100% of patients undergoing head and neck radiation therapy.⁵ Concurrent chemotherapy and radia-

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tion are often used for patients undergoing treatment for head and neck cancer. Both therapies may be utilized as adjuvant treatment or in situations where surgery is not an option. Additional complications of treatment may ultimately affect the mucositis-ridden oral cavity. Through research and extensive collaboration, an expert panel from the Multinational Association of Supportive Care in Cancer (MASCC) and the International Society for Oral Oncology (ISOO) developed clinical practice guidelines for mucositis in 2004, which were updated in 2005.^{6,7} The updated guidelines state, "The panel suggests multidisciplinary development and evaluation of oral care protocols and patient and staff education in the use of such protocols to reduce the severity of oral mucositis from chemotherapy and/or radiation therapy."⁸

Here, we first describe a collaborative team effort led by a nurse practitioner (medical oncology) and dental hygienist (dental oncology) in managing symptoms and complications occurring in patients with head and neck cancer undergoing concurrent radiation and chemotherapy treatment at St. John's Hospital in Springfield, MO. This team includes physicians, nurse practitioners, oncology nurses, oral surgeons, dental hygienists, social workers, dietitians, speech therapists, and caregivers. Second, we will discuss considerations for the dental team throughout the treatment and recovery phases of cancer care.

Education related to complications of cancer therapy

Once a cancer patient's treatment plan is established, nurse practitioners and chemotherapy/radiation nurses are the first to educate patients about treatment and associated side effects. At St. John's Hospital, the education process begins with a one-on-one session including the patient and family members. During this session, all information related to the treatment plan and potential side effects is reviewed verbally, and written material is given to the patient. Included in the written material is an oral care booklet developed by the specialty-trained dental hygienist who also serves as a significant resource person for the team. During this initial teaching, the nurse practitioner uses a pre-treatment assessment tool to identify patients at greatest risk for mucositis. Individualizing the teaching session for a patient and his or her family provides enhanced learning and facilitates development of a specific plan of care for that individual.

Education for oral care often starts at a rudimentary level. The majority of head and neck cancer patients who we have seen at St. John's Hospital have not seen a dentist for some time. The reasons for this vary but appear related to issues reflecting individual priority. Excellent articles have appeared in dental/dental hygiene journals about the role of pre- and post-dental care treatment for cancer patients. The National Oral Health Information Clearing

House (NOHIC)⁹ offers written information on oral cancer and oral complications of cancer treatment for patients and professionals. While large cancer centers often have access to comprehensive dental clinics, in smaller centers it is increasingly difficult to find dental care for indigent or Medicaid patients, another reason patients may not seek care. Thus starting treatment with a diseased oral cavity can worsen oral complications. These smaller cancer centers and their patients benefit from federally-qualified health/dental centers and the efforts of generous dental professionals who give of their time and resources. Persons working at general dentistry practices may not see patients undergoing treatment and thus they may not be familiar with acute complications occurring during treatment or how these conditions affect the oral cavity. Private practice clinicians may hear about "sore mouths" but may not realize the significance of this particular treatment complication.

Complications of oral cancer therapy

According to the National Institute of Dental and Craniofacial Research, approximately one-third of Americans diagnosed with cancer will develop oral complications from their treatment.¹⁰ Patients undergoing chemotherapy and/or radiation treatment for oral cancer may experience several challenges, including direct mucosal injury, xerostomia, myelosuppression, nausea and vomiting, infection, trismus, and osteoradionecrosis. Just as the oral cavity is an integral component of the human body and not a separate entity, mucositis is interrelated to various complications of cancer treatment. As the immune system and mucosal lining are challenged, the following cascade of events is initiated.

1) **Mucositis** is characterized by erythema, inflammation, pain, and ulceration and may affect, as noted, up to 100% of patients receiving concurrent radiation and chemotherapy to treat cancer of the head and neck. With mucositis comes increased risk for systemic infections and increased pain, leading to impaired nutrition and affecting a patient's psychological status and quality of life.¹¹

In establishing guidelines, MASCC/ISOO identified basic oral care as an integral component in preventing and managing mucositis.⁷ The panel also advocates the use of oral protocols developed by a multidisciplinary team. At St. John's Hospital, a basic oral care protocol is implemented at least 3 times a day which incorporates: (1) use of a soft toothbrush that is routinely replaced, (2) flossing and rinsing with a warm baking soda and salt water mouth rinse, (3) use of non-petrolatum-based lip products, and (4) soaking dentures overnight in denture cleanser and washing the container each morning with soap and water.

Management of mucositis starts with accurate assess-

ment, including appropriate diagnostic testing such as cultures or smears. Identification of the following inter-related symptoms and appreciating their relationship to mucositis allows implementation of an individualized plan of care.

2) **Xerostomia**, or dry mouth, is a short-term complication of chemotherapy and can become a lifelong complication of head and neck radiation therapy. Dry, fragile tissues may easily ulcerate, causing mild to severe mucositis. Because of changes in the quality and quantity of salivary flow related to the radiation field, there is a lifelong risk of rampant tooth decay in patients undergoing radiation to the head and neck. Dry mouth can also cause dietary alterations, as swallowing becomes more difficult. Talking with family and friends may be hampered, also affecting quality of life.

Keeping the mouth moist is key to the management of xerostomia. Small, spray-top water bottles can be used regularly to hydrate oral tissues. Prescription medication such as pilocarpine hydrochloride or cevimeline may be prescribed by the radiation oncologist at the initiation of treatment to lessen the severity of xerostomia. Lip moisturizers, including lanolin hydrous or products with beeswax, cocoa butter, aloe vera, or vitamin E can be used. Lifelong daily use of a fluoride gel is recommended to prevent the devastating effect of radiation caries.¹²

3) **Trismus**, the tightening of the muscles of mastication, may result from surgery and/or radiation therapy. This condition tends to develop over time and may reduce the ability to masticate food, leading to malnutrition. Deliberately opening and closing the mouth 20 times to stretch the muscles 3 or more times a day helps to prevent this complication. A variation is the “7-7-7” regimen, in which the patient opens and closes the mouth 7 times, holding the open position at the maximum opening without pain for 7 seconds, 7 times a day.

One treatment for trismus utilizes tongue depressors taped together, with the patient holding them in the mouth for several seconds. The number of depressors is then increased to enlarge the opening of the mouth to the degree tolerated. In addition, manual devices are available to assist with jaw rehabilitation.¹³ The Oral Cancer Foundation recommends using a jaw motion rehabilitation system¹ (available at www.atosmedical.com), which has been shown to improve the mobility of the mandible, speech, and swallowing. It also allows for proper mobilization of the temporomandibular joint and stretches connective tissues and thereby addresses a secondary cause of pain and tightness associated with trismus.^{14,15} Physical therapists or speech therapists are ideal resources to manage and treat trismus.

¹TheraBite®, Atos Medical AB, Philadelphia, PA

4) **Osteoradionecrosis**, which usually is not an acute oral complication, requires careful and long-term monitoring. Osteoradionecrosis represents blood vessel compromise and necrosis of bone following radiation therapy and tends to affect the mandible more than the maxilla. It is a lifelong risk for this patient population. A key to prevention is a pre-treatment dental evaluation. Knowledge of radiation treatment fields, dosage, prognosis, and patient commitment, in addition to panoramic radiograph and a clinical exam, helps the oral surgeon/dentist determine the life expectancy of the remaining dentition. Necessary extractions are done prior to the initiation of radiation when adequate healing will occur.

Osteoradionecrosis may occur spontaneously, or as a result of tissue dehiscence from denture pressure or the failure of tissues to heal after an extraction. Consultation between the radiation oncologist and an oral surgeon is required to determine the best course of treatment, which may include hyperbaric oxygen therapy. Although the incidence of osteoradionecrosis has decreased, it is important to evaluate patients carefully when planning dental surgery/treatment after radiation therapy.¹⁶

5) **Pain results from oral ulcerations and/or the presence of infections** such as herpes simplex or *Candida albicans*. It is important that every healthcare team member help the patient recognize that mouth soreness constitutes real pain. A pain scale should be used so that appropriate medication can be prescribed. Once pain is managed, issues of malnutrition, dehydration, and quality of life should improve.

6) **Myelosuppression** is chemotherapy-induced and can be associated with mucositis. Neutropenia, anemia, and thrombocytopenia resulting from myelosuppression put the patient with oral mucositis at significant risk for infection, bleeding, and delayed healing of oral mucosa.

Bleeding may occur during chemotherapy as anticancer drugs affect the ability of blood to clot. Gingival tissues affected by periodontal disease may bleed spontaneously or when irritated by eating, brushing, or flossing. Bleeding may be either mild, with petechiae forming on lips, soft palate, or buccal mucosa, or severe, especially along the gingival margin or from ulcerations in the mouth. Spontaneous gingival bleeding may occur when platelet counts fall to less than 30,000/mm³, especially when there is pre-existing gingivitis or periodontitis. Even normal function or routine oral hygiene (brushing and flossing) can induce gingival oozing in the presence of pre-existing gingivitis and periodontitis.¹⁷

It is not uncommon for oncology patients to be advised not to use toothbrushes and dental floss when platelet counts drop below 40,000/mm³. This is poor advice.

Healthy gingival tissues do not bleed unless traumatized. Discontinuing routine oral hygiene can increase infection risk that may not only promote bleeding but also increase risk of local and systemic infection because of accumulation of bacterial plaque. The fact that this recommendation is still made supports the necessity for pre-cancer therapy dental and dental hygiene treatment to reduce gingival or periodontal conditions.

The degree of health professional oversight of thrombocytopenic patients is an important consideration relative to risk of mechanical hygiene procedures. With comprehensive monitoring, patients can often safely brush and floss throughout a thrombocytopenic episode. While the use of foam brushes rather than a toothbrush is often promoted to reduce risk of bleeding, this practice is also ill-advised. Studies show that foam brushes cannot adequately remove dental plaque along gingival margins and therefore promote gingival infection and bleeding.¹⁷ Oral care recommendations are listed in Table 1.

Table 1: Oral care recommendations	
Toothbrushes	Soft, extra-soft, or ultrasoft bristles minimize pressure on gingival tissues to provide gentle cleaning
Toothpaste	May use favorite fluoride toothpaste, toothpaste for sensitive teeth may be helpful; mint flavoring may cause burning, can brush with baking soda
Rinses	Warm baking soda/salt water QID Warm salt water QID Non-alcohol-based mouthwashes
Dry mouth	Artificial saliva products, moisturizing liquids & sprays; encourage fluids, sugar-free mints/gum with xylitol
Fluoride gels, paste, & rinses	Stannous fluoride, sodium fluoride, remineralizing agents, fluoride varnishes

7) **Infection** may occur when the buccal mucosa is damaged and the immune system is weakened. Oral mucositis allows bacteria, fungi, and viruses access to the bloodstream. When the immune system is weakened by chemotherapy, even normal oral bacteria can cause infections, as can disease-causing organisms acquired at the hospital or from other sources. As the white blood cell count falls, infections may occur more often and become more serious. Neutropenic patients are at increased risk of developing serious infections. Dry mouth may also increase the risk of oral infections. Patients with mucositis and neutropenia have a relative risk of septicemia that is significantly higher than individuals without mucositis.¹⁸

Normal bacteria and fungi reside in the oral cavity, but opportunistic infections may develop when the immune system is compromised or neutropenia is present. Antibiotics and steroid drugs are often prescribed when a patient receives chemotherapy; however, these drugs change the balance of bacteria in the mouth and may also result in opportunistic infections. The mouth contains the fungi, *Candida albicans*, which exist as part of our normal oral flora. Fungal overgrowth can be serious and requires prompt treatment. Deeper fungal infections in the esophagus or intestines are treated with drugs administered orally or by injection.

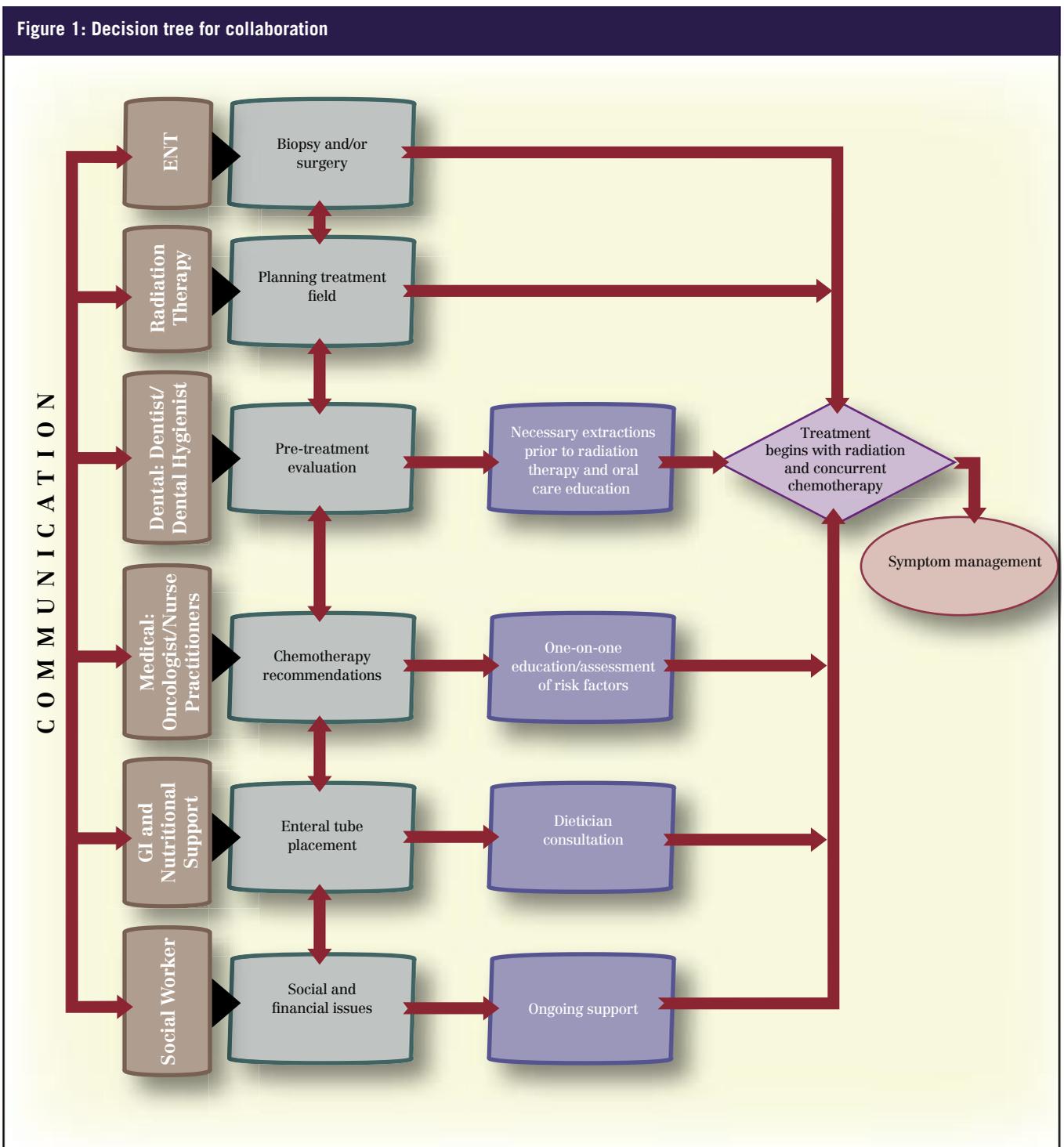
Patients receiving chemotherapy, especially those with weakened immune systems, are at risk of mild to serious viral infections. One trial showed that nearly 50% of head and neck cancer patients with ulcerative mucositis had HSV-1 (herpes simplex virus-1) infection on culture.¹⁹ Early diagnosis and treatment of infections are important. Herpes viral infections often recur during cancer treatment. Management includes prescription of appropriate medications specific to the infectious agent, based on culture results. A list of possible medications is provided in Figure 2 (page 49). Examples of oral complications are pictured in Figure 3 (page 50).

8) **Malnutrition** is common in patients undergoing treatment for head and neck cancer. The cancer itself, poor diet before diagnosis, and complications from surgery, radiation therapy, and chemotherapy can lead to nutritional shortfalls. Patients can lose the desire to eat because of nausea, vomiting, trouble swallowing, sores in the mouth, or dry mouth. When eating causes discomfort or pain, the patient's quality of life and nutritional well-being suffer.

Nutritional deficiencies can be minimized by modifying the texture and consistency of the diet and by eating more frequent meals and snacks to increase calories and protein. Ongoing nutritional assessment and counseling with a registered dietitian should be part of any patient's treatment plan.²⁰ As treatment progresses, many patients will transition to liquid diets using high-calorie, high-protein liquid nutritional supplements, and some may require gastric feeding tubes. Almost all patients receiving concurrent chemotherapy and radiation therapy will become fully dependent on enteral nutritional support within 3 to 4 weeks of therapy. Numerous studies demonstrate the benefit of enteral feedings initiated at treatment onset before significant weight loss occurs.^{21,22}

9) **Taste changes** (dysgeusia) and **taste loss** (hypogeusia) are further aggravated when mucositis affects the tongue. Since taste buds on the tongue recognize sweet, sour, and bitter, these tastes may be heightened or distorted. Some people experience a metallic taste in their mouths during

Figure 1: Decision tree for collaboration



treatment. Taste normally returns within several weeks of treatment completion.

10) **Fatigue** in cancer patients undergoing high-dose chemotherapy and/or radiation is related to either disease or treatment.²³ Many factors related to mucositis also impact development of fatigue. Pain from mucositis leads to sleep deprivation or metabolic disorders, which collec-

tively contribute to fatigue and compromised oral status. A fatigued patient may find it difficult to comply with the rigorous mouth care regimen necessary to minimize the risk of mucosal breakdown. The overall impact of fatigue may also affect the psychosocial component of a patient's life, contributing to depression.¹⁷

11) **Psychosocial and quality of life issues** are impor-

Table 2: List of resources from CancerCare®

CancerCare (800) 813-HOPE; www.cancercare.org
National Cancer Institute’s Cancer Information Service (800) 4-CANCER; www.cancer.gov
American Cancer Society (800) ACS-2345; www.cancer.org
American Head & Neck Society (310) 437-0559; www.headandneckcancer.org
American Society of Clinical Oncology (888) 651-3038 www.plwc.org
Association of Clinicians for the Underserved (703) 442-5318; www.clinicians.org
Association of Oncology Social Work (215) 599-6093; www.aosw.org
Intercultural Cancer Council (877) 243-6642; www.iccnetwork.org
Multinational Association of Supportive Care in Cancer (504) 296-2095; www.mascc.org
National Center for Frontier Communities (505) 820-6732; www.frontierus.org
Oral Cancer Foundation (949) 278-4362; www.oralcancerfoundation.org
Support for People with Oral and Head and Neck Cancer (800) 377-0928; www.spohnc.org
The Wellness Community (888) 793-WELL; www.thewellnesscommunity.org
The Yul Brynner Head and Neck Cancer Foundation, Inc. (843) 792-6624; yulbrynnerfoundation.org

tant components of the plan of care. Oral complications of cancer, including oral mucositis, are among the most devastating short- and long-term problems encountered by people with cancer because they affect eating and communication, the most basic of human activities. A study by Dodd and colleagues²⁴ examined the effect of mucositis on patients receiving chemotherapy. Patients who developed mucositis had a significant increase in mood disturbance compared with patients who did not develop mucositis. Further, the Profile of Mood Status (POMS) subscales of depression and anger showed the same pattern of significant increases. The authors determined that development of mucositis adversely impacted patients’ affective states.

Management of these quality of life issues is paramount to a patient’s well-being and improved outcomes. Consistently monitoring potential complications and collaborative communication contribute to improved outcomes.

Decision tree for collaborative care

Management of symptoms and complications associated with treatment of head and neck cancer patients requires

implementation of multidisciplinary guidelines. Any discussion of various protocols should include the Clinical Practice Guidelines developed by MASCC and the ISOO expert panel. In addition to guidelines for mucositis, other national guidelines such as those from the National Comprehensive Cancer Network (NCCN) address fatigue, nausea and vomiting, and neutropenia, and provide a foundation for evidence-based practice to manage the symptoms and complications associated with mucositis. For each institution and dental practice, a priority should be to utilize national guidelines along with current research findings to develop multidisciplinary protocols specific to head and neck cancer patients undergoing concurrent radiation and chemotherapy.

The decision trees provided in Figure 1 (page 47) and Figure 2 (page 49) illustrate processes utilized when a newly diagnosed patient with head and neck cancer enters the healthcare system at St. John’s Hospital. The process reflects interdisciplinary communication and decision-making in establishing a treatment plan.

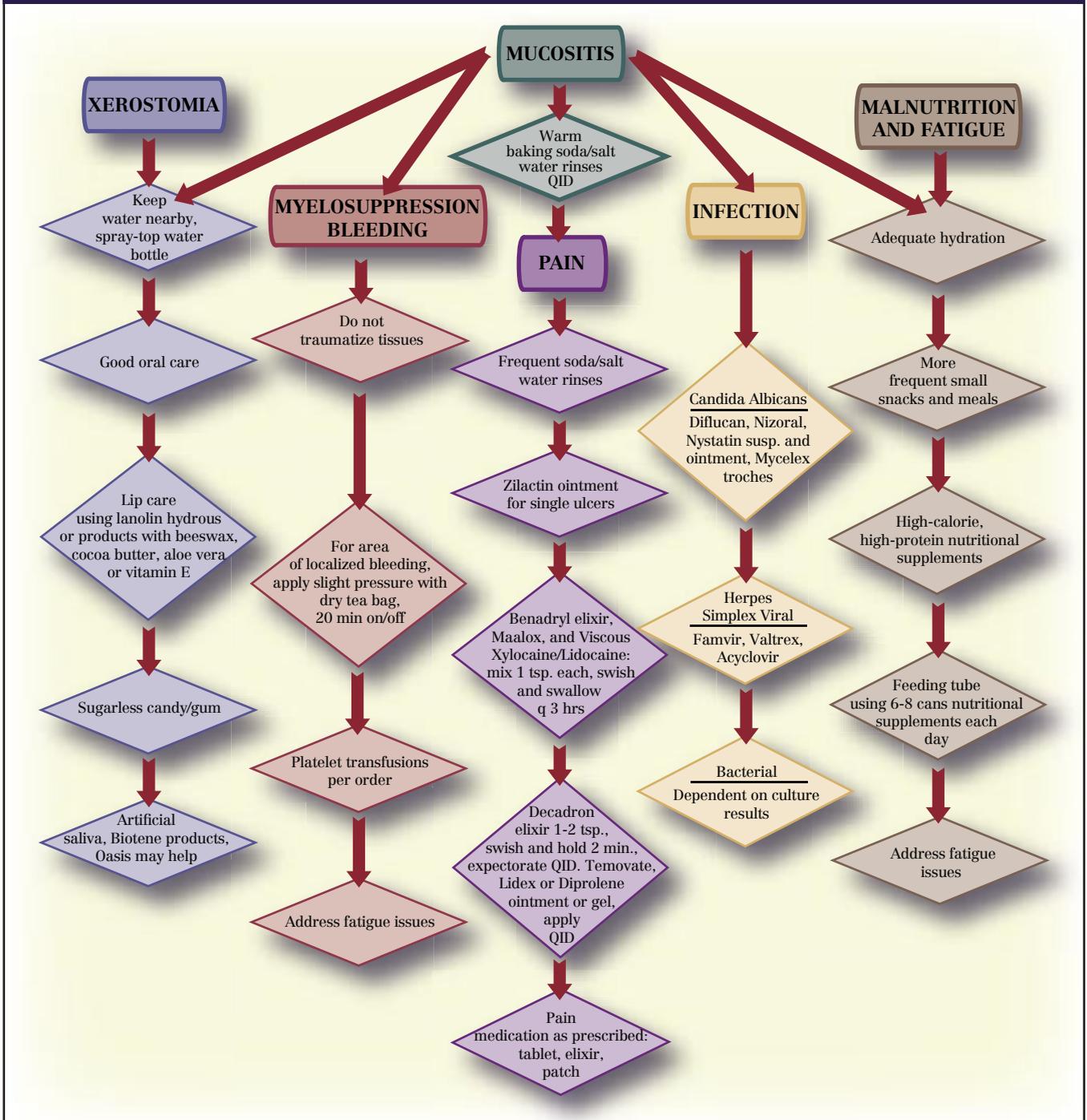
Considerations for the dental team

For dental practices actively participating in a patient’s cancer treatment, supplemental or additional oral care instructions can be given. Ask the patient about specific instructions he or she has been given by the medical team. When providing patient education, it is important to assess an individual’s oral health awareness and motivation. Some individuals faithfully attend dental and dental hygiene appointments and have excellent oral hygiene, while others require reinforcement to attend to oral hygiene needs. Reviewing complications of cancer therapy and the need for meticulous oral hygiene to prevent or reduce oral effects of therapy cannot be over-emphasized. Verbal and written home care instructions should include brushing, flossing, use of oral rinses and, when appropriate, application of daily fluoride therapy. Providing sample products for xerostomia and oral care allows an opportunity for evaluation and preference. Customized messages can be provided at each appointment as a reminder of key practices that must be performed daily.

In addition, brochures, pamphlets, and fact sheets can be presented to patients to help them learn more about their condition and treatment. The NOHIC Website offers information for both patients and healthcare professionals.⁹ The Websites of other professional associations that offer supplemental resources appear in Table 2.

Throughout the course of cancer treatment, dental health professionals should consider other practical matters. For example, patients undergoing cancer therapy may prefer appointments scheduled coincident with their energy

Figure 2: Decision tree for symptom management



level: some may find a late afternoon appointment difficult because they fatigue easily, or, alternatively, an early morning appointment may be a struggle. Others may prefer the last appointment of the schedule to have time to review questions with the healthcare provider without feeling rushed. This also provides an opportunity to reinforce home care efforts and provide encouragement if coping is an issue.

In addition, it is helpful to develop a strategic methodology for patients, including reviewing blood levels prior to scheduled appointments, maintaining contact with the oncology team to advise them of oral health considerations and treatment and, when appropriate, establishing regular contact with caregivers. In this way, communication between all team members and support personnel is fostered throughout cancer therapy.

Figure 3: Complications of oral cancer therapy



Mucositis



Candida albicans



Herpes simplex viral lesions



Mucositis, Candida albicans, and herpes simplex

(Photos courtesy of Diane McClure, RDH, MS)

Oral health professionals may also establish relationships with cancer treatment agencies and product companies. Creating a network of resources enables the provider to offer additional information to patients that can extend beyond oral healthcare.

Once a patient completes the surgical, radiation, and/or chemotherapy regimen, they begin the recovery phase. While there is a sense of relief that treatment is complete, the patient still requires follow-up by oral health professionals. When the patient completes radiation therapy, he or she should be evaluated every 4 to 8 weeks for the first 6 months.¹² A continuing care schedule can be established thereafter that is appropriate to the patient's oral health needs. If the patient has completed chemotherapy, resuming a continuing care appointment depends on his or her immune status. If the patient continues to experience compromised immune function, his or her hematologic status should be assessed prior to performing dental treatment or surgery. All recovering patients should be

examined annually with a full head and neck cancer examination, oral examination and throat examination to evaluate potential cancer recurrence.

Conclusion

The oral cavity is directly and indirectly affected by concurrent radiation and chemotherapy treatment for head and neck cancer. At St. John's Hospital, a nurse practitioner and dental hygienist have collaborated to develop patient care guidelines. The clinical expertise of each healthcare professional and interdisciplinary education increases the likelihood of better patient outcomes. Dental practices contribute to the management of both short- and long-term complications of cancer treatment. Assisting with comfort measures for mucositis improves quality of life and shows concern for the patient. Frequent recall appointments to monitor possible long-term complications following radiation therapy are imperative. Patients feel secure knowing that both dental and medical disciplines are involved with their care. In the future, we

suggest cross-training in both undergraduate and graduate nursing and dental hygiene programs. Currently, there are insufficient numbers of specialty-trained dental hygienists with emphasis on oncology/medicine and there is inadequate education related to the oral cavity in nursing/medicine. Recently, the importance and impact of mucositis has been well documented in highly respected journals in both dentistry and oncology. The cascade of events occurring once treatment complications and symptoms develop can be better managed when calibrated, collaborative guidelines are implemented.

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