



**BC Cancer Agency**

CARE & RESEARCH

An agency of the Provincial Health Services Authority

# ORAL CARE MANUAL FOR THE CANCER PATIENT

**ORAL ONCOLOGY / DENTISTRY**

**MARCH 2013**

# ORAL CARE MANUAL FOR THE CANCER PATIENT

## Purpose of the Document

The purpose of this manual is to provide evidence-based guidelines for the management of oral side-effects of cancer-related symptoms for patients treated at the BC Cancer Agency. Although written for the dental professional, it is hoped that the manual will serve as a useful resource for anyone involved in the oral care of the cancer patient including radiation and medical oncologists, radiation therapists, nurses, nutritionists, students and residents in training.

By reviewing the evidence, the oral oncology team hopes to standardize oral care protocols within the provincial program, not only in terms of providing a treatment algorithm for patient management but also by standardizing appropriate patient follow-up whether provided within the Cancer Agency or in the community. These algorithms and follow-up care schedules will also be integral features of the Head & Neck database project at the BC Cancer Agency.

## Introduction

It is well known that the maintenance of good oral health is important in cancer patients, including patients with hematologic malignancies. Oral pain and/or infections can cause delays, reductions or discontinuation of life-saving cancer treatment. Poor oral health can also lead to negative impacts on a patient's quality of life including psychological distress and social isolation and inadequate nutrition. By providing these guidelines, we can hope to achieve better patient outcomes in all of these parameters.

The information contained within this manual has been collected from many resources but, most significantly, from the recently-completed work of the Oral Care Section of the Multinational Association for Supportive Care in Cancer (MASCC) and the International Society of Oral Oncology (ISOO). Over the past two years, MASCC/ISOO has completed a systematic review of the literature on the common oral complications of cancer therapy and has published their findings in the *Journal of Supportive Care in Cancer*. As new evidence emerges in the literature these guidelines will need to be periodically updated.

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## Acknowledgements

This manual was developed by members of the BC Cancer Agency Department of Oral Oncology/Dentistry and is endorsed by the Head & Neck Tumour Group.

# **Oral Care Manual for the Cancer Patient**

## **BASIC ORAL CARE / DENTAL DISEASE**

Good oral care is fundamental to preventing and decreasing oral complications and has the potential to modify the acute and long-term sequelae of therapy. The major purpose of basic oral care is to maintain normal function and comfort of the oral tissues and to reduce the risk of bleeding (both local and systemic).

Patients should receive their education about possible oral complications and preventive mouth care practices prior to commencing treatment (whether radiotherapy or chemotherapy). Patients should be encouraged to follow these practices during active treatment and recovery.

More important than the particular agent(s) being used for basic oral care is the frequency and thoroughness with which basic oral care is performed. Good oral care becomes more important as mouth soreness increases and as immune function decreases.

## **GENERAL TREATMENT RECOMMENDATIONS**

- Adequate nutrition and fluid intake, based on body weight, is important to maintain good oral hard and soft tissue integrity. Therefore, working collaboratively with nutritionists is often important.
- To keep lips moist, use water soluble, lanolin (wax-based) or oil based lubricants. Apply lubricant after each cleaning, at bedtime, and as needed. Avoid oil-based lubricants on the inside of the mouth. Petroleum-based products should be avoided. The patient should be encouraged to not touch any lip lesions.

## **ORAL RINSES**

- A recommended oral rinse solution is a bland oral rinse consisting of 2 teaspoons of baking soda in a litre of water. The rinse should be prepared at least once daily. The patient should rinse, swish and spit with a bland rinse several times after brushing or flossing and as needed.
- 0.12% aqueous (non-alcohol) Chlorhexidine can be recommended as an adjunct rinse in patients who struggle in maintaining good oral hygiene.

## **BRUSHING**

- Remove food debris and dental plaque from teeth and gums without damaging the oral soft tissues.
- Brushing with an ultra soft bristled brush should be done within 30 minutes of eating and before bed. Rinse brush after use in hot water and allow to air dry. As with flossing recommendations, brushing may be stopped and teeth cleaned with a moist gauze or foam sponge (toothette) if brushing causes gingival tissue bleeding that persists for longer than 2 minutes. Once platelet count has recovered adequately, regular brushing can resume.

## **FLOSSING**

- Floss at least once daily; use waxed floss to minimize trauma to gingivae. If flossing causes bleeding of the gums which does not stop after 2 minutes, it should be discontinued; similarly, flossing should not be done when platelet counts drop below  $20 \times 10^9/L$  and restarted when instructed by the oral care team. Patients who have not flossed routinely before cancer treatment should not begin flossing at this time. Some patients with oral cancer may not be able to floss at all.

## **DENTURE CARE**

- Dentures should be evaluated before the start of cancer therapy and any rough areas should be smoothed. If dentures appear loose or unstable in any way, their use should be minimized until the end of cancer therapy. Patients should discontinue using their dentures if they become sore or painful during cancer therapy.
- If new dentures are to be fabricated post-radiotherapy, this should be delayed until oral tissues are completely healed and the patient's weight has stabilized.
- Remove dentures before brushing; brush and rinse dentures after meals and at bedtime. Leave dentures to soak in a rinsing solution overnight.

## **FOLLOW-UP CARE**

- Patients should be monitored closely for the development of dental caries; radiograph frequency should be determined by the caries rate and the patient's demonstrated level of oral hygiene.

- The frequency of dental hygiene follow-up care should be determined by several factors including the severity of xerostomia, caries rate and the patient's oral hygiene. Most post-radiotherapy dry mouth patients should have their teeth cleaned and checked every 3-4 months to prevent tooth loss. This recommendation can be best made in consultation with the dental hygienist and attending dentist.
- Commercially available mouthwashes are generally not recommended for patients with oral complications as they often contain alcohol bases or astringent properties.
- Moisturize the mouth with water or artificial saliva products (e.g. MoiStir Spray, Biotene products, etc.) or other water soluble lubricants for use inside the mouth. Dry mouth patients should be encouraged to sip water frequently to maintain oral comfort and cleanliness.

## **FLUORIDE**

- For head and neck cancer patients who are anticipated to become severely xerostomic post-radiotherapy and are at high risk for dental decay, customized fluoride trays can be fabricated for daily use with total application time not exceeding 4 minutes.
- Fluoride trays should only be recommended for patients who are severely xerostomic and are highly motivated to comply with fluoride tray use long-term. Due to poor long-term compliance, alternatives such as prescription strength fluoridated toothpastes (e.g. Prevident, Xpur, etc.) should be recommended for the majority of dry mouth patients and for patients whose caries risk is low.

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# Oral Care Manual for the Cancer Patient

## SALIVARY GLAND HYPOFUNCTION & XEROSTOMIA

Salivary gland hypofunction (diminished flow) and xerostomia (the subjective sense of dry mouth) are often seen following external beam head and neck radiotherapy and can have a significant effect on oral health and quality of life.

As a result of hyposalivation, patients are at an increased risk of caries, periodontal diseases, oral infections, halitosis, taste distortion, oral soreness and difficulties in swallowing and talking. Salivary gland hypofunction can also affect denture retention and cause the tissues to be more easily traumatized.

- All cancer patients should have an oral exam before initiation of cancer therapy. This should include volumetric testing of resting and stimulated whole saliva.
- There are no agreed-upon pretreatment strategies to prevent or minimize xerostomia.
- Best treatments for chronic xerostomia include regular use of topical fluorides, attention to oral hygiene, oral lubricant and/or sialogogues.
- The lack of saliva can affect denture retention and make the patient's gingiva more easily prone to injuries from ill-fitting dentures. Prostheses should be carefully evaluated by the caring clinician for any areas of roughness or problems in retention, stability and supporting surfaces.

## PREVENTION STRATEGIES

Nothing has been shown to predictably prevent radiation therapy-induced salivary gland hypofunction. However, intensity modulated radiation therapy (IMRT) shows the greatest potential as a preventive strategy by permanently preserving salivary gland function in head and neck cancer patients. IMRT can reduce the dose to salivary glands and result in less salivary gland hypofunction and subjective xerostomia. IMRT is, therefore, the recommended RT delivery modality for the majority of head and neck cancers.



## **MANAGEMENT STRATEGIES**

### **PILOCARPINE**

Pilocarpine is a cholinergic parasympathomimetic agent which has been shown to enhance salivary secretion by stimulating muscarinic receptors on the surface of salivary gland cells and, thereby, reducing the sensation of dry mouth in patients in whom some salivary gland tissue has been preserved. Typical dosing is 2.5-5.0 mg 3x per day.

Results have been more impressive using pilocarpine after rather than during radiation therapy but results are variable. Some patients do not experience a benefit. Adverse effects are common (sweating, headache, urinary frequency and nausea) but are generally reported as mild to moderate in severity. Caution should be used in administering pilocarpine to patients with cardiovascular and pulmonary disease. Pilocarpine is contraindicated in patients with narrow-angle glaucoma, uncontrolled asthma and gastric ulcers.

Since benefit declines after cessation of pilocarpine therapy, the side-effects and cost of long-term therapy often make pilocarpine an ineffective long-term management strategy.

### **SUGAR-FREE LOZENGES, ACIDIC CANDIES OR CHEWING GUM**

Such products may provide transient relief from xerostomia by stimulating residual capacity of salivary gland tissue.

### **ORAL MUCOSAL LUBRICANTS / SALIVARY SUBSTITUTES**

Various saliva substitutes have been developed and are commercially available in the form of moisturizing gels, mouthwashes or sprays (Biotene products, MoiStir, XeroLube, etc). Results are variable and the major disadvantage is the generally short duration of relief they provide. Patients may prefer to frequently sip water instead.

### **ACUPUNCTURE**

There is data to suggest that acupuncture treatment may offer an intervention that is helpful to some patients for the treatment of RT-induced xerostomia in patients with residual functional capacity.

## **HYPERBARIC OXYGEN TREATMENT**

Several studies have indicated a possible benefit to patients but research is weak. In British Columbia, however, this would not be a covered benefit under MSP.

## **GENERAL NUTRITIONAL MANAGEMENT STRATEGIES**

- Add extra moisture to foods; moisten food by adding sauces, gravy, butter, dressings, broth or another liquid
- Soft, mild tasting food is often better tolerated
- Frequent sips of cold water or dissolving ice chips in mouth may provide better mouth comfort
- Foods or fluids which may further dry or irritate the mouth and teeth should be avoided (including highly acidic foods and fluids, foods high in sugar, caffeine and alcohol).

## **DENTURES**

- In some cases, saliva production can be stimulated by the insertion of dentures. Otherwise, patients might need to regularly moisten their mouth with water for dentures to be comfortable and allow the patient to chew, swallow and talk.

## **FOLLOW-UP CARE**

Head and neck patients with post-RT salivary gland hypofunction require regular follow-up care as they have an increased risk of dental and periodontal disease and future risk of osteonecrosis (should teeth in the high-dose field need to be extracted in the future). The frequency of follow-up care depends on several factors which include: (a) the degree of oral dryness (b) the patient's oral hygiene (c) the patient's caries risk.

In general, dry mouth patients should be seen every 3-4 months for dental hygiene therapy and dental exams. Patients who demonstrate excellent oral hygiene and/or a low rate of dental decay can be seen less frequently (every 6 months). The frequency of follow-up should be determined by the dentist.

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# **Oral Care Manual for the Cancer Patient**

## **ORAL MUCOSITIS**

Oral mucositis (OM) is one of the most significant adverse side-effect of cancer therapy and yet tends to be under-reported by patients and, therefore, under-treated by physicians and dentists. OM is a significant quality of life issue for both patients and their families and, left untreated, can lead to high levels of anxiety, depression and social isolation.

Oral mucositis is common during high-dose H&N radiotherapy/combined modality therapy (~ all patients will experience some level of OM), stem cell transplant therapy (75-100%) but less commonly seen following standard dose chemotherapy (40%). Certain chemotherapy drugs (e.g. 5-FU, methotrexate, melphalan, cyclophosphamide, etoposide and cisplatin) are known to more commonly cause significant OM compared to other agents. Signs and symptoms of OM can persist for many weeks following the cessation of therapy.

### **RISK FACTORS FOR ORAL MUCOSITIS**

Patient-related risk factors for OM include: gender (women > men), older than 65 years or younger than 20 years, poor oral hygiene, oral infections, salivary gland dysfunction, viral infections, poor nutrition, smoking, alcohol, dehydration and poor-fitting dentures.

Treatment-related risk factors for OM include: RT dose and schedule, the chemotherapy agent/dose/schedule, myelosuppression, neutropenia, inadequate oral care during treatment and certain medications (antidepressants, antihypertensives, antihistamines, diuretics and sedatives).

The development of OM is predominantly influenced by the type of malignancy and the cytotoxic therapy administered but patient factors also play a role. Several patient-related factors such as poor oral health at baseline, existing mucosal damage, impaired immune status and decreased salivary production are among the risk factors. Younger patients are more susceptible to OM due to a more rapid epithelial mitotic rate; conversely, the physiologic decline in renal function may result in higher rates of OM in older patients.

As many of the risk factors cannot be controlled, the importance of establishing and maintaining excellent oral hygiene throughout cancer therapy to lessen the risk of severe oral mucositis becomes increasingly evident.

A key component of OM diagnosis and management is the use of an agreed-upon, validated scale to allow better inter-professional communication and patient management. At the BCCA, we recommend the use of the WHO scale which is a mixed-variable scale (ie accounts for both signs and symptoms of OM). It is as follows:

### **WHO ORAL MUCOSITIS ASSESSMENT SCALE**

**Grade 0** – no change over baseline

**Grade 1** – erythema and oral soreness

**Grade 2** – erythema and oral ulceration; patient able to eat solids

**Grade 3** – oral ulcers; patient able to take liquids only

**Grade 4** – oral alimentation impossible

### **PREVENTION STRATEGIES**

There are disappointingly few things that have been shown to be helpful in the prevention of oral mucositis. The best approach appears to be a thorough pre-treatment dental assessment in which the pre-existing oral infections and potential dental complications are treated and the patient is instructed in how to maintain excellent oral hygiene measure during cancer treatment.

General strategies for the prevention of oral mucositis are as follows:

#### **DOs**

- Practice preventive dental care
- Treat dental caries
- Repair broken teeth or dentures
- Remove orthodontic brackets
- Keep mouth and lips moist
- Maintain good fluid intake
- Maintain intake of protein and vitamins
- Eat bland, soft foods

#### **DON'Ts**

- Avoid mouthwashes containing alcohol
- Avoid spicy, acidic and coarse foods
- Do not consume extremely hot or cold foods
- Do not consume alcohol
- Do not use tobacco

## **FOR RADIATION-INDUCED ORAL MUCOSITIS**

### **The following strategies should be considered:**

- The use of midline radiation blocks and 3-dimensional RT or IMRT to reduce mucosal injury
- Benzylamine (Tantum) oral rinse can help prevent RT-induced oral mucositis in patients with H&N cancer receiving moderate dose (<5000 cGy) radiation therapy
- Low Level Laser Therapy (LLLT) application may be helpful in preventing severe mucositis but requires specialized equipment and training which is not widely available.
- There is no evidence that mucosal coating agents, antimicrobial lozenges or chlorhexidine oral rinse will be helpful in preventing oral mucositis

## **FOR CHEMOTHERAPY-INDUCED ORAL MUCOSITIS**

### **The following strategies should be considered:**

- There is some evidence for the use of ice chips (cryotherapy) for the prevention of oral mucositis, particularly when patients are receiving bolus 5-FU or high-dose melphalan as part of conditioning regimen for stem cell transplant.
- Keratinocyte Growth Factor (Palifermin) has been found to be beneficial for the prevention of all categories of mucositis; in particular, for patients receiving high-dose chemotherapy and total body irradiation (TBI) for treatment of hematologic malignancies with stem cell transplant. Note that the use of Palifermin is impractical in the out-patient setting as it is given as an iv infusion, typically starting 3 days pre-transplant and continued for 3 days post-transplant.

## **MANAGEMENT STRATEGIES**

- Oral mucositis management is based on palliation of symptoms
- Communication with both the patient and the patient family is important; reassure the patient that what they are experiencing is a side-effect of treatment and that it will go away once treatment has been completed
- A multidisciplinary team approach is critical to include nursing, radiation therapy and , pain and symptom management specialists

**It is important to use an evidence-based, step-wise approach to OM management based on the severity and progression of patient symptoms.**

## **PRIOR TO CANCER THERAPY**

- Complete dental exam
- Dental disease stabilization: acute and chronic dental complications
- Patient education / motivation

## **START OF CANCER THERAPY**

- Preventive measures *if indicated* (oral cryotherapy, tantum, palifermin, lasers, etc)
- Bland oral rinses (2 tsp baking soda in one litre of water) used 3-4x/day
- Regular brushing and flossing
- Frequent reassessments using a multidisciplinary team approach

## **MILD PAIN AND DYSFUNCTION**

- Topical analgesics and anesthetics (Magic Mouthwash, Viscous Xylocaine)
- Mucosal protectant agents
- Mild analgesic agents (non-opioid and mild opioids, as indicated)
- Dietary modifications

## **MODERATE PAIN AND DYSFUNCTION /PERSISTENT OR INCREASING PAIN**

- Moderate strength opioids / sustained release analgesics
- Diet / Fluid modification

## **SEVERE PAIN AND DYSFUNCTION**

- Strong opioids / continuous delivery analgesia
- Consider hyperalimentation

In summary, oral mucositis is a common side-effect of cancer therapy. Evidence-based preventive strategies are limited; management is based on palliation of symptoms using a stepped approach. Patient education, frequent reassessment during cancer therapy and the involvement of a multidisciplinary team are foundational to best practice.

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# Oral Care Manual for the Cancer Patient

## DYSGEUSIA

Dysgeusia is variably defined as an abnormal or impaired sense of taste, often described by patients as a bitter, metallic, salty or unpleasant taste. Dysgeusia is closely linked to changes in olfaction as both taste and smell are involved in producing the sense of flavour.

Alterations in taste and smell in cancer patients, due to either malignancy itself or therapeutic interventions, is a prevalent problem occurring in the majority of cancer patients treated with chemotherapy (56%), radiotherapy (66%) or combined modality therapy (76%). These alterations can affect the daily quality of life of these patients and may lead to malnutrition, weight loss and, in severe cases, significant morbidity. Fortunately, only a small fraction of patients continue to experience dysgeusia one year after the completion of treatment.

## PREVENTION AND MANAGEMENT STRATEGIES

There are no treatments that have been shown to effectively prevent or manage dysgeusia in cancer patients. However, the following comments can be offered in terms of patient management:

- Zinc supplements (using either zinc gluconate or zinc sulfate) have been shown to be helpful in some cases of idiopathic dysgeusia; these same benefits have not been shown in most cases of cancer-induced dysgeusia. Zinc is a recognized cofactor for the production of alkaline phosphatase, the most abundant enzyme within the taste bud membrane.
- Dietary counseling has been shown to have a small effect on reducing early-onset dysgeusia in the cancer setting (30% vs 40%) but a more significant effect on long-term dysgeusia (5% vs 25%). Flavour enhancement may be suggested for patients with taste loss as it can increase enjoyment of food in patients with insufficient nutritional intake and decreased taste sensitivity. Referring dysgeusia patients to an oncology nutritionist is therefore recommended.
- Dysgeusia does not seem to be a significant complaint in H&N RT patients when the tip of the tongue is excluded from the RT field.

- Eliminating potential dental sources of bad taste in the mouth (eg leaking dental restoration, untreated periodontal disease or infected teeth) may be helpful in some patients.

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# Oral Cancer Manual for the Cancer Patient

## TRISMUS

Trismus is defined as a tonic contraction of the muscles of mastication resulting in a limited ability to open the mouth. It is a complex and dynamic process that, despite its significance, is less frequently described in the literature and frequently overlooked by head and neck cancer patients and care providers. When it does occur this condition predisposes patients to significant functional challenges and can compromise quality of life. This may include a compromised ability to perform oral hygiene, reduced nutrition due to impaired chewing, difficulty with speech, compromised social eating and challenges with access for oral/dental monitoring and care. There may also be an increased risk of aspiration.

- Trismus may be the presenting symptom related to disease.
- Radiation therapy involving the temporomandibular joint, the pterygoid muscles, or the masseter muscle, is most likely to cause trismus due to painless shortening of a muscle as a result of fibrosis or scarring of the supporting tendons, ligaments of muscle fibers.
- The prevalence of trismus increases with increasing doses of RT and levels in excess of 60 Gy are more likely to cause trismus.
- The frequency and severity of trismus following radiation therapy to jaw structures is unpredictable.
- Radiation induced trismus is usually a gradual process that may begin toward the end of RT, or at any time during the subsequent 24 months.
- The condition may worsen over time, remain the same, or improve, even in the absence of treatment.
- Patients who have been previously irradiated, and who are being treated for recurrent disease, appear to be at higher risk of trismus than those who are receiving their first treatment suggesting that the effects of RT are cumulative over many years.
- Concomitant CT and RT may be associated with a higher prevalence of trismus.

## PREVENTION STRATEGIES

- Early treatment of trismus has the potential to prevent or minimize many of the consequences of this condition.
- Newer radiation modalities (IMRT) may decrease the prevalence of trismus compared to conventional radiotherapy.

## **MANAGEMENT STRATEGIES**

- At the time of initial assessment a panoramic radiograph should be obtained as a baseline reference.
- MRI of TM structures should be considered to evaluate joint structure and mechanics if an internal TM joint derangement (i.e. closed lock) is suspected.
- If TM joint or muscle pain is an associated symptom conservative care that may include diet modification, application of heat, anti-inflammatory or muscle relaxant medication and/or occlusal appliance therapy is recommended.
- Range of motion exercising performed independently or with the assistance of a physiotherapist appears to be helpful in the management of trismus.
- The use of tongue blade stretching exercises, the Therabite® system or the Dynasplint Trismus System® may be helpful in the reduction of cancer therapy-induced trismus.
- Pentoxifylline appears to exert a modest therapeutic effect in patients with radiation-induced trismus.
- Botulinum toxin injections have been shown to improve pain scores and masticatory muscle spasm, but have shown no improvement in trismus itself.

## **FOLLOW-UP CARE**

- Trismus should be assessed at the pre-treatment and end of treatment dental assessments and at the standard three and twelve month reviews.
- If trismus is identified and management strategies have been recommended re-evaluation should continue every three to six months for a total of 24 months or at the discretion of the treating practitioner.
- Maximum mouth opening, the presence or absence of pain and compromises in speech and/or eating should be recorded at each appointment.
- The importance of a meticulous daily oral care regimen and regular dental evaluation and treatment is important in maintaining optimal oral health when trismus is present.

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# Oral Cancer Manual for the Cancer Patient

## FUNGAL INFECTIONS

*Candida albicans* is a common resident microorganism of the oral cavity and, under normal conditions, co-exists with other resident oral flora and does not cause disease. However, changes in the local and/or systemic environment can result in overgrowth of certain fungal species, leading to clinical infection.

Factors resulting in these changes may include:

- Immunosuppression
- Antibiotic therapy
- Salivary gland hypofunction
- Local tissue damage caused by chemotherapy or radiation therapy induced oral mucositis

Cancer patients receiving chemotherapy and/or radiation therapy are subject to some or all of these predisposing factors and are therefore at significant risk for the development of oral fungal infection.

Immunosuppressed cancer patients are at greater risk of developing oral candidiasis with spread to the oropharyngeal regions and into the systemic circulation.

Oral candidiasis accounts for the vast majority of oral fungal infections and can be asymptomatic or associated with oral discomfort, a burning sensation and/or an alteration in taste sensation.

Oral candidiasis can have a number of clinical presentations, including:

- **\*Angular cheilitis:** erythema, fissuring, and/or crusting at the corners of the mouth
- **\*Pseudomembranous candidiasis:** white curd-like pseudomembranes, which can be removed with examiner pressure, leaving behind an erythematous mucosa
- **Chronic hyperplastic candidiasis:** hyperkeratotic white patches, with or without hyperplasia of epithelial tissue, which cannot be removed by scraping
- **\*Erythematous candidiasis:** red inflamed areas of the oral mucosa, often under a denture ("denture stomatitis) and most commonly linked to nighttime wear of the prosthesis, poor denture hygiene or the presence of a deteriorating temporary soft lining material.
- **Denture Stomatitis:** presents as erythema and/or edema under the surface of a denture. It is most commonly linked to nighttime wear of the prosthesis or

the presence of deteriorating temporary soft lining material.

\*Most common forms of oral candidiasis reported in oncology patients

## **PREVENTION STRATEGIES**

- Oral candidiasis can be easily treated, particularly in the early stages, making early recognition and treatment important.
- Patients should be educated to brush their prostheses at least once per day, take their dentures out at night and leave them to soak overnight in chlorhexidine or a denture cleansing solution.

## **MANAGEMENT STRATEGIES**

### **Denture Stomatitis**

- If the patient wears dentures, the prostheses should be carefully sanitized and always be taken out at nighttime.
- If contaminated soft relining material is present it should be removed and replaced with hard relining material.
- If denture stomatitis does not resolve with better hygiene and denture care, proceed to applying antifungal therapy using a nystatin ointment (100,000 units/g) on the tissue-contacting surface (intaglio) of the denture prior to wear. Nystatin ointment should be applied on the denture intaglio until two days after the lesions disappear.

### **Mild Oropharyngeal Candidiasis (topical therapy preferred)**

- Nystatin oral suspension  
(affordable and easy to use; can be used as a denture soak; contains sugar; limited oral tissue contact time)
  - 100,000 units/ml
  - 10 ml as an oral rinse and swallow or expectorate 4 times per day for 7-14 days
- Clotrimazole lozenges

(from a compounding pharmacy; requires saliva to dissolve; may contain sugar)

- 50-100 mg
  - allow lozenge to dissolve in mouth 1 – 2 times per day for 7-14 days
- Nystatin ointment  
(should be used to treat denture stomatitis if it does not resolve with better hygiene and denture care)
    - 100,000 units/gm
    - Apply to the tissue-contacting surface of the denture prior to wear until related tissue irritation resolves

### **Angular Cheilitis, Hyperplastic or Erythematous Candidiasis**

- Nystatin ointment
  - Apply sparingly to corners of the mouth or other involved areas 3 - 4 x per day for 7-14 days

If topical agents are not well tolerated or the clinical response is poor, then it is advised to proceed with the use of a systemic agent.

### **Moderate to Severe Oropharyngeal Candidiasis**

- Fluconazole
  - 100 mg po daily x 7-14 days
  - Other systemic antifungal medications (ie: micafungin, itraconazole voriconazole, amphotericin B) may be of benefit and could be considered. Consultation with the treating oncologist is required.

## **FOLLOW-UP CARE**

- Lack of response is most often related to non-compliance/inadequate treatment.
- Drug resistance is uncommon.
- To prevent relapse after initial treatment maintenance therapy may be required.
- Reevaluation at 1-3 month intervals is indicated during active treatment using topical agents.
- Reevaluation at 2 - 4 week intervals is indicated during active treatment using systemic agents.



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# Oral Care Manual for the Cancer Patient

## VIRAL INFECTIONS

Viral infections in the oral cavity or the perioral region are frequent complications of cancer treatment. Significant associated pain and discomfort are common and may compromise oral intake. Early diagnosis of oral viral infections is important, since treatment may reduce the spread of infection and alleviate symptoms such as pain and dehydration that may result in hospitalization.

This document is limited to a discussion about oral and/or perioral viral infections in cancer patients. Most commonly, these infections are associated with herpes viruses including:

### **Herpes Simplex Virus (HSV)**

- Humans are the only natural reservoir for HSV and the virus is responsible for primary and recurrent infections.
- After primary infection, the HSV-1 virus becomes latent, usually in the dorsal root ganglia of the trigeminal nerve
- 80% of the population are asymptomatic carriers of the virus.
- 20-40% of people will experience reactivation of the virus at some time that causes recurrent infection.
- Reactivation may follow exposure to cold, sunlight, stress, trauma, illness or immunosuppression.
- Recurrent HSV in immunocompromised cancer patients may result in atypically large areas of mucosal involvement with significant associated pain and impairment in oral function.
- Transmission is due to viral shedding into saliva and typically occurs by direct contact with saliva. Viral shedding into saliva may occur during asymptomatic infection but it is thought that the risk of infection is much smaller than during symptomatic infection. The risk of transmission is highest 1-4 days from the onset of symptoms but the duration of infectiousness may last up to 12 days.
- Viral culture is considered the gold standard diagnostically but is limited by the short time period of viral shedding and the length of time required to acquire test results.

### **Varicella zoster virus (VZV)**

- VZV is responsible for chicken pox (primary infection) and shingles (recurrent infection).
- After primary infection the virus becomes dormant in a dorsal root or cranial nerve ganglion.
- Viral reactivation, commonly known as shingles, occurs in 0.3-0.5% of the population.
- C-3, T-5, L-1 and L-2 are the most commonly involved nerves.
- The trigeminal nerve is occasionally involved. When the ophthalmic branch (V1) is involved ocular involvement may result in serious complications. Consultation with an ophthalmologist is therefore indicated.

### **Epstein–Barr Virus (EBV)**

- EBV is known to preferentially infect B lymphocytes and has been associated with malignancies such as nasopharyngeal carcinoma, Burkitt's lymphoma and Hodgkin's lymphoma. Oral hairy leukoplakia is also caused by EBV and manifests in HIV-infected individuals.

### **Cytomegalovirus (CMV)**

- Cytomegalovirus (CMV) is an uncommon cause of oral ulceration in immunosuppressed individuals such as post-hematopoietic cell transplantation (HCT) patients

## **PREVENTION AND MANAGEMENT STRATEGIES**

### **Herpes simplex virus (HSV)**

- Milder cases of HSV (recurrent herpes labialis and recurrent intraoral HSV infections) are self-limiting and can be managed with supportive care including acetaminophen, oral hydration, soft diet and an analgesic oral rinse such as benzydamine. Topical acyclovir may reduce the duration and pain of lesions if applied early.
  - 5% acyclovir cream

- Apply to affected area every 3-4 hours, for a total of 6 x/day for 7 days
  - Apply a sufficient quantity to adequately cover all lesions.
- Antiviral therapy may be considered in healthy hosts for primary HSV infection and when recurrent episodes are frequent.
    - Acyclovir 200 mg po 5x per day for 5 days
    - Valacyclovir 2 gm po 2x per day for 24 hours
  - Antiviral therapy is indicated in recurrent and chronic HSV in immunocompromised cancer patients.
    - Acyclovir 400 mg po 5x per day for 5 days
    - Valacyclovir 500 mg po 2x per day for 5-10 days\*

\*Dose reduction may be indicated when renal dysfunction is present
  - Chronic suppression may be required in immunosuppressed hosts if recurrences are frequent.
    - Valacyclovir 500 mg po 2x per day

### **Varicella zoster virus (VZV)**

- Acyclovir 400 mg po 5x per day for 7-10 days.
- For severe infection, Acyclovir 5 mg per kg body weight IV 3x per day for 5-7 days (or Acyclovir 200 mg po every 12 hours when creatinine clearance is <10 mL/min).
- Valacyclovir 1000 mg po 3x per day for 7 days

### **Cytomegalovirus (CMV)**

- Ganciclovir and Foscarnet are commonly used in treatment of CMV infection.
- Consultation with the treating hematologist/oncologist is required.

## FOLLOW-UP CARE

- Reevaluation is indicated every 7-14 days following diagnosis or initiation of antiviral therapy.
- The importance of a meticulous daily oral care regimen is important in maintaining optimal oral health when viral infections are present.

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# Oral Care Manual for the Cancer Patient

## CHRONIC ORAL GRAFT-VERSUS-HOST DISEASE

Chronic graft-versus-host disease (GVHD) is a multi-organ disease that occurs following hematopoietic stem cell transplantation. It is a major complication of allogeneic hematopoietic cell transplantation (HCT). Common sites of involvement include skin, gastrointestinal mucosa, liver and mouth. Symptoms usually present within 2 years after allogeneic HCT and may be preceded by a history of acute GVHD.

The pathogenesis of chronic oral GVHD is poorly understood. Donor-derived immunocompetent T cells react against tissue after allogeneic transplant, directly or through exaggerated inflammatory responses.

Common oral signs and symptoms of chronic oral GVHD include:

- **Mucosa & Gingiva** lichenoid striations; erythema, ulceration; dorsal tongue depapillation
  - **Salivary Glands** oral dryness; multiple mucoceles
  - **Taste Buds** dysgeusia
  - **Musculoskeletal** trismus; reduced oral soft tissue mobility
- The provision of optimal supportive oral care of the HCT patient population requires knowledge and understanding of the disease and good communication with the interdisciplinary transplant team.
  - Good basic oral care is important in minimizing local factors that may aggravate or trigger oral symptoms related to chronic oral GVHD.
  - Infections arising from the teeth and mucosa should be prevented whenever possible.
  - Treatment of oral infections requires prompt attention in patients on systemic immunosuppressive therapy.

### • **PREVENTION AND MANAGEMENT STRATEGIES**

- Comprehensive treatment of chronic oral GVHD requires attention to the multiple potential oral complexities including mucosa, salivary glands, musculature, teeth and periodontium.
- Given the complexity of this patient population, customized management of the presenting oral conditions is indicated.
- In general, management of chronic oral GVHD focuses on optimizing oral soft tissue health and controlling related symptoms such as pain, sensitivity and oral dryness.

## Chronic Oral GVHD

- Topical treatment of oral sensitivity and/or pain is complimentary to the medical management of transplant patients.
- Topical steroids have been adopted for use in chronic GVHD based on their well-accepted use in the management of other chronic inflammatory oral mucosal conditions.
- If chronic GVHD is isolated to the oral mucosa, topical treatment may reduce the requirement for systemic immunosuppressive therapy.
- Topical steroid preparations commonly used at BCCA (Oral Oncology) as local treatment for chronic oral GVHD include:
  - Dexamethasone 0.1mg/ml - 0.4 mg/ml (obtained from a compounding pharmacy)
    - 10 cc as an oral rinse and expectorate 1-4 x/day for 7-14 days before evaluating treatment response
    - Maintenance therapy is usually indicated
  - Clobetasol ointment
    - Apply sparingly to involved areas QD – TID
    - Dry tissue before each application
    - Nothing to eat or drink for 30 minutes following application
- Since topical steroids increase the risk of fungal overgrowth, antifungal prophylaxis should be considered.
- Other less commonly used topical formulations used in refractory circumstances include tacrolimus, cyclosporine, azothiaprime and thalidomide.

## Salivary Gland Hypofunction

- Chronic oral GVHD may result in hyposalivation and an associated feeling of oral dryness secondary to progressive salivary gland atrophy.
- Oral dryness increases the risk of mucosal injury, oral fungal infection and dental disease. It may also compromise speech, mastication and overall quality of life.
- Additional aspects of oral care related to salivary hypofunction are referenced in Section 2 of this manual.

## Oral Infections

- Viral and fungal infections of the oral mucosa are frequently superimposed in patients with chronic oral GVHD. This may be compounded by mucosal dryness and immunosuppression.

Additional aspects of oral care related to viral and/or fungal infections are referenced in Sections 6 & 7 of this manual.

### **Bisphosphonate-related osteonecrosis of the jaw**

- Patients with cGVHD are often treated with long-term steroids and may develop related osteopenia or osteoporosis requiring bisphosphonate therapy. This puts this patient group at risk for the development of antiresorptive-agent osteonecrosis of the jaw (ARONJ).
- Individuals with multiple myeloma often receive long term intravenously bisphosphonate medications placing this patient group at significant risk of ARONJ.
- Additional aspects of oral care related to this condition are referenced in Section 10 of this manual.

### **Secondary Malignancies**

- Long-term survivors of HCT have an increased risk of developing secondary malignancies including squamous cell carcinomas of the oral cavity.
- Individuals with chronic GVHD of the oral mucosa may be at increased risk of developing risk.
- Based on present evidence and the potential for benefit, it is recommended that oral cancer screening be offered annually to HCT patients with chronic oral GVHD.
- Distinguishing chronic oral GVHD from a malignant transformation may be challenging.
- Additional oral cancer screening information is referenced (3,4) below.

### **General Dental Health**

- Careful attention should be given to preventing dental and periodontal disease.
- When chronic oral GVHD is active and there is associated oral dryness or mucosal sensitivity there may be a reduction in compliance with daily oral care regimens thereby increasing the risk of dental caries and/or periodontal disease.



- Meticulous oral hygiene should be encouraged and reinforced.
- Dental intervention should aim at eliminating active dental or mucosal infection.
- Periodontal maintenance should be routine.
- The question of antibiotics prophylaxis for invasive dental procedures in patients with a history of stem cell transplant must be discussed with the treating hematologist/oncologist. In general, the following guidelines apply:
  - Antibiotic prophylaxis for invasive dental therapy is recommended for stem cell transplant patients who are immunocompromised (ie remain on immunosuppressant therapy).
  - Assuming immune competence and no other indication for antibiotic prophylaxis (e.g. prosthetic heart valve), there is no need to routinely give antibiotic prophylaxis post-SCT for invasive dental treatments.
  - Although supporting evidence is limited, antibiotic prophylaxis for patients with venous access devices remains recommended prior to invasive dental procedures.
  - Given the complex and diverse nature of this patient group, consultation with the treating hematologist/oncologist is strongly recommended when the approach to treatment is unclear.

## **FOLLOW-UP CARE**

- Optimal treatment of the HCT patient population requires good communication and an interdisciplinary team approach.
- Regular general dental and periodontal care should be reinforced.
- A comprehensive oral mucosal examination should be performed at the time of general dental review with particular attention given to chronic oral GVHD, salivary gland hypofunction, secondary oral (viral, fungal) infection and jaw osteonecrosis.
- An annual oral cancer screening examination is recommended for all individuals with chronic oral GVHD.

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# Oral Care Manual for the Cancer Patient

## OSTEORADIONECCROSIS

Osteoradionecrosis (ORN) is the condition characterized by having both of the following:

- Exposed bone through overlying skin or mucosa for > 3 months
- Positive history of radiation therapy to the affected area

It has an estimated prevalence of 5-7% amongst post-radiation patients with head & neck cancer.

Once developed it can be a tenacious condition to eradicate. Treatment can carry significant morbidity, at times resulting in extraction of multiple adjacent teeth or disfiguring jaw resections.

### RISK FACTORS

- Poor dentition & oral hygiene
- High radiation dose (>6000cGy)
- Smoking
- Ill-fitting prosthesis causing chronic trauma to tissue
- Dental extractions
- Other surgical procedures (apicoectomy, periodontal surgery, implant surgery)
- Trauma

### PREVENTION STRATEGIES

Prevention remains a key strategy in ORN management. Dental professionals have the opportunity to reduce the risk of ORN to their patients. The following are evidence-based treatment recommendations.

#### **Prior to Radiation Therapy**

The goal is to minimize risk factors and prevent need for post-radiation surgery. Treatment should include:

- Patient education
  - Impact of radiation and proper home care

- Smoking cessation
- Comprehensive dental exam
- Addressing all caries & periodontal disease
- Dental cleaning
- Extraction of all teeth with guarded or poor prognosis including teeth with level 2-3 furcation involvement, teeth that are severely decayed and non restorable, teeth that present endodontic lesions and/or that are severely mobile.
  - Post-radiotherapy extraction is the most common cause of ORN. Therefore, pre-XRT extraction of multiple teeth is not uncommon. Salvage therapy of teeth with guarded or poor long-term prognosis should not be attempted. It is important to remember that anticipated morbidity of ORN is often much worse than morbidity of edentulism.
  - Healing of 14-21 days prior to start of radiation therapy to allow for mucosalization is ideal but, in some scenarios, the oncologist may elect to start cancer therapy earlier.
  - Primary closure is recommended
  - Referral to oral and maxillofacial surgeon for extraction is recommended
  - Post-op coverage with
    1. Chlorhexidine 0.12% rinse BID
    2. Antibiotic (Amoxicillin; Clindamycin if Penicillin-allergic)

### **Following Radiation Therapy**

The goal is early intervention of dental issues to avoid subsequent surgical therapy.

- Elective surgery is contraindicated
- Implant surgery is not absolutely contraindicated but should only be considered where severe oral dysfunction is believed to be as morbid or more so than risks of future ORN risk
- Frequent recalls to address caries & periodontal disease early. In the setting of mucositis and xerostomia where caries risk is high, recall frequency could be increased to monthly.
- Identify bony exposure early. Common sites include posterior mandibular ridge, tori, exostoses & mylohyoid ridge.
- Endodontic, restorative and orthodontic therapies should continue as routine
- Non-restorable teeth with pulpal disease that would normally warrant extraction can be preserved by performing root canal therapy followed by a chamber-sealing restoration similar to an overdenture abutment<sup>11</sup>
- When extraction is unavoidable, it is recommended to
  - Refer to an oral and maxillofacial surgeon if possible
  - Perform flaplessly and atraumatically whenever possible

- Obtain primary closure if possible but not at expense of bone removal or wide flap elevation
- Post-op coverage with
  1. Chlorhexidine 0.12% rinse BID
  2. Antibiotic (Amoxicillin. If PCN allergic give Clindamycin.)
- Consider hyperbaric oxygen therapy (HBO)<sup>11</sup>
  - Evidence is insufficient to neither recommend nor refute pre-op HBO in this setting. It is empirically done in some institutions but not all. Individual clinician judgment is needed, often in consultation with the hyperbaric unit physician.

## MANAGEMENT STRATEGIES

Agreement on a definitive treatment protocol for ORN has not been reached in the literature. The following recommendations are based on consensus of the contemporary literature which still contains data which is largely empirical or based on expert opinion only.

### Abbreviated Classification

Stage I	Minimal soft tissue ulceration Limited exposed cortical bone
Stage II	Medullary bone exposure Does not respond to HBO
Stage III	Full thickness disease involving inferior border (Md) or nasal/sinus floor (Mx) Pathological fracture

(Schwartz & Kagan, 2002)

### Early exposure suspicious for ORN – Treatment

An exposure of <3 months duration is by definition not ORN and could simply be delayed healing. Spontaneous resolution is possible.

Local non-surgical wound care can be done.

1. Direct irrigation of lesion with Chlorhexidine 0.12% via syringe, BID.
2. Antibiotic, PO

*No evidence exists to support specific antibiotic agent selection, dosage, frequency and duration. The following empirical regimens are suggested:*

Amoxicillin 500mg TID, 7 days  
 Clindamycin 300mg QID, 7 days (2<sup>nd</sup> line if PCN allergic)  
 Erythromycin 500mg QID, 7 days (3<sup>rd</sup> line)  
 Doxycycline 100mg BID, 7 days (3<sup>rd</sup> line)

3. Grossly mobile and accessible sequestrum can be removed atraumatically
4. Consultation for HBO can be considered at this time

### **Stage I & II – Treatment**

Multi-therapy approach has been shown to have higher curative rates and should be taken at first intervention. Single-therapy “conservative” care has risks of failure and causing progression of necrosis. All of the following should be considered:

1. **Antibiotic:**  
As above list. Start one day prior to debridement when possible.
2. **Chlorhexidine rinse:**  
As above. Start one day prior to debridement when possible.
3. **Debridement:**  
Down to “bleeding bone”.  
**Small lesions:** This can sometimes be achieved flaplessly via removal of an exposed & mobile sequestrum. Access to curette underlying bone can be done through opening.  
**Larger lesions:** Routine subperiosteal flap. Definitive sequestrectomy and removal of suspicious bone. If rotary instrument is used, adequate irrigation is important.  
Teeth in involved bone are extracted.  
Clinically thickened and abnormal periosteum can be removed similar to treatment of chronic osteomyelitis.  
Any removed bony or soft tissue specimen should be sent for pathology to rule-out malignancy.
4. **Hyperbaric Oxygen:**  
Neither definitive data refuting nor recommending HBO exists. Data does support that single-therapy HBO (without surgical adjunct) has poor cure rate and is not recommended.  
Consultation with hyperbaric unit (HBU) is recommended if available.  
If recommended, common regimens are  
20/10: 20 dives pre-op, 10 dives post-op.  
30/10: 30 dives pre-op, 10 dives post-op.

### **Refractory Cases:**

It is not uncommon for patients to require multiple interventions prior to resolution. Clinical judgment is needed to consider other modalities:

1. Compromised host  
Improve nutrition, control underlying diabetes, immunocompromise, etc.  
Smoking cessation

2. Consider non-ORN diagnosis
  - Malignancy
  - ARONJ
3. Local wound care
  - Confirm patient is not wearing appliance or performing home care in a manner that creates pressure/friction to area
4. Resistant organism or patient non-compliance with antibiotics
  - Consider advancement to IV antibiotic, possibly long course via PICC line
  - Consultation with infectious disease is recommended on antibiotic choice and dosing
  - Suspicion for *actinomycosis*. Attempt to culture from previous debridements. Culturing requires special protocol which can be arranged with local laboratory in advance. Failure to culture does not rule-out actinomycosis infection as it can be difficult to culture.
5. Insufficient bony reduction
  - Assessment of lesion extension via plain-film radiography or via clinical appearance of bone is crude and sometimes inaccurate. Review of current radiograph for secondary foci & occult extension of lesion
  - Consider advanced imaging such as bone scans, MRI or CT scan in consultation with radiology
  - Extensive cases can require advancement to Stage III treatment.

### **Stage III – Treatment**

Jaw discontinuity is anticipated in these debridements as an intact border of “bleeding bone” is not achievable given full-thickness involvement.

- 1. Antibiotic:**
  - As above list. Start one day prior to debridement when possible.
- 2. Chlorhexidine rinse:**
  - As above. Start one day prior to debridement when possible.
- 3. Definitive segmental ostectomy with immediate reconstruction via vascularized bony flap:**
  - Usually in consultation with one or more of the following:
    - i) head & neck surgery
    - ii) plastic surgery
    - iii) oral & maxillofacial surgery
- 4. Hyperbaric Oxygen:**
  - Hyperbaric oxygen is believed to play less of a role in this modality. Consultation is made with the treating reconstruction surgeon.

## **Reconstruction**

In general absence of ORN should be observed clinically and radiographically for a period prior to considering reconstruction.

These criteria for periods of quiescence are in addition to any delay for reconstruction as indicated by their primary malignancy status.

- **Removable Appliance**

Observation of soft tissue maturation prior to denture fabrication

Ideally, soft tissue continuity should be observed for at least 3 months with no clinically visible signs of inflammation prior to fabricating new removable prosthesis.

In some cases, the patient presents with ORN under existing removable appliances. If the prostheses are retentive, well supported and stable, the patient can continue to wear their existing prostheses provided they are not putting any pressure or stress over the ORN lesion. Additionally, chlorhexidine can be applied inside the prostheses at the site of the ORN lesions to allow for proper surface contact time with the affected area.

If the prostheses are loose and not well fitting, the patient should be advised not to wear their prostheses until the ORN lesion resolves.

- **Implant Restoration**

Implant placement is not absolutely contra-indicated in post-ORN native bone but like all surgeries it has the possibility to trigger ORN. Individual case consideration should be made on whether improvement of oral dysfunction outweighs this risk.

Implant placement into non-irradiated vascularized bone flap has reasonable predictability and should be considered when possible.

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# Oral Care Manual for the Cancer Patient

## ANTIRESORPTIVE AGENT-INDUCED OSTEONECROSIS

Antiresorptive agent-induced osteonecrosis of the jaw (ARONJ) is the condition characterized by having all of the following:

- Exposed bone through overlying skin or mucosa for > 8 weeks
- Current or previous treatment with an antiresorptive agent
- No history of radiation therapy to the affected area

No cure exists for ARONJ. Advanced cases result in subtotal or total jaw resection with poor prognosis for reconstruction.

A limited body of literature now exists for bisphosphonate-related osteonecrosis of the jaw (BRONJ) since its initial reports in 2003. In recent years reports of ONJ associated with multiple other antiresorptive agents have surfaced and literature for these new agents are scant. This list now includes:

- Pamidronate (Aredia)
- Zoledronate (Zometa)
- Denosumab (Prolia)
- Bevacizumab (Avastin)
- Sunitinib (Sutent)

ONJ has an estimated prevalence of 0.8 - 12% amongst patients receiving IV bisphosphonate therapy for bony malignancies or bony metastases. Denosumab has been shown to have similar ONJ risks as Zoledronate. Bevacizumab & Sunitinib show lower rates on early reports (7 per 100,000, 27 per 100,000) however data on these two new agents are very limited.

### RISK FACTORS

- Poor dentition & oral hygiene
- Bisphosphonate therapy
- Smoking
- Ill-fitting prosthesis causing chronic trauma to tissue
- Dental extractions
- Other surgical procedures (apicoectomy, periodontal surgery, implant surgery)
- Diabetes
- Corticosteroid therapy

## PREVENTION STRATEGIES

There is no known cure for ARONJ. Prevention is critical. Dental professionals have the opportunity to reduce the risk of ARONJ to their patients. The following are evidence-based treatment recommendations for ONJ arising from bisphosphonates. It is prudent to extend the same treatment regimen to ONJ arising from non-bisphosphonate agents until further evidence is available to recommend otherwise.

The following recommendations are specific for high-dose, IV antiresorptive treatment in the cancer setting. They are not to be applied to non-cancer patients being treated for osteoporosis with lower doses and, most often, with PO agents.

### **Prior to Antiresorptive Therapy**

The goal is to minimize risk factors and prevent need for post-antiresorptive surgery. Treatment should include:

- Patient education
  - Impact of antiresorptive therapy and proper home care
  - Smoking cessation
- Comprehensive dental exam
- Address all caries & periodontal disease
- Dental cleaning
- Extraction of all teeth with guarded or poor prognosis.
  - Post-antiresorptive extraction is the most common cause of ARONJ. Therefore, extraction of multiple teeth or even full clearance is often recommended prior to commencing IV antiresorptive therapy. Salvage therapy of teeth with guarded or poor long-term prognosis should not be attempted. It is important to remember that anticipated morbidity of ARONJ is often much worse than the morbidity of edentulism.
  - Healing of 14-21 days prior to start of antiresorptive therapy to allow for mucosalization is ideal, but in some scenarios the oncologist may elect to start cancer therapy earlier.
  - Primary closure is recommended
  - Referral to oral and maxillofacial surgeon for extraction is recommended
  - Post-op coverage with
    - Chlorhexidine 0.12% rinse BID
    - Antibiotic (Amoxicillin; Clindamycin if penicillin allergic)

## **Following Start of Antiresorptive Therapy**

The goal is early intervention of dental issues to avoid subsequent surgical therapy.

- Elective surgery is contraindicated, including endodontic apical surgery
- Implant surgery is contraindicated following IV antiresorptive therapy
- Frequent recalls are recommended to address caries & periodontal disease early
- Identify bony exposure early. Common sites include posterior mandibular ridge, tori, exostoses & mylohyoid ridge.
- Endodontic and restorative care should continue
- Orthodontic therapy will encounter difficult tooth movement. (Role in triggering ONJ, if any, is still unclear).
- Non-restorable teeth with pulpal disease that would normally warrant extraction can be preserved by performing root canal therapy followed by a chamber-sealing restoration similar to an overdenture abutment
- When extraction is unavoidable, it is recommended to
  - Refer to an oral and maxillofacial surgeon if possible
  - Perform flaplessly and atraumatically whenever possible
  - Obtain primary closure if possible but not at expense of bone removal or wide flap elevation
  - Pre-op & post-op coverage with
    - Chlorhexidine 0.12% rinse 2x per day
    - Antibiotic (Amoxicillin.; If Penicillin allergic give Clindamycin)

## **MANAGEMENT STRATEGIES**

Agreement on a definitive treatment protocol for ARONJ has not been reached in the literature. The following recommendations are based primarily on recommendations from the 2009 AAOMS task force and 2011 ADA expert panel reports.

Treatment goal is improvement of pain, resolution of infection and prevention of progression. Eradication of necrosis is not a goal.

The following recommendations are specific for high-dose, IV antiresorptive treatment in the cancer setting. They are not to be applied to non-cancer patients being treated for osteoporosis with lower doses and, most often, with oral agents.

### Abbreviated BRONJ Classification

Staging	Criteria for Diagnosis
At Risk	Clinically normal History of antiresorptive therapy
Stage 0	No exposed bone Presence of non-specific symptoms or clinical and/or radiographic abnormalities <ul style="list-style-type: none"> <li>- Unexplained pain</li> <li>- Unexplained numbness</li> <li>- Unexplained paresthesia</li> <li>- Unexplained tooth loosening</li> <li>- Unexplained fistula</li> <li>- Changes in trabeculae pattern</li> <li>- Narrowing of IAN canal</li> </ul>
Stage 1	Exposed bone No pain No infection
Stage 2	Exposed bone Pain and/or infection is present
Stage 3	Necrosis beyond alveolar bone Radiographic osteolysis to inferior border, sinus or nasal floor Pathologic fracture Oronasal, oroantral or orocutaneous fistula

(AAOMS, 2009)

#### **At Risk**

- No treatment needed
- Routine dental care
- Patient education on risks of ARONJ, signs & symptoms

#### **Stage 0 (no exposure)**

- Pain meds as needed
- Antibiotic as needed
- Treat caries and periodontal disease as needed
- Surgery contraindicated

## **Stage 1 (exposure, asymptomatic)**

### **Wound Care:**

Direct irrigation of lesion with Chlorhexidine 0.12% via syringe, BID

### **Surgery:**

Surgery of any kind is contraindicated. This includes extractions, implants, periapical surgery, periodontal surgery and surgical debridement of necrotic bone.

### **Exception:**

Protruding necrotic bone can be trimmed conservatively and flaplessly.  
Symptomatic teeth in grossly involved bone can be extracted.

## **Stage 2 (exposure, symptomatic)**

### **Wound Care:**

As above.

### **Surgery:**

All contraindicated as above.

Same exception as above.

### **Antibiotic:**

By mouth, initial therapy with one of the following:

Amoxicillin 500mg TID

Clindamycin 300mg QID

Erythromycin 500mg QID

Doxycycline 100mg BID

No standard agent selection, dosing or duration exists.

Long-term dosing possible. Combination therapy possible. IV antibiotic possible.

High suspicion for actinomycosis in refractory cases.

### **Pain Medication:**

No standard dosing protocol exists.

Long-term therapy is possible. The potential for dependence, addiction and other adverse events should be considered before using opioid pain medication as maintenance.

Consultation with chronic pain management physician can be considered.

It is important to recall that the end point of all treatment is resolution of pain & infection. Sometimes a low-grade symptom complex is an acceptable outcome to patient and clinician. Resolution of bone exposure is not anticipated in most cases.

### **Stage 3 (extensive exposure, fistulae, pathologic fracture)**

#### **Debridement:**

These patients benefit from debridement or resection for long-term palliation.

#### **Adjuncts:**

The same adjuncts are indicated including:

Antibiotic

Chlorhexidine rinse

Pain medication

Continued non-surgical local wound care

#### **Reconstruction:**

There is limited success to reconstruction.<sup>21</sup> There is potential for ONJ recurrence at resection margin or recipient site despite vascularized bone flap reconstruction.

## **ADDITIONAL CONSIDERATIONS**

### **Hyperbaric Oxygen Therapy**

A randomized-controlled trial is underway to examine benefit of HBO for ARONJ management.<sup>22</sup> No evidence exists at this time to support recommendation for HBO for ARONJ management.

### **Emergency Care**

No guideline exists for emergency care. This includes management of severe abscess or trauma. Individual clinician judgment is needed.

Routine dental emergencies such as toothaches should be managed non-surgically, if possible.

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