BC CANCER

Provincial Health Services Authority

ORAL CARE OF THE CANCER PATIENT

BC CANCER
ORAL ONCOLOGY – DENTISTRY

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Oral Care of the Cancer Patient

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INTRODUCTION

The purpose of this manual is to provide user-friendly, evidence-based guidelines for the management of oral side-effects of cancer therapy. This will allow community-based practitioners to more effectively manage patients in their practices. 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, social isolation and inadequate nutrition. By providing these guidelines, we hope to achieve better patient outcomes.

The information contained within this manual has been collected from many resources but, most significantly, from the work of the Oral Care Section of the Multinational Association for Supportive Care in Cancer (MASCC) and the International Society of Oral Oncology (ISOO). MASCC/ISOO has continually updated and published systematic reviews of the literature on the common oral complications of cancer therapy. As new evidence emerges, these guidelines will be periodically updated.

The oral side-effects that are reviewed and presented in this manual include the following:

1. Salivary Gland Dysfunction / Xerostomia
2. Oral Mucositis / Oral Pain
3. Dysgeusia (Altered Taste)
4. Trismus
5. Oral Fungal Infections
6. Oral Viral Infections
7. Acute and Chronic Oral Graft Versus Host Disease (GVHD)
8. Osteoradionecrosis (ORN)
9. Medication-Induced Osteonecrosis of the Jaw (MRONJ)

In addition, general Principles in the Management of the Cancer Patient in community-based dental practice and a Medication List Guide have been included. This will help the community-based clinician offer the best possible care to their patient. Finally, it must be stated that guidelines are just that; in some topic areas, research quality is poor leading to a paucity of evidence-based guidelines. It is clinical judgment, experience and the individual patient response that ultimately determines recommended therapy.

SALIVARY GLAND DYSFUNCTION & XEROSTOMIA

Salivary gland hypofunction (the objective finding of reduced salivary flow) and xerostomia (the subjective sensation of dry mouth) are often seen following high dose H&N radiotherapy and are frequently reported by patients receiving various forms of chemotherapy or resection surgeries affecting salivary glands. Dry mouth can have a very significant effect on both oral health and general quality of life. Because of decreased saliva, patients are at increased risk of dental caries, periodontal disease, oral infection, halitosis, taste disorders, oral pain, difficulties with swallowing and speech, and more at risk of premature death from aspiration pneumonia. Diminished salivary flow can also affect denture retention and cause oral tissues to be more easily traumatized.

At BC Cancer, we routinely measure resting and stimulated salivary flow before the initiation of high dose H&N radiotherapy, as well as 3 months and 12 months post radiation. Similarly, we routinely measure salivary volumes at the Day 100 examination for allogeneic stem cell transplant patients as dry mouth is a consistent finding in patients with chronic oral GVHD due to T-cell mediated damage to salivary glands.

Frustratingly, there are very limited strategies in prevention of salivary gland hypofunction. Management strategies have focused on meticulous oral hygiene, topical fluoride and remineralizing rinses and pastes, oral lubricant gels and sprays and the use of sialagogue medications. Maintaining the patient's dentition after high dose radiotherapy is of paramount importance due to the risk of jaw necrosis should teeth need to be removed after radiotherapy. As importantly, healthy teeth and tissues add greatly to the patient's quality of life and ability to maintain adequate nutrition.

PREVENTION STRATEGIES

As mentioned, nothing has ever been shown to predictably prevent radiotherapy-induced salivary gland hypofunction. However, newer 3-dimensional radiotherapy delivery techniques (such as IMRT, VMAT and stereotactic radiotherapy) have shown great potential in preventing severe post-treatment oral dryness.

MANAGEMENT STRATEGIES

Conservative management:

- Frequent sips of water
- Following general nutritional strategies discussed below
- The use of various oral wetting agents such as moisturizing gels, mouthwashes and sprays. These products are available over the counter at most pharmacies.
- Biotene and Oral Science are two companies that make a wide range of dry mouth relief products.
- Sugar free mints and chewing gums: Some patients report transient relief from dry mouth by using xylitol-based products which can be ingested as a dissolvable mint, lozenge or chewing gum. Xylitol is a natural sugar that can not be metabolized by cariogenic bacteria to produce acidic by-products. Its presence alters oral bacteria environment while decreasing caries risk.

Pharmaceutical management:

Sialagogue medications have been used widely for patients with chronic and symptomatic oral dryness:

- Pilocarpine (Salagen) – 5 mg t.i.d
- Cevimeline (Evoxac) – 30 mg t.i.d
- Anetholtithion (Sailor) – 25 mg t.i.d
- Bethanacol – 25 mg t.i.d

Side-effects of these medications are not uncommon and may include headache, sweating, nausea, runny nose, increased urination and blurring of vision. Therefore, it is recommended that the dose be increased slowly over time to allow the patient to adjust to any side-effects. It should be noted that since drug costs are high and that benefits are not long-term and decline after cessation of therapy. These drugs therefore tend to be ineffective and/or impractical long-term management strategies for patients with dry mouth.

GENERAL NUTRITIONAL MANAGEMENT STRATEGIES

- Add extra moisture to foods by adding sauces, gravies, butter, dressings, broth or other liquids

- Soft, mild-tasting food is often better tolerated in the dry mouth environment
- Frequent sips of cold water or dissolving ice chips in the mouth may provide significant oral comfort
- Avoid highly acidic foods, foods high in sugar, caffeine and alcohol

Objective salivary gland hypofunction and subjective xerostomia are common long-term side-effects of high dose H&N radiotherapy and are less frequently seen with certain chemotherapy protocols. Dry mouth puts the patient at risk of serious dental and periodontal disease and may be a permanent condition. Therefore, effective management is important and patients must be reminded of the need to adhere to their proper hygiene protocols.

Fortunately, newer radiotherapy delivery techniques are resulting in less severe chronic oral dryness. Nonetheless, it remains a common and troubling side-effect of cancer therapy. The entire dental team has a role to play in effectively managing the dry mouth cancer patient.

ORAL MUCOSITIS

Oral mucositis is one of the most significant adverse side-effects of cancer therapy and yet tends to be under-reported by patients and, therefore, under-treated by dentists and physicians. Almost all patients receiving high-dose radiotherapy will experience some level of oral mucositis; similarly, almost all stem cell transplant (SCT) patients will experience some form of oral mucositis during their treatment. Oral mucositis is less frequently seen following standard dose chemotherapy and yet there are certain chemotherapy drugs (methotrexate, 5-FU, cisplatin, cyclophosphamide, etoposide and melphalan) that are known to more predictably cause some level of oral mucositis. Frustratingly for patients, signs and symptoms of oral mucositis can persist for many weeks following the cessation of cancer therapy.

Patient-associated risk factors for oral mucositis include: gender (women>men), age (older than 65 or younger than 20), poor general health, poor oral health, dry mouth, poor nutrition, smoking, alcohol use, dehydration and ill-fitting dentures.

Treatment-associated risk factors include: radiotherapy fields and dose, chemotherapy agents and dose and myelosuppression.

As many of these risk factors (both patient and treatment-related) are difficult to control, the importance of establishing and maintaining excellent oral hygiene throughout cancer therapy becomes increasingly important.

PREVENTION STRATEGIES

There are disappointingly few things that have been shown to be helpful in the prevention of oral mucositis. The most effective approach remains a thorough pre-treatment dental evaluation and teeth cleaning in which existing oral disease and infection is treated and stabilized and the patient is instructed in how to maintain excellent oral hygiene during their cancer treatment.

In general, patients are instructed to: practice preventive dental care, eliminate potential sources of irritation in their mouth (such as broken teeth or orthodontic brackets), maintain moisture of their lips and mouth, adequately hydrate and eat softer foods. Patients are similarly instructed to avoid: commercially available mouthwashes that may contain alcohol; spicy, acidic or coarse foods; foods or drinks that are extremely hot or cold; alcohol and tobacco products. Oral care products that are mint flavored or contain SLS (sodium lauryl sulfate) can also be particularly painful when the patients suffer

from mucositis, so switching to milder flavors (e.g. Children fruit flavored toothpastes) and SLS-free toothpastes might be necessary to maintain proper oral hygiene during mucositis flare up.

For patients Undergoing Head and Neck Radiotherapy

- Benzydamine (Pharixia) oral rinse has been shown to be effective in preventing severe oral mucositis in patients receiving up to 50 Gy of radiotherapy.
- Low level laser therapy (LLLT) is gaining much attention lately for both the prevention and treatment of oral mucositis. This is an area of active clinical research.
- There is surprisingly weak evidence to support the use of various mucosal coating agents, antimicrobial lozenges or antibacterial rinses (e.g. aqueous chlorhexidine) for the prevention of oral mucositis. However, there is a role for chlorhexidine in prevention of secondary bacterial infection in areas of established oral mucositis.

For Patients Undergoing Chemotherapy

- There is some evidence for the use of ice chips (cryotherapy) for the prevention of oral mucositis for certain chemotherapy protocols.
- Palifermin (Keratinocyte Growth Factor) has been shown to prevent oral mucositis in a wide range of chemotherapy settings. However, in the out-patient setting, this is impractical as Palifermin is given as an I.V. infusion.

MANAGEMENT STRATEGIES

Oral mucositis management is based on palliation of symptoms. As symptoms increase, a step-wise approach to symptom management is used:

As Cancer Therapy Begins

- Patients are instructed in the use of a bland oral rinse (saline and bicarbonate) for 30 seconds, 3-4x/day or more if desired. The rinse includes 1 tsp. baking soda, 1 tsp. salt and 4 cups of water mixed fresh daily to optimal effectiveness.
- Other management consideration (cryotherapy, Pharixia, palifermin, LLLT, etc.) based on the patient's needs may be initiated

Mild Oral Pain and Dysfunction

- Topical analgesics and anesthetic rinses are used (e.g. Magic Mouthwash, Viscous Xylocaine)
- Mucosal protectant agents (e.g. Maalox, Sucralfate)
- Mild Analgesics (Non-Opioid and Mild Opioid, as indicated)
- Dietary Modifications

"MAGIC" MOUTHWASH

A variety of mouthwash formulations – known as "magic mouthwashes" – are given to patients to palliate the symptoms of oral mucositis. There is no standard recipe for magic mouthwash, but most formulations contain some combination of a topical analgesic agent, a steroid, an antifungal agent, an antibacterial agent and (sometimes) a mucosal coating agent. The logic behind magic mouthwash is to combine ingredients with different potential mechanisms of action to provide the greatest relief. The truth is that it is often difficult to tell whether mouth sores are coming directly from the treatment or, instead, represent some form of opportunistic fungal or bacterial infection. When topical or systemic therapy does not palliate or resolve oral symptoms, biopsy of the affected area is often indicated. These patients should be referred to a BC Cancer Oral Oncology/Dentistry clinic.

At BC Cancer, three different mouthwashes are commonly prescribed, which vary in composition and cost. Of note, these mouthwashes require a compounding pharmacy.

1. **"Noll's Solution"**

   Contains 120 ml diphenhydramine, 30 ml nystatin suspension, 2.25 mg dexamethasone, ½ gram of tetracycline – all mixed with distilled water to a total volume of 203 ml. With a prescription written by a BCCA-affiliated physician, pharmacies can usually get Pharma Care approval within 1 day.

2. **"Pink Lady"**

   Contains an antacid suspension (Maalox) mixed anywhere from 1:1 to 3:1 with viscous lidocaine up to any volume. Patients can be given the ingredients separately to mix together themselves which keeps the cost very low. Viscous lidocaine is an open benefit prescription with Pharma Care.

3. **BC Cancer "Magic Mouthwash"**

   Contains 2 ml hydrocortisone injection (100 mg), 300 ml Benadryl and 100 ml nystatin mixed up to a 1-liter volume.

Moderate Pain and Dysfunction / Persistent or Increasing Oral Pain

- Moderate strength opioids and sustained-release analgesics
- Diet and Fluid Modification

Severe Oral Pain and Dysfunction

- Strong opioids/continuous delivery analgesia
- Consider hyperalimentation (feeding tube) if oral intake compromised

In summary, oral mucositis is a common and often serious side-effect of cancer therapy. Evidence-based prevention strategies are limited, and management is based on palliation of symptoms in a stepped approach.

Patient education, frequent assessment during cancer therapy and the involvement of a multidisciplinary team (including nursing, pain and symptom management and nutrition) are fundamental to best care for the cancer patient with oral mucositis.

DYSGEUSIA

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

Alterations in taste and smell are common in cancer patients either due to the malignancy itself or therapeutic interventions (e.g. chemotherapy drugs and radiotherapy to taste buds) used in treatments. Studies have shown that approximately 56% of chemotherapy patients, 66% of H&N radiotherapy patients and 76% of H&N patients treated with chemoradiation experience some form of dysgeusia.

These alterations in taste can affect the quality of life and lead to malnutrition, weight loss and, in severe cases, significant morbidity. Fortunately, the sense of taste usually does come back, and only a small fraction of patients experience dysgeusia one year after the completion of their cancer therapy.

PREVENTION AND MANAGEMENT STRATEGIES

There are no treatments that have been shown to be effective in preventing or managing dysgeusia in cancer patients. However, the following comments may be helpful:

- Zinc supplements (either in the form of zinc gluconate or zinc sulfate) have been shown to be helpful in some cases of dysgeusia. These benefits are more commonly seen in managing idiopathic dysgeusia as opposed to cancer-induced dysgeusia. Zinc is a recognized cofactor in the production of alkaline phosphatase, an important enzyme in the functioning of the taste bud.
- Dietary counselling has been shown to have a small effect on reducing early-onset dysgeusia but a more significant effect on long-term dysgeusia in the cancer setting. Flavour enhancement may be suggested for patients with decreased taste sensitivity as it can increase the enjoyment of food.
- Referring dysgeusia patients to an oncology nutritionist is therefore recommended.

In summary, dysgeusia is a common and troubling side-effect of many cancer therapies, particularly in the H&N patient group. While there are no proven effective therapies, the patient should be referred to an oncology nutritionist for dysgeusia management which may include zinc supplementation, flavour enhancements and dietary counselling. Patients should be reassured that dysgeusia symptoms are usually self-limiting within one year of completing their cancer therapy.

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 often overlooked in head and neck patient management. When it does occur, trismus predisposes the patient to significant functional challenges and can compromise oral hygiene practices, impact nutritional status, cause problems with speech and make it difficult for the patient to access routine dental care. There is also an increased risk of aspiration.

Radiation therapy to the temporomandibular joint and/or muscles of mastication (pterygoids and masseter) and scarring from resection surgeries are the most common causes of cancer therapy-related trismus. Radiotherapy may cause painless shortening of a muscle as a result of fibrosis or scarring of the supporting tendons, ligaments and muscles fibres. The prevalence of trismus increases when effective radiotherapy dose to the joints/muscles is greater than 60 Gy. Of note, curative doses for most H&N cancers are in the 60-70 Gy range.

PREVENTION STRATEGIES

Early detection and treatment has the potential to prevent or minimize many of the consequences of untreated and developing trismus. Therefore, it is important to educate patients regarding trismus prevention strategies and exercises before their treatment. Patients with a history of jaw problems need to be monitored particularly closely. Patients should be encouraged to seek our assistance if they experience symptoms of trismus while undergoing their radiotherapy.

At BC Cancer, we routinely measure inter-incisal opening at the new patient appointment and review radiation treatment fields to determine the likelihood of trismus symptoms for patients. A baseline panoramic radiograph is taken on all patients to rule out pre-existing degenerative joint disease and/or jaw fractures. At the new patient pre-radiotherapy examination, patients are provided instructions for jaw exercises which are to be performed while undergoing radiotherapy.

With the advent of 3-dimensional radiotherapy techniques (in particular, IMRT and VMAT), fewer patients are experiencing severe trismus compared to patients treated with 2-dimensional radiotherapy techniques.

MANAGEMENT STRATEGIES

- Conservative management includes diet modification, application of moist heat to the affected muscles, anti-inflammatory and/or muscle relaxant medication and consideration of an occlusal appliance.
- Range of motion exercises can be performed independently or with the assistance of a physiotherapist.
- The use of tongue blade stretching exercises or Therabite/Dynasplint systems are often helpful in the management of radiotherapy-induced trismus.
- More recently, botulinum toxin (Botox) injections are used to decrease muscle spasm and pain, and have been shown to be useful in the resolution of trismus symptoms.

In summary, trismus is a potential side-effect of head and neck radiotherapy treatment, seen most commonly when the temporomandibular joints and associated muscles of mastication are in high-dose radiation fields (>60 Gy). Early detection and management of trismus symptoms are important in preventing more serious complications such as closed lock. If detected early, conservative management techniques are often sufficient to manage symptoms of trismus. Patients can be referred to a BC Cancer dental clinic for evaluation and treatment of their oncology-related trismus.

FUNGAL INFECTIONS

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

Pre-disposing factors of importance in cancer patients may include immunosuppression, use of broad-spectrum antibiotics, salivary gland hypofunction and local tissue damage caused by chemotherapy or radiotherapy.

Head and neck cancer patients are subject to many of these risk factors and are therefore at significant risk for developing an oral fungal infection. Immunosuppressed cancer patients are at even greater risk of developing an oral fungal infection and the possible development of disseminated fungal disease.

Oral candidiasis accounts for the vast majority of oral fungal infections. It can be completely asymptomatic or associated with oral pain, burning, altered taste or, in severe cases, ulceration. Clinical presentation can vary as well:

- **Angular Cheilitis**: erythema, fissuring and/or crusting at the corners of the mouth
- **Pseudomembranous Candidiasis**: white curd-like pseudomembranous plaques which can be removed with pressure, exposing an erythematous mucosal base
- **Chronic Hyperplastic Candidiasis**: hyperkeratotic white patches (with or without epithelial hyperplasia) which cannot be removed by scraping
- **Erythematous Candidiasis**: red, inflamed areas of the oral mucosa, often under a denture ("denture stomatitis"). Typically seen in patients who wear their dentures while sleeping, demonstrate poor denture hygiene or in the presence of a deteriorating soft lining material on a denture base.

PREVENTION STRATEGIES

For dentate patients, prevention involves meticulous oral hygiene and adequate hydration of the oral mucosa. For denture patients, patients should be instructed to leave their dentures out while they sleep and for at least 8 hours per 24-hour period, and to soak their dentures overnight in a chlorhexidine, or denture cleaner or soapy water solution. Daily, dentures must be cleaned with a denture brush. If soft reline material appears to be contaminated, it should be removed and a processed hard reline should be

considered. Long term soft denture materials should be avoided due to their increased risk of microbiological contamination. Of note, patients often lose weight during their cancer treatment and often require a reline or remake of their denture once their cancer therapy is completed and their body weight has stabilized.

MANAGEMENT STRATEGIES

Mild Oropharyngeal Candidiasis / Angular Cheilitis

- Nystatin Oral Suspension (can also be used for soaking dentures at night time)
  - 100,000 units/ml; 10-15 ml as an oral rinse and swallow/expectorate; use 4 x/day for 7-14 days
- Clotrimazole Lozenges (50 or 100 mg); dissolve lozenge in mouth 2x/day x 7-14 days (note: not useful in xerostomic patients as it requires a certain amount of salivary volume to dissolve lozenges; advantage is greater tissue contact time compared to nystatin oral suspension)
- Nystatin Ointment (100,000 units/gm); apply to tissue-bearing surface of denture prior to wear; use until related tissue inflammation resolves
- Kenacomb Ointment (a compounded ointment containing an antifungal (nystatin), an antibiotic (neomycin) and a topical steroid (triamcinolone). Useful for management of angular cheilitis as this is typically a mixed bacterial/fungal infection with inflammation. Apply sparingly to the corners of the mouth 3-4x/day for 7-14 days

Moderate to Severe Oropharyngeal Candidiasis

- Fluconazole: 100-200 mg po daily x 7-14 days. If 200 mg, split into morning and evening dosing.

In summary, oral candidiasis is a common opportunistic infection seen in cancer patients. It needs to be managed carefully to prevent a more serious disseminated fungal infection which can be a significant source of morbidity in the immunocompromised patient. While anti-fungal resistance occurs, it is uncommon, and lack of response is more often related to non-compliance, inadequate dosing of antifungal medication or reinoculation from still contaminated prosthesis. Cancer patients with oral fungal infections need to be followed regularly after initiation of treatment to ensure resolution. In some patients (especially those on chronic steroid or immunosuppressive therapy), maintenance anti-fungal therapy is required.

VIRAL INFECTIONS

Viral infections in the oral cavity or the perioral region are frequent complications of cancer therapy. Pain and discomfort are common with viral infections and may compromise oral intake and ultimately lead to dehydration. Therefore, early diagnosis and management of an oral viral infection is important to reduce the spread of infection and prevent other complications that can result.

Most commonly, oral viral infections are caused by members of the herpesvirus family including herpes simplex (HSV), varicella zoster (VZV), Epstein-Barr virus (EBV) and, less commonly, cytomegalovirus (CMV).

After primary infection with HSV, the virus becomes latent, usually in the dorsal root ganglia of the trigeminal nerve. 80% of the adult population are asymptomatic carriers of the virus and up to 40% of those will experience reactivation of the virus at some point following exposure to cold, sunlight, stress, trauma, illness or immunosuppression. Recurrent HSV in immunosuppressed cancer patients may result in atypically large areas of mucosal involvement with significant associated pain and impairment in oral function. Viral culture is still considered the diagnostic gold standard but is limited by the short time period of viral shedding and the length of time required to obtain test results. Therefore, many clinicians treat empirically rather than wait for results that are sometimes inaccurate.

VZV is responsible for chicken pox (primary infection) and shingles (recurrent infection) and, like HSV, becomes dormant in the trigeminal nerve ganglia after primary infection. Immunosuppression can cause recurrent infection which may result in serious complications, especially when the ophthalmic branch (VI) is involved. Consultation with an ophthalmologist is recommended for VZV reactivation affecting the VI branch.

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.

CMV is an uncommon cause of oral ulcerations in immunocompromised patients such as post-stem cell transplant patients where it can lead to significant oral ulcerations and pain.

PREVENTION AND MANAGEMENT STRATEGIES

Herpes Simplex Virus (HSV)

- Milder cases of HSV (recurrent herpes labialis and recurrent intraoral HSV) are generally self-limiting and can be effectively managed with supportive care including acetaminophen, oral hydration, soft diet and an analgesic oral rinse such as Benzydamine (Pharixia). Topical acyclovir may reduce pain and duration of lesions if applied early in the onset of the outbreak.
    - 5% acyclovir cream; applied to affected area q3-4 hours x 7 days
- If the patient is immunocompetent, antiviral therapy may be considered for primary HSV infection or frequently recurrent HSV episodes.
    - Acyclovir 200 mg po 5 x/day x 5 days ***or***
    - Valacyclovir 2 gm po 2x/day x 2 days
- Antiviral therapy is indicated in recurrent and chronic HSV in immunocompromised cancer patients
    - Acyclovir 400 mg po 5x/day x 5 days ***or***
    - Valacyclovir 500 mg po 2x/day x 5-10 days
- Chronic suppression may be required in immunosuppressed patients with frequent recurrence
    - Valacyclovir 500 mg po 2x/day

Varicella Zoster Virus (VZV)

- Herpes zoster infections are more common and often more complicated in immunocompromised patients. The key clinical objective in these patients is to reduce the incidence of cutaneous and visceral dissemination that can lead to life-threatening complications. This is best achieved with prompt antiviral therapy, which should be instituted in all immunosuppressed zoster patients if presentation occurs within 1 week of rash onset or any time before full crusting of lesions. For localized disease, most patients can be treated with oral valacyclovir, famciclovir or acyclovir, with close outpatient follow-up. Intravenous acyclovir therapy is reserved for those with disseminated VZV infection, ophthalmic involvement, very severe immunosuppression or the inability to take oral medications. Foscarnet is the drug of choice to treat acyclovir-resistant herpes zoster. Appropriate analgesic therapy should be combined with early antiviral treatment to reduce the incidence and severity of acute zoster pain and post-herpetic neuralgia. Patients with zoster should be immediately referred for appropriate medical management which will include an anti-viral medication (acyclovir or valacyclovir).

Cytomegalovirus (CMV)

- As mentioned, CMV can cause oral infections in the immunocompromised cancer patient. Ganciclovir and Foscarnet are most commonly used to manage these potentially serious infections.
- These rare infections should be referred immediately to the treating hematologist or oncologist.

FOLLOW-UP CARE

With any viral infection in a cancer patient, re-evaluation is indicated every 7-14 days following the initiation of antiviral therapy to ensure good response to treatment. Maintenance of meticulous oral care is very important when oral viral infections are present. The concurrent use of antibacterial oral rinses (such as 0.12% aqueous chlorhexidine) is often recommended to prevent secondary bacterial infection.

ACUTE/CHRONIC ORAL GRAFT-VERSUS-HOST DISEASE (GVHD)

Chronic GVHD is a multi-organ disease that is a major complication of allogeneic (vs. autologous) hematopoietic stem cell transplantation. Common sites of involvement include the skin, gut, liver, eyes and mouth. Symptoms usually present within 2 years after transplant but can occur at any time. GVHD results from donor-derived T-cells reacting against host tissues, either directly or through up-regulation of inflammatory cells.

Common oral signs and symptoms of chronic oral GVHD include:

- Oral Mucosa – lichenoid striations, areas of erythema and/or ulceration; depapillation of the dorsum of the tongue. In this sense, it very much mimics lichen planus – both clinically and histologically
- Salivary Glands – oral dryness; multiple mucoceles
- Taste Buds – altered or unpleasant taste (dysgeusia)
- Musculoskeletal – trismus or reduced mobility of oral soft tissues

PREVENTION AND MANAGEMENT STRATEGIES

As this is a chronic condition (with periods of exacerbation and remission), treatment is focused on symptom management and maintaining optimal oral soft tissue health. If the patient has signs but no symptoms, there is no need to treat.

- Symptomatic oral lesions are best managed with steroids, applied either topically, systemically or by steroid rinses. If chronic GVHD is found in the oral cavity only, topical or rinse therapy should be attempted before using systemic steroids.
    - Topical steroid ointments that are used commonly at BC Cancer include:
        - 0.1% Kenalog ointment (applied sparingly 3-4x/day)
        - 0.05% Clobetasol ointment (applied sparingly 3-4x/day)

      Both ointments can be compounded with Orabase for better tissue adherence. Always dry the affected area(s) before each application and instruct patient to not eat or drink for 30 minutes after application.

- Topical steroid rinses that are recommended include:
  - Dexamethasone oral rinse (0.1 mg/ml – 0.4 mg/ml)
  - 0.05% Clobetasol oral rinse

  Patients are instructed to rinse with 10-15 cc of the oral rinse 3x/day for 1-2 minutes and expectorate. Again, instruct patient not to eat or drink for 30 minutes after use. Of note, you will need to contact a compounding pharmacy for most steroid rinse formulations.

OTHER ISSUES

- As topical steroids increase the risk of fungal overgrowth, concurrent antifungal therapy is often recommended.

- If topical agents are ineffective in managing the patient's oral symptoms, consideration should then be given to systemic steroids. This management is generally best directed by the patient's hematologist or physician.

- Long-term steroid therapy may increase the risk of the patient developing osteopenia or osteoporosis. As a result, many of these patients are placed on anti-resorptive medications (e.g. Pamidronate), putting them at risk for medication-induced osteonecrosis on the jaw (MRONJ).

- GVHD-related oral dryness results from T-cell injury to salivary glands. Oral dryness increases the risk of mucosal injury, oral fungal infection and dental disease (caries and aggravated periodontal disease).

- Stem cell transplant (SCT) patients are at increased risk of developing secondary malignancies including squamous cell carcinomas in the oral cavity. Areas of persistent oral GVHD tissue change are particularly worrisome and should be biopsied on a regular basis (every 2-3 years, in general) to rule out dysplastic changes.

- Dentists often ask about routine antibiotic prophylaxis for patients with a history of SCT. In general, the following guidelines apply:
  - Antibiotic prophylaxis is generally recommended for patients on chronic immunosuppressive therapy (Prednisone, Cyclosporine or Tacrolimus), depending on the invasiveness of the procedure being considered and the WBC and Neutrophil count of the

patient at the time of the procedure (see Basic Oral Care section of this manual for more information)
    - Assuming immune competence, there is no need for routine use of antibiotic prophylaxis
    - Although weakly supported in the literature, the general trend is to provide antibiotic prophylaxis to patients with a central or peripheral venous access lines for invasive dental procedures

- SCT patients are obviously complex and routinely have changes to their medications. It is thus critical to routinely update medication lists at each appointment and, if in doubt, refer the patient for updated blood work if there are any concerns about the immune status of the patient.

- Maintaining excellent dental and periodontal health is particularly important in this vulnerable patient group. Optimal treatment requires good communication between the dentist and the hematologist. Be sure to include a comprehensive oral mucosal exam at each follow-up visit with attention given to chronic oral GVHD tissue changes, salivary gland hypofunction, secondary oral infections and jaw osteonecrosis.

OSTEORADIONECROSIS (ORN)

Osteoradionecrosis (ORN) is characterized by the following:

- ✓ Exposed bone through overlying skin or mucosa for >3months or any presence of radiographically visible bone necrosis and
- ✓ Positive history of radiation therapy to the affected area.

It has an estimated prevalence of 5-7% amongst post-radiation H&N cancer patients. 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 resection.

PREVENTION STRATEGIES

Prior to Radiation Therapy

Optimization strategy pre-treatment is aimed at reducing the likeliness of needing any future extractions, especially of the posterior teeth which commonly receive higher radiation dose and have lower vascularization. This includes:

- Thorough dental examination, radiographic examination (Panorex recommended), and cleaning
- Removal of all teeth with poor or guarded prognosis, if they are to receive high treatment dose (>5000cGy). This may include teeth with heavily-restored status, present endodontic lesions, significant attachment loss, level 2-3 furcation involvement, mobility, severely decayed and non-restorable teeth
- Reduction/Removal of tori and exostoses, as they are common sites of ORN development and compromise the fabrication of future removable prosthesis
- Patient education to improve future oral hygiene practices
- Smoking cessation

Sometimes this results in removal of multiple teeth. While seemingly drastic, it is important to recall that the morbidity of ORN, if developed, is much worse than that of partial edentulism.

Following Radiation Therapy

Post-radiation patients are at a very high caries risk due to profound xerostomia and an increase in acidogenic flora. Caries risk is further compounded by unavoidable decrease in oral hygiene practice during treatment due to fatigue as well as radiation related pain and ulceration of mucosa.

As a result, these patients should initially be seen on a very frequent recall basis (every 3 months is optimal) and thereafter spread further out when the patient demonstrates sufficient oral hygiene and limited caries progression. Patient should also be advised to contact their dental specialist for any pain or wound to their oral soft tissues, however benign they might be, as they pose a possible risk of developing into ORN.

Radiographs are to be taken at every visit if there is suspected lack of oral hygiene from the patient and aggressive incipient caries observation. Incipient or early carious lesions should be aggressively restored as rapid rampant progression is especially common in the presence of xerostomia. The location of radiation-caries lesions is often circumferential from the enamel/cementum junction to the gumline. Clinical examination is often more helpful for early detection of these lesions.

Post-treatment, teeth that were not exposed to high dose radiation can be safely treated as routine with all modalities, including restorative, surgical and endodontic therapy.

Teeth that were exposed to high dose radiation should be approached with caution. For these teeth, there is a list of do's and don'ts:

Safe to continue to do:

- Direct and indirect restorations
- Prophylaxis, including scaling and root planning (no flap approach)
- Orthograde endodontics

Safe to do, with caution:

- Removable prosthodontics, as denture sores are a common trigger of ORN, especially if in areas of pre-existing tori/exostoses, mucositis or xerostomia
- Orthodontic treatment. It's important to note teeth in irradiated bone may not move and the caries risk of both fixed and removable appliances can lead to rampant caries in this susceptible population

Unsafe to do without consulting radiation oncologist or oral oncology department:

- Retrograde endodontics (apical surgery)
- Periodontal surgery
- Dentoalveolar surgery which includes extractions, bone grafting, and implant therapy

It is recommended to refer any at-risk situation above to a BC Cancer Oral Oncology Department. If not feasible due to geographical distance, it is recommended to contact a BC Cancer practitioner to discuss any questions or concerns before proceeding with treatment.

MANAGEMENT STRATEGIES

The treatment of osteoradionecrosis is complex, involves multi-modality care, and is best referred to BC Cancer Dental Department as soon as it is diagnosed or suspected. If not possible, referral to a community oral and maxillofacial surgeon is recommended.

ORN lesions are not always painful, leading to a tendency to observe, smoothen or debride the lesions conservatively. Delay in seeking appropriate care can lead to worsened prognosis. Exposed bone in a post-radiation patient believed to be ORN can sometimes in fact represent recurrent cancer. Prompt referral of all exposed bone lesions regardless of size or symptoms is important.

MEDICATION-RELATED OSTEONECROSIS OF THE JAW (MRONJ)

MRONJ is characterized by the following:

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

It is estimated to occur at a rate of 1-5% in those receiving antiresorptive medications for cancer therapy. The agents linked to MRONJ include:

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

In B.C., the most commonly encountered agents are Pamidronate & Denosumab.

Some of the anti-resorptive drugs associated with MRONJ are also prescribed at a lower dosage/frequency to non-cancer patients for osteoporosis management. In these patients, resultant jaw necrosis is observed at a lower incidence than oncology patients. The management strategies outlined below apply strictly to the cancer patient and should not be interpreted as applicable to the osteoporosis patient.

PREVENTION STRATEGIES

Prior to Antiresorptive Therapy

Once the patient starts their antiresorptive therapy, they are at lifetime risk of developing MRONJ if they undergo any extractions or other dentoalveolar surgery. Optimization strategy pre-treatment is aimed at reducing the likeliness of future extractions. All teeth are considered 'at risk', though in general, posterior teeth are at higher risk than anteriors, and mandibular teeth are at higher risk than maxillary.

It is important to balance the protective benefits of pre-treatment tooth removal against the quality of life impact of tooth loss. With some exceptions, the majority of cancer patients receiving IV antiresorptive agents have incurable cancer. The most common presentations include multiple myeloma, metastatic breast cancer and metastatic prostate cancer. For these patients, mean survival is often only a few years, so prophylactic extraction is only aimed at teeth that pose either active or imminent pain/infection.

Unlike radiotherapy, where the local changes to the salivary flow and oral environment cause drastic increase to caries rate, antiresorptive therapy has minimal impact on salivary flow. This, combined with the above patient survival considerations mean many teeth with guarded prognoses can usually be left as is. Pre-antiresorptive therapy assessment should include:

- Thorough examination, radiographic assessment (especially Panorex) and cleaning
- Removal of teeth with poor or guarded prognosis - *if pain/infection onset is anticipated to occur within the near future*
- Reduction of tori and exostoses, as they are common sites of MRONJ development
- Patient education to improve oral hygiene practices
- Smoking cessation

Following Start of Antiresorptive Therapy

Once antiresorptive therapy has started, the goal is stabilization of existing dentition and prevention of future dentoalveolar surgery.

A normal recall period of every six months is suggested.

Teeth with suspected periapical disease should be considered for orthograde endodontic therapy before contemplating extraction. This also applies to non-restorable teeth where “heroic” root canal therapy is completed, and the tooth is subsequently domed to avoid extraction in this unique demographic.

The do’s and don’ts are very similar to those of post-radiation patients:

Safe to continue to do:

- Direct and indirect restorations
- Prophylaxis, including scaling and root planning (no flap approach)
- Orthograde endodontics

Safe to do, with caution:

- Removable prosthodontics, as denture sores are a common trigger of ORN, especially if in areas of pre-existing tori/exostoses

Unsafe to do without consulting and oral surgeon or oral oncology department:

- Retrograde endodontics (apical surgery)
- Periodontal surgery
- Dentoalveolar surgery which includes extractions, bone grafting, and implant therapy

It is recommended to refer any at-risk situation above to the BC Cancer dental clinic whenever possible. If not feasible due to geographical distance, it is recommended to contact BC Cancer dentistry to discuss any questions or concerns before proceeding with treatment.

MANAGEMENT STRATEGIES

The treatment of MRONJ is complex, involves multi-modality care and is thus best referred to BC Cancer Dental Department as soon as it is diagnosed or suspected. If not possible, referral to a community oral and maxillofacial surgeon is recommended.

MRONJ lesions are not always painful, leading to a tendency to observe, smoothen or debride the lesions conservatively. This delay in seeking appropriate care can lead to worsened prognosis. Exposed bone believed to be MRONJ can sometimes in fact represent metastatic cancer. Prompt referral of all exposed bone lesions regardless of size or symptoms is important.

MANAGEMENT OF THE CANCER PATIENT

Good oral care is fundamental in preventing and decreasing potential oral complications of cancer therapy. Good oral care encompasses any dental, periodontal and soft tissue measures that will help an individual maintain optimal oral health. For the oncology patient, maintaining optimal oral health is made more difficult by the direct negative effects of cancer treatment on the oral hard and soft tissues.

Regardless of the type of oncology treatment, patients should be educated about potential oral complications and side effects before commencing treatment. Emphasis must be placed on implementing an optimal oral hygiene regimen before, during and after treatment. Practitioners should provide recommendations that are individualized for the patient. They need to be practical and realistic. This will ensure greater compliance and achieve the best results.

In order to devise an individualized oral care plan for a patient, a comprehensive oral assessment needs to be completed and should include the following:

- A review of the patient's current oral hygiene practices
- Evaluation of pre-existing dental disease or potential sources of irritation and/or infection
- Stabilizing the patient's oral condition to eliminate these potential sources of irritation and/or infection. This may involve dental extractions, fillings, root canals, dental hygiene therapy and smoothing sharp edges on teeth. In addition, poor-fitting dentures should be stabilized to prevent further tissue irritation during cancer therapy. Any removable appliance that the patient wears (including night guards, orthodontic retainers, partial and complete dentures) needs to be checked for cleanliness (see Denture Care section).

Once the overall oral health has been stabilized, the customized oral care plan should be established. This plan should include the understanding of the importance of maintaining excellent plaque control during cancer therapy.

General management principles for oral care should also include:

- Adequate fluid intake, avoiding drinks that are high in sugar or are highly acidic (such as club soda)
- Lip care using water-soluble, lanolin or oil-based lubricants (avoid petroleum-based products)
- Maintaining adequate nutrition; when challenges arise, working with an oncology nutritionist is highly advised

BRUSHING

The basics of oral care are founded on excellent plaque control. Brushing will physically remove food debris and plaque from teeth, gums and other oral tissues without damaging soft tissues. With decreased salivary flow, plaque and food will more tightly adhere to oral structures and their physical removal, therefore, becomes more challenging. Some general guidelines include:

- Use an ultrasoft bristled manual toothbrush, especially when oral soft tissues become sensitive during treatment. When counts are low, it is recommended to change the toothbrush every 2-3 weeks.
- Brushing should be done within 30 minutes of eating and for at least 2 minutes. The toothbrush should be rinsed with hot water after use and allowed to air dry between uses.
- Brushing with a fluoridated toothpaste. Often, adult mint flavored toothpastes become intolerable when oral mucositis is present; in such cases, we recommend substituting with children's mild flavored (usually fruity) fluoridated toothpaste. If the patient is nauseous due to cancer treatments and cannot tolerate any flavoring, they should be advised to at least brush with warm water. Again, the focus needs to be on plaque control however it can be best achieved.
- If brushing becomes too painful or causes excessive bleeding (either due to low platelet count or tissue friability), the patient should be instructed to use either a moist gauze, Q-tip or foam sponge soaked in aqueous chlorhexidine to clean their teeth.
- If the patient has had radiation therapy and is at risk of osteoradionecrosis, electric toothbrushes should be avoided as their strong vibrations may cause tissue irritations.

FLOSSING

For patients who routinely floss, we encourage them to continue to do so during cancer therapy. Because oral tissues are more fragile, we recommend the use of waxed floss. If flossing causes excessive bleeding and/or tissue irritation, patients are advised to discontinue until they can do so comfortably and without excessive bleeding. Again, the use of aqueous chlorhexidine oral rinse (0.12%) can supplement the patient's oral hygiene practices when routine practices are more challenging. If the patient has had radiation therapy and is at risk of ORN, the use of electric flossers should be avoided as they are more likely to cause tissue trauma.

TOOTHPASTE

Toothpaste choice should be individualized to the needs of the patient. One size does not fit all, and we do our patients a disservice if we focus too much on particular products and not enough on toothbrushing technique.

In general, however, a few recommendations are:

- For patients with tissue sensitivity, toothpastes without sodium laurel sulphate (SLS) are generally better tolerated (e.g. Proenamel, PreviDent, Biotene).
- For xerostomic patients, toothpastes high in fluoride content (5000 ppm) are recommended (e.g. PreviDent 5000, Clinpro 5000).

FLUORIDE

Patients who have received high dose radiotherapy to the head and neck region often suffer from permanent dry mouth. Less commonly, certain chemotherapy protocols have been shown to reduce salivary output. Patients with chronic oral GVHD often suffer from permanent changes in salivary output and are, therefore, at increased risk for dental decay.

For all these patients, fluoride supplementation should be considered as it has been shown to be effective in reducing caries risk. The actual delivery method should be customized to the individual patient considering factors such as patient age, manual dexterity and motivation/compliance.

Among the options are the following:

- Fabrication of fluoride trays for nightly application of fluoride gel. This requires high patient compliance as studies have confirmed poor long-term compliance in some patients. Patients hold the fluoride filled trays in the mouth for 4 minutes; remove trays and spit out excess; do not eat or drink for the next 30 minutes. Ideally done just after brushing their teeth before bedtime.
- Fluoride gel application after brushing. The gel is applied to teeth for 2-3 minutes. The patient is then instructed to spit out excess and not eat or drink for the next 30 minutes. Can be done 1-2x/day and, again, ideally done just before bedtime.
- Application of high fluoride-containing toothpaste: focused on brushing the toothpaste onto the gingival thirds of the teeth, both on the lingual and facial aspects. Brush for 2 minutes; spit out excess and do not eat or drink for 30 minutes. Used 2x/day with one time ideally being done just before bedtime.

Again, the primary focus needs to be on excellent plaque control as fluoride will only be effective when applied to a clean tooth surface. This needs to be clearly messaged to patients.

ORAL RINSES

Oral mucositis (sore mouth) is the most common oral side effect of cancer therapy, happening at alarmingly high rates to patients receiving head and neck radiotherapy, induction or consolidation chemotherapy for hematologic malignancies or adjuvant chemotherapy for a variety of other cancers.

Despite all the research that has been done on oral mucositis prevention and/or management, the most effective oral rinse to maintain tissue health and to avoid tissue irritation has been shown to be a simple combination of: *1 teaspoon of baking soda + 1 teaspoon of salt mixed in 4 cups of water.*

At BC Cancer, patients are instructed to begin using this rinse throughout the day as they start their cancer therapy. Patients are instructed to make a fresh batch daily, to store at room temperature and to use it as often as they like throughout the day. Patients are similarly instructed to continue using the rinse until their mouth tissues return to normal. Of note, oral mucositis can persist many weeks or months after the cessation of active cancer therapy.

In terms of other oral rinses, patients are strongly advised to avoid commercially-available mouthwashes which may contain alcohol or other ingredients that may be irritating to the oral soft tissues. When ordering chlorhexidine oral rinse for your cancer patient, be sure to specify the *aqueous* (non-alcohol) variant as regular chlorhexidine does contain a small amount of alcohol and will be poorly tolerated by the cancer patient.

MAINTENANCE AND FOLLOW-UP CARE

Once cancer therapy is completed, patients are referred to their community dentist for ongoing care. Individual long-term care plans are created for patients at BC Cancer and communicated with the patient's dentist. Recall frequency will depend on a number of factors including the patient's post-treatment oral hygiene practices and the severity of any salivary gland hypofunction. Please contact us if you have any questions or concerns regarding your patient's care.

For patients returning to your practice for elective care, always remember the following:

- Updated health history and medication list (sometimes patients are placed on certain medications, for example, that may make elective procedures unsafe while on the drug)
- For patients on active chemotherapy, always check bloodwork 24 hours before providing elective care. Treatments need to be postponed if platelets are at <50,000/mm^3 and/or absolute neutrophil counts are <1,000/mm^3. Not all chemotherapy drugs lower blood counts but, when they do, the counts are typically lowest 7-10 days after chemotherapy. In general, the safest time to do an elective dental procedure is just before an upcoming round of chemotherapy. Always check with the treating oncologist before proceeding with elective care for patients on active chemotherapy.
- For patients with central venous access lines (Hickman lines), antibiotic prophylaxis is often recommended. Check with the treating oncologist or call one of the dentists at BC Cancer if you have any questions regarding provision of antibiotic prophylaxis.
- For patients on anti-resorptive medications or with a history of anti-resorptive medications for cancers metastatic to the bone, great care needs to be exercised in avoiding surgical procedures involving the bone. This is somewhat drug and procedure-dependent, so it is always best to check with a BC Cancer dental practitioner before proceeding. In some cases, anti-resorptive medication "holidays" are appropriate to allow you to do your invasive dental procedure.

DENTURE CARE

Before cancer therapy begins, dentures (partial and complete) should be evaluated for adequate fit and comfort. Denture sore spots should be adjusted, and any rough edges should be smoothed. Ill-fitting dentures should not be worn during active cancer treatment as they may precipitate or aggravate oral mucositis or lead to ulcers and potential osteonecrosis.

If the mouth becomes sore during cancer treatment, please ask patients to leave dentures out as much as possible. Likewise, if patients lose a lot of weight during cancer therapy and the dentures become unretentive, patients should be instructed to discontinue use of their unstable dentures.

Unhygienic reline materials should be removed prior to cancer therapy and patients must be instructed on immaculate denture hygiene throughout their cancer care. Advise patients to brush and soak their dentures in soapy water when they are not being worn. Dentures should not be worn while the patient sleeps and/or continuously (24 hours per day) to minimize the risk of denture stomatitis.

Patients are advised to wait until oral tissues have completely healed and their body weight has stabilized (3-6 months, in general) before relining or remaking dentures post-treatment.

Dentures should be cleaned daily by soaking and/or brushing them with a non- abrasive denture cleanser, as well as bacterial biofilm removed from the oral cavity to minimize the risk of denture stomatitis. Denture adhesives should be completely removed from the prostheses and the oral cavity on a daily basis. Denture-cleansing solutions should be thoroughly rinsed off dentures prior to reinsertion into the oral cavity.

Dentures should be cleaned annually by a dentist or dental professional using an ultrasonic cleansers to minimize biofilm accumulation over time.

Dentures should never be cleaned with hot water, or soaked in sodium hypochlorite (bleach) for periods that exceed 10 minutes (even if diluted bleach is used). These may damage dentures.

Patients who wear dentures should be examined at least once a year by their dental professional to ensure proper maintenance and assessment of oral health status.

IMPLANT CARE

Patients with implant restorations should be educated about brushing existing natural teeth, dental restorations and implants fixtures twice daily using oral hygiene aids such as dental floss, water flossers, air flossers, interdental cleaners and manual toothbrushes.

Patients with implant-borne restorations (fixed or removable) should be advised to obtain a dental professional examination visit at least every 6 months as a lifelong regimen. Professional biological maintenance for patients with implant-borne removable restorations should include extraoral and intraoral health and dental examination, oral hygiene instructions, hygiene instructions for the prostheses and oral hygiene intervention including cleaning any remaining natural teeth, tooth-borne restorations, implant-borne restorations and/or implant abutments.

Implants-supported removable dental prostheses (partial or complete overdenture) should be professionally cleaned extraorally yearly as mentioned previously in the denture section, and the patients should be advised to not wear their prostheses while sleeping and store them in a cleaning solution when not in use.

Additionally, patients should be reminded to not use sodium hypochlorite in any concentration with their implants-supported removable prostheses as it will damage the retentive attachments inside their

prostheses. Patient should also be instructed to clean their implants abutments after every meal as food impaction inside the abutments can cause their prostheses to not seat properly and cause damages to tissues.

In patients with implant-supported fixed prostheses, the decision to remove the prosthesis for biological maintenance should be based on the patient's demonstrated inability to perform adequate oral hygiene. The prosthesis contours should be reassessed to facilitate at-home maintenance. Additionally, professionals should consider using new prosthetic screws when an implant-borne restoration is removed and replaced for professional biological maintenance to avoid worn fatigued screw fractures complications.

PATIENT CONSIDERATIONS

Changes in ability to think clearly, get or stay organized, concentrate, or remember words or things have been documented in patients who have undergone chemotherapy (chemo brain or chemo fog), radiation and/or other types of treatment. Although these changes may improve over time, they may not go away. In fact, changes may be compounded by other health issues such as menopause, anxiety and depression.

As such, practitioners should be cognizant not to overwhelm their patient with too many hygiene aids and instructions. Practitioners should try to recommend the minimum number of hygiene aids that will address the needs of the patient. Instructions should be simple, to-the-point and, whenever possible, written out for the patient's future reference.

SUMMARY

In general, best oral care involves the establishment of a healthy dentition and periodontium pre-treatment, maintenance of optimal dental and tissue health during treatment and maintenance strategies to help the patient deal with any long-term side-effects of cancer therapy. Working together, we can achieve excellent results for our patients.

The clinicians at BC Cancer are here to help and have a breadth of experience to help you safely and effectively manage cancer patients in your practice. We are always available by telephone to answer any of your questions.

MEDICATION LIST GUIDE

Antibiotics for Bacterial Infections

- Amoxicillin 500 mg capsules - 1 tablet Q8H x 7 days - $ 19
- Clindamycin 300 mg capsules - 1 capsule 4x/day x 7 days - $ 25
- Flagyl 500 mg tablets - 1 tablet 3x/day x 7 days - $ 30

Antifungal Medications

- Clotrimazole 100 mg lozenges – dissolve in mouth 2-3 x /day for 7-14 days; disp 60 tabs - $162
- Fluconazole Suspension - Swish & Swallow 3x/day for 7-14 days - $50
- Fluconazole 100 mg tabs - 2 stat then 1 tab/day for 7-14 days; disp 16 tabs - $56
- Kenacomb ointment (nystatin / neomycin compounded ointment)
  – apply sparingly to corners of mouth 3-4x / day for 7-14 days. 30g - $ 36
- Ketoconazole 200 mg tabs - 1 tab/day for 7-14 days; disp 10 tabs - $24
- Ketoconazole Suspension 10mg/mL; swish & swallow 4x/day for 7-14 days; disp 200 mL - $45
- Nystatin Cream - apply affected areas 2x/day x 20 days; disp 15, 30 or 60g - $2 - $9
- Nystatin Ointment/powder - $50
- Nystatin Oral Suspension - swish and swallow 1 tsp 4-5x/day for 7-10 days; disp 300 mL - $32
- Nystatin Tablets - dissolve 1 tab in mouth, 3x/day for 10 days - $43

Antiviral Medications

- 5% Acyclovir Cream – apply sparingly to affected area 3-4h x 7 days- 5g - $ 97
- Acyclovir 200 mg tab – 1 tab 5 x/day for 5 days – 25 tabs - $ 36
- Acyclovir 400 mg tab – 1-tab 5x/day for 5-10 days - $ 93

- Valacyclovir 2 gm – 2 tabs (1 g each) 2x/day for 2 days - $ 38

- Valacyclovir 500 mg tab – 1-tab 2x/day for 5-10 days - $ 36.78

Dysplasia

- Vitamin A Acid Gel/Cream (0.01-0.05%) - apply 2-4x/day; disp 30 g - $22

GVHD

- Azathioprine Cream (5-7.5 mg/g) - apply 2-4x/day; disp 15 g - $90+

- Azathioprine Suspension (5-7.5 mg/mL) - swish & spit 2-4x/day; disp 500mL - $90+

- Clobetasol Gel or Cream (0.5mg/g) or 0.05% Ointment – apply sparingly 3-4x/day; disp 30-50g - $30-45

- Clobetasol Rinse – .05% - Swish 10 cc., hold in mouth for 1-2 min and spit – spit, do not eat or drink 30 minutes after, use 3-4x/day x 10-14 days; disp 300mL- $ 53

- Clotrimazole Lozenges (50 or 100 mg); dissolve lozenge in mouth 2x/day x 7-14 days - $ 65

- Dexamethasone Rinse (0.1 – 0.4 mg/mL) – Swish 10-15 cc, hold in mouth for 1-2 minutes and spit, do not eat or drink 30 minutes after, use 3-4x/day x 10-14 days; disp 300mL - $57

- Fluocinonide Gel (0.05-1%) - apply 2-4x/day x 14 days; disp 15-60g - $35-70

- Halobetasol Cream or Ointment (0.5 mg/g) - apply 2x/day; disp 15-50g - $27-67

- Kenalog 0.1% ointment – 7.5 g paste – apply 2x/day for 14 days - $48

Magic Mouthwash Rinses

- **Basic oral rinse**

  - Mix 1 tsp. salt, 1 tsp baking soda, 500 cc room temperature water
  - Make a fresh batch each day for optimal effectiveness

- Swish 10 cc throughout the day and spit

- **Noll's solution**

- 20 mL Diphenhydramine, 30 mL Nystatin suspension, 2.25 mg Dexamethasone, 0.5 g of tetracycline added to total volume of 203 mL - $52

- **Pink Lady**

- Antacid suspension (Maalox) mixed with Viscous Lidocaine from 1:1 to 3:1 ratio
- Both can be purchased OTC and mixed together - $45 for 2:1 ratio 300 mL mixture

- **BC Cancer "Magic Mouthwash"**

- 2 mL hydrocortisone (100 mg), 300 mL Benadryl and 100 mL nystatin mixed with distilled water to 1L volume - $60

Mucositis

- Benzydamine Rinse (Pharixia) - 0.15% - swish & spit PRN pain; disp 250 mL - $33

- Doxepin Cream 5 mg/g - Apply Q1-4hrs PRN pain; disp 30 g - $40

- Doxepin Suspension 0.5% - Swish & spit PRN pain; disp 300mL - $40

- Viscous Lidocaine 2% - swish & spit PRN pain; OTC 100 mL - $5.49

Prophylaxis Antibiotics

- Amoxicillin 500 mg capsules - 4 tablets 1 hr. before appointment

- Clindamycin 300 mg capsules - 2 tablets 1 hr. before appointment

Xerostomia

Over the Counter:

- Xylitol Pastilles - 2-4 pastilles 3-5x/day - $15+

- Xylitol Gums - $5+

- Time-released Pastilles – Xylimelts - $20

Prescription:

- Anetholtithion (Sailor) 25 mg tabs - 1-tab 3x/day; disp 120 tabs - $221
- Bethanecol 25 mg tabs - 1-tab 3x/day; disp 100 tabs - $129
- Cevimeline (Evoxac) 30 mg tabs – 1-tab 3x/day; disp 120 tabs - $745+
- Pilocarpine (Salagen) 5 mg tabs – 1-tab 3-4x/day; disp 90 tabs - $ 285

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DISCLAIMER

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