ORAL CARE PROTOCOL:
FOR THE HEAD AND NECK CANCER PATIENT

GHASSAN SINADA, D.D.S.
DIVISION OF DENTISTRY AND ORAL SURGERY
OTOLOGYNGOLOGY - HEAD AND NECK SURGERY
1.2 million Americans diagnosed with cancer each year.

Approximately 400,000 will develop oral complications from their treatments.


This increased emphasis on oral complications has been attributed to five factors:

1) Use of marrow-stimulating growth factors in the management of neutropenia.
2) Use of increasingly aggressive single-agent or multi-agent drug therapy.
3) Application of radiation regimens including concomitant chemotherapy.
4) Studies demonstrating the relationship between oral health and systemic health.
5) The economic impact of oral complications.
# BACKGROUND

<table>
<thead>
<tr>
<th>TREATMENT REGIMEN</th>
<th>ANTICIPATED PERCENTAGE OF COMPLICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjunctive chemotherapy</td>
<td>10%</td>
</tr>
<tr>
<td>Primary chemotherapy</td>
<td>40%</td>
</tr>
<tr>
<td>Hematopoietic stem cell transplantation in which myeloablative conditioning regimens are used</td>
<td>80%</td>
</tr>
<tr>
<td>Head and neck radiation therapy to fields involving the oral cavity</td>
<td>100%</td>
</tr>
</tbody>
</table>
Common oral complications related to cancer therapy:
- Mucositis
- Pain
- Infection
- Salivary gland dysfunction
- Taste dysfunction

- Difficult or impossible to swallow and eat.
- Dehydration and malnutrition
Psychosocial

- Mucositis; outwardly visible side effect of therapy other than hair loss.
- Oral complications and patient tolerance; compromise treatment regime, reduction in dose, longer treatment intervals.
- Diagnosis of cancer and therapy, dealing with oral complications; prompt or exacerbate a depressive episode.
- Irradiated oral tissues require life-long attention and care.

Oral health provider is involvement in the treatment planning prior to, during and following treatment, for the life of the patient.
The goal of therapeutic radiation to the head and neck is to kill the cancerous tumor.

Two classes of tissue reactions due to the delivery of radiation treatment

1) **Immediate/Acute Reactions**
2) **Long term/late side effects**

**Oral sequelae**
- Site radiated, total radiation dose, and fraction rate

**Head and neck tumors**
- 5000-7000 cGy over a 5-7 week period

**Hodgkin’s, non-Hodgkin’s lymphoma**
- 3000-4500 cGy

**Brachytherapy**
- Concentrated dose to tumor
- Large dose to immediately surrounding tissue

**Osteoradionecrosis**
MUCOSITIS

Occurs as the result of early cell death in the epithelial basement membrane

Clinical manifestation begins within the second week of radiation therapy

Subsides slowly over several weeks

Mucosa in the radiation field:
- Thin
- Atrophic
- Minimal trauma may result in ulceration
HYPOGEUSIA/DYSGEUSIA

- Permanent taste loss may occur at >6000 cGy
- Particularly if the tongue is within the volume of tissue radiated
- Below this level, recovery usually takes several months
- Both mucositis and decreased saliva flow may contribute to taste alteration

Chemoreceptors on the dorsal tongue that allow discriminative taste acuity can be markedly affected by mucosal ulceration that can last months to years.
HYPERSENSITIVITY

- Dental hypersensitivity
  - Lowered oral pH
  - Demineralization of enamel
  - Mechanical forces opening dentinal tubules
SALIVA BENEFITS

• The formation of a pellicle to act as a physical barrier to the invasion of microorganisms and as a moisturizing lubricant to prevent abrasive tooth wear and soft tissue trauma.

• Potent antimicrobial effects which protect against bacteria, fungi and viruses in the mouth.

• A washing effect to help clear the oral cavity of microorganisms and food debris, especially sugars.

• A hydrating effect that moistens the mouth and aids in chewing and swallowing.

• The promotion of remineralization of the teeth and the retarding of demineralization because it is a saturated solution of calcium and phosphate ions.

• A high buffering capacity, which protects the dentition against acids from both external and internal sources and aids in the control of the microorganisms that are responsible for dental decay and oral fungal infections.
XEROSTOMIA

• Atrophy of the secretory cells, particularly the serous cells

• Vascular damage and connective tissue changes

• Radiation field and radiation dose dependent

• Serous glands degenerate at a faster rate than mucous glands
  Saliva becomes more acidic, ropy and does not flow readily

The normal functions of saliva are compromised, which can result in:

• pH buffer capacity reduction (mean pH reduced from 6.45 to 5.48-6.05)
• Decreased remineralization capacity
• Decreased antimicrobial capacity
• Decreased cleansing of the mouth
• Taste alterations
• Difficulties with: deglutition, mastication, speech
XEROSTOMIA

• Ionizing radiation results in cell damage, death and subsequent fibrosis of the salivary glands

• Decreased salivary flow reported at doses of 10 Gy

• Permanent xerostomia results at doses greater than 35-52 Gy

• One of the most unpleasant and problematic side effects of radiation therapy

• Xerostomia can also result in difficulty sleeping due to oral dryness

• Loss of social and physical well-being

• Emotional challenge with the possible result of withdrawal and clinical depression
<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>MANUFACTURER</th>
<th>TELEPHONE</th>
</tr>
</thead>
</table>
| Oralbalance® moisturizing gel  
  pH 6.5 approximately 15% xylitol, enzymes (hydroxyethylcellulose)  
  1.5 oz tube ~ $7.00 at Walgreen, Eckerds, Revco  
  also available online at www.dentaldepot.com ($4.66) | Laclede Research Laboratories  
  Gardena, CA  
  www.laclede.com | 800-922-5856 |
| Omnii BreathTech®  
  1.2% poloxamer 407/dimeticone  
  18 ml spray bottle, pH 7.0  
  Available only to dentists  
  Case of 48 for $120 ($2.50) | Omnii Oral Pharmaceuticals  
  Gravette, AR  
  www.omniiapharma.com | 800-445-3386 |
| VA OraLube  
  6 oz spray bottle, pH 7.0, Xylitol (carboxymethylcellulose)  
  2 ppm F | Only available from VA Hospitals  
  NDC 052859-005Moist | |
| Moist Plus® Mouth Moisturizer moisturizing gel  
  pH 7.0, xylitol, (carboxymethylcellulose)  
  Available from HDIS, 1/2 oz tube is ~ $6.00.  
  Will sell to patients | Sage Products, Inc.  
  Crystal Lake, IL  
  HDIS  
  www.hdis.com | 800-323-2220  
  800-269-4663 |
| Moi-Stir Mouth Moistener®  
  120 ml pump spray bottle (carboxymethylcellulose), pH 7.1  
  Not sold in U.S. pharmacies, Canadian pharmacies for ~ $5.00  
  Also available online at www.dentaldepot.com ($3.89) | Paladins Labs Inc.  
  Montreal, Canada | 514-340-1112 |
<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>MANUFACTURER</th>
<th>TELEPHONE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Saliva Substitute®</strong></td>
<td>Roxane Laboratories Inc.</td>
<td>800-8480120</td>
</tr>
<tr>
<td>120 ml squeeze bottle, pH 6.5, (carboxymethylcellulose)</td>
<td>Columbus, OH</td>
<td></td>
</tr>
<tr>
<td>Will not sell direct to patients</td>
<td><a href="http://www.roxane.com">www.roxane.com</a></td>
<td></td>
</tr>
<tr>
<td>Pharmacies can order at $4.85 each</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Salivart® Synthetic Saliva</strong></td>
<td>Gebauer Company</td>
<td>800-321-9348</td>
</tr>
<tr>
<td>75 g spray can, pH 6.2-7.2, (carboxymethylcellulose)</td>
<td>Cleveland, OH</td>
<td></td>
</tr>
<tr>
<td>Available in pharmacies at about $11.00</td>
<td><a href="http://www.gebauerco.com">www.gebauerco.com</a></td>
<td></td>
</tr>
<tr>
<td>Also available online at <a href="http://www.dentaldepot.com">www.dentaldepot.com</a> ($9.26)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Stoppers4 Dry Mouth Spray®</strong></td>
<td>Woodridge Labs, Inc</td>
<td>888-766-7331</td>
</tr>
<tr>
<td>4 oz pump spray bottle, pH 7.0, contains glycerin, xylitol (hydroxyethylcellulose)</td>
<td>Van Nuys, CA</td>
<td></td>
</tr>
<tr>
<td>Will sell direct to patient ($5.00 for 12 + shipping)</td>
<td><a href="http://www.woodridgelab.com">www.woodridgelab.com</a></td>
<td></td>
</tr>
<tr>
<td><strong>Dentalcal Mouth Moistener</strong></td>
<td>New Zealand Pharmaceuticals LTD.</td>
<td></td>
</tr>
<tr>
<td>100 ml spray bottles</td>
<td>PO Box 1869, Palmerston North 5330</td>
<td></td>
</tr>
<tr>
<td>Contains casein derivatives complexed with calcium phosphate (CD-CP)</td>
<td>New Zealand</td>
<td></td>
</tr>
<tr>
<td>Available in New Zealand</td>
<td><a href="http://www.nzp.co.nz">www.nzp.co.nz</a></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NSI Ltd., NSW, Australia</td>
<td></td>
</tr>
<tr>
<td></td>
<td>email: <a href="mailto:nsi@nulite.com.au">nsi@nulite.com.au</a></td>
<td></td>
</tr>
<tr>
<td><strong>MouthKote Saliva Substitute®</strong></td>
<td>Parnell Pharmaceuticals, Inc.</td>
<td>800-457-4276</td>
</tr>
<tr>
<td>8 oz pump bottle, lemon flavor</td>
<td>Larkspur, CA</td>
<td></td>
</tr>
<tr>
<td>(mucopolysaccharide), pH 4.0</td>
<td><a href="http://www.parnellpharm.com">www.parnellpharm.com</a></td>
<td></td>
</tr>
</tbody>
</table>
**BEFORE AND DURING RADIATION**

**OBJECTIVES**

- Eliminate sources of trauma and infection; calculus, sharp teeth, ill-fitting prostheses/appliances
- Impressions of teeth to fabricate custom trays for fluoride
- Appropriate radiographs; identify problems and establish baseline
- Periodontal charting
- Teeth that are non-restorable, those with moderate to severe periodontal disease and partially erupted mandibular third molars should be extracted if they are within the radiation field. The patient’s ability and motivation to maintain meticulous oral hygiene for the rest of their life must be assessed. This should strongly influence the decision to extract other, relative sound teeth within the radiation field. If patients have previously exhibited low concern for their dentition, it is predictable that the future oral environment will dramatically promote disease, putting these patients at risk for osteoradionecrosis.
- Restore advanced carious lesions and fractured restorations elsewhere in the mouth.
OBJECTIVES

• The dentist must consult closely with the radiation oncologist to determine the timing and extent of dental treatment needed prior to radiation therapy.

• As with chemotherapy, dental treatment should be avoided while the patient is receiving radiation.

• At least 14 days should be available for healing of any dental surgery before radiation therapy begins.

• The dentist must know the area of the jaws that will receive radiation exposure and the doses delivered.

• For example, radiation for a base of tongue cancer would tend to spare the anterior mandible, but not the posterior mandible. Therefore the posterior mandible in this patient would be at greatest risk of ORN. This figure is used as a guide.

• With each case it is critical to obtain the exact area of radiation exposure for that patient.
BEFORE AND DURING RADIATION

• Avoid moistening their mouth with cariogenic liquids such as soft drinks, citrus flavored or carbonated water, juices, punches, tea or any other liquid containing sugar.

• Avoid using any liquid with an acidic pH as a oral moistener.

• Avoid using items containing sugar to stimulate salivary flow (non-sugar free gums, mints, candies, lemon drops, tic-tacs, etc.)

• Understand the difference between sugar-free and sugar-less products.

• Avoid frequent between meal snacks, especially those that contain sugar or those that are composed primarily of carbohydrates.

• Perform thorough oral hygiene measures using a soft toothbrush and floss or an interproximal brush (if sufficient space exists), and a fluoridated toothpaste (1100 ppm fluoride ion) at least twice per day

• Brush teeth after every meal or snack.

• Use a topical fluoride rinse or gel daily; fluoride tray and a 1-1.1% neutral sodium fluoride or a 0.4% stannous fluoride gel.
The concept of dental decay as a transmissible, microbial disease is fundamental to understanding the etiology of the extensive dental disease (radiation caries) seen in head and neck radiation patients.

- Radiation-induced atrophy of salivary gland tissue
  - Decrease in quality and quantity of saliva
  - Reducing the antimicrobial, buffering, cleansing and remineralizing effects

- Increased susceptibility to decay can result in rampant caries
  - Increases the risk of osteoradionecrosis

- In the absence of daily fluoride treatment and proper oral hygiene maintenance, there can be rapid destruction of the dentition.
PREVENTION AND TREATMENT OF DENTAL CARIES

- Normal salivary pH is approximately 6.8 - 7.2
- In xerostomic patients the oral pH can fall to 5.5
- Rapid growth of acidophilic organisms 
  Mutans streptococci, lactobacillus and Candida
- Follow treatment model as described by Anderson, Bales and Omnell

Using this model, dental caries is primarily approached as an infection of the oral cavity with treatment directed at the causative organism.
PREVENTION AND TREATMENT OF DENTAL CARIES

- Elimination of existing nidi of mutans streptococci infection by removing caries from all cavitated caries lesions and obturating with glass ionomer interim restorations, as well as sealing all carious pits and fissures.

- Initiation of antimicrobial therapy using a 0.12% chlorhexidine rinse, 1/2 oz. oral rinse for one minute twice daily for two weeks. This will reduce the number of mutans streptococci below a pathological level for 12–36 weeks.

- Immediately following the two week twice daily course of 0.12% chlorhexidine, place the patient on a 1/2 oz. oral rinse for one minute twice daily one or two days per week. A recent study showed that a once per week rinse maintained a low mutans streptococcus count; however, two days per week may be required to maintain a suppressed level of mutans streptococci in xerostomic patients because the oral environment is these patients is conducive to a more rapid growth in the number of organisms.

- Application of a fluoride varnish to all of the remaining teeth during or following the removal of caries from all cavitated caries lesions and placing the patient on a brush-on 1% neutral sodium fluoride gel such as FluoroShield™ or Prevident™ to protect the teeth against demineralization and promote remineralization.
DENTAL CARIES

PREVENTION AND TREATMENT OF DENTAL CARIES

• Fabrication of fluoride trays for the application of the neutral sodium fluoride gel or stannous fluoride gel

• Both types of fluoride have proven effective; stannous fluoride is highly acidic and may affect certain types of restorations particularly glass ionomers

Instruct the patient on the daily use of the trays as follows:
• Place a ribbon of fluoride gel in the carriers
• Insert both the upper and lower carrier
• Gently bite several times to “pump” gel between the teeth
• Leave the carriers in place for 10 minutes
• Remove carriers and expectorate the gel but do not rinse
• Rinse the carriers and allow to air dry
• Do not eat or brush for at least 30 minutes (A good time to do this is prior to bedrest)
PREVENTION AND TREATMENT OF DENTAL CARIES

- Low concentration products such as 0.05% sodium fluoride rinses (250 ppm) and 0.63% stannous fluoride rinses (diluted 1:8 - 250 ppm) are relatively ineffective in xerostomic patients.

- The most effective products are those containing 1100 to 5000 ppm, such as 0.4% stannous fluoride gel or 1-1.1% sodium fluoride gel and/or toothpastes.

- The recommended technique is placing gel in fluoride trays, together with the twice-daily use of a conventional 1100 ppm fluoride toothpaste.

- The next most favorable protocol is to brush on the fluoride gel, together with the twice-daily use of a conventional 1100 ppm fluoride toothpaste.

- A less favorable third protocol is to brush twice daily with a 1% sodium fluoride dentifrice such as Colgate 5000®.
<table>
<thead>
<tr>
<th>RX TOOTHPASTES</th>
<th>MANUFACTURER</th>
<th>TELEPHONE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ControlRx ® 1.1% NaF Dentifrice 5000 ppm, Berry flavor</td>
<td>Omnii Oral Pharmaceuticals Gravite, AR <a href="http://www.omniipharma.com">www.omniipharma.com</a></td>
<td>800-445-3386</td>
</tr>
<tr>
<td>Prevident 5000 Plus ® 1.1% NaF Dental Cream, pH 7.0 or 5000 ppm, ≈ $7.00</td>
<td>Colgate Oral Pharmaceuticals, Inc Canton, MA <a href="http://www.colgateprofessional.com">www.colgateprofessional.com</a></td>
<td>800-821-2800 800-2-colgate</td>
</tr>
<tr>
<td>Pro-DentX ® 1.1% NaF toothpaste 5000 ppm, pH 7.0 - Mint, bubble gun, redberry flavors Not sold retail, dental offices only</td>
<td>Pro-Dentec Batesville, AK <a href="http://www.prodentec.com">www.prodentec.com</a></td>
<td>800-228-5595</td>
</tr>
<tr>
<td>FluorideX ® 1.1% NaF toothpaste 5000 ppm, pH 7.0, ≈ $6.00</td>
<td>Discus Dental Culver City, CA <a href="http://www.discusdental.com">www.discusdental.com</a></td>
<td>800-422-9448</td>
</tr>
</tbody>
</table>
FUNGAL INFECTIONS

MANAGEMENT OF CANDIDA INFECTIONS

• Perform gram stain or potassium hydroxide (KOH) wet prep to assist diagnosis of pseudomembranous candidiasis.

• Treat infections aggressively; sore throat, evaluate for esophageal candidiasis.

• Fluconazole tablets or clotrimazole troches are the most popular therapies (compliance better with fluconazole due to one time versus five times per day dosing). Xerostomic patients may have difficulty dissolving troches or pastilles.

• Itraconazole suspension may be used if patient has resistance to fluconazole. Nystatin pastilles are another option.

• Avoid nystatin suspension due to sugar content and poor patient acceptance.

• Treatment should include removable prosthetics and appliances.
TOPICAL TREATMENT FOR INFECTED APPLIANCES

- Daily 30 minute soak in 0.12% chlorhexidine solution
- Daily 30 minute soak in diluted sodium hypochlorite solution (10 ml / 2 teaspoons of 5% bleach in 250 ml or 1 cup of water)

Decreased salivary output has a direct correlation with increased prosthetic functional difficulty in edentulous patients.

Clinicians should consider recommending implant borne prostheses for xerostomic edentulous patients. Patients typically report improved oral comfort and function when compared to conventional prostheses.
# Fungal Medications

<table>
<thead>
<tr>
<th>Medication</th>
<th>Formulation</th>
<th>Dispensation</th>
<th>Dosing Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clotrimazole (Mycelex ®) 10 mg troches</td>
<td></td>
<td>70 troches</td>
<td>Dissolve one troche in the mouth five times per day for 14 days</td>
</tr>
<tr>
<td>Nystatin (Mycostatin ®) 200 mg oral pastilles</td>
<td></td>
<td>56 pastilles</td>
<td>Dissolve pastilles in mouth four times per day for 14 days</td>
</tr>
<tr>
<td>Fluconazol (Diflucan ®) 100 mg tablets</td>
<td></td>
<td>8 to 15 tablets</td>
<td>Take 2 tabs on day one and then one tab for 6 to 13 days (Oral suspension is also available)</td>
</tr>
<tr>
<td>Itraconazole (Sporonox ®) suspesion 100 mg/10 ml</td>
<td></td>
<td>140-280 ml</td>
<td>Swish and swallow 200 mg for 7 to 14 dys</td>
</tr>
</tbody>
</table>
“The maintenance of oral health in xerostomic patients is demanding for both the patient and the dentist. It requires cooperation and compliance on the part of the patient, with a commitment of time and effort well beyond that required for normal oral care. The dentist must promote and inspire this cooperation, provide detailed instructions and guidance, and follow the patient meticulously. Only in this way can the ravaging form of caries often found in these patients be prevented.”

Ira Shannon 1977
REFERENCES


REFERENCES


