Oral Health in Chemotherapy and Head and Neck Radiotherapy

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Oral Medicine Specialist
BDSc(Hons), DClinDent(OralMed/OralPath), FRACDS(GDP), MRACDS(OralMed), FOMAA.
What is an Oral Medicine Specialist?

- Oral medicine specialist vs Dentist
Initially see a lesion

Diagnosis of lesion and workup

**Dentist**
- Oral medicine
  - Diagnosis, workup

**Medical GP**
- Oral medicine
  - Diagnosis, workup, surgery
  - EN

**Oral medicine**
- Radiation oncology ± medical oncology

**Cancer Nurse coordinator**
- Reviews and rehab
  - Dentists, Prosthodontists, Oral surgeons
  - Oral medicine
  - Speech pathology
  - Dietician
  - Physiotherapy
  - Radiation therapists
  - Nurses
  - Radiation oncologists
  - ENT
1. The importance of dental reviews before, during and after cancer treatment.

2. The oral side-effects of head and neck radiotherapy and chemotherapy.

3. The management of oral side-effects during and after head and neck radiotherapy and chemotherapy.

4. Future follow-up of cancer patients.
Chemotherapy

- Chemotherapy is a cancer treatment that uses drugs to stop the growth of cancer cells, either by **killing the cells** or by **stopping them from dividing**.

- The regime depends on the Staging and type of cancer.

- Each drug has certain characteristic side-effects to be aware of.

- **5-FU (5-fluorouracil)**
- **Capecitabine (Xeloda)**
- **Cisplatin**

**Combined with**
- **Dexamethasone**
- **Denosumab, Zolendronate**
Need for pre-chemotherapy DENTAL review

- Prevent infections
  - Neutropenic and Thrombocytopenic
  - Transient bacteraemia
    - Teeth which require extractions should be performed prior to chemotherapy.
    - Good oral hygiene to reduce gingival bleeding, i.e. from toothbrushing.

- Reduce long-term side-effects of some of the medications.
  - Antiresorptive
    - Used to reduce Cancer therapy-induced bone loss from systemic chemotherapy and hormone ablation therapy.
    - Osteonecrosis of the jaws
Radiotherapy

- Targets rapidly dividing cells and makes small breaks in the DNA inside cells. This stops further growth and cell divisions, often killing the cancer cells.

- Radiation location and dose.
- Modality
  - IMRT for head and neck.
Need for Pre-radiotherapy DENTAL review

- Prevent dental infections which may interrupt radiotherapy regime
  - Abscess
  - Swellings
  - Pain

- Reduce radiotherapy short term side-effects
  - Mucositis

- Reduce radiotherapy long term side-effects
  - ORN
  - Dental caries
<table>
<thead>
<tr>
<th></th>
<th>CHEMOTHERAPY</th>
<th>RADIOThERAPY</th>
<th>CHEMOTHERAPY AND RADIOTHERAPY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eliminate trauma-Fillings, broken teeth.</td>
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<tr>
<td>Eliminate infection</td>
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<tr>
<td>Oral hygiene regime</td>
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<td>Fluoride</td>
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<td>Chlorhexidine</td>
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<tr>
<td>Brush and floss (after every meal)</td>
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<tr>
<td>Diet</td>
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<tr>
<td>Reduce sugars</td>
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<tr>
<td>Reduce food irritants (spicy, acidic)</td>
<td>++</td>
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<tr>
<td>Education</td>
<td>++</td>
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<tr>
<td>Quit smoking</td>
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<td>Reduce / eliminate alcohol</td>
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<tr>
<td>Remaining teeth to have a good long-term prognosis</td>
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<tr>
<td>Oral hygiene regime</td>
<td>CHEMOTHERAPY</td>
<td>RADIOTherapy</td>
<td>CHEMoTherAPy AND RADIOTHERAPy</td>
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Important for chemotherapy to reduce bacterial load

Important for radiotherapy since salivary defence is reduced

Important for chemotherapy to reduce bacterial load
The purpose of basic oral care is to maintain the patient's baseline oral health and reduce the impact of cancer therapy on the oral mucosa. Good oral hygiene practices are thought to reduce pain, bleeding, infection, and dental complications.

(Rubenstein et al 2004).
# Side-effects during chemotherapy and radiotherapy

<table>
<thead>
<tr>
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<th>RADIOThERAPy</th>
<th>CHEMOTHERAPy AND RADIOThERAPy</th>
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</thead>
<tbody>
<tr>
<td><strong>Mucositis</strong></td>
<td>+</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td><strong>Infections</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Candidal</td>
<td>+</td>
<td>++</td>
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</tr>
<tr>
<td>Bacterial</td>
<td>++</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td><strong>Taste changes</strong></td>
<td>+</td>
<td>+</td>
<td>++</td>
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<tr>
<td><strong>Reduced / altered saliva</strong></td>
<td>+</td>
<td>+</td>
<td>++</td>
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<tr>
<td><strong>Halitosis</strong></td>
<td>+</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td><strong>Paraesthesia</strong></td>
<td>++</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td><strong>Pain</strong></td>
<td>+</td>
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◆ In radiotherapy, this depends on the location, dosage of radiotherapy received.
1. Mucositis

- A painful inflammation and ulceration of the mucous membranes.
**MILD MUCOSITIS**

- Redness, no ulceration.
  - Depends on the location of the radiotherapy.
- Taste change
- Halitosis
- Dry mouth
- Thick saliva
  - Submandibular and sublingual glands are less sensitive than parotid glands.

**SEVERE MUCOSITIS**

- Pain
  - Depends on location
- Ulcers
  - Lost barrier
- Candidiasis
- Reduced diet
- Patient feels weaker
# WHO oral toxicity scale

<table>
<thead>
<tr>
<th>I</th>
<th>• Soreness ± erythema</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>• Erythema</td>
</tr>
<tr>
<td></td>
<td>• Ulcer</td>
</tr>
<tr>
<td></td>
<td>• Patient can swallow solid foods</td>
</tr>
<tr>
<td>III</td>
<td>• Extensive erythema</td>
</tr>
<tr>
<td></td>
<td>• Ulcers</td>
</tr>
<tr>
<td></td>
<td>• Patient cannot swallow food</td>
</tr>
<tr>
<td>IV</td>
<td>• Mucositis to an extent that alimentation is not possible</td>
</tr>
</tbody>
</table>

*(Sonis 1995)*
- Oral effects vary between patients

**Tonsillar SCC:** oropharynx, soft palate

**Tongue SCC:** tongue, buccal mucosa, gingiva
Reducing severity or delaying mucositis

- Amifostine injections
- Good Oral Hygiene
- Benzydamine HCL
- Caphosol
- Swishing ice chips in the mouth for 30 minutes, beginning 5 minutes before patients receive Fluorouracil.
BENZYMADINE:
• Reduced the frequency and severity of mucositis.
• Reduces Tumour necrosis factor-α.
• Offers effectiveness up to 50Gy.

( Epstein 2001); (Keefe 2007)

CAPHOSOL:
• Supersaturated solution of calcium and phosphate ions.
• Proven that if used from the beginning of radiotherapy and its duration, radiation mucositis is minimised.
• How it works
  • It lubricates the mucosa and helps to maintain the integrity of the oral cavity.
  • No randomised control trials.

(Miyamoto 2009)
<table>
<thead>
<tr>
<th>Mild – Moderate Mucositis</th>
<th>Severe Mucositis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salt and bicarbonate rinses</td>
<td>Systemic analgesia</td>
</tr>
<tr>
<td></td>
<td>- Fentanyl patch</td>
</tr>
<tr>
<td>Benzydamine rinses</td>
<td>Topical morphine</td>
</tr>
<tr>
<td>Curasept rinses (chemotherapy pts)</td>
<td></td>
</tr>
<tr>
<td>Oral 7 products</td>
<td></td>
</tr>
<tr>
<td>Xylocaine viscous</td>
<td></td>
</tr>
<tr>
<td>Swishing ice chips</td>
<td></td>
</tr>
<tr>
<td><strong>MucoLox</strong> - Coating agent-effective with minimal side-effects</td>
<td></td>
</tr>
</tbody>
</table>
MucoLox:
Formulated without dye, gluten, casein, dairy, soy, egg, nuts, ethanol, parabens, propylene glycol, or flavors
2. Infections: Candidiasis

- May present as:
  - Redness of the mucosa,
  - White, removable plaques,
  - Oral discomfort.

Daktarin - Miconazole

Nilstat - Nystatin (variety without sucrose)

4 x day
2. Infections: Periodontal

- May present as:
  - redness of the gingiva,
  - Swelling of the gingiva,
  - oral discomfort.

Chlorhexidine gel and/or rinse (Curasept)

Brushing and flossing

Good education and oral hygiene usually prevents this
3. Reduced taste

- Direct damage to taste buds
- Xerostomia

- Copious rinsing (salt/bicarbonate)
- Tongue cleaning (gentle)
  - Allows some (if any) saliva to enter the taste buds.
4. Reduced / Altered saliva

- Dried secretions may become caked on the mucosal surfaces, particularly the palate (and often misdiagnosed as candidiasis).

- Mucolytic agents, help to soften and dislodge them.
  - *Alkolol*- Not readily available
  - *Sodium bicarbonate* - a mucolytic agent
Dry mouth

- Reduced desquamation of cells.
- Reduced saliva flow.
- Use of biotene / Oral Seven products.
- Short-term lubrication – oil with water.
- Thick secretions- change in mucous : serous ratio
  - Salt / bicarbonate rinses
5. Halitosis

- Micro-organisms and plaque are increased due to:
  - Reduced salivary flow
  - Thick, mucous, acidic saliva
  - Soft diet
  - Immunosuppression

**Management**
- Tongue cleaning
  - Tongue scrapers
  - Teaspoon
- Rinses
  - Biotene / OralSeven
  - Salt / bicarbonate (breaks down mucin)
Maintaining oral hygiene during chemotherapy and radiotherapy

- The regime prior to commencement to radiotherapy should be followed until the initiation of oral symptoms (mucositis).

- Change in toothbrush
  - Ultra soft bristles
  - Massage of sulci, palate.
  - Reduce and dislodge plaque accumulation.

- Change in toothpastes
  - No SLS
  - Increased salivary enzymes and lubrication

<table>
<thead>
<tr>
<th>Biotene / OralSeven toothpaste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salt / Bicarbonate slurry</td>
</tr>
<tr>
<td>Chlorofluor gel</td>
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</table>

Mouth exercises-
- Tongue, mouth opening.
Oral prostheses: Cleaning

- **Dentures**
- **Obturators**

- Rinsed after every meal.
- Cleaned with a toothbrush and mild soap.
- Weekly soak in Steradent.
6. Paraesthesia

- Most common in chemotherapy.
- Patients often experience sensory symptoms such as numbness, tingling, or burning sensations.
  - Damage to the peripheral nervous system, caused by some chemotherapy agents, i.e., Cisplatin.
- Severity of symptoms is related to the cumulative dose of the drug received.
7. Pain

- Comes to a point that the use of systemic medication is mandatory:
  - will reduce central somatisation, which can worsen and prolong pain.

- NSAIDs and non-opioids first, but most likely need ....

- Opioids
  - Fentanyl patch
Are we considering the patients psychological status?

- Pain somatisation
  - Cognitive behavioural therapy
  - Medications
    - Treatment with antidepressants will not only contribute in reducing depression but also reduces pain somatisation.

- Must encourage and support patients
  - to get them through the treatment to avoid disruptions
Post-radiotherapy and post-chemotherapy

- Patient is relieved that management has been completed!

- Nevertheless,
  - meticulous oral hygiene will need to be continued, and
  - a sugar-free diet should be instituted / maintained.

- This is indefinitely! (especially for radiotherapy)
After chemotherapy and head and neck radiotherapy:

AIMS:

- Management of side-effects
- Consideration of dental replacement (if required).
## Long-term side-effects

<table>
<thead>
<tr>
<th></th>
<th>Chemotherapy</th>
<th>Radiotherapy</th>
<th>Chemotherapy and Radiotherapy</th>
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<tbody>
<tr>
<td>Dry mouth</td>
<td>+</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Reduced taste</td>
<td>+</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Dental caries</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Periodontal / gingival disease</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Dentinal sensitivity</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Trauma susceptibility</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Osteoradionecrosis</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Osteonecrosis</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<tr>
<td>(if on antiresorptive medications)</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Fibrosis</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Dysphagia</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Psychological</td>
<td>+</td>
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</table>

Majority of the long-term side-effects affect patient’s who have undergone radiotherapy treatment. **These side-effects vary depending on the location and dose of the radiotherapy.**
Post-radiotherapy: Dry mouth

- Reduced saliva flow.

- Short-term lubrication
  - Oral 7 and Biotene products
  - oil with water
  - Mucolox

- Gustatory stimulants
  - xylitol chewing gum, xylitol lozenges

- Thick secretions - change in mucous:serous ratio
  - Salt / bicarbonate rinses
Pilocarpine
- parasympathomimetic agent
- functions primarily as a non-selective muscarinic agonist
Reduced taste

- Direct damage to taste buds
- Hyposalivation
  - Tongue cleaning
    - Allows some (if any) saliva to enter the taste buds.

Sometimes taste returns- there is a period of unpleasant taste.
Post-radiotherapy: Dental caries

Less saliva:
= pH in the oral cavity is decreased (more acidic)
  = More cariogenic micro-organisms and less chance of remineralisation.
Post-radiotherapy: Other dental effects

- Periodontal / gingival disease-
  - Recession
  - Worsening disease

- Tooth sensitivity
  - Increased tooth wear
  - Gingival recession
Post-radiotherapy: Dysphagia

- Xerostomia
- Fibrosis of the swallowing muscles.
- Fibrosis and narrowing of the esophagus.
- Stiffening of the soft palate.

→ Aspiration pneumonia

Dieticians, speech therapists- Very important!
Post-radiotherapy: Trismus

- Muscles of mastication fibrosis
  - Reduced mouth opening.
  - Difficulty cleaning the teeth.

- Usually increases 6 months after radiotherapy

- More noticeable when radiotherapy is bilateral and at higher doses.

Need physiotherapy and speech therapy after radiotherapy.
- Home exercises
- Tongue blades

(Dijkstra 2004)
Post-radiotherapy: Trauma susceptibility

- Reduced saliva
  - Less lubrication
  - Reduced immune response
    - Reduced healing
    - Altered lining mucosa
- Fibrosis
- Decreased circulation
Post-radiotherapy: Osteoradionecrosis (ORN)

- A radiation-induced ischemic necrosis of bone with associated soft tissue necrosis of variable extent, occurring in the absence of local primary tumor necrosis, recurrence, or metastatic disease.

Usually occurs at a dose of **52Gy and above.**

Patients are usually unaware - dead bone - no sensation.

(Wong 1997)
Osteoradionecrosis (ORN): Risk factors

- Smoking, alcohol consumption
- Diabetes, high BP
- Poor oral health
- Total radiation dose
- Treatment modality, fraction size and dose rate.
- Invasive procedures
- Dentures—poorly fitting

The risks last indefinitely!
Recurrences / New cancers

- A need to have an early diagnosis:
  - surgery is usually the only management.
Reducing risk of side-effects, recurrences / new cancers

- Smoking and alcohol
- Oral hygiene maintenance
- Diet
- Reviews / monitoring
Encourage no smoking and no alcohol consumption

- Synergistic effect
- Reduces longterm prognosis after cancer treatment.

(Rosenquist 2007)
Post-radiotherapy: Oral hygiene

- Oral hygiene regime
  - NeutroFluor 5000
  - Fluoride, alcohol free rinses

- Customised medicament trays-
  - Fluoride varnish / foam/gel application, three times per year.

- Regular frequent dental evaluations to detect dental disease.
  - GC tooth mousse
  - Regular dental checks
Post-radiotherapy: Diet

- Diet instructions
  - Reduced caffeine
  - Diuretic
  - Reduced sugar
  - Dental caries.

→ Liaise with Dieticians
Patient recalls

- 1 month, then 2 months and then 3 monthly.
- Later 6 monthly and then to 1 year.

- Patients are seen indefinitely in Oral Medicine on at least a yearly basis.
  - Continual reinforcement of OH and social habits and diet
  - Detection of oral pathology
    - Traumatic lesions
    - Recurrences
    - ORN prevention
  - Management of dry mouth and its sequelae.

- Dieticians-
  - must be able to eat and maintain nutrition

- Speech therapist-
  - must be able to swallow

- No time point for discharge-
  - Patient dependent!

(Frydrych 2012)
Dental Rehabilitation

- Dentures
- Implants
New Dentures

Addition to dentures

- Delay for 3 – 12 months post-radiotherapy.
- Time depends on-
  - Anatomy of ridges,
  - location and doses to areas of irregularity.

No significant risk of developing complications from well-constructed dentures.

(Gerngross 2005)
(Kumar 2015)
Implant rehabilitation

- Reduced retention rate.

**BUT**

- No failures in irradiated jaw bone or bone grafts.
- Failures in irradiated bone that had been provided as part of a composite (soft tissue and bone) free flap.
  - Decreased vascularisation
  - Bulky soft tissues - peri-mucositis.

*(Barrowman 2011)*

- **Effect of radiation dose**: Favorable osseointegration
  
  = radiation doses less than 45-50 Gy.

*(Colella 2007)*
TIMING

- Jacobson (1985) recommended that dental implantation should be done at least after one year of completion of radiation. (animal study)

- Taylor (1993) and Franzen (1995) believe that implant placement should be delayed at least two years after completion of irradiation therapy.

CONSIDER:

- Suitability
- Costs / risks vs Benefits

(Jacobsson 1985)
(Taylor TD 1993)
(Franzén 1995)
Individuals who have undergone cancer management, will require continual reinforcement and advice regarding oral health.

We want advice to be consistent!
Must work as a cohesive TEAM!
Thank you

- QUESTIONS?