Mucositis – A nursing management approach

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Introduction
Mucositis is a common side-effect of radiation therapy and chemotherapy. It is extremely debilitating for the patient as they often experience significant pain. Severe mucositis can complicate the treatment process of cancer as programmes need to be altered or postponed, while waiting for healing to take place. The patient’s nutritional status may become compromised and wound healing delayed. Hospitalisation may become necessary for symptom control.

Neutropaenic patients with mucositis have an increased risk for infection, as micro-organisms can enter the patient via the injured membranes. Systemic infections in these patients can be life-threatening.

Definition
Mucositis is a general term that refers to an inflammatory reaction that takes place in the mucosal lining. This inflammatory process can lead to ulcerative lesions which can become extremely painful.

The mucosal surfaces are not limited to those found in the mouth and oropharynx (stomatitis), but include oesophagus (oesophagitis), stomach (gastritis), intestine (enteritis), colon (colitis), rectum (proctitis) and vagina (vaginitis).1

Anatomy and physiology
The mucous membranes line the cavities that open to the outside of the body.2 They provide a mechanical barrier to inhibit the invasion of micro-organisms. A mucous membrane consists of three layers.

• The outer layer (the epithelial layer) is made up of stratified, squamous or columnar epithelium, depending on its anatomical position within the gastro-intestinal or reproductive tracts.
• The middle layer (the lamina propria) contains the blood vessels, nerve endings and glandular tissue. The inner layer, the sub-mucosal layer, varies in thickness depending on its location.
• The middle and outer layers are separated by a basement membrane. Stem cells of the basement membrane differentiate to form the various cells of the surface epithelium. It is estimated that the surface epithelium of the oral cavity is replaced every 7–14 days.1 When the loss of surface epithelial cells exceeds the rate of repair and replacement of these cells, shallow ulcerative lesions occur. These lesions are essentially a break in the integrity of the mucosal lining and therefore potential portals for invasion by pathogenic organisms. Normally, Gram-negative and Gram-positive bacteria, as well as certain fungi, reside within body cavities. These organisms (endogenous) as well as exogenous micro-organisms can become pathogenic, especially in the immune-compromised host.

Cells in the body, such as those of the mucosal membrane, that undergo rapid renewal, are particularly sensitive to cancer-related treatments. Care of the mucosal membranes therefore becomes particularly relevant for oncology or haematology patients undergoing radiation therapy or high dose chemotherapy with or without haematopoietic stem cell transplantation.

Mucositis is a multi-stage process as shown in Table I.

Causes of mucositis

• Disease related causes
Causal agents would include the primary tumours that present within the anatomical regions where a mucosa membrane is found, e.g. tumours of the gastro-intestinal tract; infiltration of leukaemic cells; Kaposi’s sarcoma
• Treatment related causes
Mucositis is a side-effect of many anti-cancer treatments such as radiation therapy and certain chemotherapy agents such as the alkylating agents.3
Mucositis can also be caused by a dry mouth (xerostomia) and inflamed salivary glands (parotitis). Surgical interventions performed over the mucosal surface (such as incisions), also cause a degree of inflammation.
PHASE DESCRIPTION
1. The initiation Treatment (such as radiotherapy or chemotherapy) damages the DNA of the cells of the basement membrane, which releases reactive oxygen species (ROS). This further injures cells within the sub mucosa.
2. Primary damage response The combination of DNA damage and release of ROS leads to the production of inflammatory cytokines, which results in tissue injury and apoptosis (cell death).
3. Signal amplification Inflammatory cytokines cause further damage and the injury process is amplified.
4. Ulcerative The rate of repair is less than the rate of injury and shallow ulcers appear. The integrity of the mechanical barrier of the mucosal membrane is compromised. The patient often experiences severe pain during this phase.
5. Healing Through differentiation and proliferation of epithelial cells, the delicate balance between rate of injury and restoration of cells is restored. Healing of the mucosal membrane takes place when the white cell counts start to return to normal.

Table 1: Five phases of mucositis

<table>
<thead>
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<th>PHASE</th>
<th>DESCRIPTION</th>
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<tbody>
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Grading of mucositis
The most frequently used scales for grading the severity of mucositis are based on recommendations by the National Cancer Institute (NCI) or World Health Organization (WHO).

A grading scale is needed to accurately and consistently evaluate the severity of the mucositis and compare findings with members of the multi-disciplinary team. (See Table II)

Epidemiology
The cancer patient’s risk of developing oral mucositis is extremely variable and each patient should be individually assessed.

There is also variation in the individual’s experience of mucositis on each cycle of treatment given. Radiation therapy to the oral cavity and high dose chemotherapy used in the conditioning programmes prior to haematopoetic stem cell transplantation (HSCT), are associated with increased severity of mucositis. However, severe mucositis can also occur in standard doses of chemotherapy, for example with the administration of 5-Fluorouracil (5-FU).

Oral mucositis usually develops within two weeks of initiating treatment. It is usually at its most severe stage when the patients’ white cell count is at its lowest. Healing usually occurs as the counts improve.

Oral mucosal assessment
It is suggested that assessment of the oral mucosa should be done at least twice per day on patients admitted to hospital for cancer-related treatment, such as chemotherapy or radiation therapy. Assessments should be structured in approach and consistent in application.

- The lips: Note the presence of oedema, lesions, cracks, colour, movement and dryness.
- Tongue: Assess the size, shape, movement, dryness, texture and any roughened areas or lesions.
- Mucous membrane: Inspect the inside of the cheeks, hard and soft palates, under the tongue.
- Gingiva: Observe colour, oedema and the presence of any bleeding.
- Teeth: Note the presence of dental caries, loose or broken teeth and overall dental hygiene.
- Saliva: Normal saliva is described as being watery and slightly

Table II: Scales for the assessment of oral mucositis: NCI and WHO

<table>
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<tr>
<td>Grade 0</td>
<td>None</td>
</tr>
<tr>
<td>Grade 1</td>
<td>Painless ulcers, erythema, or mild soreness in the absence of ulcers</td>
</tr>
<tr>
<td>Grade 2</td>
<td>Painful erythema, oedema, or ulcers but early eating or swallowing is still possible</td>
</tr>
<tr>
<td>Grade 3</td>
<td>Painful erythema, oedema, or ulcers requiring IV hydration</td>
</tr>
<tr>
<td>Grade 4</td>
<td>Severe ulceration, requiring parenteral or enteral nutritional support or prophylactic intubation</td>
</tr>
<tr>
<td>Grade 5</td>
<td>Death related to toxicity</td>
</tr>
<tr>
<td>Grade 0</td>
<td>None</td>
</tr>
<tr>
<td>Grade 1</td>
<td>Soreness with or without erythema, no ulceration</td>
</tr>
<tr>
<td>Grade 2</td>
<td>Erythema, ulcers. Patients can swallow a solid diet</td>
</tr>
<tr>
<td>Grade 3</td>
<td>Ulcers, extensive erythema. Patients cannot swallow solid diet</td>
</tr>
<tr>
<td>Grade 4</td>
<td>Oral mucositis to the extent that alimentation is not possible</td>
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foamy. The saliva may become more stringy and sticky (like thick honey), or be absent (especially in a dehydrated patient).
• **Odour**: Note the presence of halitosis.
• **Assess the patient’s ability to swallow and what the patient is able to swallow.**

**Rectal and vaginal assessment**
Neutropenic patients should be assessed daily, but this inspection is limited to a visual inspection only. Consideration and sensitivity should be shown towards the patient’s need for privacy and maintenance of dignity.

Note any areas of excoriation, oedema or inflammation on the perineum. Look for the presence of fissures or haemorrhoids.

**Nursing management – oral mucosa**
Oral mucositis is described as the most significant and debilitating side effect of cancer treatment, due to pain.

• **Pain control**: The patient should be asked to assess their experience of pain (related to the mucositis) on a pain scale of 0–10 (0 = no pain; 10 = worst pain imaginable). Doctors can then prescribe appropriate analgesia ranging from topical applications such as aspirin gargles to systemic intravenous infusions e.g. morphine. The pain assessment should be done at least twice a day.
• **Avoid irritants that can further injure the inflamed mucosa e.g. alcohol, smoke, hot spicy food and commercial mouthwashes (often contain alcohol).**
• **Encourage adequate fluid intake (depends on size of patient and environmental conditions amongst other factors).**
• **Regular mouth-care protocols should be initiated.** Centres treating oncology/haematology patients usually have their own protocols for mouth-care. Many of these protocols include the “salt n soda” combinations which are primarily made up of saline and sodium bicarbonate preparations.
• **Instruct the patient with established mucositis to gargle for at least one minute every two to four hours during the day and four hourly or when awake at night. In patients that do not have mucositis, gargling as prophylaxis should be recommended every six to eight hours.**
• **Do not gargle directly from the mouthwash mix bottle, but decant the gargle into another container before use, to prevent contamination.**

**An example of such a mouth-care mix is:**

In 1000 ml Saline 0.9% (preferably in a pour bottle)

Add: 3 heaped teaspoons Sodium Bicarbonate powder
50 ml–100 ml 2% Lignocaine (added only if topical pain control is required)

• **Chlorhexidine-containing regimens may cause irreversible yellow-staining of the teeth when used consistently for longer than 10 days.**
• **Brush the teeth at least twice a day using a new, soft toothbrush. Replace the toothbrush at least every two months. If brushing is not possible, use a clean piece of gauze wrapped around the finger to clean the teeth.**
• **If the patient is used to flossing between the teeth, this practice may be continued gently, taking care to avoid further injury to the gingiva.**
• **The lips are kept moist and supple using a new barrier cream or equivalent such as lip-ice or Vaseline.**
• **Dentures should be kept clean and washed in recommended solutions. Dentures should only be worn at mealtimes where possible, when mucositis is present or when the absolute neutrophil count (ANC) is less than 1 000/mm3 or the platelet count falls below 50 000/mm3.**
• **Health education to the patient should include:**
  - Signs and symptoms of mucositis and infection
  - Mouth-care protocols to be used at home
  - Adequate nutrition and hydration
  - Avoiding unnecessary trauma e.g. smoke

**Cryotherapy**
Certain chemotherapy agents are known to be particularly toxic to the mucosal membrane. It has been recommended that patients who are treated with 5-fluorouracil (5-FU) or high dose melphalan should be given oral cryotherapy as prophylaxis to reduce the incidence and severity of oral mucositis. Patients should suck on ice-chips for 30 minutes, starting 5 minutes before the infusion commences.

**Nursing management – rectal/vaginal mucositis**

• **Avoid exposure to chemical (such as perfumed soaps) or physical irritants (e.g. tampons).**
• **Assess pain and administer analgesia as prescribed.**
• **Encourage adequate fluid intake.**
• **Modify diet to minimise diarrhoea or constipation.**
• **Wash perineum after urination and defecation and pat dry.**
• **Use a barrier cream to the peri-anal area if necessary.**
• **Twice daily sitz baths (e.g. salt).**
• **Avoid standing or sitting for long periods.**
• **Wear loose-fitting underwear, preferably made of cotton.**

**Conclusion**
Mucosal membranes which are inflamed and painful affect the quality of life of our cancer patients. As nursing professionals, we should assess the mucosal membranes of our patients in a structured and informed manner, remembering that the mucosal lining is not limited to the oral cavity alone. As an anticipated side-effect of many anti-cancer treatments, we should ensure that we are able to provide effective protocols for the management of mucositis in order to minimize discomfort and prevent further complications.

**References:**
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