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ORAL HEALTH OF MEDICALLY COMPROMISED PATIENTS

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ORAL HEALTH OF MEDICALLY COMPROMISED PATIENTS

NIL BY MOUTH, FEEDING TUBES, CHEMOTHERAPY, RADIOTHERAPY AND PALLIATIVE CARE: INFORMATION FOR DENTAL PRACTITIONERS

Oral care is pivotal in maintaining oral health, particularly because oral diseases are mostly preventable by adhering to good basic oral care practices, including consistent removal of plaque as well as application of fluoride mainly via brushing teeth with a fluoride toothpaste and restricting sugar consumption.¹ On the other hand, a growing body of evidence supports oral health-general health relationships. Type 2 diabetes, cardiovascular diseases, respiratory diseases and adverse pregnancy outcomes are some of the main general health conditions that are associated with poor oral health, predominantly, uncontrolled periodontal disease.^{1,2} Therefore, the impact of oral care on general health cannot be understated.

There are certain groups of patients including 1. those who are nil by mouth (NBM), 2. those on feeding tubes, and 3. those undergoing chemotherapy and/or radiotherapy and those in palliative care, that are more likely to develop oral complications such as xerostomia and oral mucositis.^{1,3} Consequently, these 3 patient groups are at a greater risk of further deterioration of their oral health. In addition, these oral complications can lead to long-term secondary complications such as malnutrition and aspiration pneumonia among such patients.^{1,4,5} Considering all this, it is apparent that these groups of patients require extra oral care to minimise such risks and consequently, they present additional challenges for dental practitioners.

Oral complications that may present in these three groups of patients and the special oral care they need are briefly discussed below.

1. Patients who are nil by mouth (NBM):

These patients are restricted from eating and drinking due to a range of medical conditions such as dysphagia, unconsciousness/compromised consciousness, acute abdomen and non-functional bowel, and at different stages of managing their medical condition, in particular during surgery.⁶ The following oral complications are common among them, mainly due to dehydration, after-effects of anaesthetic agents as well as fear and anxiety associated with having surgery in patients undergoing surgical procedures⁶:

- Xerostomia
- Thicker saliva
- Dry/cracked lips
- Difficulty in swallowing and speaking
- Halitosis
- Difficulty in wearing dentures

2. Patients on feeding tubes:

It is a common practice to resort to tube feeding or enteral nutrition in patients, particularly with dysphagia, who may be unable to take adequate nutrition orally.⁷ Nasogastric (NG) tube and the percutaneous endoscopic gastrostomy (PEG) are the main methods of enteral feeding where an enteral tube is connected to the stomach (NG) or small bowel (PEG).

Absence of, or restricted oral nutrition intake among these patients could lead to alterations in the biochemical composition of saliva as well as salivary flow rate and disruption to the normal equilibrium of oral microbial flora.^{7,8} Consequently, they can present with the following oral complications:

- Xerostomia
- Thicker saliva
- Oral infections such as candidiasis
- Difficulty in swallowing
- Oral ulceration

Research suggests that natural oral feeding is a protective mechanism against colonization of the oral cavity with pathogenic bacteria.^{7,8} Accordingly, absence of natural oral feeding alongside the above mentioned oral complications may lead to an overgrowth of pathogenic gram-negative bacteria in tube-fed patients, potentially causing aspiration pneumonia.^{5,7,8}

3. Patients on chemotherapy, radiotherapy and those in palliative care:

Oral mucosa has a rapid cell turnover rate and hence is at a high risk for both direct and indirect noxious effects of chemotherapy and radiotherapy.⁴ Direct toxic effects include lethal and sublethal damage to oral tissues, attenuation of immune and other protective systems, and interference with normal healing while suppression of bone marrow tissue, loss of tissue-based immune cells, as well as protective salivary constituents, are regarded as indirect effects.⁴ Additionally, divergence as well as complexity of the oral microbial flora and trauma caused by natural oral activities, accompanied by decreased immunity in this group of patients may increase their susceptibility for such noxious effects.^{4,9} Consequently, these patients may present with the following oral complications:

- Oral mucositis
- Xerostomia
- Oral infections including candidiasis and viral/bacterial infections
- Salivary gland dysfunction including sialadenitis

- Taste dysfunction including dysgeusia (altered taste) and ageusia (absence of taste)

In addition, patients who are on radiotherapy can develop osteoradionecrosis, which leads to poor healing of bones.⁴ Most of the patients in palliative care are managed with chemotherapy and hence they can also present with the above oral complications. In addition to this, palliative care patients have reported swallowing difficulties (dysphagia) and orofacial pain among other complications. On the other hand, palliative care patients tend to underreport their oral complications, probably due to either an inability to convey their oral health needs or their acceptance of oral complications as an unavoidable effect of palliative care.³

It is apparent that all these groups of patients present with xerostomia, oral mucositis and oral infections, in particular oral candidiasis, as the main complications.^{3,4} Accordingly, these complications are discussed in more detail below.

Xerostomia

The subjective perception of dry mouth, which is not necessarily accompanied by hyposalivation or a reduced salivary flow rate, is known as xerostomia.^{10,11} On the other hand, a significant reduction in stimulated or unstimulated whole salivary flow rate is defined as salivary gland hypofunction (SGH), which is sometimes reported as xerostomia.^{10,11} Therefore, it is important for dental practitioners to distinguish between xerostomia and SGH. Xerostomia is most frequently cited as a side effect of using a range of medications such as antidepressants, antihistamines, antihypertensive and anti-asthmatic agents. Radiotherapy to the head and neck region, Sjogren's syndrome, other systemic conditions including diabetes, hypertension and asthma, dehydration and chemotherapy have been suggested as other common causes of it.¹¹ Given that xerostomia is a subjective condition, it is essential to evaluate this condition by direct questioning of the patient.^{10,11}

Clinical presentation of xerostomia

Clinical features of xerostomia can vary with the severity of the condition but patients with xerostomia may present with the following signs and symptoms:

- Thick and stringy saliva
- Dryness, crusting and cracking of lips (Figure 1)
- Atrophy and fissuring of the tongue (Figure 2)
- Fragile oral mucosa
- Difficulty in speech, eating, chewing and swallowing

- Oral burning sensation and pain/sensitivity to spicy foods
- Difficulty in wearing dentures
- Taste disturbances
- Increased thirst



Figure 1: Dry/cracked lips



Figure 2: Fissuring of the tongue

Oral mucositis

Inflammation of oral mucosa, which is characterised by erythema or ulcerations, as a consequence of chemotherapy or radiotherapy is referred to as oral mucositis.^{4,12,13} It is one of the most ubiquitous and complex complications in patients undergoing cancer therapy and palliative care. While alimentary or gastrointestinal mucositis refers to mucosal injury of the alimentary tract from mouth to anus, induced by cancer therapy, oral mucositis is usually described separately given its salient clinical features as well as pathophysiological responses.^{9,13} Oral mucositis can occur by a direct injury to the basal layer and consequent to a complex cascade of biological events mediated through pro-inflammatory cytokines such as TNF- α and IL-6.¹³ There are several stages in the development of oral mucositis including initiation, ulceration and spontaneous healing.^{12,13} Onset of oral mucositis could occur following 1-2 weeks of chemotherapy/radiotherapy and spontaneous healing could happen 2-4 weeks after cessation of chemotherapy/radiotherapy.^{12,13}

Clinical presentation of oral mucositis

Depending on the severity, a patient with oral mucositis can present with a range of clinical features, including, but not limited to, the following:

- Erythema
- Erythematous lesions (Figure 3)
- Burning mucosal discomfort
- Pain/soreness
- Ulceration and bleeding from ulcers
- Deep submucosal ulcers
- Difficulty in eating, chewing and swallowing
- Difficulty in wearing dentures



Figure 3: Radiotherapy induced erythematous lesions in the right buccal mucosa¹²

Clinicians and researchers have been using various scales for grading the severity of oral mucositis. However, many prefer the grading system suggested by the World Health Organization (WHO) because it is simple and easy to use (Table 1).¹²

Table 1. WHO scale for grading oral mucositis

Grade	Criteria
Grade 0	No oral mucositis
Grade 1	Erythema and soreness
Grade 2	Ulcers, able to eat solids
Grade 3	Ulcers, requires liquid diet
Grade 4	Ulcers, alimentionation not possible

Oral candidiasis

Candida Albicans is a commensal fungal organism in the oral cavity, which cohabits with normal oral flora in a vast majority of individuals and does not cause an infection under normal circumstances.^{4,14} Nonetheless, the below alterations to the oral and/or systemic environment could lead to an excessive growth of this organism resulting in an opportunistic infection, i.e., oral candidiasis^{4,14}:

- Loss of equilibrium in the oral flora following antibiotic treatment
- Immunosuppression due to drugs/disease
- Hyposalivation caused by drugs, disease or radiotherapy
- Damage to local tissues/mucositis after radiotherapy/chemotherapy

All three groups of patients discussed hitherto, in particular those who receive chemotherapy and radiotherapy, can undergo the above changes and hence may be more vulnerable to the development of oral candidiasis compared with the general population who are otherwise healthy.^{4,14}

Clinical presentation of oral candidiasis

Pseudomembranous candidiasis (Figure 4) and erythematous candidiasis are the most common forms of oral candidiasis seen among patients on chemo/radio therapy.^{4,14} Sometimes, oral candidiasis may be asymptomatic.

Clinical features of pseudomembranous candidiasis include:

- Burning pain
- Taste changes when eating
- Foul taste when not eating
- White-curd like pseudomembranes (thrush), which can be removed with pressure exposing erythematous mucosa. In denture wearing patients, thrush could be detected under dentures.



Figure 4. Pseudomembranous candidiasis of tongue

Clinical features of erythematous candidiasis include:

- Burning sensation
- Red, inflamed oral mucosa
- Bald and red appearance of the dorsum of the tongue due to diffuse loss of filiform papillae
- Discomfort and taste changes

Although rare, oral candidiasis might present as angular cheilitis in these patients.

Oral care of medically compromised patients

Given that these groups of patients may present with common oral complications, oral care suggested for these patients is discussed collectively. Oral complications that develop in these patients may render them more susceptible for further deterioration of their oral health as well as general health. Therefore, maintaining good oral hygiene practices such as toothbrushing is pivotal for them. Some of these patients, including those who are very sick and lacking the energy to clean their teeth and/or cannot grip a toothbrush properly, are unable to perform self-oral care and hence they may require assistance from a carer. In general, the guidelines below can be followed to perform oral care in these patients.^{1,3-18}

• Oral hygiene practices

Use a small-headed and soft-bristled toothbrush to clean teeth and gums twice daily with a fluoride toothpaste. A pea-sized toothpaste for patients without dysphagia and a smear of non- or low-foaming toothpaste is preferred for patients with dysphagia. A piece of gauze or oral swab can be used to remove debris in patients with poor oral control/damaged gums or those who are unable to rinse. To maximise the effect of fluoride, patients are encouraged

to spit the toothpaste out but not to rinse. A powered toothbrush may be recommended for patients with manual dexterity issues. In addition, a combination of toothbrushing with dental flossing, mouth rinsing and topical application of fluoride is suggested for these patients to better maintain their oral hygiene.

• Dry mouth care

Unless the patient is NBM or on fluid restriction, frequent sips of water help keep the mouth moist. Apply dry mouth moisturising gels or sprays/mouthwashes to lubricate the mouth, particularly before toothbrushing/mouth cleaning and eating. Artificial saliva including saliva substitutes and stimulants may be prescribed, in particular for patients with severe dry mouth. Chewing sugar-free gum may help in stimulating saliva flow. It is important to restrict sugar intake and check regularly for oral thrush in patients with xerostomia as they are at a high risk of developing dental caries and oral candidiasis, respectively.

• Oral mucositis

Application of local analgesic gel, mouthwashes including bland rinses such as sterile water and normal saline and moisturising gels/sprays may help reduce pain and discomfort. In severe cases, systemic analgesics ranging from nonsteroidal anti-inflammatory drugs (NSAIDs) to opioids may be recommended to relieve pain, depending on the severity of pain.

• Oral candidiasis

In view of lower risk of side effects and drug interactions, topical antifungal agents such as nystatin rinse/suspension and clotrimazole troches (lozenges) are generally preferred over systemic agents. However, efficacy of these topical agents seems to be inconsistent and therefore systemic agents such as fluconazole

have been recommended for patients with extensive immunosuppression and persistent candidiasis. Patients wearing removable dentures are advised to remove them before starting antifungal treatment and to soak them overnight in antifungal solutions such as peroxide- and enzyme- based or sodium bicarbonate solutions.

• Denture care for patients wearing dentures

Clean the dentures with a commercial denture paste or soap and store dentures in a dry, safe location. However, storing them in water is an option.

• Osteoradionecrosis

Osteoradionecrosis is a serious complication of radiotherapy to the head and neck region where an area of exposed devitalised irradiated bone fails to heal over a period of 3–6 months in the absence of local neoplastic disease.^{4,18} Therefore patients who are about to undergo radiotherapy, are required to have a comprehensive dental check-up and remove any grossly carious teeth as well as loose and mobile teeth to minimise the risk of osteoradionecrosis.^{4,16,18} Good oral hygiene practices should be instilled in them before starting cancer treatment and continued both during and after treatment.

• Dental caries and periodontal disease

Oral complications, such as dry mouth and salivary gland dysfunction, may render all these groups of patients at a greater risk of developing dental caries and periodontal disease, jeopardizing their oral health further. Therefore, limiting sugar intake, using high-fluoride toothpaste, applying fluoride gel/varnish and using 0.2% chlorhexidine gluconate mouthwash may be recommended to reduce their caries and periodontal disease risk.

• Multidisciplinary approach

Oral and potential systemic complications, such as aspiration pneumonia, and malnutrition, among these groups of patients may require dental practitioners to collaborate with other health professionals including dietitians, speech pathologists, general medical practitioners and medical specialists as well as carers of these patients. Moreover, dental practitioners have a key role to play in referring these patients for further management, where appropriate. This in turn would help in alleviating the general health risks associated with such complications and improving the quality of life of these patients.

Summary

- Patients who are NBM and/or on feeding tubes, undergoing chemotherapy and/or radiotherapy and those in palliative care are at a high risk of developing oral complications that would further jeopardise their oral health as well as general health.
- Xerostomia, oral mucositis and oral candidiasis are among the main oral complications shared by these patients. They may present with dysphagia, difficulty in speaking, pain/soreness/burning sensation of the mouth, thick/stringy saliva, dry/cracked lips, taste changes and difficulty in wearing dentures.
- These groups of patients may develop long-standing systemic complications such as malnutrition and aspiration pneumonia because of their oral complications.
- Given the vulnerability for further deterioration of oral health, it is essential to instil and maintain good oral hygiene practices in these patients.
- In order to minimise the general health risks, and to improve the quality of life of these patients, dental practitioners have a responsibility to collaborate with other health professionals as well as carers of these patients and to refer them for further management, where appropriate.

References:

1. NHS. Health Education England. Mouth Care Matters. A guide for hospital healthcare professionals. http://mouthcarematters.hee.nhs.uk/wp-content/uploads/2016/10/MCM-GUIDE-2016_100pp_OCT-16_v121.pdf#:~:text=Mouth%20Care%20Matters%20%28MCM%29%20is%20a%20training%20initiative,best%20of%20our%20knowledge%2C%20is%20up-to-date%20and%20evidence-based Accessed February 02, 2021.
2. Sabbah W, Folyan MO, Tantai ME. The link between oral and general health. *International Journal of Dentistry* 2019; 2019: 7862923. doi: 10.1155/2019/7862923.
3. Venkatasalu MR, Murang ZR, Ramasamy DTR, Daliwal JS. Oral health problems among palliative and terminally ill patients: an integrated systematic review. *BMC Oral Health* 2020;20:79 <https://doi.org/10.1186/s12903-020-01075-w>
4. National Cancer Institute (US). PDQ Cancer Information Summaries (Internet). Oral Complications of Chemotherapy and Head/Neck Radiation (PDQ®). Health Professional Version. PDQ Supportive and Palliative Care Editorial Board. Published online: December 16, 2016. <https://www.ncbi.nlm.nih.gov/books/NBK65881/> Accessed February 04, 2021.
5. Lim MAWT. Basic oral care for patients with dysphagia. A Special Needs Dentistry perspective. *Journal of Clinical Practice in Speech-Language Pathology* 2018;20:142-149.
6. Little C. Nil by mouth: best practice and patient education. *NursingTimes* 2014;110:12-14.
7. Maeda K, Akagi J. Oral care may reduce pneumonia in the tube-fed elderly: A preliminary study. *Dysphagia* 2014;29:616-621 DOI 10.1007/s00455-014-9553-6.
8. Leibovitz A, Plotnikov G, Rosenberg M et al. Saliva secretion and oral flora in prolonged nasogastric tube-fed elderly patients. *IMAJ* 2003;5:329-332.
9. Keefe DM, Schubert MM, Elting LS et al. Updated clinical practice guidelines for the prevention and treatment of mucositis. *Cancer* 2007;109:821-831.
10. Hopcraft MS, Tan C. Xerostomia: an update for clinicians. *Australian Dental Journal* 2010; 55: 238–244.
11. Villa A, Connell CL, Abati S. Diagnosis and management of xerostomia and hyposalivation. *Therapeutics and Clinical Risk Management* 2015;11 45–51.
12. Treatment for oral mucositis and noninfectious, non-neoplastic oral ulcerations. <https://pocketdentistry.com/12-treatment-for-oral-mucositis-and-noninfectious-non-neoplastic-oral-ulcerations/#c12fg0001xa> Accessed February 25, 2021.
13. Dantas JBL, Martins GB, Lima HR, Carrera MP, Reis SRA, Medrado AP. Immunopathogenesis of oral mucositis induced by chemotherapy and/or radiotherapy: state of art. *Brazilian Journal of Medicine and Human Health*. 2017;5:63-74.
14. Lalla RV, Latortue MC, Hong CH, et al. A systematic review of oral fungal infections in patients receiving cancer therapy. *Support Care Cancer* 2010;18:985-992. doi:10.1007/s00520-010-0892-z
15. Han Y, Liu X, Cai Y. Effects of two peroxide enzymatic denture cleansers on *Candida albicans* biofilms and denture surface. *BMC Oral Health* (2020) 20:193 <https://doi.org/10.1186/s12903-020-01176-6>
16. Department of Health. Government of South Australia. SA Dental Service. Oral care for chemotherapy and radiotherapy patients. <https://www.sahealth.sa.gov.au/wps/wcm/connect/166d3180434712239317f32835153af6/SADS-chemotherapy-radiotherapy-patients-10-04-12.pdf?> Accessed March 02, 2021.
17. Cancer Council SA. Oral health during Cancer treatments. <https://www.cancersa.org.au/support/living-with-cancer/managing-specific-side-effects/oral-health/> Accessed March 02, 2021.
18. Wang TH, Liu CJ, Chao TF, Chen TJ, Hu YW. Risk factors for and the role of dental extractions in osteoradionecrosis of the jaws: A national-based cohort study. *Head Neck* 2017;39:1313-1321. doi:10.1002/hed.24761.

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