



Ontario Health
Cancer Care Ontario

Symptom Management Algorithm

**Xerostomia &
Salivary Hypofunction
In Adults with Cancer**

About Xerostomia & Salivary Hypofunction

Definitions

Salivary gland hypofunction	<ul style="list-style-type: none"> Reduced salivary flow rate as measured objectively
Hyposalivation	<ul style="list-style-type: none"> Pathologic low saliva secretion, defined as an unstimulated whole saliva flow rate of ≤ 0.1 mL/minute and/or a stimulated whole saliva flow rate of ≤ 0.5 or ≤ 0.7 mL/minute measured by sialometry (measure of saliva flow)
Xerostomia	<ul style="list-style-type: none"> Patient-reported, subjective sensation of oral dryness Most frequently occurs when the unstimulated whole saliva flow rate is reduced by about 45–50% of the normal secretion of that person. There are no specific threshold levels of salivary flow rate that characterize xerostomia The degree of xerostomia may be affected by factors other than salivary flow rates
Whole saliva	<ul style="list-style-type: none"> Derives from the major salivary glands (parotid, submandibular, and sublingual glands, which account for 90% of the saliva secretion) and the minor salivary glands (which account for 10%)

Screening and Performing Clinical Assessment

Adapted Xerostomia Assessment Acronym: OPQRSTUV (Adapted from Fraser Health¹ and COSTaRS Practice Guides²)

Onset	<ul style="list-style-type: none"> When did the symptom begin? How long have you had it?
Provoking/ Palliating	<ul style="list-style-type: none"> What makes it better? What makes it worse? What do you think may be causing the symptom? What are the aggravating or alleviating factors (e.g. active treatment, dietary changes)? Are you taking any medications that can cause dry mouth?
Quality	<ul style="list-style-type: none"> Is your saliva thick? Do you have less saliva than normal? Do you see any redness, white patches, cracks, or blisters in your mouth? Is your mouth bleeding? Are you feeling dehydrated, which can include feeling dizzy, a dry mouth, increased thirst, feeling faint, rapid heart rate, decreased amount of urine?
Region/ Radiation	<ul style="list-style-type: none"> Do you have any other related or associated symptoms? Is your mouth painful? Do you have a fever $>38^{\circ}\text{C}$?
Severity	<ul style="list-style-type: none"> What number from 0 to 10 best describes your dry mouth where 0="no dry mouth" and 10="worst possible dry mouth"? Right Now? At Best? At Worst? On Average?
Treatment	<ul style="list-style-type: none"> Are you taking any fluids? Are you using any oral rinses, saliva substitutes or stimulants? What type? Are they effective? Are there any other treatments that you are using to help with pain? Alteration in diet texture?
Understanding/ Impact on you	<ul style="list-style-type: none"> Are you able to eat? How much fluid are you drinking per day? Does your dry mouth affect your ability to speak? Are you having taste changes? Have you lost weight in the last 1-2 weeks without trying? Are you worried about your dry mouth? Does your dry mouth affect your daily activities?
Values	<ul style="list-style-type: none"> What is an acceptable level of severity for this symptom (0 – 10 scale)? What does this symptom mean to you? How has it affected you and your family and/or caregiver?

Consideration for All Patients

- Good oral care is important to prevent and decrease oral complications, to maintain normal function of the oral tissues, to maintain comfort, and to reduce the risk of local and systemic infection. See the basic oral care tables (pages 5 and 6)
- Oral care should be intensified when a patient experiences any oral complication
- Significant risk factors for the development of oral complications include the type of cancer, type of cancer treatments, cumulative doses of chemotherapy or radiation treatment (current or prior), method of delivery, and duration of treatment
- Predisposing medical, dental, and lifestyle factors such as uncontrolled diabetes, pre-existing autoimmune conditions, polypharmacy, tobacco and alcohol use, and non-compliance with oral care may increase severity of oral complications
- Oral complications can significantly affect the patient's morbidity, ability to tolerate treatment, and overall quality of life
- Managing dry mouth is the first step to prevention of infection, oral mucositis, taste disturbance, oral pain, and dental caries
- Rigorous assessment (including nutritional status and adequacy of oral intake), diagnosis, and early intervention are important to prevent and decrease oral complications
- A large variety of medications may cause oral complications. Consultation with the prescriber, dental provider, and/or pharmacist is strongly recommended
- Some pharmaceuticals may be unaffordable, and alternatives should be offered where possible
- If odontogenic or periodontal infection infections suspected, consultation with a oncology team is strongly recommended

Non-Pharmacological

Radiotherapy Considerations

- Parotid sparing Intensity Modulated Radiation Therapy (IMRT) is recommended in head and neck patients
- IMRT should be used to spare major and minor salivary glands from higher dose of radiation to reduce the risk of salivary gland hypofunction and xerostomia in patients with head and neck cancer
- In addition to IMRT, the generic principle of tissue-sparing for novel radiation techniques is recommended to spare major and minor salivary glands from higher dose of radiation to reduce the risk of salivary gland hypofunction and xerostomia.

Natural Recommendations

- Acupuncture may be offered during radiation therapy for head and neck cancer to reduce the risk of developing xerostomia
- Vitamin E or other antioxidants should not be used to reduce the risk of radiation-induced salivary gland hypofunction and xerostomia due to the potential adverse impact on cancer-related outcomes and the lack of evidence of benefit

Interventions with Insufficient Evidence

- There is insufficient evidence with contemporary radiation techniques to recommend for or against the use submandibular gland transfer administered before head and neck cancer treatment to reduce the risk of salivary gland hypofunction and xerostomia
- There is insufficient evidence to recommend for or against the use of the following interventions to reduce the risk of salivary gland hypofunction or xerostomia in patients with head and neck cancer: traditional Chinese medicine-based herbal mouthwash, boost radiation therapy, hyperfractionated or hypofractionated radiation therapy, melatonin, zinc sulphate, propolis, viscosity-reducing mouth spray, transcutaneous electrical nerve stimulation (TENS), parotid gland massage, thyme, and honey

Pharmacological

Radiotherapy Considerations

- Systemic administration of the sialagogue bethanechol (a saliva stimulant) may be offered during radiation therapy for head and neck cancer to reduce the risk of salivary gland hypofunction and xerostomia
- There is insufficient evidence to recommend for or against the use of the following interventions during radiation therapy for head and neck cancer: Oral pilocarpine, amifostine (with contemporary radiation techniques), or low-level laser therapy

Recommendations with Insufficient Evidence

- There is insufficient evidence to recommend for or against the use the following interventions to reduce the risk of salivary gland hypofunction or xerostomia in patients with head and neck cancer: n-acetylcysteine oral rinse, local clonidine, concurrent chemotherapy with nedaplatin, intra arterial chemoradiation, minocycline, nimotuzumab, and human epidermal growth factor

Management

Non-Pharmacological

Nutritional

- Soft, mild tasting foods are often better tolerated

Encourage patients to:

- Enjoy foods that taste good
- Experiment with food flavours to enhance taste:
 - Add more or less seasonings and spices to food
 - Use more or less condiments with food
 - Add something sweet to meat dishes, e.g. cranberry sauce, or jelly
 - Marinate meats to change the taste
 - Add fats or sauces
 - Boil food to make them more bland

Patients should avoid:

- Beef, if it tastes bitter or rotten
- Foods that have strong smells, like fish
- Fluids and other items which dry/irritate mouth, including foods and fluids which are highly acidic, high in sugar, caffeine, and alcohol

Patients should eat foods that are:

- High in protein and have a lot of flavor, e.g. chicken, beans and eggs
- Bland, e.g. potatoes, bread, and crackers

- Let hot foods cool to warm or room temperature before eating, or eat cold foods

- Eat small meals, several times a day

- Brush teeth before eating

- If food tastes metallic, use plastic forks, knives, and spoons to eat

- To stimulate residual salivary secretion and to improve the condition of the mucosa, use fresh lightly acidic fruits, cold cucumber slices, tomato slices, or thin cold apple slices. Do not use if patient has mucositis

- To help cool and moisten the mouth, try: sucking on plain ice cubes, xylitol containing: lozenges, gum and popsicles; frequent sips or sprays of cold water

- Drink plenty of fluids, especially with meals, to help swallow foods or rinse away bad tastes. Oral rinses may improve swallowing and taste problems

Saliva Stimulation

- Topical mucosal lubricants/ saliva substitutes may be offered to improve xerostomia induced by non-surgical cancer therapies

Acupuncture

- Acupuncture may be offered during radiation therapy for head and neck cancer to reduce the risk of developing xerostomia
- Acupuncture may be offered after radiation therapy in patients with head and neck cancer for improvement of xerostomia

TENS

- Transcutaneous electrostimulation (TENS) or acupuncture-like transcutaneous electrostimulation of the salivary glands may be offered after radiation therapy in patients with head and neck cancer for improvement of salivary gland hypofunction and xerostomia

Pharmacological

- To stimulate residual capacity of salivary gland tissue post-radiation therapy in patients with head and neck cancer, oral pilocarpine and cevimeline (where available) may be offered for improvement of xerostomia and salivary gland hypofunction, although improvement of salivary gland hypofunction may be limited and transitory

- Use of pilocarpine hydrochloride with radiation therapy to reduce xerostomia and salivary gland hypofunction are inconsistent, however in some patients a beneficial effect has been shown on xerostomia

- There is insufficient evidence to recommend for or against the use of amifostine. Amifostine reduces xerostomia after radiation therapy however, tumor protection remains a clinical concern

- There is insufficient evidence to recommend for or against the use of extract of ginger, and mesenchymal stem cell therapy following interventions for improvement of salivary gland hypofunction and xerostomia

Follow-Up and Ongoing Monitoring

- If xerostomia remains unrelieved despite the approaches outlined above, request the assistance of specialists within the oncology consultation team (e.g. hospital dentist, registered dietitian, speech language pathologists, registered dental hygienist)

Basic Oral Care Tables

Flossing

Basic	<ul style="list-style-type: none"> • Patients who have not flossed routinely before cancer treatment should not begin flossing at this time • Patients with mouth cancers, trismus, dysphagia, and/or dysgeusia may not be able to floss; use of interproximal brushes can replace flossing • Floss at least once daily • Waxed floss may be easier to use and minimize trauma to the gums
Intensified	<ul style="list-style-type: none"> • Continue with basic plan until discomfort becomes too great
End of Life	<ul style="list-style-type: none"> • Discontinue flossing if patient chooses

Discontinue flossing if:

- Gums bleed for longer than two minutes

Restart flossing if:

- Platelet count is $>20 \times 10^9$ cells/L, or as instructed by cancer care team

Brushing

Basic	<ul style="list-style-type: none"> • Use a small, ultra-soft-headed, rounded-end, bristle toothbrush (an ultrasonic toothbrush, may be acceptable) • Rinse toothbrush in hot water to soften the brush before using • Use a prescription strength fluoride toothpaste. Spit out the foam but do not rinse mouth • Use a fluoridated toothpaste and re-mineralizing toothpaste containing calcium and phosphate • Brush tongue gently from back to front, using a sweeping motion • Rinse brush after use in hot water and allow to air dry • Change toothbrush when bristles are not standing up straight • Brush within 30 minutes after eating and before bed. Ensure the gingival portion of the tooth and periodontal sulcus (where the tooth and gums meet) are included • Consider topical anesthetics (e.g. viscous lidocaine 2% or viscous xylocaine 2%, 2-5 mL) before brushing and eating to minimize pain • With continuous pain, a regularly prescribed oral analgesic allows for more thorough tooth brushing
Intensified	<ul style="list-style-type: none"> • Encourage patient to continue brushing through treatment phase even when it causes discomfort • If bleeding occurs, encourage gentler brushing • Use a non-flavoured, non-alcoholic chlorhexidine gluconate (CHX) 0.12% rinse to aid in plaque control, 2 times a day after meals • If unable to continue brushing with a toothbrush, use a moist gauze or foam swab • Discontinue use of toothpaste if it is too astringent and dip toothbrush in bland rinse • If there has been an oral infection, use a new toothbrush after infection has resolved • If unable to tolerate brushing, seek assistance from nursing or dental staff
End of Life	<ul style="list-style-type: none"> • Continue with basic and intensified mouth care plan, if possible • Instead of moist gauze may use a foam brush soaked in CHX

Discontinue brushing if:

- Gums bleed for longer than two minutes

Restart brushing if:

- Platelet count is $>20 \times 10^9$ cells/L, or as instructed by cancer care team

Bland rinse:

- 1 teaspoon salt, 1 teaspoon baking soda, 4 cups of water

Lidocaine alternative:

- Dyclonine 0.5 or 1% rinse (5 mL every 6 to 8 hours, swish and swallow) as needed for pain

Patients with head and neck cancers:

- Brushing may not be appropriate in the area of tumour involvement
- Consult with a dentist
- Patients should be assessed for the use of daily fluoride tray

Patients with dentures:

- Remove dentures, plates and prostheses before brushing
- Brush and rinse dentures after meals and at bedtime
- Remove from mouth nightly (at least 8 hours per 24 hours) and soak in bland rinse
- Leave dentures out as much as possible during radiation therapy
- Patients who have had head and neck surgery should not wear dentures post-surgery unless assessed by a dental specialist or head and neck surgeon, to prevent trauma to the

Rinsing

Basic	<ul style="list-style-type: none"> Rinse the oral cavity with a bland rinse vigorously, at least twice a day to maintain mouth moisture, remove the remaining debris and toothpaste, and reduce the accumulation of plaque and infection Use a bland rinse to increase oral clearance for oral hygiene maintenance and improved patient comfort. Following emesis, rinse with bland rinse immediately to neutralize the mouth If allergic to lidocaine, dyclonine 0.5 or 1% rinse (5 mL every 6 to 8 hours, swish and swallow) may be used as needed for pain
Intensified	<ul style="list-style-type: none"> Rinse in place of brushing if patient is unable to brush Seek dental care where possible for removing plaque In addition to rinsing twice a day, encourage rinsing every 1 to 2 hours while awake and every 4 hours through the night if awake, to minimize complications of decreased saliva If unable to clean using moist gauze, or foam swab, consider rinsing via syringe if platelet count $>20 \times 10^9$ cells/L
End of Life	<ul style="list-style-type: none"> Continue with basic and intensified mouth care plan Consider sialagogues in instances of dry mouth for pharmacotherapy relief (pilocarpine, and anethole trithione)

Patients with dentures:

- After removing dentures, rinse mouth thoroughly with rinse solution
- Brush and rinse dentures after meals and at bedtime
- Rinse with rinsing solution before placing in mouth
- Remove from mouth nightly (at least 8 hours per 24 hours) and soak in rinsing solution

Bland rinse:

- 1 teaspoon salt, 1 teaspoon baking soda, 4 cups of water

Avoid:

- Club soda due to the presence of carbonic acids
- Commercial mouthwashes with hydroalcoholic base or astringent properties

Avoid:

- Glycerin or lemon-glycerin swabs as they dry the mouth
- Acidic or minty mouth products, if they burn

Moisturizing the Oral Cavity

Basic	<ul style="list-style-type: none"> Moisturize the mouth with water, artificial saliva products, or other water soluble lubricants Apply lubricant after each cleaning, at bedtime, and as needed. Water-based lubricant needs to be applied more frequently Frequent rinsing as needed with basic mouth rinse Patients may suck on xylitol lozenges (up to 6 grams a day), xylitol containing popsicles, or xylitol containing gum
Intensified	<ul style="list-style-type: none"> Continue with basic mouth care plan with increased frequency and intensity Increase frequency of bland mouth rinse to every hour
End of Life	<ul style="list-style-type: none"> Continue with basic mouth care plan with increased frequency and intensity, as needed Use a steam vaporizer at night May use a cool mist humidifier at night, but use should be weighed against the risk for fungal infection

Lip Care

Basic	<ul style="list-style-type: none"> To keep lips moist and avoid chapping and cracking, use water soluble lubricants, lanolin (wax-based), or oil based lubricants (mineral oil, cocoa butter) Water soluble lubricants should be used inside and outside the mouth, and may also be used with oxygen (e.g. products compounded with Glaxal base or Derma base) Apply lubricant after each cleaning, at bedtime, and as needed. Water-based lubricants need to be applied more frequently
Intensified	<ul style="list-style-type: none"> Continue with basic mouth care plan with increased frequency and intensity
End of Life	<ul style="list-style-type: none"> Continue with basic mouth care plan with increased frequency and intensity, as needed May use a cool mist humidifier at night, but use should be weighed against the risk for fungal infection

Avoid:

- Touching any lip lesions
- Oil based lubricants on the inside of the mouth
- Petroleum based products

Miscellaneous

Basic	<ul style="list-style-type: none"> Dental evaluation and treatment as indicated prior to cancer therapy is desirable to reduce risk for local and systemic infections from odontogenic sources for hematologic, solid or head and neck cancers
Intensified	<ul style="list-style-type: none"> Continue with basic mouth care plan with increased frequency and intensity
End of Life	<ul style="list-style-type: none"> Continue with basic mouth care plan with increased frequency and intensity, as needed

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