

## Oral Complications of Cancer Treatment: What the Oral Health Team Can Do

With more than 1 million new cases of cancer diagnosed each year and a shift to outpatient management, it is likely that you will see some of these patients in your practice. Because cancer treatment can affect the oral tissues, you need to know about potential oral complications. Moreover, preexisting or untreated oral disease can complicate cancer treatment. Your role in patient management can extend benefits beyond the oral cavity.

Oral complications from radiation to the head and neck or chemotherapy for any malignancy can seriously compromise patients' health and quality of life, as well as affect their ability to complete planned cancer treatment. The complications can be so debilitating that patients may tolerate only lower and less effective doses of therapy, may postpone scheduled treatments, or may have to discontinue treatment entirely. Oral complications can also lead to potentially life-threatening systemic infections. Medically necessary oral care before, during, and after cancer treatment can prevent or reduce the incidence and severity of oral complications, enhancing both patient survival and quality of life.

### Oral Complications Related to Cancer Treatment

**Oral complications of cancer treatment arise in various forms and degrees of severity, depending on the individual and the cancer treatment.** Chemotherapy often impairs the function of bone marrow, suppressing the forma-

tion of white blood cells, red blood cells, and platelets (myelosuppression). Some cancer treatments are described as stomatotoxic because they have toxic effects on the oral tissues. Following are lists of complications common to both chemotherapy and radiation therapy, and complications specific to each type of treatment. You will need to consider the possibility of these complications each time you evaluate a patient with cancer.

### Oral complications common to both chemotherapy and radiation

- **Oral mucositis:** inflammation and ulceration of the mucous membranes; can increase the risk for pain, oral and systemic infection, and nutritional compromise.
- **Infection:** viral, bacterial, and fungal; results from myelosuppression, xerostomia, and/or damage to the mucosa from chemotherapy or radiotherapy.
- **Xerostomia/salivary gland dysfunction:** dryness of the mouth because of thickened, reduced, or absent salivary flow; increases the risk of infection and compromises speaking, chewing, and swallowing. Medications other than chemotherapy can also cause salivary gland dysfunction. Persistent dry mouth increases the risk for dental caries.
- **Functional disabilities:** impaired ability to eat, taste, swallow, and speak because of mucositis, dry mouth, trismus, and infection.



- **Taste alterations:** changes in taste perception of foods, ranging from unpleasant to tasteless.
- **Nutritional compromise:** poor nutrition from eating difficulties caused by mucositis, dry mouth, dysphagia, and loss of taste.
- **Abnormal dental development:** altered tooth development, craniofacial growth, or skeletal development in children secondary to radiotherapy and/or high doses of chemotherapy before age 9.

### Additional complications of chemotherapy

- **Neurotoxicity:** persistent, deep aching and burning pain that mimics a toothache, but for which no dental or mucosal source can be found. This complication is a side effect of certain classes of drugs, such as the vinca alkaloids.
- **Bleeding:** oral bleeding from the decreased platelets and clotting factors associated with the effects of therapy on bone marrow.

### Additional complications of radiation therapy

- **Radiation caries:** lifelong risk of rampant dental decay that may begin within 3 months of completing radiation treatment if changes in either the quality or quantity of saliva persist.
- **Trismus/tissue fibrosis:** loss of elasticity of masticatory muscles that restricts normal ability to open the mouth.
- **Osteonecrosis:** blood vessel compromise and necrosis of bone exposed to high-dose radiation therapy; results in decreased ability to heal if traumatized.

## Who Has Oral Complications?

Oral complications occur in almost all patients receiving radiation for head and neck malignancies, in up to 75 percent of blood and marrow transplant recipients, and in nearly 40 percent of patients receiving chemotherapy. Risk for oral complications can be classified as low or high:

- **Lower risk:** Patients receiving minimally myelosuppressive or nonmyelosuppressive chemotherapy.
- **Higher risk:** Patients receiving stomatotoxic chemotherapy resulting in prolonged myelosuppression, including patients undergoing blood and marrow transplantation; and patients undergoing head and neck radiation for oral, pharyngeal, and laryngeal cancer.

Some complications occur only during treatment; others, such as xerostomia, may persist for years. Unfortunately, many patients with cancer do not receive oral care until serious complications develop.

## The Role of Pretreatment Oral Care

A thorough oral evaluation by a knowledgeable dental professional before cancer treatment begins is important to the success of the regimen. Pretreatment oral care achieves the following:

- Reduces the risk and severity of oral complications.
- Allows for prompt identification and treatment of existing infections or other problems.
- Improves the likelihood that the patient will successfully complete planned cancer treatment.

- Prevents, eliminates, or reduces oral pain.
- Minimizes oral infections that could lead to potentially fatal systemic infections.
- Prevents or minimizes complications that compromise nutrition.
- Prevents or reduces later incidence of bone necrosis.
- Preserves or improves oral health.
- Provides an opportunity for patient education about oral hygiene during cancer therapy.
- Improves the quality of life.
- Decreases the cost of care.

With a pretreatment oral evaluation, the dental team can identify and treat problems such as infection, fractured teeth or restorations, or periodontal disease that could contribute to oral complications when cancer therapy begins. The evaluation also establishes baseline data for comparing the patient's status in subsequent examinations.

Before the exam, you will need to obtain the patient's cancer diagnosis and treatment plan, medical history, and dental history. **Open communication with the patient's oncologist is essential to ensure that each provider has the information necessary to deliver the best possible care.**

## Evaluation

The pretreatment evaluation includes a thorough examination of hard and soft tissues, as well as appropriate radiographs to detect possible sources of infection and

pathology. Also take the following steps before cancer treatment begins:

- Identify and treat existing infections, carious and other compromised teeth, and tissue injury or trauma.
- Stabilize or eliminate potential sites of infection.
- In adults, extract teeth that may pose a future problem or are nonrestorable to prevent later extraction-induced osteonecrosis.
- Conduct a prosthodontic evaluation, if indicated. If a removable prosthesis is worn, make sure that it is well adapted to the tissue and that the patient is able to wear and clean it daily. Instruct the patient to leave the prosthesis out of the mouth at night.
- Perform oral surgery at least 2 weeks before radiation therapy begins. For patients receiving radiation treatment, this is the best time to consider surgical procedures. Oral surgery should be performed at least 7 to 10 days before the patient receives myelosuppressive chemotherapy. Medical consultation is indicated before invasive procedures.
- Remove orthodontic bands and brackets if highly stomatotoxic chemotherapy is planned or if the appliances will be in the radiation field.
- In children, consider extracting highly mobile primary teeth and teeth that are expected to exfoliate during treatment.
- Prescribe an individualized oral hygiene regimen to minimize oral complications. Patients undergoing head and neck radiation therapy should be instructed on the use of supplemental fluoride.



## Supplemental Fluoride

Fluoride rinses are not adequate to prevent tooth demineralization. Instead, a high-potency fluoride gel, delivered via custom gel-applicator trays, is recommended. Several days before radiation therapy begins, patients should start a daily 5-minute application of a 1.1% neutral pH sodium fluoride gel or a 0.4% stannous fluoride (unflavored) gel. Patients with porcelain crowns or resin or glass ionomer restorations should use a neutral pH fluoride. Be sure that the trays cover all tooth structures without irritating the gingival or mucosal tissues.

For patients reluctant to use a tray, a high-potency fluoride gel should be brushed on the teeth following daily brushing and flossing. Either a 1.1% neutral pH sodium or a 0.4% stannous fluoride gel is recommended, based on the patient's type of dental restorations.

Patients with radiation-induced salivary gland dysfunction must continue lifelong daily fluoride applications.

## Instructions for Patients Using Supplemental Fluoride

### If using a tray

- ✓ Place a thin ribbon of fluoride gel in each tray.
- ✓ Place the trays on the teeth and leave in place for 5 minutes. If gel oozes out of the tray, you are using too much.
- ✓ After 5 minutes, remove the trays and spit out any excess gel. Do not rinse.
- ✓ Rinse the applicator trays with water.
- ✓ Do not eat or drink for 30 minutes.

### If using a brush-on method

- ✓ After brushing with toothpaste, rinse as usual.
- ✓ Place a thin ribbon of gel on the toothbrush.
- ✓ Brush for 2 to 3 minutes.
- ✓ Spit out any excess gel. Do not rinse.
- ✓ Do not eat or drink for 30 minutes.

## Education

Patient education is an integral part of the pretreatment evaluation and should include a discussion of potential oral complications. It is very important that the dental team impress on the patient that optimal oral hygiene during treatment, adequate nutrition, and avoiding tobacco and alcohol can prevent or minimize oral complications. To ensure that the patient fully understands what is required, provide detailed instructions on specific oral care practices, such as how and when to brush and floss, how to recognize signs of complications, and other instructions appropriate for the individual. Patients should understand that good oral care during cancer treatment contributes to its success.

### Advise patients to

- Gently brush teeth, gums, and tongue with an extra-soft toothbrush and fluoride toothpaste after every meal and before bed. If brushing hurts, soften the bristles in warm water.
- Follow instructions for using fluoride gel.
- Floss teeth gently every day. If gums are sore or bleeding, avoid those areas but keep flossing other teeth.
- Avoid mouthwashes containing alcohol.
- Several times a day, rinse the mouth with a baking soda and salt solution, followed by a plain water rinse. (Use 1/4 teaspoon of baking soda and 1/8 teaspoon of salt in 1 cup of warm water.)
- Exercise the jaw muscles 3 times a day to prevent and treat jaw stiffness. Open and close the mouth as far as possible without causing pain; repeat 20 times.
- Avoid candy, gum, and soda unless they are sugar-free.
- Avoid spicy or acidic foods, toothpicks, tobacco products, and alcohol.
- Keep the appointment schedule recommended by the dentist.

## Oral Care During Cancer Treatment

Careful monitoring of oral health is especially important during cancer therapy to prevent, detect, and treat complications as soon as possible. **When treatment is necessary, consult the oncologist before any dental procedure, including dental prophylaxis.**

- Examine the soft tissues for inflammation or infection and evaluate for plaque levels and dental caries.
- Review oral hygiene and oral care protocols; prescribe antimicrobial therapy as indicated.
- Provide recommendations for treating dry mouth and other complications.
  - Sip water frequently.
  - Suck ice chips or sugar-free candy.
  - Chew sugar-free gum.
  - If appropriate, use a saliva substitute spray or gel or a prescribed saliva stimulant.
  - Avoid glycerin swabs.
- Take precautions to protect against trauma.
- Provide topical anesthetics or analgesics as appropriate for oral pain.

### Other factors to remember

**Schedule dental work carefully.** If oral surgery is required, allow at least 7 to 10 days of healing before the patient receives myelosuppressive chemotherapy. Elective oral surgery should not be performed for the duration of radiation treatment.

**Determine hematologic status.** If the patient is receiving chemotherapy, have the oncology team conduct blood work 24 hours before dental treatment to deter-

mine whether the patient's platelet count, clotting factors, and absolute neutrophil count are sufficient to recommend oral treatment.

**Consider oral causes of fever.** Fever of unknown origin may be related to an oral infection. Remember that oral signs of infection or other complications may be altered by immunosuppression related to chemotherapy.

**Consider prophylactic antibiotic treatment.** If the patient has a central venous catheter, consult the oncologist about implementing the American Heart Association prophylactic antibiotic regimen before any dental treatment. This regimen can be viewed online at <http://circ.ahajournals.org/cgi/content/full/96/1/358>.

### Normal Complete Blood Count

Red blood cells	4.2–6.0 million/mm <sup>3</sup>
Hemoglobin	12–18 g/dL
Hematocrit	36–52%
Platelets	150,000–450,000/mm <sup>3</sup>
White blood cells	4,000–11,000/mm <sup>3</sup>

### Differential White Blood Cell (WBC) Count

Neutrophils (granulocytes)	
“Segs” (or Polys or PMNs)	40–60%
“Bands”	0–5%
Eosinophils	1–3%
Basophils	0–1%
Lymphocytes	20–40%
Monocytes	2–8%

*Absolute Neutrophil Count = total WBC × (% “Segs” + “Bands”)*

Source: Barker GJ, Barker BF, Gier RE. *Oral Management of the Cancer Patient: A Guide for the Health Care Professional* (5th ed.). Kansas City, MO: University of Missouri–Kansas City School of Dentistry, 1996.





## Follow-up Oral Care

### Chemotherapy

Once all complications of chemotherapy have resolved, patients may be able to resume their normal dental care schedule. However, if immune function continues to be compromised, determine the patient's hematologic status before initiating any dental treatment or surgery. This is particularly important to remember for patients who have undergone blood and marrow transplantation.

### Radiation therapy

Once the patient has completed head and neck radiation therapy and acute oral complications have abated, evaluate the patient regularly (every 4 to 8 weeks, for example) for the first 6 months. Thereafter, you can determine a schedule based on the patient's needs. However, keep in mind that oral complications can continue or emerge long after radiation therapy has ended.

### Points to remember

- High-dose radiation treatment carries a lifelong risk of osteonecrosis, xerostomia, and dental caries.
- Because of the risk of osteonecrosis, principally in the mandible, patients should avoid invasive surgical procedures, including extractions that involve irradiated bone. If an invasive procedure is required, use of antibiotics and hyperbaric oxygen therapy before and after surgery should be considered.
- Lifelong daily fluoride application, good nutrition, and conscientious oral hygiene are especially important for patients with salivary gland dysfunction.

- Dentures may need to be reconstructed if treatment altered oral tissues. Some people can never wear dentures again because of friable tissues and xerostomia.
- Dentists should closely monitor children who have received radiation to craniofacial and dental structures for abnormal growth and development.
- Dentists should be mindful about the recurrence of malignancies, especially in patients with oral and head and neck cancers, and thoroughly examine all oral mucosal tissues at recall appointments.

## Special Considerations for Blood and Marrow Transplant Patients

The intensive conditioning regimes of transplantation can result in pronounced immunosuppression, greatly increasing a patient's risk of mucositis, ulceration, hemorrhage, infection, and xerostomia. The complications begin to resolve when hematologic status improves. Although the complete blood count and differential may be normal, immunosuppression may last for up to a year after the transplant, along with the risk of infections. Also, the oral cavity and salivary glands are commonly involved in graft-versus-host disease in allograft recipients. This can result in mucosal inflammation, ulceration, and xerostomia, so continued monitoring is necessary. Careful attention to oral care in the immediate and long-term posttransplant period is important to patients' overall health.

## Additional Readings

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## Publications

This brochure is part of *Oral Health, Cancer Care, and You: Fitting the Pieces Together*, an awareness campaign sponsored by the National Institute of Dental and Craniofacial Research (NIDCR) through its National Oral Health Information Clearinghouse (NOHIC). The following publications are part of the campaign and can be ordered from NOHIC.

For patients:

- \_\_\_\_\_ Chemotherapy and Your Mouth
- \_\_\_\_\_ Quimioterapia y la Boca  
(Chemotherapy and Your Mouth)
- \_\_\_\_\_ Head and Neck Radiation Treatment and Your Mouth
- \_\_\_\_\_ Su Boca y el Tratamiento de Radiación en la Cabeza y el Cuello  
(Head and Neck Radiation Treatment and Your Mouth)
- \_\_\_\_\_ Three Good Reasons To See a Dentist (tip sheet)
- \_\_\_\_\_ Tres Buenas Razones Para Ver a un Dentista (tip sheet)  
(Three Good Reasons To See a Dentist)
- \_\_\_\_\_ Three Good Reasons To See a Dentist (illustrated booklet, appropriate for adults with reading skills at the 2nd grade level or below)
- \_\_\_\_\_ Who's on My Cancer Care Team? (wallet card)

For professionals:

- \_\_\_\_\_ Oral Complications of Cancer Treatment: What the Oral Health Team Can Do
- \_\_\_\_\_ Oral Complications of Cancer Treatment: What the Oncology Team Can Do
- \_\_\_\_\_ Oral Care Provider's Reference Guide for Oncology Patients
- \_\_\_\_\_ Oncology Reference Guide to Oral Health

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