

Oral Complications of Chemotherapy and Head/Neck Radiation

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The contents of this course are taken from the National Cancer Institute, NIH. Learning objectives and post test have been prepared by Marietta T. Farrell, RN, BSN

Objectives

Upon completion of this course, the learner will be able to:

1. Discuss the oral complications of anticancer therapy
2. Describe each of the oral complications and their causes
3. Discuss the prevention and treatment of the oral complications of anticancer therapy
4. Discuss the management of the oral complications during and after chemotherapy and radiotherapy
5. Discuss the management of the oral complications of high dose chemotherapy and stem cell transplant
6. Discuss the mental and social aspects of the oral complications of anticancer therapy

Introduction

This patient summary on [oral](#) complications of [cancer](#) and cancer [therapy](#) is adapted from the summary written for health professionals by cancer experts. This and other accurate, credible information about cancer treatment, [screening](#), [prevention](#), [supportive care](#), and ongoing [clinical trials](#) is available from the [National Cancer Institute](#). Oral complications are common in cancer patients, especially those with [head and neck cancer](#). This summary describes oral complications caused by [chemotherapy](#) and [radiation therapy](#) and various methods of prevention and treatment.

Overview

Oral complications are common in patients receiving chemotherapy or undergoing radiation therapy to the head and neck.

The [oral cavity](#) is at high risk of [side effects](#) from [chemotherapy](#) and [radiation therapy](#) for a number of reasons.

- Chemotherapy and radiation therapy stop the growth of rapidly dividing [cells](#), such as [cancer](#) cells. Since normal cells in the lining of the mouth also divide rapidly, anticancer treatment can prevent cells in the mouth from reproducing, making it difficult for oral [tissue](#) to repair itself.
- The mouth contains hundreds of different [bacteria](#), some helpful and some harmful. Chemotherapy and radiation therapy can cause changes in the lining of the mouth and production of [saliva](#) and upset the healthy balance of bacteria. These changes may lead to mouth sores, [infections](#), and tooth decay.
- Wear and tear occur from normal use of the mouth, teeth, and jaws, making healing more difficult.

Preventive measures may lessen the severity of oral complications.

Oral side effects may make it difficult for a patient to receive all of his or her cancer treatment. Sometimes treatment must be stopped. Preventing and controlling oral complications will enhance both the patient's [quality of life](#) and the effectiveness of cancer therapy.

Preventing and treating oral complications of cancer therapy involve identifying the patient at risk, starting preventive measures before cancer therapy begins, and treating complications as soon as they appear.

Description and Causes

Radiation therapy and chemotherapy may cause some of the same oral side effects, including the following:

- [Mucositis](#) (an [inflammation](#) of the [mucous membranes](#) in the mouth).
- [Infections](#) in the mouth or that travel through the bloodstream, reaching and affecting [cells](#) all over the body.
- Taste changes.
- Dry mouth.
- Pain.
- Changes in dental growth and development in children.

- [Malnutrition](#) (lack of [nutrients](#) needed by the body for health, often caused by the inability to eat).
- [Dehydration](#) (lack of water needed by the body for health, often caused by the inability to drink).
- Tooth decay and gum disease.

Complications may be caused directly or indirectly by anticancer therapy.

[Oral](#) complications associated with [chemotherapy](#) and [radiation therapy](#) may be caused directly by the treatment or may result indirectly from side effects of the treatment. Radiation therapy may directly damage oral [tissue](#), [salivary glands](#), and bone. Areas treated may scar or waste away.

Slow healing and infection are indirect complications of [cancer](#) treatment. Both chemotherapy and radiation therapy can affect the ability of cells to reproduce, which slows the healing process in the mouth. Chemotherapy may reduce the number of [white blood cells](#) and weaken the [immune system](#) (the [organs](#) and cells that defend the body against infection and disease), making it easier for the patient to develop an infection.

Complications can be acute or chronic.

[Acute](#) complications are those that occur during therapy. Chemotherapy usually causes acute complications that heal after treatment ends.

[Chronic](#) complications are those that continue or develop months to years after therapy ends. Radiation can cause acute complications but may also cause permanent tissue damage that puts the patient at a lifelong risk of oral complications. The following chronic complications commonly continue after radiation therapy to the head and/or neck has ended:

- Dry mouth.
- Tooth decay.
- Infections.
- Taste changes.
- Problems using the mouth and jaw due to tissue and bone loss and/or the growth of [benign tumors](#) in the skin and muscle.

[Invasive](#) dental procedures can cause additional problems. The dental care of patients who have undergone radiation therapy will therefore need to be adapted to the patient's ongoing complications.

Prevention and Treatment of Oral Complications Before Chemotherapy and/or Radiation Therapy Begins

Finding and treating oral problems before anticancer therapy begins can prevent or lessen the severity of oral complications.

[Oral](#) complications in patients undergoing treatment for [head and neck cancer](#) may be reduced by aggressive [prevention](#) measures taken before treatment begins. This will get the mouth and teeth in the best possible condition to withstand treatment.

Preventive measures include the following:

- Eating a well-balanced [diet](#). Proper [nutrition](#) can help the body tolerate the stress of [cancer](#) treatment, maintain energy, fight [infection](#), and rebuild [tissue](#).
- Learning how to care for the mouth and teeth during and after anticancer therapy. Good dental [hygiene](#) helps prevent cavities, mouth sores, and infections.
- Having a complete oral health exam by a [dentist](#) familiar with the oral [side effects](#) of anticancer treatments.

The cancer care team should include the patient's dentist. It is important to choose a dentist familiar with the oral side effects of [chemotherapy](#) and/or [radiation therapy](#). An evaluation of the patient's oral health at least a month before treatment begins usually provides enough time for the mouth to heal after dental work. The dentist will identify and treat teeth at risk for infection or decay, so the patient may avoid having [invasive](#) dental treatment during anticancer therapy. The dentist may also provide appropriate preventive care to lessen the severity of dry mouth, a common complication of radiation therapy to the head and neck.

A preventive oral health exam will check for the following:

- Mouth sores or infections.
- Tooth decay.
- Gum disease.
- Dentures that do not fit well.
- Problems moving the jaw.
- Problems with the [salivary glands](#).

Patients undergoing high-dose chemotherapy, stem cell transplant, and/or radiation therapy need an oral care plan in place before treatment begins.

The goal of the oral care plan is to find and treat oral disease that may produce complications during treatment and to continue oral care throughout treatment and recovery. Different oral complications may occur during the different phases of

[transplantation](#). Steps can be taken ahead of time to prevent or lessen the severity of these side effects.

Ongoing oral care during radiation therapy will depend on the specific needs of the patient; the [dose](#), locations, and duration of the radiation treatment; and the specific complications that occur.

It is important that patients who have head or neck cancer stop smoking.

Continued smoking slows recovery and increases the risk that the head or neck cancer will [recur](#) or that a [second cancer](#) will develop. (Refer to the [PDQ](#) summary on [Smoking Cessation and Continued Risk in Cancer Patients](#) for more information.)

Management of Oral Complications During and After Chemotherapy and/or Radiation Therapy

Routine Oral Care

Continuing good dental [hygiene](#) during and after [cancer](#) treatment can reduce complications such as cavities, mouth sores, and [infections](#). It is important to clean the mouth after eating. The following are guidelines for everyday [oral](#) care during [chemotherapy](#) and [radiation therapy](#):

Tooth brushing

- Brush teeth and gums with a soft bristle brush 2 to 3 times a day for 2 to 3 minutes.
- Rinse the toothbrush in hot water every 15 to 30 seconds to soften the bristles, if needed.
- If it is necessary to use a foam toothbrush, use it with an antibacterial rinse, when possible.
- Allow the toothbrush to air dry between brushings.
- Choose toothpaste with care:
 - Use a mild-tasting toothpaste; flavoring may irritate the mouth.
 - If toothpaste irritates the mouth, brush with a solution of 1 teaspoon of salt added to 4 cups (1 quart) of water.
 - Use a [fluoride](#) toothpaste.

Rinsing

- Rinse the mouth 3 or 4 times while brushing.
- Avoid rinses containing alcohol.
- One of the following rinses made with salt and/or baking soda may be used:
 - 1 teaspoon of salt in 4 cups of water.
 - 1 teaspoon of baking soda in 1 cup (8 [ounces](#)) of water.
 - ½ teaspoon salt and 2 tablespoons baking soda in 4 cups of water.
- An antibacterial rinse may be used 2 to 4 times a day for gum disease. Rinse for 1 to 2 minutes.
- If dry mouth occurs, rinsing may not be enough to clean the teeth after a meal. Brushing and flossing may be needed.

Flossing

- Floss gently once a day.

Lip care

- Use lip care products to prevent drying and cracking.

Oral Mucositis

Mucositis is an inflammation of mucous membranes in the mouth.

The terms "oral [mucositis](#)" and "[stomatitis](#)" are often used in place of each other, but their meanings are different.

- Mucositis is an [inflammation](#) of [mucous membranes](#) in the mouth. It usually appears as red, burn-like sores or as [ulcer](#)-like sores throughout the mouth.
- Stomatitis is an inflammation of [tissues](#) in the mouth, such as the gums, tongue, roof and floor of the mouth, and tissues inside the lips and cheeks. It includes infections of mucous membranes.

Mucositis may be caused by either radiation therapy or chemotherapy. In patients receiving chemotherapy, mucositis will heal by itself, usually in 2 to 4 weeks when there is no [infection](#). Mucositis caused by radiation therapy usually lasts 6 to 8 weeks, depending on the duration of treatment.

The following problems may occur:

- Pain.
- Infection.
- Bleeding, in patients receiving chemotherapy. Patients undergoing radiation therapy usually do not have a bleeding risk.

- Inability to breathe and eat normally.

Swishing ice chips in the mouth for 30 minutes may help prevent mucositis from developing in patients who are given [fluorouracil](#). Medication may be given to help prevent mucositis or keep it from lasting as long in patients who undergo [high-dose chemotherapy](#) and [bone marrow transplant](#).

Care of mucositis during chemotherapy and radiation therapy focuses on cleaning the mouth and relieving the symptoms.

Treatment of mucositis caused by either radiation therapy or chemotherapy is generally the same. After mucositis has developed, proper treatment depends on its severity and the patient's [white blood cell](#) count. The following are guidelines for treating mucositis during chemotherapy, [stem cell transplantation](#), and radiation therapy:

Cleaning the mouth

- Clean the teeth and mouth every 4 hours and at bedtime, more often if the mucositis becomes worse.
- Use a soft bristle toothbrush.
- Replace the toothbrush often.
- Use water-soluble lubricating jelly to moisturize the mouth.
- Use bland rinses or plain [sterile](#) water. Frequent rinsing removes particles and [bacteria](#) from the mouth, prevents crusting of sores, and moistens and soothes sore gums and the lining of the mouth. The following rinse may be used to neutralize acid and dissolve thick [saliva](#):
 - *½ teaspoon salt and 2 tablespoons baking soda in 4 cups of water.*
- If crusting of sores occurs, the following rinse may be used:
 - *Equal parts [hydrogen peroxide](#) and water or saltwater (1 teaspoon of salt in 4 cups of water).*

This should not be used for more than 2 days because it will keep mucositis from healing.

Relieving pain

- Try [topical](#) medications for pain. Rinse the mouth before applying the medication onto the gums or lining of the mouth. Wipe mouth and teeth gently with wet gauze dipped in saltwater to remove particles.

- Painkillers may provide relief when topical medications do not. [Nonsteroidal anti-inflammatory drugs](#) (NSAIDS, [aspirin](#)-type painkillers) should not be used by patients receiving chemotherapy because these patients have a bleeding risk.
- [Capsaicin](#), the active ingredient in hot peppers, may be used to increase a person's ability to tolerate pain. When capsaicin is put on [inflamed](#) tissues in the mouth, mucositis pain may decrease as the burning feeling from the capsaicin decreases. The [side effects](#) of capsaicin are not known.
- Zinc [supplements](#) taken during radiation therapy may help treat mucositis as well as [dermatitis](#) (inflammation of the skin).

Infection

Damage to the lining of the mouth and a weakened immune system make it easier for infection to occur.

Oral mucositis breaks down the lining of the mouth, allowing germs and [viruses](#) to get into the bloodstream. When the [immune system](#) is weakened by chemotherapy, even good bacteria in the mouth can cause infections, as can disease-causing organisms picked up from the hospital or other sources. As the white blood cell count gets lower, infections may occur more often and become more serious. Patients who have low white blood cell counts for a long time are more at risk of developing serious infections. Dry mouth, common during radiation therapy to the head and neck, may also raise the risk of infections in the mouth. [Preventive](#) dental care during chemotherapy and radiation therapy can reduce the risk of mouth, tooth, and gum infections.

The following types of infections may occur:

Bacterial infections

Treatment of [bacterial infections](#) in patients who have gum disease and receive [high-dose chemotherapy](#) may include the following:

- Medicated and peroxide mouth rinses.
- Brushing and flossing.
- Wearing dentures as little as possible.

Bacterial infections in patients undergoing radiation therapy are usually treated with [antibiotics](#).

Fungal infections

The mouth normally contains [fungi](#) that can exist on or in the body without causing any problems. An overgrowth of fungi, however, can be serious and requires treatment.

[Antibiotics](#) and [steroid drugs](#) are often used when a patient receiving chemotherapy has a low white blood cell count. These [drugs](#) change the balance of bacteria in the mouth, making it easier for a fungal overgrowth to occur. Fungal infections are common in patients treated with radiation therapy.

Drugs may be given to prevent fungal infections from occurring. Treatment of surface fungal infections in the mouth only may include mouthwashes and lozenges that contain [antifungal](#) drugs. These are used after removing dentures, brushing the teeth, and cleaning the mouth. An antibacterial rinse should be used on dentures and dental appliances and to rinse the mouth.

Deeper fungal infections, such as those in the [esophagus](#) or [intestines](#), are treated with drugs taken by mouth or [injection](#).

Viral infections

Patients receiving chemotherapy, especially those with weakened immune systems, are at risk of mild to serious viral infections. Finding and treating the infections early is important. Drugs may be used to prevent or treat viral infections.

[Herpesvirus](#) infections may [recur](#) in radiation therapy patients who have these infections.

Bleeding

Bleeding may occur during chemotherapy when anticancer drugs affect the ability of blood to clot.

Areas of gum disease may bleed on their own or when irritated by eating, brushing, or flossing. Bleeding may be mild (small red spots on the lips, [soft palate](#), or bottom of the mouth) or severe, especially at the gumline and from [ulcers](#) in the mouth. When [blood counts](#) drop below certain levels, blood may ooze from the gums.

With close monitoring, most patients can safely brush and floss throughout the entire time of decreased blood counts.

Continuing regular oral care will help prevent infections that may further complicate bleeding problems. The [dentist](#) or [doctor](#) can provide guidance on how to treat bleeding and safely keep the mouth clean when blood counts are low.

Treatment for bleeding during chemotherapy may include the following:

- Medications to reduce blood flow and help clots form.
- Topical products that cover and seal bleeding areas.
- Rinsing with a mixture of one part 3% hydrogen peroxide to 2 or 3 parts saltwater solution (1 teaspoon of salt in 4 cups of water) to help clean oral wounds. Rinsing must be done carefully so clots are not disturbed.

Dry Mouth

Dry mouth (xerostomia) occurs when the salivary glands produce too little saliva.

Saliva is needed for taste, swallowing, and speech. It helps prevent infection and tooth decay by neutralizing acid and cleaning the teeth and gums. Chemotherapy and radiation therapy can damage [salivary glands](#), causing them to produce too little saliva. The mouth is less able to clean itself. Acid in the mouth is not neutralized, and [minerals](#) are lost from the teeth. Tooth decay and gum disease are more likely to develop. Symptoms of dry mouth include the following:

- Thick, stringy saliva.
- Increased thirst.
- Changes in taste, swallowing, and speech.
- A sore or burning feeling (especially on the tongue).
- Cuts or cracks in the lips or at the corners of the mouth.
- Changes in the surface of the tongue.
- Difficulty wearing dentures.

Salivary glands usually return to normal after chemotherapy ends.

Dry mouth during chemotherapy is usually temporary. The salivary glands often recover 2 to 8 weeks after chemotherapy ends.

Salivary glands may not recover completely after radiation therapy ends.

Saliva production drops within 1 week after starting radiation therapy to the head and/or neck and continues to decrease as treatment continues. The severity of dry mouth depends on the dose of radiation and the number of glands [irradiated](#). The salivary glands in the upper cheeks near the ears are more affected than other salivary glands.

Partial recovery of salivary glands may occur in the first year after radiation therapy, but recovery is usually not complete, especially if the salivary glands were directly irradiated. Salivary glands that were not irradiated may become more active to offset the loss of saliva from the destroyed glands.

Careful oral hygiene can help prevent mouth sores, gum disease, and tooth decay caused by dry mouth.

The following are guidelines for managing dry mouth:

- Clean the mouth and teeth at least 4 times a day.
- Floss once a day.
- Use a fluoride toothpaste when brushing.
- Apply fluoride gel once a day at bedtime, after cleaning the teeth.

- Rinse 4 to 6 times a day with a solution of salt and baking soda (mix ½ teaspoon salt and ½ teaspoon baking soda in 1 cup of warm water). Avoid foods and liquids that contain a lot of sugar. Sip water to relieve mouth dryness.

A dentist can provide the following treatments:

- Solutions to replace minerals in the teeth.
- Rinses to fight infection in the mouth.
- Saliva substitutes or medications to stimulate the salivary glands.
- Fluoride treatments to prevent tooth decay.

Tooth Decay

Dry mouth and changes in the balance of oral bacteria increase the risk of tooth decay. Meticulous oral hygiene (as described in [Routine Oral Care](#)) and regular care by a dentist can help prevent cavities.

Taste Changes

Changes in taste are common during chemotherapy and radiation therapy.

Change in the sense of taste ([dysgeusia](#)) is a common [side effect](#) of both chemotherapy and head and/or neck radiation therapy. Foods may have no taste or may not taste as they did before therapy. These taste changes are caused by damage to the taste buds, dry mouth, infection, and/or dental problems. Chemotherapy patients may experience unpleasant taste related to the spread of the drug within the mouth. Radiation may cause a change in sweet, sour, bitter, and salty tastes.

In most patients receiving chemotherapy and in some patients undergoing radiation therapy, taste returns to normal a few months after therapy ends. For many radiation therapy patients, however, the change is permanent. In others, the taste buds may recover 6 to 8 weeks, or later, after radiation therapy ends. [Zinc sulfate supplements](#) may help with the recovery for some patients.

Fatigue

Cancer patients who are undergoing high-dose chemotherapy and/or radiation therapy often experience [fatigue](#) (lack of energy) that is related to either the cancer or its treatment. Some patients may have difficulty sleeping. The patient may feel too tired to perform routine oral care, which may further increase the risk for mouth ulcers, infection, and pain. (Refer to the [PDQ](#) summary on [Fatigue](#) for more information.)

Malnutrition and Nutritional Support

Loss of appetite can lead to malnutrition.

Patients undergoing treatment for [head and neck cancers](#) are at high risk for [malnutrition](#). The cancer itself, poor [diet](#) before [diagnosis](#), and [complications](#) from [surgery](#), [radiation therapy](#), and [chemotherapy](#) can lead to [nutritional](#) shortfalls. Patients can lose the desire to eat due to [nausea](#), [vomiting](#), trouble swallowing, sores in the mouth, or dry mouth. When eating causes discomfort or pain, the patient's [quality of life](#) and nutritional well-being suffer. The following suggestions may help patients with cancer meet their nutritional needs:

- Change the texture of food. Serving food chopped, ground, or blended can reduce the amount of time it needs to stay in the mouth before being swallowed.
- Eat between-meal snacks to add [calories](#) and [nutrients](#).
- Choose foods high in calories and protein.
- Take [supplements](#) that provide [vitamins](#), [minerals](#), and calories.

Nutritional counseling may be helpful during and after treatment.

Nutritional support may include liquid diets and enteral feedings.

Many patients treated for head and neck cancers who receive radiation therapy alone are able to eat soft foods. As treatment progresses, most patients will include or switch to liquid diets using high-calorie, high-protein nutritional drinks. Some patients may need [enteral tube feeding](#) to meet their nutritional needs. Almost all patients who receive chemotherapy and head and/or neck radiation therapy at the same time will require enteral nutritional support within 3 to 4 weeks. Studies show that patients benefit when they begin enteral feedings at the start of treatment, before weight loss occurs.

Normal eating by mouth begins again when treatment is finished and the site that received radiation is healed. The return to normal eating often needs a team approach, including a [speech and swallowing therapist](#) to ease the adjustment back to solid foods. Tube feedings are decreased as a patient's intake by mouth increases, and are stopped when the patient is able to get enough nutrients by mouth. Although most patients will regain their ability to eat solid foods, many will have lasting complications such as taste changes, dry mouth, and trouble swallowing. These complications can interfere with meeting their nutritional needs and with their quality of life.

Pain

Certain anticancer drugs can cause nerve damage that may result in oral pain.

If an anticancer drug is causing the pain, stopping the drug usually stops the pain. Because there may be many causes of oral pain during cancer treatment, a careful [diagnosis](#) is important. This may include obtaining a medical history, performing physical and dental exams, and taking [x-rays](#) of the teeth.

Tooth sensitivity may occur in some patients weeks or months after chemotherapy has ended. Fluoride treatments and/or toothpaste for sensitive teeth may relieve the discomfort.

Pain in the teeth or jaw muscles may occur from tooth grinding or stress.

Pain in the teeth or jaw muscles may occur in patients who grind their teeth or clench their jaws, often because of stress or the inability to sleep. Treatment may include the following:

- Muscle relaxers.
- Drugs to treat [anxiety](#).
- [Physical therapy](#) (moist heat, massage, and stretching).
- Mouthguards to wear while sleeping.

Jaw Stiffness

A long-term complication of radiation therapy is the growth of [benign tumors](#) in the skin and muscles. These [tumors](#) may make it difficult for the patient to move the mouth and jaw normally. Oral [surgery](#) may also affect jaw mobility. Management of jaw stiffness may include the following:

- Physical therapy.
- Oral appliances.
- Pain treatments.
- Medication.

Tissue and Bone Loss

Radiation therapy can cause [tissue](#) and bone in the treated area to waste away. When tissue death occurs, ulcers may form in the soft tissues of the mouth, grow in size, and cause pain or loss of feeling. Infection becomes a risk. As bone tissue is lost, fractures can occur. Preventive care can lessen the severity of tissue and bone loss.

Treatment of tissue and bone loss may include the following:

- Eating a well-balanced [diet](#).

- Wearing removable dentures or appliances as little as possible.
- Not smoking.
- Not drinking alcohol.
- Using topical antibiotics.
- Using painkillers.
- Undergoing surgery to remove dead bone or to reconstruct bones of the mouth and jaw.
- Receiving [hyperbaric oxygen](#) therapy, a method of delivering oxygen under pressure to the surface of a [wound](#) to help it heal.

(Refer to [Nutrition in Cancer Care](#) for more information about managing mouth sores, dry mouth, and taste changes.)

Management of Oral Complications of High-Dose Chemotherapy and/or Stem Cell Transplant

Patients who have received transplants are at risk of graft-versus-host disease.

[Graft-versus-host disease](#) (GVHD) is a reaction of donated [bone marrow](#) or [stem cells](#) against the patient's [tissue](#). [Symptoms](#) of [oral](#) GVHD include the following:

- Sores that appear in the mouth 2 to 3 weeks after the [transplant](#).
- Dry mouth.
- Pain from spices, alcohol, or flavoring (such as mint in toothpaste).

[Biopsies](#) taken from the lining of the mouth and [salivary glands](#) may be needed to [diagnose](#) oral GVHD. Treatment of oral GVHD may include the following:

- [Topical](#) rinses, gels, creams, or powders.
- [Antifungal drugs](#) taken by mouth or [injection](#).
- [Psoralen](#) (a drug used with [ultraviolet light](#) to treat skin disease).
- Drugs that promote the production of [saliva](#).
- [Fluoride](#) treatments.
- Treatments to replace [minerals](#) lost from teeth by acids in the mouth.

Dentures, braces, and oral appliances require special care during high-dose chemotherapy and/or stem cell transplant.

The following are guidelines for the care and use of dentures, braces, and other oral appliances during [high-dose chemotherapy](#) and/or [stem cell transplant](#)

- Remove brackets, wires, and retainers before high-dose chemotherapy begins.
- Wear dentures only when eating during the first 3 to 4 weeks after the transplant.

- Brush dentures twice a day and rinse them well.
- Soak dentures in an antibacterial solution when they are not being worn.
- Clean denture soaking cups and change denture soaking solution every day.
- Remove appliances or dentures when cleaning the mouth.
- If mouth sores are present, avoid wearing removable appliances until the mouth is healed.

Dental treatments may be resumed when the transplant patient's immune system returns to normal.

Routine dental treatments, including scaling and polishing, should be delayed until the transplant patient's [immune system](#) returns to normal. Caution is advised for at least a year after the transplant.

Relapse and Second Cancers

[Cancer](#) survivors who received [chemotherapy](#) or a [transplant](#) or who underwent [radiation therapy](#) are at risk of developing a [second cancer](#) later in life. [Oral squamous cell](#) cancer is the most common second cancer occurring in transplant patients. The lips and tongue are the sites most often affected.

Mental and Social Considerations

The social aspects of [oral](#) complications can make them the most difficult problems for [cancer](#) patients to cope with. Oral complications affect eating and speaking and may make the patient unable or unwilling to take part in mealtimes or to dine out. Patients may become frustrated, withdrawn, or depressed, and they may avoid other people. Some [drugs](#) that are used to treat [depression](#) may not be an option because they cause [side effects](#) that make oral complications worse. (Refer to the [PDQ](#) summaries on [Anxiety](#) and [Depression](#) for more information.)

Education, [supportive care](#), and the treatment of [symptoms](#) are important for patients who have mouth problems that are related to cancer [therapy](#). Patients will be closely monitored for pain, ability to cope, and [response](#) to treatment. Supportive care from health care providers and family can help the patient cope with cancer and its complications.

Special Considerations for Children

A change in dental growth and development is a special complication for [cancer](#) survivors who received [high-dose chemotherapy](#) and/or [radiation therapy](#) to the head and neck for childhood cancers. Changes may occur in the size and shape of the teeth; eruption of teeth may be delayed; and development of the head and face may not reach full maturity. The role and timing of orthodontic treatment for patients with altered dental growth and development is under study. Some treatments have been successful, but standard guidelines have not yet been established.