Use of the dental hygiene interventions of scaling of teeth and root planing including curetting surrounding tissue, orthodontic and restorative practices, and other invasive interventions for persons\(^1\) receiving or who have received radiation therapy.

Cite as

*College of Dental Hygienists of Ontario, CDHO Advisory Radiation Therapy, 2016-02-16*

Scaling of teeth and root planing including curetting surrounding tissue, orthodontic and restorative practices, and other invasive interventions (“the Procedures”).

Radiation therapy

Advanced practice nurses  
Dental assistants  
Dental hygienists  
Dentists  
Denturists  
Dieticians  
Health professional students

Nurses  
Patients/clients  
Pharmacists  
Physicians  
Public health departments  
Regulatory bodies

To guide dental hygienists at the point of care relative to the use of the Procedures for persons who are receiving or who have received radiation therapy, chiefly as follows.

1. Understanding the medical condition.
2. Sourcing medications information.
3. Taking the medical and medications history.
4. Identifying and contacting the most appropriate healthcare provider(s) for medical advice.

\(^1\) Persons includes young persons and children
5. Understanding and taking appropriate precautions prior to and during the Procedures proposed.
6. Deciding when and when not to proceed with the Procedures proposed.
7. Dealing with adverse events arising during the Procedures.
8. Keeping records.

TARGET POPULATION

Child (2 to 12 years)
Adolescent (13 to 18 years)
Adult (19 to 44 years)
Middle Age (45 to 64 years)
Aged (65 to 79 years)
Aged 80 and over
Male
Female

Parents, guardians, and family caregivers of children, young persons and adults receiving or who have received radiation therapy.

MAJOR OUTCOMES CONSIDERED

For persons receiving or who have received radiation therapy: to maximize health benefits and minimize adverse effects by promoting the performance of the Procedures at the right time with the appropriate precautions, and by discouraging the performance of the Procedures at the wrong time or in the absence of appropriate precautions.

RECOMMENDATIONS

UNDERSTANDING THE MEDICAL CONDITION

Terminology used in this Advisory

Resources consulted
- Radiation Therapy for Cancer: National Cancer Institute
- Radiation therapy: Canadian Cancer Society
- Understanding Radiation Therapy: American Cancer Society

1. Radiation therapy
   a. is the use of radiation energy, such as x-rays, gamma rays, electron beams and protons, to destroy cancer cells
   b. is also called
      i. brachytherapy
      ii. irradiation
      iii. radiotherapy
      iv. x-ray therapy.

2. Types of radiation therapy
   a. external beam radiation therapy, which
      i. delivers radiation to the cancer
ii. is aimed at a specific part of the body
iii. uses a machine to direct high-energy rays from outside the body into the tumour and, unavoidably, some adjacent normal tissue
iv. is delivered as outpatient treatment over a period of many weeks

b. **internal radiation therapy**, radiation delivered from a source placed within the body, including
   i. brachytherapy, in which the radiation source is a solid in the form of seeds, ribbons, or capsules which are placed in the body in or near the cancer
   ii. liquid radiation, which is delivered orally as liquids or pills

c. **systemic radiation**, a variant of **internal radiation therapy**, which
   i. uses radioactive medications called radiopharmaceuticals to treat certain types of cancer, such as thyroid cancer or bone metastases
   ii. uses unsealed radioactive sources given orally or by injection, which then disperse throughout the body
   iii. requires brief inpatient stays.

Other terminology is as follows.

1. **Candida**, oral candidiasis, also termed thrush or oral moniliasis, is
   a. a yeast infection of the mouth or throat
   b. most commonly caused by *Candida albicans*.

2. **Lesion**, a term variously and loosely used in medicine to refer to such things as
   a. any abnormality of tissue in the body, including the mouth and skin
   b. any localized abnormal structural change in a bodily part
   c. a mass especially before a definite diagnosis is established
   d. cancer
   e. an injury to living tissue, such as a cut or break in the skin.

3. **Oral ulcer**, an open **lesion**, often painful, inside the mouth or upper throat, an alternative name for
   a. mouth ulcer
   b. aphthous ulcer
   c. aphthous stomatitis, also known as a **canker sore**
   d. cancerous ulcer.

4. **Palliative care**, services of care for persons towards the end of life with terminal illnesses such as cancer, when the focus of the care
   a. is relieving symptoms
   b. attending to physical and spiritual needs.

5. **Risk factor**, a term
   a. used strictly to identify anything that affects the person’s chances of developing a disease
   b. used loosely to refer to things that in themselves may not greatly affect the person’s chances of developing a disease but which may signal the presence of things that are risk factors as strictly defined
   c. that informs medical history-taking and examination
   d. that, in the absence of clear-cut epidemiological data, often cannot be quantified or even rank-ordered for importance.
6. Sicca syndrome, a term reserved for the combination of dryness of the mouth and eyes, regardless of cause; when accompanied by lymphocyte infiltration of the salivary glands is named Sjögren syndrome (CDHO Advisory).
7. Supportive care, services of care to help persons meet the physical, emotional and spiritual challenges arising from the condition or its treatment.
8. Xerostomia, abnormal dryness of the mouth resulting from decreased secretion of saliva; has various causes including
   a. sicca syndrome
   b. Sjögren syndrome (CDHO Advisory)
   c. some medications.

Overview of radiation therapy

Resources consulted
- Bone Marrow Transplant – Radiation Therapy: Rush University Medical Center
- Mucositis – Oral Problems and Solutions: Cancer Supportive Care
- Oral Complications of Chemotherapy and Head/Neck Radiation: National Cancer Institute
- Radiation Therapy Principles: American Cancer Society
- Radiation Therapy Side Effects and Ways to Manage Them: National Cancer Institute
- Radiation therapy: Canadian Cancer Society
- Radiation Therapy: MedlinePlus
- Side effects of radiation therapy: Canadian Cancer Society
- Understanding Radiation Therapy: American Cancer Society

Occurrence
Radiation therapy is one of the most common treatments for cancer.

Application
Radiation therapy is
1. often part of the main treatment for certain types of cancer, such as cancers of the head and neck, bladder and lung, and Hodgkin disease (CDHO Advisory), and as part of the treatment for many other cancers
2. intensely focused on the anatomical site of the cancer, and may require tests, scans or x-ray examinations to pinpoint the locus.

Usefulness
Radiation therapy’s usefulness varies because some types of cancer
1. are more sensitive to radiation than others
2. are located in anatomical sites that are relatively easily treated with radiation without creating major side effects.

Differentiation from chemotherapy
Radiation therapy differs from chemotherapy (CDHO Advisory), which circulates anti-cancer medications to the entire body: radiation therapy is focused on the part of the body receiving treatment, with the important exception of radioactive substances delivered intravenously or orally.
Treatment

Radiation therapy
1. is given alone or combined with other treatments, such as surgery or chemotherapy, and in various forms of radiation therapy
2. is carefully planned, and is delivered as a number of treatments in a pre-determined sequence
3. may be affected by some medications taken during radiation therapy, which may
   a. cause or aggravate side effects of radiation therapy
   b. cause or aggravate side effects of medications
   c. reduce the effectiveness of the radiation therapy.

Action

Radiation therapy is used to
1. shrink tumours prior to other treatments, such as surgery and chemotherapy
2. destroy cancer cells
   a. often in conjunction with other treatments, by damaging their DNA, which inhibits their growth and division
   b. after other treatments, such as surgery and chemotherapy.
3. inhibit the rapid and uncontrolled growth not only of cancer cells, but it may also inhibit or damage healthy cells, though most healthy cells repair themselves on cessation of the radiation.

Side effects

Radiation therapy's side effects
1. vary from person to person
2. are influenced by the
   a. quantity of radiation
   b. anatomical site of the radiation treatment
   c. treatment schedule
   d. general physical health of the person
   e. medications
      i. pertaining directly to the treatment
      ii. for other purposes
3. vary in their duration
   a. during treatment
      i. skin changes and some fatigue are common
      ii. other side effects depend on the part of the body being treated
      iii. most of these side effects go away within two months once radiation therapy is finished
   b. after treatments result in late side effects with durations ranging from weeks or months to permanency, may first occur 6 or more months after radiation therapy is over, and
      i. vary by the part of the body treated and the dose of radiation delivered
      ii. include
         1. infertility
         2. joint problems
         3. lymphedema
         4. changes to the mouth
         5. secondary cancer
4. are described as
   a. general side effects, when they occur with radiation therapy and arise in any
   area of the body and not only in the anatomical locus irradiated; these include
      i. anxiety *(CDHO Advisory)*
      ii. depression *(CDHO Advisory)*
      iii. loss of appetite, which can lead to nutritional deficiencies *(CDHO Advisory)*
      iv. fatigue
   v. changes in sleep patterns
   b. specific side effects that
      i. occur with radiation therapy
      ii. are associated with the anatomical locus irradiated
      iii. may be accompanied by general side effects
      iv. include those arising from radiation therapy to the
         1. skin, resulting in skin changes in the treatment area, which
            a. include dryness, itching, peeling, or blistering
            b. occur because radiation therapy damages healthy skin cells in the treatment area
            c. usually disappear once treatment ends
         2. head and neck, resulting in
            a. changes to the mouth, such as
               i. candidiasis
               ii. dental caries
               iii. disorder of salivary function
               iv. ill-fitting of dentures owing to the swelling of the gums
               v. loss of taste
               vi. mucocutaneous changes and mucositis
               vii. mouth ulcers
               viii. osteonecrosis of the jaw *(CDHO Advisory)*
               ix. osteoradionecrosis
               x. soft tissue necrosis
            b. other changes, such as
               i. nausea and vomiting
               ii. earache or difficulty hearing
               iii. hair loss, and tenderness of the scalp
         3. chest, such as
            a. cough and shortness of breath
            b. difficulty swallowing
            c. breast, such as
               i. skin changes in and around the breast
               ii. change in size or shape of the breast (rare)
         4. stomach and abdomen, such as
            a. diarrhea
            b. nausea and vomiting
         5. pelvis, such as
            a. abdominal bloating
            b. bladder and rectal irritation
c. diarrhea

d. infertility, men and women

e. menopausal symptoms

f. nausea and vomiting

6. blood system, causing low levels of

a. white blood cells

b. platelets, which may cause bleeding problems.

**Prognosis**

Radiation therapy is closely monitored for progress, reactions and side effects; the overall effect of the treatment may not be discernible until after it is completed.

**Social considerations**

Radiation therapy support groups

1. In Canada include

   - Facing cancer? We can help
   - Prostate Cancer Canada
   - Willow Breast Cancer Support Canada

2. In the US include

   - Radiation Therapy and You: Support for People With Cancer
   - Find Support & Treatment
   - Overview for Friends & Family

**Multimedia and images**

Radiotherapy, Video

Radiation Therapy as a Career, Video

**Comorbidity, complications and associated conditions**

Comorbid conditions are those which co-exist with radiation therapy but which are not believed to be caused by it. Complications and associated conditions are those that may have some link with it. Distinguishing among comorbid conditions, complications and associated conditions may be difficult in clinical practice.

Comorbid conditions, complications and conditions associated with radiation therapy comprise chiefly those associated with the

1. particular cancer

2. side effects of the radiation therapy

3. side effects of medications used for radiation therapy, treatment of cancer, or other purposes.

**Oral health considerations**

Resources consulted

- Cancer Supportive Care: Mucositis – Oral Problems and Solutions

- College of Dental Hygienists of Ontario Guideline for Best Practice
1. Advice of the treating physician or radiation therapy team is required before any oral healthcare, particularly in reference to risks of infection and bleeding.
2. **Pre-radiation oral healthcare planning** requires special attention because of the risks that accompany radiation therapy.
3. The mouth is often a site of side effects of cancer treatment with medications or radiation therapy.
4. Oral side effects of radiation therapy that affect the mouth occur chiefly with radiation therapy to the head and neck, which increases the risk of
   a. painful **mouth sores**, which may become infected and heal slowly
   b. cavities
   c. bone loss in the jaw.
5. Attention to oral healthcare is important during radiation therapy, and requires
   a. check-up of mouth, teeth, and jaw every 1 to 2 months for at least 6 months after radiation treatment ends
   b. encouragement of oral self-care to keep the teeth and gums healthy
   c. consideration of
     i. gentle ways of cleaning the teeth, which may preclude flossing if the mouth is very sore or the blood counts are low, especially when chemotherapy accompanies the radiation therapy
     ii. daily fluoride treatments
   d. exercise of the jaw even in the absence of jaw stiffness, 3 times a day, with opening of the mouth 20 times as wide as possible without causing pain
   e. use of alcohol-free mouthwashes, of which particular formulations may be provided or recommended by the radiation treatment centre.
6. Dentures
   a. full or partial, may require removal on the days of radiation therapy treatments because they may provoke vomiting
   b. may no longer fit well if the radiation therapy causes the gums to swell
   c. may have to be discarded until the radiation therapy is over to avoid sores of the gums
   d. may require frequent removal to rest the gums.
7. Dental x-rays during radiation therapy should be avoided except in emergencies and then with prior consultation with the appropriate primary or specialist care provider.
8. Radiation therapy to the chest may
   a. be associated with a cough
   b. cause shortness of breath
   c. increase the production of mucus.
## Sourcing medications information

1. Adverse effect databases
   - Health Canada’s Marketed Health Products Directorate
     - toll-free 1-866-234-2345
   - Health Canada’s Drug Product Database

2. Specialized organizations
   - British Columbia Cancer Agency (BCCA) Cancer Drug Manual
   - US National Library of Medicine and the National Institutes of Health Medline Plus Drug Information
   - WebMD

3. Medications considerations
   All medications have potential side effects whether taken alone or in combination with other prescription medications, or as over-the-counter (OTC) or herbal medications.

4. Information on herbals and supplements
   - US National Library of Medicine and the National Institutes of Health Medline Plus Drug Information All Herbs and Supplements

5. Complementary and alternative medicine
   - National Center for Complementary and Alternative Medicine

6. Any changes in medications, prescribed or over-the-counter, prior to and during radiation therapy treatments should be accurately reported to the radiation therapy provider or treating physician, including
   a. creams or ointments
   b. vitamin supplements
   c. mineral supplements
   d. herbal remedies and other natural health products
   e. complementary and alternative therapies.

## Types of medications

1. The types of medications comprise chemotherapy and its associated medications (CDHO Advisory), which may be
   a. part of the radiation therapy
   b. directed at the cancer to which the radiation therapy is directed
   c. directed at side effects of chemotherapy and/or radiation therapy.

2. For side effects during radiation therapy most relevant to oral health, the medications commonly used include those directed at
   a. mouth problems
      i. sore mouth or tongue
         1. associated with cancer therapy
            - lidocaine viscous (Xylocaine Viscous®)
         2. dietary supplements such as
            - Boost®
            - Ensure®
ii. **xerostomia**
   1. where functioning cells remain in the major salivary glands, systemic salivary gland stimulants include
      - **cevimeline** (Evoxac®)
      - **pilocarpine** (Salagen®)
   2. otherwise artificial saliva products and moisturizing gels are recommended
b. swallowing problems, sore throat
   - **codeine** (Tylenol with Codeine®, among others)
   - **lidocaine viscous** (Xylocaine Viscous®)
   - **sucralfate** (Carafate®)
c. fungal infection
   - **fluconazole** (Diflucan®)
   - **itraconazole** (Sporanox®)
   - **ketoconazole** (Nizoral®)
   - **nystatin** (Mycostatin®, among others)
d. heartburn, reflux and indigestion
   i. prescription, such as
      - **belladonna alkaloid combinations and phenobarbital** (Donnatal®, among others)
      - **cimetidine** (Tagamet®)
      - **famotidine** (Pepcid®)
      - **lansoprazole** (Prevacid®)
      - **nizatidine** (Axid®)
      - **omeprazole** (Prilosec®)
      - **ranitidine** (Zantac®)
   ii. over-the-counter antacids include
      - **aluminum hydroxide and magnesium hydroxide** (Maalox®, among others)
      - **calcium carbonate** (Tums®)
      - **simethicone** (Mylanta®, among others)

e. early filling and bloating
   - **simethicone** (Mylanta®, among others)
f. diarrhea
   i. as a side effect of radiation medications
      - **capecitabine** (Xeloda®)
      - **cytarabine** (Cytosar-U®, DepoCyt®)
      - **fluorouracil** (Adrucil®)
      - **irinotecan** (Camptosar®)
      - **methotrexate** (Rheumatrex®, Trexall®)
   ii. non-infective diarrhea
      - **bismuth subsalicylate** (Kaopectate®, Pepto-Bismol®)
      - **diphenoxylate and atropine** (Lomotil®, Lonox®)
      - **loperamide** (Imodium®, Anti-Diarrheal Formula®)
      - **paregoric** (Camphorated Tincture of Opium®)
g. nausea and vomiting, anti-emetics, which
   i. should be taken strictly as directed before the start of or during radiation therapy treatment
ii. should be considered especially when the vomiting persists for 24 hours or longer

iii. include

1. serotonin receptor antagonists
   - granisetron (Kytril®)
   - ondansetron (Zofran®)

2. dopamine antagonists
   - haloperidol (Haldol®)
   - metoclopramide (Metoclopramide Hydrochloride Intensol®, Reglan®)

3. benzodiazepines, for nausea and vomiting associated with anxiety, including
   - diazepam (Diazepam Intensol®, Valium®)
   - lorazepam (Ativan®, Lorazepam Intensol®).

Side effects of medications

See the links above to the individual medications.

THE MEDICAL AND MEDICATIONS HISTORY

The dental hygienist in taking the medical and medications history-taking should

1. focus on screening the patient/client prior to treatment decision relative to
   a. key symptoms
   b. medications considerations
   c. contraindications
   d. complications
   e. comorbidities
   f. associated conditions

2. explore the need for advice from the primary or specialized care provider(s)

3. inquire about
   a. symptoms indicative of complications or side-effects of radiation therapy or the cancer which is being treated, and debilitation to a degree that may require advice from the appropriate primary care provider
   b. the patient/client’s understanding and acceptance of the need for oral healthcare
   c. medications considerations, including over-the-counter medications, herbals and supplements
   d. problems with previous dental/dental hygiene care
   e. problems with infections generally and specifically associated with dental/dental hygiene care
   f. the patient/client’s current state of health
   g. how the patient/client’s current symptoms relate to
      i. oral health
      ii. health generally
      iii. recent changes in the patient/client’s condition.
IDENTIFYING AND CONTACTING THE MOST APPROPRIATE HEALTHCARE PROVIDER(S) FOR ADVICE

Identifying and contacting the most appropriate healthcare provider(s) from whom to obtain medical or other advice pertinent to a particular patient/client

The dental hygienist should
1. record the name of the physician/primary care provider most closely associated with the patient/client’s healthcare, and the telephone number
2. obtain from the patient/client or parent/guardian written, informed consent to contact the identified physician/primary healthcare provider
3. use a consent/medical consultation form, and be prepared to fax the form to the provider
4. include on the form a standardized statement of the Procedures proposed, with a request for advice on proceeding or not at the particular time, and any precautions to be observed.

UNDERSTANDING AND TAKING APPROPRIATE PRECAUTIONS

Infection Control

Dental hygienists are required to keep their practices current with infection control policies and procedures, especially in relation to
1. the Recommendations published by the Centers for Disease Control and Prevention (a frequently updated resource)
2. relevant occupational health and safety legislative requirements
3. relevant public health legislative requirements
4. best practices or other protocols specific to the medical condition of the patient/client.

DECIDING WHEN AND WHEN NOT TO INITIATE THE PROCEDURES PROPOSED

The dental hygienist
1. should not implement the Procedures without prior consultation with the appropriate primary or specialist care provider(s)
   a. if the patient/client
      i. has received, is receiving or is about to receive radiation therapy
      ii. has a bleeding tendency
   b. if the dental hygienist is uncertain about
      i. requirements for special precautions
      ii. medication considerations
2. may postpone the Procedures pending medical advice if the patient/client
   a. appears debilitated
   b. is unable to provide the dental hygienist with sufficient information about
      i. medications
      ii. bleeding tendency
   c. has recently changed significant medications, under medical advice or otherwise
   d. has symptoms or signs of
      i. exacerbation of the medical condition
      ii. comorbidity, complication or an associated condition
e. has not recently or ever sought and received medical advice relative to oral healthcare procedures  
f. has recently experienced changes in his/her medical condition such as medication or other side effects of treatment  
g. is deeply concerned about any aspect of his or her medical condition.

### DEALING WITH ANY ADVERSE EVENTS ARISING DURING THE PROCEDURES

Dental hygienists are required to initiate emergency protocols as required by the College of Dental Hygienists of Ontario’s [Standards of Practice](#), and as appropriate for the condition of the patient/client.

First-aid provisions and responses as required for current certification in first aid.

### RECORD KEEPING

Subject to [Ontario Regulation 9/08](#) Part III.1, *Records*, in particular S 12.1 (1) and (2) for a patient/client with a history of radiation therapy, the dental hygienist should specifically record

1. a summary of the medical and medications history  
2. any advice received from the physician/primary care provider relative to the patient/client’s condition  
3. the decision made by the dental hygienist, with reasons  
4. compliance with the precautions required  
5. all Procedure(s) used  
6. any advice given to the patient/client.

### ADVISING THE PATIENT/CLIENT

The dental hygienist should

1. urge the family caregiver or patient/client, as appropriate, to alert any healthcare professional who proposes any intervention or test  
   a. that the patient/client has a history of radiation therapy  
   b. to the medications the patient/client is taking  
2. should discuss, as appropriate  
   a. the importance of the patient/client’s  
      i. speaking to the radiation therapy team about having the teeth cleaned and cavities repaired before treatment starts  
      ii. taking medication(s) as prescribed for pre-medication including antibiotic prophylaxis  
      iii. self-checking the mouth regularly for suspicious signs or symptoms  
      iv. reporting to the appropriate healthcare provider any changes in the mouth indicative of suspicious lesions  
   b. the particular side effects of radiation therapy to the head and neck  
      i. [xerostomia](#) and very dry throat  
      ii. what can be done to moisten the mouth, throat and lips  
      iii. use of artificial saliva  
      iv. difficulties with talking, chewing and swallowing
v. problems with wearing of dentures during the period of the swelling of the gums induced by radiation therapy, and the possible need to stop the use of dentures until the treatment is over 

c. the need for 
   i. regular oral health examinations and preventive oral healthcare 
   ii. infection control within the oral cavity 

d. oral self-care including information about 
   i. choice of toothpaste 
   ii. tooth-brushing techniques and related devices 
   iii. dental flossing 
   iv. mouth rinses 
   v. management of a xerostomia 

e. the importance of an appropriate diet in the maintenance of oral health 

f. for persons at an advanced stage of a disease or debilitation 
   i. regimens for oral hygiene as a component of supportive care and palliative care 
   ii. the role of the family caregiver, with emphasis on maintaining an infection-free environment through hand-washing and, if appropriate, wearing gloves 
   iii. scheduling and duration of appointments to minimize stress and fatigue 

g. comfort level while reclining, and stress and anxiety related to the Procedures 

h. medication side effects such as xerostomia, and recommend treatment 
   i. mouth ulcers and other conditions of the mouth relating to radiation therapy, comorbidities, complications, medications or diet 
   j. pain management. 

### BENEFITS/HARMS OF IMPLEMENTING THE RECOMMENDATIONS 

#### POTENTIAL BENEFITS 

1. Promoting health through oral hygiene for persons subject to radiation therapy. 
2. Reducing the adverse effects, such as oral infection or bleeding by 
   a. encouraging attention to oral healthcare including appropriate oral self-care 
   b. consulting the appropriate care provider on matters pertaining to 
      i. pain management; other medications 
      ii. particular concerns about the Procedures 
   c. generally increasing the comfort level of persons in the course of dental hygiene interventions 
   d. using appropriate techniques of communication 
   e. providing advice on scheduling and duration of appointments. 
3. Reducing the risk that oral health needs are unmet. 

#### POTENTIAL HARMS 

1. Causing infection or bleeding. 
2. Performing the Procedures at an inappropriate time, such as 
   a. in the presence of complications for which prior medical advice is required 
   b. in the presence of acute oral infection without prior medical advice. 
3. Disturbing the normal dietary and medications routine of a person with radiation therapy. 
4. Inappropriate management of pain or medication.
# Contraindications

## Contraindications in Regulations

Identified in the *Dental Hygiene Act, 1991 – O. Reg. 218/94 Part III*

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