COLLEGE OF DENTAL HYGIENISTS OF ONTARIO ADVISORY

ADVISORY TITLE

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\(^1\) with polycythemia.

ADVISORY STATUS

Cite as

*College of Dental Hygienists of Ontario, CDHO Advisory Polycythemia, 2018-11-09*

INTERVENTIONS AND PRACTICES CONSIDERED

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

SCOPE

DISEASE/CONDITION(S)/PROCEDURE(S)

Polycythemia

INTENDED USERS

- Advanced practice nurses
- Dental assistants
- Dental hygienists
- Dentists
- Denturists
- Dieticians
- Health professional students
- Nurses
- Patients/clients
- Pharmacists
- Physicians
- Public health departments
- Regulatory bodies

ADVISORY OBJECTIVE(S)

To guide dental hygienists at the point of care relative to the use of the Procedures for persons who have polycythemia, 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**

<table>
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<th>Child (2 to 12 years)</th>
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<td>Adult (19 to 44 years)</td>
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Parents, guardians, and family caregivers of children, young persons and adults with polycythemia.

**MAJOR OUTCOMES CONSIDERED**

For persons who have polycythemia: 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
- Pediatric Polycythemia Vera: Medscape
- Pediatric Polycythemia: Medscape
- Polycythemia vera: MayoClinic.com
- Polycythemia vera: MedlinePlus
- Polycythemia Vera: Merck Manual
- Secondary Polycythemia: Medscape

Terminology varies among centres.

Polycythemia, the terminology preferred for this Advisory, is a name for a condition which may also be called erythrocytosis. It
1. refers to three conditions of the blood
   a. **primary polycythemia**, which
   i. is a rare bone marrow disease
   ii. thickens the blood, the consequences of which cause the greatest concern
iii. is of unknown cause
   b. secondary polycythemia, which results from factors
      i. associated with common conditions that lead to oxygen shortage in the blood
      ii. independent of the function of the blood-forming stem cells
   c. relative polycythemia, in which decreased plasma volume results in a relative, not absolute, increase in circulating red blood cells.

2. in some usages refers to a condition of the blood
   a. in which red blood cells, white blood cells, and platelets are abnormally increased
   b. also termed polycythemia vera
      i. in which chiefly red blood cells are abnormally increased
      ii. may be termed erythrocytosis.

Other terminology includes
1. Erythrocytosis, excess of erythrocytes, red blood cells, which occurs in
   a. primary polycythemia
   b. relative polycythemia
   c. secondary polycythemia.

2. Erythropoietin, hormone produced by the kidney that promotes the formation of red blood cells in the bone marrow.

3. Gout, inflammation in the joints.

4. Hematocrit, the percentage, by volume, of the blood that consists of red blood cells; hematocrit = 25 percent means 25 ml of red blood cells in 100 ml of blood.

5. Hyperviscosity, increase in the resistance of blood to flowing.

6. Mutation, permanent change in the DNA sequence that makes up a gene; mutations are inherited by a child from a parent or acquired during an individual's lifetime.

7. Myeloproliferative disorder, where the bone marrow produces too many cells too rapidly, or produces too few cells.

8. Neoplastic proliferation, new growth, especially abnormal new growth which produces a tumour, which may be
   a. benign
   b. malignant, which is then called cancer.


10. Phlebotomy, bloodletting
    a. in which a predetermined amount of blood, usually half a litre, is removed and replaced with a predetermined amount of intravenous saline solution
    b. which is used in the treatment of primary polycythemia.

11. Prevalence, the number of people currently suffering from an illness in a given year.

12. Primary polycythemia
    a. is a type of myeloproliferative disorder
    b. arises when red blood cells are over-produced because of abnormality in the function of the bone marrow caused by mutation, which
       i. occurs in a blood-forming stem cell in the bone marrow
       ii. alters a process that governs the growth of the blood cells
       iii. is found in more than 90 percent of people with primary polycythemia
       iv. is not inherited
       v. is not yet fully understood
c. may be brought on by tumours in the kidneys because these participate in the regulation of red blood cell production

d. may result in
  i. total blood volume increasing even to the extent of doubling
  ii. hyperviscosity of the blood
  iii. plugging of capillaries
  iv. generally sluggish flow of blood in the blood vessels.

13. Secondary polycythemia, occurs

a. as a physiological response that increases red blood cells that
  i. compensates for lack of oxygen delivery and restores tissue oxygenation to its normal level
  ii. compromises circulation because of hyperviscosity when the hematocrit reaches levels higher than 60-65 percent, which
     1. leads to greater tissue hypoxia and EPO secretion
     2. continued increase in red blood cells
     3. further impairment of circulation.

b. in response to factors or underlying conditions that
  i. are associated with oxygen shortage in the tissues
     1. chronic obstructive pulmonary disease (CDHO Advisory)
     2. chronic heart disease
     3. prolonged lack of oxygen at high altitudes
     4. sleep apnea (CDHO Advisory)
     5. smoking
  ii. promote red blood cell production, including
     1. increased production of erythropoietin
     2. kidney or liver tumors
     3. abuse of anabolic steroids or erythropoietin by athletes and bodybuilders

c. as relative polycythemia, in which an apparent excess red blood cells is due to loss of volume in the liquid portion of the blood, the plasma, arising from
  i. burns
  ii. dehydration resulting from
     1. fluid loss
     2. decreased fluid intake
     3. diuretics
  iii. hypertension
  iv. stress.

14. Stem cells, capable of development into various cell types during early life and growth; stem cells pertaining to polycythemia exist in the bone marrow where they differentiate into red and white blood cells; see also leukemia (CDHO Advisory).

15. Thrombophlebitis, swelling and inflammation of a vein caused by a blood clot.


Overview of polycythemia

Resources consulted
- Pediatric Polycythemia Vera: Medscape
- Pediatric Polycythemia: Medscape
Polycythemia vera: MayoClinic.com
Polycythemia vera: MedlinePlus
Polycythemia Vera: Merck Manual
Secondary Polycythemia Treatment & Management: Medscape
Secondary Polycythemia: Medscape

Occurrence
1. **Primary polycythemia**, which
   a. affects 1 to 2 persons per 100,000
   b. has a prevalence of 22 persons per 100,000 people
   c. is first diagnosed at average age of 60 to 65 years of age
   d. seldom occurs below age 40 years
   e. affects men more than women
   f. develops slowly
2. **Secondary polycythemia**, which
   a. develops in response to lack of oxygen in the tissues
   b. is associated with common conditions such as heart and lung disease.

Cause
1. **Primary polycythemia** is usually associated with a gene mutation, the cause of which is unknown.
2. **Secondary polycythemia** is usually associated with increased erythropoietin production variously
   a. in response to low blood oxygen level
   b. from an erythropoietin-secreting tumour.

Risk factors
1. **Primary polycythemia** risk factors include
   a. age, because it is
      1. most common in adults older than 60
      2. rare in people younger than 20
   b. sex, because it affects men more often than women
   c. family history, because it appears to run in families even though it is not generally inherited
2. **Secondary polycythemia** include the risk factors of the underlying cause.

Signs and symptoms
**Polycythemia** signs and symptoms, which are non-specific, include
1. orofacial signs
   a. purplish or red areas on the
      i. cheeks
      ii. gums
      iii. lips
      iv. oral mucosa
      v. tongue
   b. spontaneous bleeding of the gums
2. peptic ulceration of the
   a. esophagus
b. stomach  
c. upper small intestine  

3. indications of excessive bleeding, such as  
a. nosebleeds 
b. coughing productive blood variously originating in  
   i. bronchi  
   ii. larynx  
   iii. mouth  
   iv. trachea  
c. black feces, from intestinal bleeding  
d. menorrhagia  

4. skin problems, variously  
a. bluish colour  
b. itching  
   i. especially after a warm bath or shower  
   ii. after sleeping in a warm bed  
c. burning or tingling sensation in the skin, particularly on the  
   i. arms and hands  
   ii. legs and feet  
d. reddening of the skin, especially on the  
   i. face  
   ii. palms  
   iii. earlobes  
e. easy bruising  

5. for primary polycythemia, non-specific complaints variously experienced, such as  
   ▪ breathing difficulty on lying down  
   ▪ chest pain  
   ▪ dizziness  
   ▪ enlargement of the spleen  
   ▪ fatigue  
   ▪ feelings of abdominal fullness  
   ▪ gout  

Medical investigation  
Polycythemia is considered when physical examination and tests  
1. reveal  
   a. hematocrit readings greater than 48 percent in women and 52 percent in men  
   b. hemoglobin levels that are raised  
   c. red blood cells and, in some cases, platelets or white blood cells that are increased in number  
   d. blood level of oxygen that is below normal  
   e. erythropoietin is at abnormal levels  
2. done for another reason reveal abnormalities  
3. may be confirmed by bone marrow sampling  
4. yield a confident diagnosis, which is then differentiated into  
   a. primary polycythemia  
   b. secondary polycythemia, which involves further investigations for the underlying cause.
Treatment

1. **Primary polycythemia**
   a. controls but does not cure primary polycythemia
      i. aims to
         1. decrease the number of red blood cells and, as a result, the thickness of the blood
         2. prevent excessive bleeding
         3. prevent abnormal clotting
         4. reduce severe itching
         5. reduce the likelihood of complications
   ii. includes
      1. **phlebotomy**, often the first line of treatment, which may also require **medications to suppress production of red blood cells** because phlebotomy
         a. may increase the number of platelets
         b. does not reduce the size of an enlarged liver or spleen
      2. **medications to reduce the risk of blood clots**
      3. **medications for symptoms**
   2. **Secondary polycythemia** requires treatment of the underlying cause.

Prevention

1. **Primary polycythemia** prevention, because the cause is unknown, is limited to the prevention of complications, comorbidities and associated conditions.
2. **Secondary polycythemia** prevention is directed to the conditions to which the polycythemia is secondary.

Prognosis

1. **Primary polycythemia** prognosis
   a. for adults who are
      i. untreated reflects survival time of some 18 months for about half of the persons affected
      ii. treated reflects survival time of 15 to 20 years for about half of the persons affected
   b. is affected by the
      i. likelihood of diagnosis and therefore treatment in advance of severe symptoms
      ii. absence of serious problems following diagnosis and treatment.
2. **Secondary polycythemia** prognosis is dependent of that of the underlying cause.

Multimedia and images

- Polycythemia vera, bone marrow film
Comorbidity, complications and associated conditions

Comorbid conditions are those which co-exist with polycythemia 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 associated conditions for polycythemia include the following.

1. **Hyperviscosity** of the blood, which slows the rate of blood flow through blood vessels and in combination with abnormalities in the platelets increases the risk of blood clots, which can cause
   a. thrombosis, which may lead to
      i. heart attack
      ii. pulmonary embolism
      iii. stroke
      iv. vision abnormalities
2. Hemorrhage
   a. orofacial effects
   b. nose bleeds
   c. from the stomach or other parts of the intestinal tract
   d. indicative of serious complications
3. Enlarged spleen, caused by the overload of red blood cells that the spleen normally removes from the circulation
4. **Skin problems**
5. High levels of red blood cells, which may lead to
   a. peptic ulceration
   b. gout
   c. kidney stones
6. Various blood disorders including leukemia.

Oral health considerations

1. Primary polycythemia is rare, but the occurrence of secondary polycythemia is governed by the factors and conditions to which it is secondary and that, collectively, are not rare.
2. Primary and secondary polycythemia and their complications, comorbidities and associated conditions have implications for oral healthcare because
   a. precautionary measures, such as blood tests, may be required before oral healthcare is undertaken
   b. close communication and cooperation is required between the treating hematologist and the oral healthcare provider who, for certain oral healthcare interventions, may be a dental specialist
   c. primary and secondary polycythemia may initially present with
      i. spontaneous bleeding from the gums
      ii. purplish or red areas on the tongue, cheeks, lips and gums
      iii. poor oral hygiene, including
1. Inflamed gingivae
2. Periodontal disease

d. Of the liability of polycythemia
   i. To excessive bleeding from the gums, which requires
      1. Attention to the medical history
      2. Cautious or conservative use of the procedures
      3. Observation after the procedures
      4. Appropriate advice for the patient/client because bleeding may occur days after the oral healthcare intervention
   ii. To formation of blood clots

e. Primary and secondary polycythemia and their complications, comorbidities and associated conditions occur in older persons, who may be subject to factors causing
   i. Secondary polycythemia, such as oxygen deficiency caused by
      1. Chronic lung disease
      2. Heart disease
   ii. Relative polycythemia, in particular dehydration associated with
      1. Decreased fluid intake
      2. Diuretics
   f. Dental emergencies, which in polycythemia should be avoided as far as possible by preventive oral healthcare.

### MEDICATIONS SUMMARY

**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
   - 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 Integrative Health
Types of medications

Medications
1. for reduction of the number of blood cells by
   a. suppression of the bone marrow’s ability to produce blood cells may be required in primary polycythemia when phlebotomy is insufficient
       anagrelide (Agrylin®)
       hydroxyurea (Droxia®, Hydrea®)
   b. stimulating the immune system to combat the overproduction of red blood
       interferon alfa-2a and alfa-2b injection (Intron A [alfa-2b], Roferon-A [alfa-2a])
2. for reduction of the risk of blood clots
    low-dose aspirin
3. for symptomatic relief
   a. burning pain in feet or hands
       low-dose aspirin, see pain management
   b. bone pain
       low-dose aspirin, see pain management
   c. itching; antihistamines, such as
       desloratadine (Clarinex®)
       fexofenadine (Allegra®)
       levocetirizine (Xyzal®)
   d. gastrointestinal symptoms of peptic ulceration; H2 receptor antagonists, such as
       cimetidine (Tagamet®)
       famotidine (Pepcid®)
       nizatidine (Axd®)
       ranitidine (Zantac®).

Side effects of medications

1. See the links to the specific medications listed above.
2. Pain management with ibuprofen, is used for toothache, but over-the-counter ibuprofen, even for short periods, should be recommended only with medical advice for persons with polycythemia because ibuprofen
   a. is associated with gastrointestinal ulceration, a complication of polycythemia
   b. may counteract the anti-clotting effect of low-dose aspirin, though the evidence of this interaction is somewhat weak.

THE MEDICAL AND MEDICATIONS HISTORY

The dental hygienist in taking the medical and medications histories 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 inadequate control of polycythemia, such as
      i. bleeding gums
      ii. nosebleeds
      iii. easy bruising
   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 CDHO’s Infection Prevention and Control Guidelines (2019)
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 should consult with the primary care physician or hematologist to obtain
1. clearance for implementing the Procedures (given that this is a blood disorder as per Ontario Regulation 501/07 pursuant to the Dental Hygiene Act, 1991)
2. advice about
   a. excessive bleeding  
   b. complications that may be affected by oral healthcare, such as increased risk of blood clots  
   c. possible antibiotic prophylaxis if the patient/client has spleen damage or has had a splenectomy  
   d. possible immunosuppression secondary to medications (e.g., ruxolitinib) or treatment modalities (e.g., chemotherapy)  
   e. recent changes in medications, under medical advice or otherwise  
   f. recently experienced changes in the patient/client’s 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 polycythemia, 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 hygienists should
1. urge the patient/client to alert any healthcare professional who proposes any intervention or test  
   a. that he or she has a history of polycythemia  
   b. to the medications he or she is taking  
2. should discuss, as appropriate  
   a. the importance of the patient/client’s  
      i. self-checking the mouth regularly for new signs or symptoms  
      ii. reporting to the appropriate healthcare provider any changes in the mouth  
   b. the need for regular oral health examinations and preventive oral healthcare  
   c. 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 dry mouth
d. the importance of an appropriate diet in the maintenance of oral health
e. 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
f. comfort level while reclining, and stress and anxiety related to the Procedures
g. medication side effects such as dry mouth, and recommend treatment
h. mouth ulcers and other conditions of the mouth relating to polycythemia, comorbidities, complications or associated conditions, medications or diet
   i. pain management.

BENEFITS/HARMS OF IMPLEMENTING THE RECOMMENDATIONS

POTENTIAL BENEFITS

1. Promoting health through oral hygiene for persons who have polycythemia.
2. Reducing the adverse effects, such as excessive bleeding from the gums, by
   a. seeking appropriate medical advice
   b. generally increasing the comfort level of persons in the course of dental hygiene interventions
   c. using appropriate techniques of communication
   d. providing advice on scheduling and duration of appointments.
3. Reducing the risk of oral health needs being unmet.

POTENTIAL HARMs

1. Increasing the risk of blood clots as a serious complication by failing to obtain appropriate medical advice.
2. Performing the Procedures at an inappropriate time, such as
   a. when the patient/client’s polycythemia is at high risk of excessive bleeding
   b. in the presence of unrecognized complications, such as blood clots, for which prior medical advice is required
   c. in the presence of acute oral infection without prior medical advice.
3. Disturbing the normal dietary and medications routine of a person with polycythemia.
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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<td>Greyhead Associates, medical information service specialists</td>
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<th>COMPOSITION OF GROUP THAT AUTHORED THE ADVISORY</th>
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| **Dr Gordon Atherley**  
O StJ, MB ChB, DIH, MD, MFCM (Royal College of Physicians, UK), FFOM (Royal College of Physicians, UK), FACOM (American College of Occupational Medicine), LLD (hc), FRSA |
| **Lisa Taylor**  
RDH, BA, MEd, MCOD |
| **Dr Kevin Glasgow**  
MD, MHSc, MBA, DTM&H, CHE, CCFP, DABPM, LFACHE, FCFP, FACPM, FRCPC |
| **Giulia Galloro**  
RDH, BSc(DH) |

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<td>The College of Dental Hygienists of Ontario gratefully acknowledges the <em>Template of Guideline Attributes</em>, on which this advisory is modelled, of <em>The National Guideline Clearinghouse™ (NGC)</em>, sponsored by the Agency for Healthcare Research and Quality (AHRQ), U.S. Department of Health and Human Services.</td>
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| Denise Lalande  
Final layout and proofreading |

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