

# Provincial Clinical Knowledge Topic

## *Cleft Lip/Palate Surgery, Pediatric – Inpatient*

### V 1.0

**Copyright:**



© 2018, Alberta Health Services. This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License. To view a copy of this license, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

**Disclaimer:** This material is intended for use by clinicians only and is provided on an "as is", "where is" basis. Although reasonable efforts were made to confirm the accuracy of the information, Alberta Health Services does not make any representation or warranty, express, implied or statutory, as to the accuracy, reliability, completeness, applicability or fitness for a particular purpose of such information. This material is not a substitute for the advice of a qualified health professional. Alberta Health Services expressly disclaims all liability for the use of these materials, and for any claims, actions, demands or suits arising from such use.

**Revision History**

<b>Version</b>	<b>Date of Revision</b>	<b>Description of Revision</b>	<b>Revised By</b>
1.0	January 2019	CKT Complete	See Acknowledgements

## Important Information Before You Begin

The recommendations contained in this knowledge topic have been provincially adjudicated and are based on best practice and available evidence. Clinicians applying these recommendations should, in consultation with the patient, use independent medical judgment in the context of individual clinical circumstances to direct care. This knowledge topic will be reviewed periodically and updated as best practice evidence and practice change.

The information in this topic strives to adhere to Institute for Safe Medication Practices (ISMP) safety standards and align with Quality and Safety initiatives and accreditation requirements such as the Required Organizational Practices. Some examples of these initiatives or groups are: Health Quality Council Alberta (HQCA), Choosing Wisely campaign, Safer Healthcare Now campaign etc.

## Rationale

In our Canadian population cleft lip with or without cleft palate occurs at a rate of 0.82 per 1000 live births with cleft palate alone occurring at a rate of 0.58 per 1000 live births. Cleft lip can occur in isolation or in combination with cleft palate. The cosmetic deformity resulting from a cleft lip is significant and it is important to strive for the best surgical repair possible in order to decrease the appearance of this deformity and restore acceptable facial symmetry. This is best achieved by care provided by a multidisciplinary team throughout the child's life. Below is a directed approach to management to assist in peri-operative care.

## Keywords

- Cleft palate repair
- Cleft lip repair
- Alveolar bone graft
- Pharyngoplasty
- Velopharyngeal insufficiency (VPI)

## Decision Making

### Cleft Lip

#### Preoperative Management/Care

- Incomplete cleft lip:
  - referral to Speech Language Pathology (SLP) and/or Nursing for assessment of appropriate breast or bottle feeding; post-operative assessment at 3 years for assessment of speech and resonance to rule out submucous cleft
  - referral to pediatrics for general assessment
  - referral to plastic surgery for repair of cleft lip
  - plan for surgical repair of lip between 3 to 6 months of age
- Complete cleft lip with associated palate:
  - referral to speech language pathology for feeding assessment and trial of bottle feeding with specialized nipple (e.g. Dr. Browns bottle, etc.)
  - referral to pediatrics for general assessment
  - referral to dentistry for consideration of nasopalveolar molding appliance in instances of wide complete cleft lip/palate patients
  - plan for surgical repair of lip only between 3 to 6 months; co-ordinate with dentistry in the case of patients undergoing NAM treatment

Note: It is recommended that patients with a nasogastric feeding tube (NG) must transition to oral feeds prior to repair of palate or bilateral cleft lip.

#### Evidence for Pre-Surgical Nasopalveolar Molding (NAM)

Pre-surgical nasopalveolar molding may be offered to complete cleft lip/palate patients. Although there is limited evidence to demonstrate the long-term benefit of nasopalveolar molding, preliminary studies of children 6 years post-operatively demonstrates improved maxillary arch symmetry and stability and decreased need for secondary nasal correction.<sup>3, 4, 5</sup>

#### Preoperative Antibiotics

The reported rate of infection post cleft lip repair varies. One study out of Belgium in 2011 reported a 2.6% rate of infection despite an extensive post-op protocol including arm splints, post-operative antibiotics, specific wound ointment, wound cleansing and feeding protocol.<sup>6</sup> However, a much larger patient cohort of 2062 patients out of a cleft center in India reported an infection rate of 1.1% using a single dose of intra-op cefuroxime (30 mg/kg) and gentle washing of the wound with soap and water.<sup>7</sup> The most common pathogen associated with infection is *Staphylococcus aureus* and *B-haemolytic streptococcus* organism.<sup>8</sup>

A study performed in 2013 found that 38.1% of patients undergoing cleft lip and palate repair had associated bacteremia within 1 minute of wound closure and 53% of those patients continued to have bacteremia 15 minutes post-op.<sup>9</sup> The bacteremia was found to be polymicrobial in nature with the most common organisms being *coagulase-negative Staphylococcus* and *Acinetobacter Iwoffii*. This evidence of persistent bacteremia should be taken into consideration when performing surgical repair of patients with cardiac abnormalities.

Based on the above review of the literature, current recommendation would include preoperative antibiotics targeting staphylococcus aureus for patients without cardiac anomalies.

Refer to the AHS surgical prophylaxis guidelines / [Bugs & Drugs](#) for specific antibiotic recommendations based on surgery type and clinical indications. Pre-operative dose to be given within 60 minutes prior to skin incision for optimal Surgical Site Infection (SSI) prophylaxis.

### **Postoperative Pain Control**

A Cochrane review on infraorbital nerve block for postoperative pain following cleft lip repair showed low quality evidence that this intervention decreases post-op pain.<sup>16</sup> However, there is evidence that this provides longer lasting post-operative analgesia when compared with intravenous opioid alone.<sup>17</sup>

### **Postoperative Feeding**

Although breast and bottle feeding is sometimes restricted post-operatively there is no strong evidence to support this practice. The concern with breast or bottle feeding, is that friction against the lip will cause wound dehiscence. However, the more important cause of wound dehiscence is tension on the wound from crying. Thus, allow the child to return to the previous feeding regimen whether it be bottle or breast. If bottle feeding is chosen a very soft nipple of sufficient size is recommended to provide a dripping milk flow.<sup>18</sup> Restrictions of soother may still be warranted.

### **Use of Arm Restraints**

Although commonly practiced in our center there seems to be little evidence to support the use of arm splints, particularly in children 3 months or younger. Many surgeons, including Sommerlad have abandoned the use of splints for over a decade without adverse outcome.<sup>13, 14</sup> Furthermore, a recent study using video surveillance of infants post cleft lip repair demonstrated that patients did not demonstrate any rubbing or aggressive touching of their lip repair.<sup>15</sup>

### **Length of Stay**

For uncomplicated cleft lip repair, same day surgery has been shown to have no adverse effect on either aesthetic outcome or complication rate.<sup>10, 11</sup> In addition, cost-analysis of outpatient cleft lip surgery demonstrates considerable cost savings to the health care system. Hospital admission is appropriate for patients with medical comorbidities or for those travelling from remote communities.<sup>12</sup>

## **Cleft Palate**

### **Preoperative Management/Care**

All cleft patients are to be referred to and managed by a multi-disciplinary cleft lip and palate team

- Patients should be referred to speech language pathology for feeding and prelinguistic skills assessment
- Referral to dentistry for consideration of nasoalveolar molding appliance in patients with complete cleft lip/palate
- Referral to otolaryngology for auditory brain stimulatory testing and consideration of myringotomy tube placement
- Referral to plastic surgery for repair of cleft palate
- Plan for repair between 9 and 12 months; delayed of repair may be considered in special circumstances

Note: It is recommended that patients with a nasogastric feeding tube (NG) must transition to oral feeds prior to repair of palate or bilateral cleft lip.

### **Evidence for Pre-Surgical Nasoalveolar Molding (NAM)**

Pre-surgical nasoalveolar molding may be offered to complete cleft lip/palate patients. Although there is limited evidence to demonstrate the long-term benefit of nasoalveolar molding, preliminary studies of children 6 years post-operatively demonstrates improved maxillary arch symmetry and stability and decreased need for secondary nasal correction.<sup>3, 4, 5</sup>

### **Preoperative Antibiotics**

The risk of post-operative infection following cleft palate surgery is low. One center in California reported a rate of 1.5% over a 15-year period.<sup>19</sup> The article, however, did not clearly report their use of peri-operative antibiotics and thus it is difficult to know the true infection rate associated with cleft palate repair.

The most common pathogen in the cleft palate is *Staphylococcus aureus* and this is routinely covered by peri-operative antibiotics. Although *Staphylococcus aureus* is the most common pathogen it is by no means the only organism occupying space in the oral cavity. Group A,B, and G streptococcus, coliforms and *Moraxella catarrhalis* have all been reported to reside in the naso-oropharynx.<sup>20</sup> *Moraxella catarrhalis*, which has long been thought to be a harmless commensal of the upper respiratory tract, was associated with post-operative infection and fistula formation in a study conducted in the United Kingdom.<sup>20</sup>

Refer to the AHS surgical prophylaxis guidelines / [Bugs & Drugs](#) for specific antibiotic recommendations based on surgery type and clinical indications. Pre-operative dose to be given within 60 minutes prior to skin incision for optimal Surgical Site Infection (SSI) prophylaxis.

### **Postoperative Pain Control**

The post-operative pain experienced by patients after cleft palate repair is known to be moderate to severe and can continue for more than 24 hours post-operatively.<sup>21</sup> Opioids are frequently used as a mainstay for inpatient post-operative pain control. Opioids are an effective source of pain relief but have the risk of contributing to respiratory depression. Thus, it is worth exploring the efficacy of adjuvant therapy in treating pain and decreasing the need of post-operative opioids.

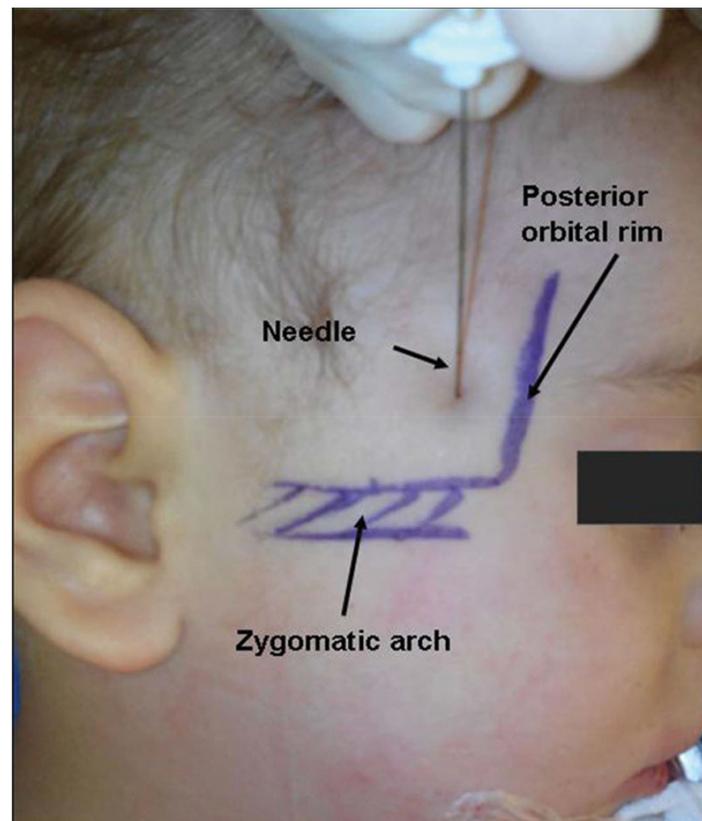
Acetaminophen when used peri-operatively provides significant morphine sparing effects.<sup>22</sup> The pain regimen followed in one statistically significant study provided pre-operative oral acetaminophen followed by either regular intravenous acetaminophen (12.5 mg/kg [not currently available on formulary within AHS]) or regular oral acetaminophen (15 mg/kg).<sup>21</sup> Compared with placebo, they found that IV acetaminophen provided morphine-sparing pain control in both the recovery room setting and the ward setting while oral administration of acetaminophen provided morphine-sparing effect in the ward setting only.<sup>21</sup>

Bilateral suprazygomatic maxillary nerve blocks have also been found to provide morphine sparing effects.<sup>24</sup> A prospective, randomized, double-blind study out of France found that pre-operative regional block using 0.15 mL/kg of 0.2% ropivacaine results in a statistically significant reduction in post-operative morphine consumption in the 48 hours after cleft palate repair.<sup>23</sup>

---

**Figure #1 Suprazygomatic maxillary nerve block landmarks**

---



The needle entry point is situated at the angle formed by the superior edge of the zygomatic arch below and the posterior orbital rim forward.<sup>23</sup>

### **Postoperative Feeding**

A survey of post-operative cleft care practices of American Cleft-Palate-Craniofacial Association registered cleft teams was conducted in 2009.<sup>24</sup> One-third of surgeons restricted bottle feeding post-operatively and instead prescribed syringe or cup feeding.<sup>24</sup> The majority of surgeons

allowed patients to return to an age-appropriate diet once they had successfully taken in clear fluids. The largest consensus was on restriction of hard foods such as chips, crackers, and pretzels; 98% of surgeons restricted these types of foods for 1 to 3 weeks post-operatively.

## **Alveolar Bone Graft**

### **Background**

Patients born with cleft lip or palate often have an associated cleft through the alveolar ridge resulting in dental abnormalities. A bone gap within the alveolar ridge causes abnormal position of the canines and central incisors as well as a genesis of the permanent lateral incisor.<sup>25, 26</sup> Effective dental rehabilitation of the clefted alveolus requires sufficient bone to support permanent dentition, which can be achieved with secondary bone grafting.<sup>27</sup>

### **Preoperative Management/Care**

All cleft patients are to be referred to and managed by a multi-disciplinary cleft lip and palate team which may include orthodontist, plastic surgeon and oral and maxillofacial surgeon.

\*Please refer to the cleft palate clinical knowledge topic for early management of cleft lip/palate.

- Referral to oral surgery for repair of alveolar cleft
- Evaluation and plan for repair of alveolar defect should occur between the interval of when the patient has lost most of their primary teeth and the adult central incisors have developed.

### **Preoperative Antibiotics**

Review of current literature yielded no results for infection rate or use of antibiotics. Despite lack of research in this area, it is common practice to administer preoperative antibiotics with the addition of post-operative rinses.

Refer to the AHS surgical prophylaxis guidelines / [Bugs & Drugs](#) for specific antibiotic recommendations based on surgery type and clinical indications. Pre-operative dose to be given within 60 minutes prior to skin incision for optimal Surgical Site Infection (SSI) prophylaxis.

### **Postoperative Pain Control**

The use of iliac crest bupivacaine infusion to manage post-operative pain following alveolar bone grafting has been well-established.<sup>28</sup> Further investigation comparing the use of intravenous ketorolac versus bupivacaine infusion in a randomized, prospective, single-blind study found that pain scores, morphine consumption, and satisfaction scores were equivalent among groups, including groups in which both treatments were combined.<sup>29</sup> This same study also found that the estimated cost for bupivacaine infusion was significantly higher with no added analgesic benefit.

### **Postoperative Feeding**

Review of current literature yielded no results for benefits of dietary restriction or oral rinses. General practice would support the use of chlorhexidine rinses, a pureed, texture modified or graduated diet and avoidance of brushing at the graft site.

## **Pharyngoplasty**

### **Rationale**

Velopharyngeal insufficiency (VPI) or incomplete closure of the velopharynx or during phonation allows air to escape creating nasal resonance during speech production. Velopharyngeal insufficiency occurs at a rate ranging from 6% to 19% post-cleft palate repair.<sup>24</sup> Severe velopharyngeal insufficiency can greatly affect a patient's ability to effectively communicate with others and thus, is an important aspect of cleft palate reconstruction.

### **Preoperative Management/Care**

All cleft patients are to be referred to and managed by a multi-disciplinary cleft lip and palate team. \* Please refer to the cleft palate clinical knowledge topic for early management of cleft palate.

- Speech Language Pathology (SLP) post- operative assessment:
  - 18 month old assessment of linguistic skills
  - 3 year old assessment of speech and resonance
  - 4 year old assessment of speech and resonance
  - 5 year old assessment of speech and resonance
- Nasoendoscopy to be performed by either otolaryngology or plastic surgery in conjunction with SLP for patients who have been found to have velopharyngeal insufficiency based on SLP assessment
- Plan for pharyngoplasty based on SLP assessment and nasoendoscopy findings

### **Preoperative Antibiotics**

Despite lack of research in this area, it is common practice to administer preoperative antibiotics with the addition of post-operative rinses. Review of current literature yielded no results for infection rate or use of antibiotics.

Refer to the AHS surgical prophylaxis guidelines / [Bugs & Drugs](#) for specific antibiotic recommendations based on surgery type and clinical indications. Pre-operative dose to be given within 60 minutes prior to skin incision for optimal Surgical Site Infection (SSI) prophylaxis.

### **Postoperative Pain Control**

Review of current literature yielded no results for post-op pain control. Common practice would be in keeping with that for cleft palate repair.

### **Postoperative Feeding**

Review of current literature yielded no results for dietary restrictions. Common practice would be in keeping with that for cleft palate repair.

## Cleft Lip/Palate Repair, Alveolar Bone Graft, Pharyngoplasty Pediatric Inpatient Preprocedure Order Set

**Order Set Keywords:** cleft lip, cleft palate, alveolar bone graft, pharyngoplasty, peds, pre-op

**Order Set Requirements:** weight

### Admit

- Admit to \_\_\_\_\_ under Dr \_\_\_\_\_
- Admitting diagnosis \_\_\_\_\_

### Goals of Care

*Conversations leading to the ordering of a Goals of Care Designation (GCD), should take place as early as possible in a patient's course of care. The Goals of Care Designation is created, or the previous GCD is affirmed or changed resulting from this conversation with the patient or, where appropriate, the Alternate Decision-Maker.*

*Complete the Goals of Care Designation (GCD) Order Set within your electronic system, or if using paper process, complete the Provincial Goals of Care Designation (GCD) paper form (<http://www.albertahealthservices.ca/frm-103547.pdf>).*

### Diet and Nutrition

- NPO at \_\_\_\_\_ hours
- Breast Milk/Formula Fed
- Pediatric diet

### Patient Care

- Vital Signs: Temperature (T), pulse rate (P), respirations (RR), blood pressure (BP), oxygen saturation (SpO<sub>2</sub>) every \_\_\_\_\_ hours and PRN
- Weigh Patient

### Activity

- Activity as Tolerated

### Intake / Output

- Intake and Output – measure all intake, measure all output every \_\_\_\_\_ (hours/shift)

### Intravenous Fluids

- Intravenous Cannula – insert in Operating Room

### Medications

#### Anti-Infective Agents

Use [Bugs and Drugs](#) for specific antibiotic recommendations based on surgery type and clinical indications. Antibiotics should be given within 60 minutes of incision and be fully infused prior to skin incision.

*Recommended ceFAZolin dosing is 25 mg/kg/dose*

- ceFAZolin \_\_\_\_\_ mg IV once preoperatively

#### OR

*If ceFAZolin allergy or severe non-IgE mediated reaction to any  $\beta$ -lactam choose:*

*Recommended clindamycin dosing is 15 mg/kg/dose, Maximum 600 mg/dose.*

- clindamycin \_\_\_\_\_ mg IV once preoperatively

**Analgesics and Antipyretics**

*Recommended acetaminophen dosing is 15 mg/kg/dose. Maximum 1000 mg/dose*

- acetaminophen \_\_\_\_\_ mg PO every 4 hours PRN for pain. Maximum 5 doses/24 hours or 4000 mg/day, from all sources.

## Cleft Lip Repair Postprocedure, Pediatric Order Set

**Order Set Keywords:** cleft lip, cleft lip repair, peds, post-op

**Order Set Requirements:** weight

### General

*Consider opening and merging the following order sets if appropriate*

- PCA/Continuous Opioid Infusion, Pediatric Order Set

### Admit, Transfer, Discharge

- Admit To: \_\_\_\_\_ under Dr \_\_\_\_\_ (Surgeon)
- Notify: Plastics Surgery when: \_\_\_\_\_

### Diet and Nutrition

- Breast Milk/Formula Fed
- Pediatric diet
  - In addition to Pediatric diet, choose:*
  - Infant Pureed (less than 12 months): x \_\_\_\_\_ (hours/days/weeks)
  - Infant Minced (less than 12 months): x \_\_\_\_\_ (hours/days/weeks)

### Diet and Nutrition Communication

- Clinical communication: may resume normal breast or bottle feeding (breastmilk or formula)
- Clinical communication: No bottle, drink with cup

### Patient Care

- Post-Op Vital Sign Protocol: temperature (T), pulse rate (P), respirations(RR), blood pressure(BP) and oxygen saturation (SpO<sub>2</sub>)

### Oral Care

- Suction Nares: PRN, suction nasal splints to keep clear at all times
- No soothers or pacifiers

### Activity

- Activity as Tolerated
- Restraints – Mechanical: Apply Elbow Restraints, continuous

### Intake / Output

- Intake and Output – measure all intake and output every \_\_\_\_\_ hour(s)

### Respiratory Care

- Oxygen Therapy - Titrate to Saturation: Maintain SpO<sub>2</sub> equal to or greater than 92%
- Oxygen Saturation Monitoring - Continuous, reassess after 24 hours

### Wound Care

- hydrogen peroxide 1.5 % (Hydrogen peroxide 3% mixed with equal parts sterile water): cleanse lip gently with cotton applicator BID and PRN

- hydrogen peroxide 0.75% (1 part of Hydrogen Peroxide 3% mixed with 2 parts of sterile water): cleanse lip gently with cotton applicator BID and PRN
- sterile water: cleanse lip gently with cotton applicator BID and PRN

### Topical Care

- polymyxin b sulphate/bacitracin ointment: Apply to surgical site BID and PRN
- aquaphor oint TOPICALLY to surgical site and lips BID and PRN

### Intravenous Fluids

*When calculating total fluid intake (TFI), include ALL IV fluids and oral fluids.*

- Total Fluid Intake: TFI to equal \_\_\_\_\_ mL/hr oral and IV
- dextrose 5% – sodium chloride 0.9% infusion IV at \_\_\_\_\_ mL/hours, decrease IV rate as PO intake increases to achieve total fluid intake volume
- sodium chloride 0.9% infusion IV at \_\_\_\_\_ mL/hour, decrease IV rate as PO intake increases to achieve total fluid intake volume
- lactated ringers infusion IV at \_\_\_\_\_ mL/hour, decrease IV rate as PO intake increases to achieve total fluid intake volume

### Saline Lock/Flush

- sodium chloride 0.9% lock: When patient drinking well/PO intake equals total fluid intake
- sodium chloride 0.9% flush/lock 2 to 5 mL IV flush every 12 hours PRN

### Medications

#### Analgesics and Antipyretics

*Recommended acetaminophen dosing is 15 mg/kg/dose. Maximum 1000 mg/dose*

- acetaminophen \_\_\_\_\_ mg PO every 4 hours PRN for pain. Maximum 5 doses/24 hours or 4000 mg/day, from all sources.

*Recommended ibuprofen dosing is 10 mg/kg/dose. Maximum 400 mg/dose.*

- ibuprofen \_\_\_\_\_ mg PO every 6 hours PRN for pain. Maximum 40 mg/kg/day, 2400 mg/day

#### OR

*Recommended ketorolac dosing is 0.5mg/kg/dose. Maximum 30mg/dose.*

- ketorolac \_\_\_\_\_ mg IV every 8 hours PRN for pain. Stop after 72 hours. Maximum 60 mg/day

#### Opioid Analgesic

*Recommended morphine dosing is 0.2 to 0.3 mg/kg/dose Maximum 10 mg/dose*

- morphine \_\_\_\_\_ mg PO every 4 hours PRN for pain

*Recommended morphine dosing is 0.1 mg/kg/dose Maximum 10 mg/dose*

- morphine \_\_\_\_\_ mg IV every 4 hours PRN for pain

### **Antiemetics**

*Recommended dimenhyDRINATE dosing is 1 mg/kg/dose*

- dimenhyDRINATE \_\_\_\_\_ mg PO every 6 hours PRN for nausea. Maximum 50 mg/dose
- dimenhyDRINATE \_\_\_\_\_ mg IV every 6 hours PRN for nausea. Maximum 50 mg/dose
- dimenhyDRINATE supp \_\_\_\_\_ RECTALLY every 6 hours PRN for nausea. Maximum 50 mg/dose

*Recommended ondansetron dosing is 0.1 mg/kg/dose*

- ondansetron \_\_\_\_\_ mg PO every 8 hours PRN for nausea. Maximum 8 mg/dose
- ondansetron \_\_\_\_\_ mg IV every 8 hours PRN for nausea. Maximum 4 mg/dose

### **Other Medications**

- sodium chloride 0.9% nasal drops, 1 drop to both nostrils every 4 hours PRN, Apply to nasal splints along with suctioning to keep clear at all times

## Cleft Palate Repair Postprocedure, Pediatric Order Set

**Order Set Keywords:** cleft palate, cleft palate repair, peds, postop

**Order Set Requirements:** weight

### General

Consider opening and merging the following order sets if appropriate

- PCA/Continuous Opioid Infusion, Pediatric Order Set

### Admit, Transfer, Discharge

- Admit To: \_\_\_\_\_
- Notify: Plastics Surgery when: \_\_\_\_\_

### Diet and Nutrition

- Breast Milk/Formula Fed
- Pediatric diet
  - In addition to Pediatric diet, choose:*
  - Clear Fluids: x \_\_\_\_\_ (hours)
  - Full Fluids: x \_\_\_\_\_ (hours/days/weeks)
  - Infant Pureed (less than 12 months): x \_\_\_\_\_ (hours/days/weeks)
  - Infant Minced (less than 12 months): x \_\_\_\_\_ (hours/days/weeks)
  - 1 to 2 years

### Diet and Nutrition Communication

- Clinical Communication: No soother or straws
- Clinical Communication: No bottle, drink with cup
- Clinical Communication: No popsicles
- Clinical Communication: No tomatoes, no citrus

### Patient Care

- No soothers or pacifiers
- No oral suctioning
- Clinical communication: encourage drinking water after each meal

### Activity

- Activity as Tolerated
- Restraints – Mechanical: Apply Elbow Restraints, continuous

### Monitoring

- Post Op Vital Sign Protocol: temperature (T), pulse rate (P), respirations(RR), blood pressure(BP) and oxygen saturation (SpO<sub>2</sub>)
- Intake and Output – measure all intake, measure all output every \_\_\_\_\_ (hours/shift)

### Respiratory Care

- Oxygen Therapy - Titrate to Saturation: Maintain SpO<sub>2</sub> equal to or greater than 92%
- Oxygen Saturation Monitoring – PEDS: Continuous, reassess after 24 hours
- Oxygen Saturation Monitoring – PEDS: Continuous, while sleeping

### Intravenous Fluids

*When calculating total fluid intake (TFI), include ALL IV fluids and oral fluids.*

- Total Fluid Intake: TFI to equal \_\_\_\_\_ mL/hr oral and IV
- dextrose 5% – sodium chloride 0.9% infusion IV at \_\_\_\_\_ mL/hours, decrease IV rate as PO intake increases to achieve total fluid intake volume
- sodium chloride 0.9% infusion IV at \_\_\_\_\_ mL/hour, decrease IV rate as PO intake increases to achieve total fluid intake volume
- lactated ringers infusion IV at \_\_\_\_\_ mL/hour, decrease IV rate as PO intake increases to achieve total fluid intake volume

### Saline Lock/Flush

- sodium chloride 0.9% lock: When patient drinking well/PO intake equals total fluid intake
- sodium chloride 0.9% flush/lock 2 to 5 mL IV flush every 12 hours PRN

### Medications

#### Anti-Infective Agents

*If tympanostomy tubes inserted at same time as cleft palate procedure choose:*

- ciprofloxacin/dexamethasone (each mL contains ciprofloxacin 3 mg and dexamethasone 1 mg) ear drops \_\_\_\_\_ drop(s) \_\_\_\_\_ (Left ear, right ear, both ears) every \_\_\_\_\_ hours x 5 days

#### Analgesics and Antipyretics

*Recommended acetaminophen dosing is 15 mg/kg/dose. Maximum 1000 mg/dose*

- acetaminophen \_\_\_\_\_ mg PO every 4 hours PRN for pain. Maximum 5 doses/24 hours or 4000 mg/day, from all sources.

*Recommended ibuprofen dosing is 10 mg/kg/dose. Maximum 400 mg/dose.*

- ibuprofen \_\_\_\_\_ mg PO every 6 hours PRN for pain. Maximum 40 mg/kg/day, 2400 mg/day

#### OR

*Recommended ketorolac dosing is 0.5mg/kg/dose. Maximum 30mg/dose.*

- ketorolac \_\_\_\_\_ mg IV every 8 hours PRN for pain. Stop after 72 hours. Maximum 60 mg/day

#### Opioid Analgesic

*Recommended morphine dosing is 0.2 to 0.3 mg/kg/dose Maximum 10 mg/dose*

- morphine \_\_\_\_\_ mg PO every 4 hours PRN for pain

*Recommended morphine dosing is 0.1 mg/kg/dose Maximum 10 mg/dose*

- morphine \_\_\_\_\_ mg IV every 4 hours PRN for pain

#### Antiemetics

*Recommended dimenhyDRINATE dosing is 1 mg/kg/dose*

- dimenhyDRINATE \_\_\_\_\_ mg PO every 6 hours PRN for nausea. Maximum 50 mg/dose

- dimenhyDRINATE \_\_\_\_\_ mg IV every 6 hours PRN for nausea. Maximum 50 mg/dose
- dimenhyDRINATE supp \_\_\_\_\_ RECTALLY every 6 hours PRN for nausea. Maximum 50 mg/dose

*Recommended ondansetron dosing is 0.1 mg/kg/dose*

- ondansetron \_\_\_\_\_ mg PO every 8 hours PRN for nausea. Maximum 8 mg/dose
- ondansetron \_\_\_\_\_ mg IV every 8 hours PRN for nausea. Maximum 4 mg/dose

### **Topical Agents**

- aquaphor oint TOPICALLY to lips BID

### **Other Medications**

- sodium chloride 0.9% nasal drops, 1 drop to both nostrils every 4 hours PRN, Apply to nasal splints along with suctioning to keep clear at all times

### **IP Specialty Consults**

- Inpatient consult to Registered Dietitian
- Ambulatory referral to Registered Dietitian

## Alveolar Bone Graft Postprocedure, Pediatric Order Set

**Order Set Keywords:** alveolar bone graft, peds, post-op

**Order Set Requirements:** weight

### General

Consider opening and merging the following order sets if appropriate

- PCA/Continuous Opioid Infusion, Pediatric Order Set

### Admit, Transfer, Discharge

- Admit To: \_\_\_\_\_
- Notify: Plastics Surgery when: \_\_\_\_\_

### Diet and Nutrition

- Pediatric diet
  - In addition to Pediatric diet, choose:*
    - Clear Fluids: x \_\_\_\_\_ (hours)
    - Full Fluids: x \_\_\_\_\_ (hours/days/weeks)
    - Pureed: x \_\_\_\_\_ (hours/days/weeks)
    - Minced: x \_\_\_\_\_ (hours/days/weeks)

### Diet and Nutrition Communication

- Clinical Communication: No milk x 24 hours post-op
- Clinical Communication: No popsicles
- Clinical Communication: No tomatoes, no citrus

### Patient Care

- Clinical Communication: DO NOT suction intraorally
- Clinical Communication: NO blowing nose
- Mouth Care: Patient may brush teeth with baby toothbrush if tolerated, NOT to brush graft site
- Wound Care: Oral wound care to start on post-op day 1; hip wound dressing to remain dry and intact x \_\_\_\_\_ days
- chlorhexidine gluconate 0.12% oral rinse with syringe after meals and PRN, patient is NOT to swish with mouthwash
- chlorhexidine gluconate 0.12% oral rinse Every \_\_\_\_\_ hours PRN, cleanse nares with cotton swab

### Activity

- Activity as Tolerated
- Head of bed: elevate to at least 30°

### Monitoring

- Post Op Vital Sign Protocol: temperature (T), pulse rate (P), respirations(RR), blood pressure(BP) and oxygen saturation (SpO<sub>2</sub>)
- Intake and Output – measure all intake, measure all output every \_\_\_\_\_ (hours/shift)

### Respiratory Care

- Oxygen Therapy - Titrate to Saturation: Maintain SpO<sub>2</sub> equal to or greater than 92%

### Intravenous Fluids

*When calculating total fluid intake (TFI), include ALL IV fluids and oral fluids.*

- Total Fluid Intake: TFI to equal \_\_\_\_\_ mL/hr oral and IV
- dextrose 5% – sodium chloride 0.9% infusion IV at \_\_\_\_\_ mL/hours, decrease IV rate as PO intake increases to achieve total fluid intake volume
- sodium chloride 0.9% infusion IV at \_\_\_\_\_ mL/hour, decrease IV rate as PO intake increases to achieve total fluid intake volume
- lactated ringers infusion IV at \_\_\_\_\_ mL/hour, decrease IV rate as PO intake increases to achieve total fluid intake volume

### Saline Lock/Flush

- sodium chloride 0.9% lock: When patient drinking well/PO intake equals total fluid intake
- sodium chloride 0.9% flush/lock 2 to 5 mL IV flush every 12 hours PRN

### Medications

#### Analgesics and Antipyretics

*Recommended acetaminophen dosing is 15 mg/kg/dose. Maximum 1000 mg/dose*

- acetaminophen \_\_\_\_\_ mg PO every 4 hours PRN for pain. Maximum 5 doses/24 hours or 4000 mg/day, from all sources.

*Recommended ibuprofen dosing is 10 mg/kg/dose. Maximum 400 mg/dose.*

- ibuprofen \_\_\_\_\_ mg PO every 6 hours PRN for pain. Maximum 40 mg/kg/day, 2400 mg/day

#### OR

*Recommended ketorolac dosing is 0.5mg/kg/dose. Maximum 30mg/dose.*

- ketorolac \_\_\_\_\_ mg IV every 8 hours PRN for pain. Stop after 72 hours. Maximum 60 mg/day

#### Opioid Analgesic

*Recommended morphine dosing is 0.2 to 0.3 mg/kg/dose Maximum 10 mg/dose*

- morphine \_\_\_\_\_ mg PO every 4 hours PRN for pain

*Recommended morphine dosing is 0.1 mg/kg/dose Maximum 10 mg/dose*

- morphine \_\_\_\_\_ mg IV every 4 hours PRN for pain

- Follow orders for morphine continuous infusion, refer to local institutional practices until provincial orders available

#### Antiemetics

*Recommended dimenhyDRINATE dosing is 1 mg/kg/dose*

- dimenhyDRINATE \_\_\_\_\_ mg PO every 6 hours PRN for nausea. Maximum 50 mg/dose

- dimenhyDRINATE \_\_\_\_\_ mg IV every 6 hours PRN for nausea. Maximum 50 mg/dose

*Recommended ondansetron dosing is 0.1 mg/kg/dose*

- ondansetron \_\_\_\_\_ mg PO every 8 hours PRN for nausea. Maximum 8 mg/dose
- ondansetron \_\_\_\_\_ mg IV every 8 hours PRN for nausea. Maximum 4 mg/dose

### **IP Specialty Consults**

- Inpatient consult to Registered Dietitian
- Ambulatory referral to Registered Dietitian

## Pharyngoplasty Postprocedure, Pediatric Order Set

**Order Set Keywords:** pharyngoplasty, peds, post-op

**Order Set Requirements:** weight

### General

*Consider opening and merging the following order sets if appropriate*

- PCA/Continuous Opioid Infusion, Pediatric Order Set

### Admit, Transfer, Discharge

- Admit To: \_\_\_\_\_
- Notify: Plastics Surgery when: \_\_\_\_\_

### Diet and Nutrition

- Pediatric diet  
*In addition to Pediatric diet, choose:*
  - Clear Fluids: x \_\_\_\_\_ (hours)
  - Full Fluids: x \_\_\_\_\_ (hours/days/weeks)
  - Pureed: x \_\_\_\_\_ (hours/days/weeks)
  - Minced: x \_\_\_\_\_ (hours/days/weeks)

### Diet and Nutrition Communication

- Clinical Communication: No milk x 24 hours post-op
- Clinical Communication: No popsicles
- Clinical Communication: No tomatoes, no citrus

### Activity

- Activity as Tolerated

### Monitoring

- Post Op Vital Sign Protocol: Temperature, pulse, respirations, blood pressure and oxygen saturation (SpO<sub>2</sub>)
- Intake and Output – measure all intake, measure all output every \_\_\_\_\_ (hours/shift)

### Respiratory Care

- Oxygen Therapy - Titrate to Saturation: Maintain SpO<sub>2</sub> equal to or greater than 92%
- Oxygen Saturation Monitoring – PEDS: Continuous, reassess after 24 hours
- Oxygen Saturation Monitoring – PEDS: Continuous, while sleeping
- Clinical Communication: If Nasopharyngeal (NP) airway in place, may irrigate with normal saline and suction through NP airway PRN

### Intravenous Fluids

*When calculating total fluid intake (TFI), include ALL IV fluids and oral fluids.*

- Total Fluid Intake: TFI to equal \_\_\_\_\_ mL/hr oral and IV
- dextrose 5% – sodium chloride 0.9% infusion IV at \_\_\_\_\_ mL/hours, decrease IV rate as PO intake increases to achieve total fluid intake volume
- sodium chloride 0.9% infusion IV at \_\_\_\_\_ mL/hour, decrease IV rate as PO intake increases to achieve total fluid intake volume

- lactated ringers infusion IV at \_\_\_\_\_ mL/hour, decrease IV rate as PO intake increases to achieve total fluid intake volume

**Saline Lock/Flush**

- sodium chloride 0.9% lock: When patient drinking well/PO intake equals total fluid intake
- sodium chloride 0.9% flush/lock 2 to 5 mL IV flush every 12 hours PRN

**Medications**

**Analgesics and Antipyretics**

*Recommended acetaminophen dosing is 15 mg/kg/dose. Maximum 1000 mg/dose*

- acetaminophen \_\_\_\_\_ mg PO every 4 hours PRN for pain. Maximum 5 doses/24 hours or 4000 mg/day, from all sources.

*Recommended ibuprofen dosing is 10 mg/kg/dose. Maximum 400 mg/dose.*

- ibuprofen \_\_\_\_\_ mg PO every 6 hours PRN for pain. Maximum 40 mg/kg/day, 2400 mg/day

**OR**

*Recommended ketorolac dosing is 0.5mg/kg/dose. Maximum 30mg/dose.*

- ketorolac \_\_\_\_\_ mg IV every 8 hours PRN for pain. Stop after 72 hours. Maximum 60 mg/day

**Opioid Analgesic**

*Recommended morphine dosing is 0.2 to 0.3 mg/kg/dose Maximum 10 mg/dose*

- morphine \_\_\_\_\_ mg PO every 4 hours PRN for pain

*Recommended morphine dosing is 0.1 mg/kg/dose Maximum 10 mg/dose*

- morphine \_\_\_\_\_ mg IV every 4 hours PRN for pain

**Antiemetics**

*Recommended dimenhyDRINATE dosing is 1 mg/kg/dose*

- dimenhyDRINATE \_\_\_\_\_ mg PO every 6 hours PRN for nausea. Maximum 50 mg/dose
  - dimenhyDRINATE \_\_\_\_\_ mg IV every 6 hours PRN for nausea. Maximum 50 mg/dose

*Recommended ondansetron dosing is 0.1 mg/kg/dose*

- ondansetron \_\_\_\_\_ mg PO every 8 hours PRN for nausea. Maximum 8 mg/dose
- ondansetron \_\_\_\_\_ mg IV every 8 hours PRN for nausea. Maximum 4 mg/dose

**IP Specialty Consults**

- Inpatient consult to Registered Dietitian
- Ambulatory referral to Registered Dietitian

## Analytics

### Outcome Measure #1

<b>Name of Measure</b>	Compliance to clinical standards of the CKT, specific items/orders in the order sets
<b>Definition</b>	The elements of the CKT for which it is important to measure compliance against, specific items/orders in the order set are: <ul style="list-style-type: none"> <li>• Antibiotic use post-op</li> <li>• Analgesic use post-op</li> <li>• Ketorolac use post-op</li> <li>• Regional block use intra-op for cleft lip repair</li> </ul>
<b>Rationale</b>	Measure compliance to specified clinical standards within the CKT

### Outcome Measure #2

<b>Name of Measure</b>	Post-operative length of stay for cleft lip repair, cleft palate repair, alveolar bone graft, and pharyngoplasty
<b>Definition</b>	Length of stay for patients admitted for cleft lip repair, cleft palate repair, alveolar bone graft and pharyngoplasty
<b>Rationale</b>	To facilitate the identification of gaps in care; and identify cause for extended length of stay.

### Outcome Measure #3

<b>Name of Measure</b>	Return to OR for bleeding post-operatively for cleft lip repair, cleft palate repair, alveolar bone graft, and pharyngoplasty
<b>Definition</b>	Return to OR for bleeding post-operatively for cleft lip repair, cleft palate repair, alveolar bone graft, and pharyngoplasty
<b>Rationale</b>	To identify occurrence and cause of bleeding post-operatively.

## References

1. Mossey PA, Little J, Munger RG, Dixon MJ, Shaw WC. Cleft lip and palate. *Lancet*. 2009;374(9703):1773-1785. doi: 10.1016/S0140-6736(09)60695-4
2. Gorlin RJ, Cervenka J, Pruzansky S. Facial clefting and its syndromes. *Birth Defects Orig Artic Ser*. 1971;7(7):3-49.
3. Maillard S, Retrouvey JM, Ahmed MK, Taub PJ. Correlation between nasoalveolar molding and surgical, aesthetic, functional and socioeconomic outcomes following primary repair surgery: a systematic review. *Journal of Oral & Maxillofac Res*. 2017;8(3):e2. doi: 10.5037/jomr.2017.8302
4. Shetty V, Agrawal RK, Sailer HF. Long-term effect of presurgical nasoalveolar molding on growth of maxillary arch in unilateral cleft lip and palate: randomized controlled trial. *Int J Oral & Maxillofac Surg*. 2017;46(8):977-987. doi: 10.1016/j.ijom.2017.03.006
5. Patel PA, et al. Comparative study of early secondary nasal revisions and costs in patients with clefts treated with and without nasoalveolar molding. *J Craniofac Surg*. 2015;25(4):1229-33. doi: 10.1097/SCS.0000000000001729.
6. Nagy K, Mommaerts MY. Postoperative wound management after cleft lip surgery. *Cleft Palate Craniofac J*. 2011;48(5):584-586. doi: 10.1597/09-242
7. Schonmeyr B, Wendby L, Campbell A. Early surgical complications after primary cleft lip repair: a report of 3018 consecutive cases. *Cleft Palate Craniofac J*. 2017;52(6):706-710. doi: 10.1597/14-158
8. Jolleys A, Savage JP. Healing defects in cleft palate surgery – the role of infection. *Br J Plast Surg*. 1963;16:134–9.
9. Adeyemo WL. et al. Prevalence and bacteriology of bacteremia associated with cleft lip and palate surgery. *J Craniofac Surg*. 2013;24(4):1126-1131. doi: 10.1097/SCS.0b013e31828016e8
10. Khan M, Ullah H, Aziz A, Tahir M. Outcomes of primary unilateral cheiloplasty in same-day surgical settings. *Arch Plast Surg*. 2016;43(3):248-253. doi: 10.5999/aps.2016.43.3.248
11. Rosen H, et al. Outpatient Cleft Lip Repair. *Plastic & Reconstructive Surgery*. 2003;112(2):388-389. doi: 10.1097/01.PRS.0000070721.78741.EB
12. Arneja JS, Mitton C. Ambulatory Cleft Lip Surgery: A Value Analysis. *Can J Plast Surg*. 2013;21(4):213-216. doi:10.1177/229255031302100401
13. Mercer NSG. Arm Restraints. *Cleft Palate Craniofac J*. 2011;48(3):352. doi: 10.1597/09-214
14. Sommerlad BC, Kangesu T. Arm restraint in children with cleft lip/palate. *Plast Reconstr Surg*. 2003;112(1):331-332. doi:10.1097/01.PRS.0000063094.01792.D6

15. Tokioka K, et al. Video Recording Study of Infants Undergoing Primary Cheiloplasty: Are Arm Restraints Really Needed? *Cleft Craniofac J*. 2009;46(5):494-497. doi: 10.1597/08-083.1
16. Feriani G, Hatanaka E, Torloni MR, Da Silva EMK. Infraorbital nerve block for postoperative pain following cleft lip repair in children. *Cochrane Database of Systemic Rev*. 2016;4. doi: 10.1002/14651858.CD011131.pub2
17. Grewal G, Garg K, Grewal A. Bilateral infraorbital nerve block versus intravenous pentazocine: a comparative study on post-operative pain relief following cleft lip surgery. *J Clin Diagn Res*. 2015;9(5):4-6. doi: 10.7860/JCDR/2015/11953.5984
18. Matsunaka E, Ueki S, Makimoto K. Impact of breastfeeding or bottle-feeding on surgical wound dehiscence after cleft lip repair in infants: a systematic review protocol. *JBI Database System Rev Implement Rep*. 2015;13(10):3-11. doi: 10.11124/jbisrir-2015-2336
19. Mahboubi H, Truong A, Pham NS. Prevalence, demographics, and complications of cleft palate surgery. *Int J Pediatr Otorhinolaryngol*. 2015;79(6):803-807. doi: 10.1016/j.ijporl.2015.02.032
20. Narinesingh SP, Whitby DJ, Davenport PJ. Moraxella catarrhalis: an unrecognized pathogen of the oral cavity? *Cleft Palate Craniofac J*. 2011;48 (4):462- 464. doi: 10.1597/09-054
21. Augsornwan D, Pattangtanang P, Pikhunthod K, Surakunprapha P. Postoperative pain in the patients with cleft lip and palate in srinagarind hospital. *J Med Assoc Thai*. 2011;94(6):118-123.
22. Nour C et al. Analgesic effectiveness of acetaminophen for primary cleft palate repair in young children: a randomized placebo controlled trial. *Pediatric Anesthesia*. 2014;24(6):574-581. doi: 10.1111/pan.12393
23. Chiono J et al. Bilateral suprazygomatic maxillary nerve block for cleft palate repair in children: a prospective, randomized, double-blind study versus placebo. *Anesthesiology*. 2014;120(6):1362-1369. doi: 10.1097/ALN.0000000000000171
24. Katzel EB, Basile P, Koltz PF, Marcus JR, Girotto JA. Current surgical practices in cleft care: cleft palate repair techniques and postoperative care. *Plast Reconstr Surg*. 2009;124(3):899-906. doi: 10.1097/PRS.0b013e3181b03824
25. Freitas JA et al. Rehabilitative treatment of cleft lip and palate: experience of the Hospital for Rehabilitation of Craniofacial Anomalies-USP (HRAC-USP)-part 2: pediatric dentistry and orthodontics. *J Appl Oral Sci*. 2012;20(2):268-281. doi: 10.1590/S1678-77572012000200024
26. Garib DG, et al. Dual embryonic origin of maxillary lateral incisors: clinical implications in patients with cleft lip and palate. *Dental Press J Orthod*. 2015;20(5):118-125. doi:10.1590/2177-6709.20.5.118-125.sar

27. Boyarskiy S, Choi HJ, Park. Evaluation of alveolar bone support of the permanent canine in cleft and noncleft patients. *Cleft Palate Craniofac J.* 2006;43(6):678-682. doi: 10.1597/05-050
28. Meara DJ et al. Continuous infusion of bupivacaine for pain control after anterior iliac crest bone grafting for alveolar cleft repair in children. *Cleft Palate Craniofac J.* 2011;48(6):690-694. doi: 10.1597/09-267.1
29. Hayes JA et al. Continuous bupivacaine infusion post-iliac crest bone graft harvesting in pediatric cleft surgery: role and comparison with ketorolac. *Cleft Palate Craniofac J.* 2011;48(5):532-537. doi: 10.1597/10-148

## Acknowledgements

We would like to acknowledge the contributions of the clinicians who participated in the development of this topic. Your expertise and time spent are appreciated.

<b>Name</b>	<b>Title</b>	<b>Zone</b>
<i>Knowledge Lead</i>		
Bryan Dicken	General Surgeon, Pediatric	Provincial
Andrew Wong	General Surgeon, Pediatric	Provincial
<i>Topic Lead</i>		
Regan Guilfoyle	Plastic Surgeon, Pediatric	Edmonton Zone
<i>Working Group Members</i>		
Pediatric Surgery Working Group		Provincial
<i>Clinical Support Services</i>		
Lesley Beique	Pharmacy Information Management Governance Committee (PIM-GC) <i>on behalf of</i> Pharmacy Services	Provincial
James Wesenberg	<i>on behalf of</i> Laboratory Services - Provincial Networks	Provincial
Bernice Lau	<i>on behalf of</i> Diagnostic Imaging Services	Provincial
Carlota Basualdo-Hammond & Kim Brunet Wood	<i>on behalf of</i> Nutrition & Food Services	Provincial
<i>SCN or Provincial Committee</i>		
Surgery SCN		Provincial
<i>Clinical Informatics Lead</i>		
Karin Domier	Registered Nurse	Provincial
Candice Healey	Registered Nurse	Provincial

## Additional Contributors

Thank you to all provincial stakeholders who participated in the review process for this topic. Your time spent reviewing the knowledge topics and providing valuable feedback is appreciated.

For questions or feedback please contact [ClinicalKnowledgeTopics@ahs.ca](mailto:ClinicalKnowledgeTopics@ahs.ca)