Paediatric Emergency Department Asthma Clinical Pathway

Information Package September 2014
Background

Following a teen’s death from asthma in 2000, the province moved to develop the Ontario Asthma Plan of Action (APA) “to reduce mortality, morbidity and health care costs . . . through integrated initiatives focused on health promotion and prevention, management and treatment, and research and surveillance.”\(^1\) One of the APA initiatives is the Emergency Department Asthma Care Pathways (EDACP), a standardized approach to the urgent treatment of asthma. The Lung Health Foundation has been leading this initiative since 2007.

The EDACP and its implementation tools have been designed to support best practice and to address key objectives of asthma management that can lead to improved asthma care delivery and patient outcomes in the emergency department (ED). Use of clinical pathways may improve quality of care by promoting adherence to clinical guidelines, reducing variation in treatment, and improving communication with patients and between members of the health care team.\(^3\)

The Lung Health Foundation assembled an inter-professional Steering Committee to oversee the development, dissemination and implementation of the EDACP. An interdisciplinary Expert Content Working Group (ECWG) reviewed Canadian Thoracic Society (CTS) and international asthma guidelines, other relevant published literature, and examples of previously developed pathways with the goal of creating comprehensive clinical pathways. Key priorities identified to guide deliberations included: assessment of exacerbation severity; evidence-based treatment; patient education prior to discharge; comprehensive discharge instructions; and, follow-up arrangements.

An Adult Emergency Department Asthma Care Pathway (A-EDACP) for ages 16 years and older was developed first. A pilot study\(^4\) undertaken in 2006 demonstrated that pathway use increased referrals for follow-up care and improved patient recollection of teaching done in the ED without a substantial increase in length of stay; there was also increased documentation of objective measures such as peak expiratory flow (PEF) and the use of systemic corticosteroids in the ED and on discharge. Dissemination of the A-EDACP commenced in late 2008. Incorporating new evidence and feedback from clinical users, an updated A-EDACP was released in March 2013. Lessons learned from the provincial implementation guided development of a Pediatric Emergency Department Asthma Clinical Pathway (P-EDACP) for ages 1 to 17 years, which began in late 2009. Pilot implementation of the P-EDACP at Cambridge Memorial Hospital was undertaken between November 2012 and April 2013.

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Funded by the Government of Ontario within the APA, the EDACP is available at no cost to Ontario health care professionals and facilities for non-commercial use. The pathway tools can be accessed electronically through the Lung Health Foundation website: https://hcp.lunghealth.ca/clinical-programs/. Hospitals are permitted to adapt the formatting of EDACP tools to suit their site’s requirements for order sets, including adding logos.

**Description: P-EDACP**

**Inclusion Criteria**

The P-EDACP is for patients aged 1 to 17 years presenting with wheeze and/or cough who have a history of asthma and/or prior history of wheezing. The patient must also be assessed using the Paediatric Respiratory Assessment Measure (PRAM) score, a validated measure based on 5 clinical signs: suprasternal retractions, scalene muscle retractions, air entry, wheezing, and oxygen saturation. The PRAM score assists clinicians to determine the asthma exacerbation severity level: mild, moderate, severe, or impending respiratory failure – the latter being informed by clinical presentation rather than a specific PRAM score.

**Pathway Tools**

A comprehensive algorithm guides specific treatment in each severity level, the escalation of treatment if the patient’s condition worsens, and when to consider discharge.

Additional tools include medication guidelines and pre-printed physician’s orders (PPO) for each of the four severity levels, a patient education checklist, and discharge instructions with integrated prescription. To address treatment delays noted during the A-EDACP implementation, an optional medical directive was developed to authorize administration of bronchodilators and systemic corticosteroids prior to physician assessment. A pocket reference guide and small poster will also be available to support implementation.

The discharge instructions are an adaptation, with permission, of a similar tool in use at the Children’s Hospital of Eastern Ontario (CHEO). This tool includes instructions based on the stop-light coloured zones of control depicted in many asthma action plans, along with information about asthma triggers and a quick asthma control quiz.

During pilot implementation, there was a request for a documentation tool to record PRAM scores and medication administration. As each hospital will have its own standards for medication and vital sign documentation, the expert group decided not to create a PRAM documentation tool as part of the pathway; however, examples of such documentation records from CHEO, Montreal Children’s Hospital, and a combined version will be made available, which may guide individual hospitals in creating their own documentation tools.

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6 Ibid
### Paediatric Asthma Clinical Pathway

**Indications to start Paediatric Asthma Clinical Pathway**
- Age 1-17 years with wheeze and/or cough
- Asthma diagnosis and/or past history of wheeze

**Medication Guidelines**

**Bronchodilators**
- Metered Dose Inhaler (MDI) via age appropriate spacer, allow 30 sec between puffs
  - salbutamol (100 mcg/puff)
  - ipratropium bromide (20 mcg/puff)
  - Wet Nebulizer

**Corticosteroids**
- Intravenous methylprednisolone 1 mg/kg/dose or IV (max 125 mg dose) x 1, could be repeated q 6h

**Magnesium Sulfate**
- Magnesium sulfate (requires cardiorespiratory monitoring and frequent BP checks)
  - 50 mg/kg/dose iv x 1 (max 2 g), give over 20-30 min

### Physician assessment required prior to starting on clinical pathway if:
- any active chronic condition other than asthma
- prior serious reaction to salbutamol, ipratropium bromide, or oral corticosteroids
- active chickenpox or suspected incubation of chickenpox
- heart rate greater than or equal to 200 beats/min

### Impending Respiratory Failure
- tachycardia, cyanosis, decreasing respiratory effort, and/or rising pCO2

**PRAM scoring table**

<table>
<thead>
<tr>
<th>Score</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severity</td>
<td>Mild</td>
<td>Moderate</td>
<td>Severe</td>
<td></td>
</tr>
</tbody>
</table>

**PRAM**
- PRAM 0-3 (Mild)
  - FEV₁, greater than or equal to 70% of predicted or personal best, if known
  - MD to assess within 60 min
  - Vital Signs + PRAM q 60 min
  - Reassess Vital Signs + PRAM q 60 min

**PRAM 4-7 (Moderate)**
- FEV₁, 50-70% of predicted or personal best, if known
- MD to assess within 30 min
- Administer oxygen to keep SpO₂ greater than or equal to 92%
- Salbutamol now and q 30-60 min pm (via MDI and spacer)
- Give oral corticosteroid AS SOON AS POSSIBLE after 1st salbutamol dose (within 60 min of triage)
- Vital Signs + PRAM q 30-60 min
- If at any time PRAM is greater than or equal to 4 or **PRAM, less than 50% of predicted, or if PRAM is unchanged or has improved less than 3 points:
  - MD to reassess and consider admission

**PRAM 8-12 (Severe)**
- **PRAM, less than 50% of predicted or personal best, if known
- MD to assess within 15 min
- Administer oxygen to keep SpO₂ greater than or equal to 92%
- Salbutamol + ipratropium NOW, + q 20 min x 3 doses (via MDI + spacer or nebulizer), then q 20-60 min pm
- Give systemic corticosteroid AS SOON AS POSSIBLE after 1st salbutamol/ipratropium dose (within 20 min of triage)
- Vital Signs + PRAM q 20-60 min
- If PRAM improving, move to "Moderate" pathway

**Reassess Vital Signs + PRAM q 30-60 min**
- If PRAM remains less than or equal to 4 or **PRAM, less than 50% of predicted:
  - MD to reassess and reconsider admission

**Complete all of above within 60 min of triage.**
**EMERGENCY DEPARTMENT**
**ASTHMA CLINICAL PATHWAY**
**PAEDIATRIC: 1 to 17 years**

**Inclusion Criteria:** Age 1 to 17 years with wheeze and/or cough AND asthma diagnosis and/or past history of wheeze AND patient has had a Paediatric Respiratory Assessment Measure (PRAM) assessment.

**Exclusion Criteria:** Emergency Department visit for prescription refill only.

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**Introduction**
This is a proactive tool that provides considerations for asthma management based on the Paediatric Respiratory Assessment Measure (PRAM) \(^1\), \(^2\), the Canadian Paediatric Asthma Consensus Guidelines, 2003 (updated to December 2004), the Canadian Thoracic Society Asthma Management Continuum – 2010 Consensus Summary for children six years of age and over, and adults, the Canadian Thoracic Society 2012 guideline update: Diagnosis and management of asthma in preschoolers, children and adults, and other evidence from subsequent publications.

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**Paediatric Respiratory Assessment Measure (PRAM)**

<table>
<thead>
<tr>
<th>SIGNS/SCORING</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>PATIENT’S SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(O_2) saturation (in room air) (\geq 95%)</td>
<td>92-94%</td>
<td>&lt; 92%</td>
<td>(max 2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suprasternal retraction</td>
<td>Absent</td>
<td>Present</td>
<td>(max 2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scalen muscle contraction</td>
<td>Absent</td>
<td>Present</td>
<td>(max 2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air entry*</td>
<td>Normal</td>
<td>(\downarrow) at the base</td>
<td>(\downarrow) at the apex and the base</td>
<td>Minimal or absent</td>
<td>(max 3)</td>
</tr>
<tr>
<td>Wheezing$</td>
<td>Absent</td>
<td>Expiratory only</td>
<td>Inspiratory ((\pm) expiratory)</td>
<td>Audible without stethoscope or silent chest (minimal or no air entry)</td>
<td>(max 3)</td>
</tr>
</tbody>
</table>

* In case of asymmetry, the most severely affected (apex-base) lung field (right or left, anterior or posterior) will determine the rating of the criterion.

$ In case of asymmetry, the two most severely affected auscultation zones, irrespective of their location (RUL, RML, RLL, LUL, LLL), will determine the rating of the criterion.

PRAM Score 0 – 3  **MILD Asthma**  
PRAM Score 4 – 7  **MODERATE** Asthma  
PRAM Score 8 – 12  **SEVERE** Asthma  

**IMPELLING RESPIRATORY FAILURE** is based on clinical presentation

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**Instructions**
1. **TRIAGE** to determine patient eligibility for clinical pathway.
2. **Determine initial PRAM score** (see below).
3. **Nurse/RT** to begin Paediatric Emergency Department Asthma Clinical Pathway Medical Directive OR **Physician** to choose order set according to initial PRAM.
4. **IF PATIENT’S CONDITION CHANGES**, select order set that corresponds with the revised PRAM score.
5. Refer to medication guidelines and asthma care path on reverse of physician’s orders for more information.
6. **Physician/Nurse Practitioner** to complete Patient Discharge Prescription.
7. **Physician/RN/RT/Pharmacist** to review “Education Checklist” and “Discharge Instructions” with patient.

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**Logos of endorsing organizations**

Disclaimer: This Clinical Pathway is not intended to set the standard of care applicable in any particular clinical situation. It is merely prepared as a guide to assist physicians, nurses, respiratory therapists and other healthcare providers in deciding on the appropriate care required for a particular patient. At all times, physicians, nurses, respiratory therapists and other healthcare providers must exercise their independent clinical judgment, based on their knowledge, training and experience, taking into account the specific facts and circumstances of each patient, when deciding on the appropriate course of investigation and/or treatment to recommend in a particular clinical situation. Any reference throughout the document to specific pharmaceutical products as examples does not imply endorsement of any of these products.

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| Drug Allergies: ____________________________ | Ht: _____ cm | Wt: _____ kg |

**MILD ASTHMA**
(PRAM Score 0 to 3 or *FEV₁* greater than 70% of predicted or personal best, if known)

Refer to Medication Guidelines on Reverse

- ☑ physician to assess within 60 min
- ☑ HR, RR, *SpO₂*, PRAM q 60 min

**FIRST HOUR OF TREATMENT** *(to be administered only if not already given as per the Paediatric ED Asthma Clinical Pathway Medical Directive):*

**β₂-agonist:**
- □ salbutamol metered dose inhaler *(preferred)*: ___ puffs NOW and q 60 min PRN
- OR □ salbutamol nebul: ___mg NOW and q 60 min PRN
- OR □ salbutamol solution (5 mg/mL): ___mg in 3 mL 0.9% sodium chloride NOW and q 60 min PRN

Additional Orders: ____________________________________________________________

___________________________________________________________________________

_________________________  ______________________________  Date: ___________  Time: ___________

MD Name  Signature

**AFTER FIRST HOUR OF TREATMENT:**

**β₂-agonist:**
- □ salbutamol metered dose inhaler *(preferred)*: ________ puffs q 60 min PRN
- OR □ salbutamol nebul: ________mg q 60 min PRN
- OR □ salbutamol solution (5 mg/mL): ___mg in 3 mL 0.9% sodium chloride q 60 min PRN

Additional Orders: ____________________________________________________________

___________________________________________________________________________

_________________________  ______________________________  Date: ___________  Time: ___________

MD Name  Signature

**AT DISCHARGE OR ADMISSION, CONSULT:**
- □ Respiratory Therapist  □ Asthma Educator  □ Specialist/Service__________

_________________________  ______________________________  Date: ___________  Time: ___________

MD Name  Signature

_________________________  ______________________________  Date: ___________  Time: ___________

Nurse Name  Signature
**MEDICATION GUIDELINES: MILD ASTHMA**

(PRAM Score 0-3 or *FEV*₁ greater than 70% of predicted or personal best, if known)

<table>
<thead>
<tr>
<th>β₂-agonist (salbutamol): one initial dose, then q 60 min PRN:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preferred: salbutamol metered dose inhaler (MDI): 100 mcg/puff + age-appropriate spacer</td>
</tr>
<tr>
<td>Dose according to patient age:</td>
</tr>
<tr>
<td>1 to 3 yrs: 4 puffs/dose</td>
</tr>
<tr>
<td>4 to 6 yrs: 6 puffs/dose</td>
</tr>
<tr>
<td>7 yrs and older: 8 puffs/dose</td>
</tr>
<tr>
<td>Alternative: salbutamol nebule or 5 mg/mL solution (add 0.9% sodium chloride for total vol. 3-4 mL)</td>
</tr>
<tr>
<td>Dose according to patient weight:</td>
</tr>
<tr>
<td>Less than (&lt;) 10 kg = 1.25 mg/dose = 1.25 mg nebule or 0.25 mL of a 5 mg/mL solution</td>
</tr>
<tr>
<td>10 to 20 kg = 2.5 mg/dose = 2.5 mg nebule or 0.5 mL of a 5 mg/mL solution</td>
</tr>
<tr>
<td>Greater than (&gt;) 20 kg = 5 mg/dose = 5 mg nebule or 1 mL of a 5 mg/mL solution</td>
</tr>
</tbody>
</table>

Reassess Vital Signs and PRAM every 60 minutes

- If PRAM is greater than or equal to (≥) 4 or *FEV*₁ is less than 70% of predicted or personal best, if known:
  - MD to reassess and
  - Move to top of “MODERATE” pathway

- If PRAM remains less than or equal to (≤) 3 or *FEV*₁ is greater than or equal to 70% of predicted or personal best, if known:
  - MD to consider discharge
  - Provide asthma teaching
  - Provide discharge instructions

* FEV₁ (or as second choice, PEF) should only be used in children aged 6 years and older with demonstrated reproducibility within 10% and when performed by health care personnel trained in spirometry. NOTE: FEV₁ results may be discordant with the severity level indicated by the PRAM (as clinical signs and lung function are different parameters); in case of discordance, the physician is invited to use his/her best judgment to decide which parameter to use to manage the child. Do not delay treatment to obtain FEV₁ and/or peak flow.
Based on the Canadian Pediatric Asthma Consensus Guidelines, 2003 (updated to December 2004), the Canadian Thoracic Society Asthma Management Continuum – 2010 Consensus Summary for children six years of age and over, and adults and Canadian Thoracic Society 2012 guideline update: Diagnosis and management of asthma in preschoolers, children and adults, and other evidence from subsequent publications. 

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MODERATE ASTHMA
(PRAM Score 4 to 7 or *FEV₁ 50-70% of predicted or personal best, if known)
Refer to Medication Guidelines on Reverse

☐ physician to assess within 30 min
☐ HR, RR, S<sub>O₂</sub>, PRAM every 30 min x 1 hr, then q 30-60 min until PRAM less than 4
☐ administer oxygen to keep S<sub>O₂</sub> greater than or equal to (≥) 92%

FIRST HOUR OF TREATMENT (to be administered only if not already given as per the Paediatric ED Asthma Clinical Pathway Medical Directive):

β<sub>2</sub>-agonist:
☐ salbutamol metered dose inhaler (preferred): _____ puffs NOW and q 30-60 min PRN x 2 doses
OR ☐ salbutamol nebul: _____ mg NOW and q 30-60 min PRN x 2 doses
OR ☐ salbutamol solution (5 mg/mL): _____ mg in 3 mL 0.9% sodium chloride NOW and q 30-60 min PRN x 2 doses

Oral Corticosteroid, AS SOON AS POSSIBLE, within 60 (SIXTY) min of triage:
☐ predniSONE: _____ mg (2 mg/kg; max 50 mg) PO x 1 dose
OR ☐ prednisoLONE: _____ mg (2 mg/kg; max 50 mg) PO x 1 dose

Additional Orders: ____________________________________________________________
____________________________________________________________________________

Date: ________________ Time:__________

MD Name __________________________ Signature __________________________

Nurse Name __________________________ Signature __________________________

AFTER FIRST HOUR OF TREATMENT:

β<sub>2</sub>-agonist:
☐ salbutamol metered dose inhaler (preferred): _____ puffs q 60 min PRN
OR ☐ salbutamol nebul: _____ mg q 60 min PRN
OR ☐ salbutamol solution (5 mg/mL): _____ mg in 3 mL 0.9% sodium chloride q 60 min PRN

If not improving (PRAM unchanged or less than 3 point improvement), consider:
☐ ipratropium bromide metered dose inhaler: 3 puffs, alternate each puff with salbutamol x 3 doses

AT DISCHARGE OR ADMISSION, CONSULT:
☐ Respiratory Therapist ☐ Asthma Educator ☐ Specialist/Service

Additional Orders: ____________________________________________________________
____________________________________________________________________________

Date: ________________ Time:__________

MD Name __________________________ Signature __________________________

Nurse Name __________________________ Signature __________________________
MEDICATION GUIDELINES: MODERATE
(PRAM Score 4-7 or *FEV₁ 50% to 70% of predicted or personal best, if known)

β₂-agonist (salbutamol) q 30-60 min PRN x 2 doses, then q 60 min PRN:

*Preferred*: salbutamol metered dose inhaler 100 mcg/puff + age-appropriate spacer

Dose according to patient age:
- 1 to 3 yrs: 4 puffs/dose
- 4 to 6 yrs: 6 puffs/dose
- 7 yrs and older: 8 puffs/dose

*Alternative*: salbutamol nebulizer or 5 mg/mL solution (add 0.9% sodium chloride for total vol. 3-4 mL)

Dose according to patient weight:
- Less than (<) 10 kg = 1.25 mg/dose = 1.25 mg nebulizer or 0.25 mL of a 5 mg/mL solution
- 10 to 20 kg = 2.5 mg/dose = 2.5 mg nebulizer or 0.5 mL of a 5 mg/mL solution
- Greater than (>) 20 kg = 5 mg/dose = 5 mg nebulizer or 1 mL of a 5 mg/mL solution

PLUS

Oral Corticosteroid AS SOON AS POSSIBLE, within 60 (SIXTY) minutes of triage:
prednISONE/prednisoLONE:  2mg/kg/dose PO x 1 dose (max 50 mg)

If not improving, consider:

Anticholinergic (ipratropium bromide):

*Preferred*: ipratropium bromide metered dose inhaler (20 mcg/puff)+ age-appropriate spacer:
- 3 puffs q 20 min x 3 doses, alternate each puff with salbutamol

Dose according to patient weight:
- Less than (<) 10 kg = 1.25 mg/dose = 1.25 mg nebulizer or 0.25 mL of a 5 mg/mL solution
- 10 to 20 kg = 2.5 mg/dose = 2.5 mg nebulizer or 0.5 mL of a 5 mg/mL solution
- Greater than (>) 20 kg = 5 mg/dose = 5 mg nebulizer or 1 mL of a 5 mg/mL solution

Reassess Vital Signs and PRAM every 30 to 60 minutes

- If PRAM is greater than or equal to (≥) 8 at any time OR if PRAM is unchanged OR less than 3-point improvement in PRAM or *FEV₁ is less than 50% of predicted or personal best, if known:
  - MD to reassess and
  - Move to top of “SEVERE” pathway

- If 6-8 hours post corticosteroid, PRAM is greater than or equal to (≥) 4 or *FEV₁ is less than 70% of predicted or personal best, if known:
  - MD to reassess and consider admission

- If PRAM score less than or equal to (≤) 3 or *FEV₁ is greater than or equal to 70% of predicted or personal best, if known:
  - MD to consider discharge
  - provide asthma teaching
  - provide discharge instructions

* FEV₁ (or as second choice, PEF) should only be used in children aged 6 years and older with demonstrated reproducibility within 10% and when performed by health care personnel trained in spirometry. NOTE: FEV₁ results may be discordant with the severity level indicated by the PRAM (as clinical signs and lung function are different parameters): in case of discordance, the physician is invited to use his/her best judgment to decide which parameter to use to manage the child. Do not delay treatment to obtain FEV₁ and/or peak flow.

Based on the Canadian Pediatric Asthma Consensus Guidelines, 2003 (updated to December 2004), the Canadian Thoracic Society Asthma Management Continuum – 2010 Consensus Summary for children six years of age and over, and adults and Canadian Thoracic Society 2012 guideline update: Diagnosis and management of asthma in preschoolers, children and adults, and other evidence from subsequent publications. Copyright © 2014, Ontario Lung Association. All rights reserved. Without the prior written permission of the Ontario Lung Association, any and all copying, reproduction, reproduction, distortion, mutilation, modification, or the authorization of any such acts is strictly prohibited. September 2014. Ontario Lung Association is a registered charity operating as the Lung Health Foundation.
### PHYSICIAN’S ORDERS

**Drug Allergies:**

<table>
<thead>
<tr>
<th>Ht:</th>
<th>cm</th>
<th>Wt:</th>
<th>kg</th>
</tr>
</thead>
</table>

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### SEVERE ASTHMA

(PRAM Score 8 to 12 or *FEV₁ less than 50% of predicted or personal best, if known)

*Refer to Medication Guidelines on Reverse*

- [x] physician to assess urgently
- [x] administer oxygen to keep $S_{O_2}$ greater than or equal to (≥) 92%
- [x] HR, RR, $S_{O_2}$ PRAM q 20 min for 1 hour until PRAM less than 8, then q 30-60 min
- [ ] continuous cardiopulmonary monitoring
- [ ] blood gas: □ arterial OR □ venous
- [ ] IV access: □ saline lock OR □ __________________________

### FIRST HOUR OF TREATMENT

(to be administered only if not already given as per the Paediatric ED Asthma Clinical Pathway Medical Directive):

#### β₂-agonist and anticholinergic:

- [ ] salbutamol metered dose inhaler (MDI): ___ puffs AND ipratropium bromide
  - MDI: 3 puffs q 20 min x 3 doses; alternate puffs of each medication
- [ ] salbutamol nebulized (nebule or 5 mg/mL solution): _____ mg MIXED WITH 250 mcg ipratropium bromide (125mcg/mL or 250 mcg/mL) q 20 min x 3 doses

#### Systemic Corticosteroid, AS SOON AS POSSIBLE, within 20 (TWENTY) mins of triage:

- [ ] prednisone: _____ mg (2 mg/kg; max 50 mg) PO x 1 dose
- [ ] prednisolone: _____ mg (2 mg/kg; max 50 mg) PO x 1 dose
- [ ] methylprednisolone IV: _____ mg (1 mg/kg/dose; max 125 mg/dose) x 1 dose NOW
  - (infuse over 3 - 15 minutes)
- [ ] methylprednisolone IM: _____ mg (1 mg/kg/dose; max 125 mg/dose) x 1 dose NOW

Additional Orders:

__________________________

<table>
<thead>
<tr>
<th>MD Name</th>
<th>Signature</th>
<th>Date:</th>
<th>Time:</th>
</tr>
</thead>
</table>

### AFTER FIRST HOUR OF TREATMENT:

#### β₂-agonist:

- [ ] salbutamol metered dose inhaler: _____ puffs q _____ min PRN
- [ ] salbutamol nebulized: _____ mg q _____ min PRN
- [ ] salbutamol solution (5 mg/mL): _____ mg in 3 mL 0.9% sodium chloride q _____ min PRN

If not improving (PRAM unchanged or less than 3 point improvement), consider:

- [ ] magnesium sulfate IV: _____ mg (50 mg/kg/dose; max 2g/dose x 1 dose NOW;
  - give over 20 to 30 minutes
  - Note: may cause severe hypotension - check BP q 5 min during infusion and x 30 min after

### AT DISCHARGE OR ADMISSION, CONSULT:

- [ ] Respiratory Therapist □ Asthma Educator □ Specialist/Service______________________

Additional Orders:

__________________________

<table>
<thead>
<tr>
<th>MD Name</th>
<th>Signature</th>
<th>Date:</th>
<th>Time:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Nurse Name</th>
<th>Signature</th>
<th>Date:</th>
<th>Time:</th>
</tr>
</thead>
</table>
MEDICATION GUIDELINES: SEVERE
(PRAM 8 – 12 or *FEV\textsubscript{1} less than 50% of predicted or personal best, if known)

\textbf{\(\beta_2\)-agonist (salbutamol) q 20 minutes x 3 doses, then q 20-60 minutes PRN:}

\textit{Preferred:} salbutamol metered dose inhaler (MDI) 100 mcg/puff + age-appropriate spacer

Dose according to patient age:
- 1 to 3 yrs: 4 puffs/dose
- 4 to 6 yrs: 6 puffs/dose
- 7 yrs and older: 8 puffs/dose

\textit{Alternative:} salbutamol nebulizer or 5 mg/mL solution
(Add 0.9% sodium chloride for total volume 3-4 mL)

Dose according to patient weight:
- Less than (<) 10 kg: 1.25 mg/dose = 1.25 mg nebulizer or 0.25 mL of a 5 mg/mL solution
- 10 to 20 kg: 2.5 mg/dose = 2.5 mg nebulizer or 0.5 mL of a 5 mg/mL solution
- Greater than (> 20 kg: 5 mg/dose = 5 mg nebulizer or 1 mL of a 5 mg/mL solution

PLUS

\textbf{Anticholinergic (ipratropium bromide) q 20 minutes x 3 doses:}

\textit{Preferred:} ipratropium bromide MDI (20 mcg/puff) + age-appropriate spacer:
3 puffs q 20 min x 3 doses, alternate each puff with salbutamol

\textit{Alternative:} ipratropium bromide nebulizer or solution (125 mcg/mL or 250 mcg/mL):
250 mcg q 20 min x 3 doses; mix with salbutamol; add 0.9% sodium chloride for a total volume of 3-4 mL

PLUS

\textbf{Systemic Corticosteroid AS SOON AS POSSIBLE, within 20 (TWENTY) minutes of triage:}

PrednISON/E PrednisoLONE: 2 mg/kg/dose PO x 1 dose (max 50 mg)

OR if there is a concern about reliability of oral route:
- methylPREDNISolone: 1 mg/kg/dose q 6 h IV or IM (max 125 mg/dose); give IV dose over 3-15 min

If not improving, consider:

\textbf{Magnesium sulfate:} 50 mg/kg/dose IV ONCE (max. 2 g per dose) over 20-30 min

\textit{Attention:} may cause severe hypotension; ensure IV access, monitor BP q 5 minutes during infusion and for 30 minutes after dose end

Reassess Vital Signs and PRAM every 20 to 60 minutes

- If poor response (PRAM unchanged or less than 3 point improvement) OR signs of impending respiratory failure at any time:
  - MD to reassess STAT and
  - Move to top of “IMPENDING RESPIRATORY FAILURE” pathway

- If 4 hours post corticosteroid PRAM score is greater than or equal to (\(\geq\)) 4 or \(\ast FEV_1\) is less than 70% of predicted or personal best, if known:
  - MD to reassess and consider admission

- If PRAM score improving, move to “MODERATE” pathway

\(\ast FEV_1\) (or as second choice, PEF) should only be used in children aged 6 years and older with demonstrated reproducibility within 10% and when performed by health care personnel trained in spirometry. NOTE: \(\ast FEV_1\) results may be discordant with the severity level indicated by the PRAM (as clinical signs and lung function are different parameters): in case of discordance, the physician is invited to use his/her best judgment to decide which parameter to use to manage the child. Do not delay treatment to obtain \(\ast FEV_1\) and/or peak flow.
**Emergency Department**

**Asthma Clinical Pathway**

**Paediatric: 1 to 17 years**

**PHYSICIAN’S ORDERS**

| Drug Allergies: ____________________________ | Ht: ______ cm | Wt: ______ kg |

**IMPending RESPIRATORY FAILURE**

Lethargy, Cyanosis, Decreasing Respiratory Effort and/or Rising PCO

*Refer to Medication Guidelines & Algorithm on Reverse*

- physician to assess STAT and remain in attendance until patient stabilized
- administer 100% oxygen
- support ventilation if required (bag + mask)  
  Note: avoid high rates and/or volumes
- continuous cardiopulmonary monitoring
- HR, RR, S\textsubscript{p}O\textsubscript{2}, PRAM q 15 min
- obtain IV access (if not already done): fluid________ rate of infusion__________
- NPO
- blood gas: □ arterial OR □ capillary
- chest radiograph (portable)
- contact **CritiCall Ontario: 1-800-668-4357** to be connected with regional ICU/tertiary care centre for further support and to arrange transfer

**IMMEDIATE MANAGEMENT:**

\( \beta_2 \)-agonist and anticholinergic:

- □ salbutamol nebulized (nebule or 5 mg/mL solution): _____ mg MIXED WITH 250 mcg ipratropium bromide (125 mg/mL or 250 mg/mL), continuously with oxygen,  
  add 0.9% sodium chloride for a total volume of 3 to 4 mL

**Systemic Corticosteroid, AS SOON AS POSSIBLE** after first salbutamol/ipratropium dose  
(if not already given):

- □ methylPREDNISolone IV: _____mg (1 mg/kg/dose; max 125 mg/dose) x 1 dose NOW and q 6 h (infuse over 3 to 15 minutes)

OR □ methylPREDNISolone IM: _____mg x 1 dose NOW and q 6 h

**Magnesium sulfate:**

- □ magnesium sulfate IV: _____ mg (50 mg/kg/dose; max. 2 g/dose) x 1 dose NOW;  
  give over 20 to 30 min

  Note: may cause severe hypotension; check BP q 5 mins during infusion and for 30 mins after

**AT DISCHARGE OR ADMISSION, CONSULT:**

- □ Respiratory Therapist □ Asthma Educator □ Specialist/Service________________

**Additional Orders:** ____________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

Date: __________ Time: __________

MD Name __________________ Signature __________________

Nurse Name __________________ Signature __________________
MEDICATION GUIDELINES: IMPENDING RESPIRATORY FAILURE
Lethargy, Cyanosis, Decreasing Respiratory Effort and/or Rising PCO₂

**Bronchodilators (β₂-agonist and Anticholinergic):**
*continuous nebulization with oxygen, physician to reassess as necessary*

salbutamol nebul or 5 mg/mL solution (dose according to patient weight):

- Less than (<) 10 kg = 1.25 mg/dose = 1.25 mg neule or 0.25 mL of a 5 mg/mL solution
- 10 to 20 kg = 2.5 mg/dose = 2.5 mg neule or 0.5 mL of a 5 mg/mL solution
- Greater than (>) 20 kg = 5 mg/dose = 5 mg neule or 1 mL of a 5 mg/mL solution

AND

- ipratropium bromide nebul or solution (125 mcg/mL or 250 mcg/mL):
  - 250 mcg/dose; mix with salbutamol, add 0.9% sodium chloride for total volume of 3 to 4 mL

**PLUS**

**Systemic Corticosteroid, AS SOON AS POSSIBLE after first bronchodilator dose:**
- methylPREDNISolone 1 mg/kg/dose q 6 h IV or IM (max 125 mg /dose); give IV dose over 3-15 min

**PLUS**

**Magnesium sulfate:**
- 50 mg/kg/dose IV ONCE (maximum 2 g per dose); give over 20-30 minutes
  - *Attention*: may cause severe hypotension; ensure IV access, monitor BP q 5 min during infusion and for 30 min after
## Patient Education Checklist

### Learning Goals Reviewed with Patient

(To be completed by Physician / Nurse / Nurse Practitioner / RT / Pharmacist)  

<table>
<thead>
<tr>
<th>Initials &amp; Comments</th>
</tr>
</thead>
</table>

1. **Assessed device/spacer technique and demonstrated optimal technique:**  
   Metered dose inhaler (MDI) with spacer:
   - Ensure age/ability-appropriate valved spacer/device and demonstrate optimal technique
   - **Spacer with mouthpiece** - Shake MDI canister and place end into holding chamber, breathe out, place holding chamber mouthpiece into mouth and make a seal, release puff, inhale slowly (no whistle), hold for 10 seconds, exhale, wait 30 seconds between each puff of the same MDI.
   - **Spacer with mask** - Shake canister, place end of MDI into holding chamber, place mask over mouth and nose and make a seal, release puff, allow patient to inhale and exhale approximately 3 times. Wait 30 seconds between each puff of the same MDI.

2. **Reviewed basics of asthma:**
   - Airway inflammation (swelling), increased mucus, and bronchospasm (airways narrow)

3. **Symptom recognition:**
   - Cough, wheeze, chest tightness and/or shortness of breath

4. **Reviewed asthma triggers:**
   - Know your asthma triggers
   - Avoid cigarettes and secondhand smoke

5. **Reviewed asthma medications:**
   - **Relievers** (e.g. Airomir®, Apo-Salvent®, Bricanyl®, Novo-salmol®, salbutamol, or Ventolin®) – (often blue containers)
     - Relax smooth muscle around airways.
     - Rapid relief
   - **Controllers** (e.g. Advair®, Alvesco®, Asmanex™ beclomethasone, Flovent®, Pulmicort®, QVAR®, or Symbicort®, Zenhale®)
     - Treat airway inflammation and mucus;
     - Need to be taken **regularly** even when feeling well.
   - **Oral Steroids**
     - (e.g. prednisone, prednisolone)
     - Treats severe airway inflammation and mucous
     - Short term therapy

6. **Asthma Quiz for Kids** – (see reverse of discharge plan)
   - Measure of current control

7. **Arrange regular follow-up**
   - Family Physician, Paediatrician, Asthma Educator, Specialist

8. **Discharge Plan and Prescription**
   - Given and explained
   - If no drug plan, refer to Social Work or Trillium Fund (available through most pharmacies)

9. **Hospital’s Asthma (if available) or the Lung Health Foundation booklet given to patient.**

**Name (print): ___________________________ Signature: __________________________________ Status:______**

**Date (YYYY/MM/DD):_______________________ Time:________________**

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Today, your child was seen in the Emergency Department for a significant asthma exacerbation. To treat this attack, in addition to your Controller and Quick Relief medicine, also give:

- **Prednisolone** liquid __mg daily for ___ days, Refill 0
- **Prednisone** tablet __mg daily for ___ days, Refill 0

**Additional discharge instructions:**

- Schedule appointment with:
  - family doctor
  - asthma educator
  - specialist ____________ within _____ weeks.

If you have any questions about asthma, call the Lung Health Foundation Lung Health Information Line: 1-888-344-LUNG (5864)

---

**Controller Medicine:**

- (specify name)
- __mcg/inhalation, take ___ inhalations ___ times per day, for 3 months, Refill 3
- ☐ metered dose inhaler (puffer) OR ☐ dry powder inhaler

**Quick Relief Medicine:**

- (usually a blue inhaler)
- __mcg/inhalation, take ___ inhalations every 4 to 6 hours as needed, 1 inhaler, Refill 1
- ☐ metered dose inhaler (puffer) OR ☐ dry powder inhaler

**Spacer Device:**

- ☐ Infant with mask ☐ Pediatric with mask ☐ Adult with mouthpiece

---

**Asthma under control**

- Breathing is good.
- Run & play normally.
- Cough or wheeze less than 4 times a week.

**Asthma not well controlled**

- Signs of a cold.
- Mild to moderate cough or wheezing.
- Waking up because of asthma.

**Asthma out of control**

- Very short of breath.
- Severe wheezing.
- “Pulling in” of skin between ribs.
- Cannot do usual activities.
- Severe trouble breathing, walking or talking.
- Blueness of lips or skin.
- Tired because of effort of breathing.

---

If you are in the **Green Zone**, continue your **Controller** medicine.

Take **Quick Relief** medicine every 4 hours until better.

If the effect of the **Quick Relief** medicine does not last 4 hours, or if the child’s symptoms are getting worse, see a doctor.

---

If you are in the **Yellow Zone**, take **Quick Relief** medicine (usually a blue inhaler) every 4 hours.

If the effect of the **Quick Relief** medicine does not last 4 hours, or if the child’s symptoms are getting worse, seek medical attention NOW.

If still in the **Red Zone** after 15 minutes or you have not reached your doctor, call 911 or go to nearest emergency department NOW.

Take **Quick Relief** medicine as needed (even every 10 or 20 minutes if not improving) on the way to hospital.

---

**Schedule appointment with:**

- ☐ family doctor
- ☐ asthma educator
- ☐ specialist ____________ within _____ weeks.

- If you have any questions about asthma, call the Lung Health Foundation Lung Health Information Line: 1-888-344-LUNG (5864)

---

**Physician:** (print name)  **License #**  **Signature:**  **Date:**  (dd/mm/yyyy)
ASTHMA QUIZ FOR KIDZ*

* Adapted from Canadian Respiratory Journal 2004; 11(8):541-6.

1. Did you cough, wheeze, or have a hard time breathing 4 or more days out of the last 7 days? ☐ ☐

2. Did you wake up at night because you were coughing, wheezing, or having a hard time breathing 1 or more times in the last 7 days? ☐ ☐

3. Did you use your blue puffer 4 or more times in the last 7 days? ☐ ☐

4. In the last 7 days, did you do less exercise or sports because it was making you cough, wheeze, or you were having a hard time breathing? ☐ ☐

5. In the last 30 days, did you miss school or regular activities because you were coughing, wheezing, or having a hard time breathing? ☐ ☐

6. In the last 30 days, did you go to a clinic or a hospital without an appointment because you were coughing, wheezing, or having a hard time breathing?
   • How many times did you answer YES? _____
   • If you said YES 2 or more times, your asthma is not well controlled. Talk to your mom and dad about seeing a doctor. Let your doctor be your asthma coach!

TRIGGERS

Follow these steps to avoid these common triggers:

COLDs: Most common trigger. Wash hands before touching your mouth or nose to prevent colds. Follow Yellow Zone at first sign of a cold.

SMOKE: Don’t smoke! Do not allow others to smoke in your home or car. Encourage your parents to STOP smoking. Even if they smoke outside, the smoke in their clothes and hair can trigger your asthma.

AIR POLLUTION: Avoid fumes and chemicals.

Follow these steps if you have any of the following allergies:

PETS: Avoid pets with fur or feathers. If you have pets, wash them often.

POLLEN: Close windows during pollen season (Spring and Fall). Air conditioning helps. Avoid freshly cut grass.

DUST MITES: Wash bed sheets in hot water. Vacuum and dust often. Cover pillows and mattresses with dust mite-resistant covers.

MOLD: Keep bathroom and basement dry. Keep away from decomposing leaves and garden waste.

Controlling your asthma

1. Avoid your triggers.
2. Know your medication and how and when to take it. Take controller medications regularly.
3. Follow your action plan.
4. After any emergency room visit, you must schedule a follow-up appointment with a doctor in the next 2 weeks.
5. Always have spare quick relief medication (blue inhaler) available.
Medical Directive and/or Delegation Template
Template for Use by Physicians or Authorizers with Ordering Authority

Emergency Department Asthma
Title: Medical Directive – Paediatric Age 1 to 17 years

Number: (set by hospital)

Activation Date: (set by hospital)                    Review due by: (set by hospital)

Sponsoring/Contact Person(s)
(hospital based site champion e.g. professional practice advisor(s),
clinical educator)
Lung Health Foundation – lunghealth.ca

Order and/or Delegated Procedure:                      Appendix Attached: ☑ Yes ☐ No Title: Appendix B - Flowchart

1. Supplemental oxygen to keep SaO₂ at 92% or greater

2. Salbutamol: metered dose inhaler (MDI) with spacer device (100 mcg/puff) 4 to 8 puffs per dose or nebulized
   1.25 mg to 5 mg per dose in 3 mL 0.9% sodium chloride, as per flowchart (Appendix B) attached.  
   Administer first dose as soon as possible. May administer up to 3 doses depending on severity score. See 
   flowchart (Appendix B) for specific number of doses and frequency. MDI with spacer is preferred delivery system unless continuous oxygen is required.

3. Ipratropium bromide: MDI with spacer device (20 mcg/puff) 3 puffs per dose or nebulized ipratropium bromide (250 mcg per dose) times 3 doses. Administer first dose as soon as possible. Administer in alternating puffs with salbutamol (if MDI) or mixed with salbutamol (if nebulized). See flowchart (Appendix B) for specific number of doses and frequency.
   Note: For use in ‘Severe’ and ‘Impending Respiratory Failure’ streams only.

4. PrednISON/E/prednisoLONE: 2 mg/kg to a maximum of 50 mg PO once, as soon as possible following salbutamol: within 60 minutes of triage for ‘Moderate’ stream and within 20 minutes of triage for ‘Severe’ and ‘Impending Respiratory Failure streams. See flowchart (Appendix B).
   Note: do not use in ‘Mild’ stream.

5. Spirometry (FEV₁) or Peak Expiratory Flow (PEF) in children 6 years and over, performed by healthcare personnel trained in spirometry. See flowchart (Appendix B).
Recipient Patients:  

Patients who are registered in the Emergency Department presenting with symptoms of an acute asthma exacerbation (e.g. dyspnea, wheezing), under the care of an authorizing physician, who meet the following:

Inclusion Criteria:

Age 1 to 17 years with wheeze and/or cough AND asthma diagnosis and/or past history of wheeze AND who have had a Paediatric Respiratory Assessment Measure (PRAM) assessment (Appendix A).

Exclusion Criteria:

ED visit for prescription refill only.

Authorized Implementers: 

Nurses, Respiratory Therapists, Pharmacists registered and in good standing with their respective regulatory college in Ontario, who have received up-to-date education and training on this medical directive.

Indications and Contraindications: 

Indications:

Age 1 to 17 years with wheeze and/or cough AND asthma diagnosis and/or past history of wheeze, AND presenting with mild, moderate or severe symptoms of asthma as assessed by Paediatric Respiratory Assessment Measure (PRAM) score.

Contraindications:

Re: medical directive in whole
  ñ if patient has any active chronic conditions other than asthma, suspend medical directive and obtain physician assessment and orders for care.

Re: salbutamol
  ñ heart rate greater than 200 beats/min; and/or
  ñ allergic to salbutamol ñ hold salbutamol and proceed with rest of medical directive. Obtain physician assessment as soon as possible.

Re: ipratropium bromide
  ñ allergic to ipratropium bromide ñ hold ipratropium bromide and proceed with rest of medical directive

Re: predniSONE or prednisoLONE
  ñ patient unable to take medication via oral route ñ request physician assessment and orders and proceed with remainder of medical directive.
  ñ patient with active or suspected incubation of chickenpox infection ñ hold prednisone/prednisolone and proceed with rest of medical directive. Obtain physician assessment as soon as possible.
  ñ allergic to prednisone or prednisolone ñ hold prednisone or prednisolone and proceed with rest of medical directive. Obtain physician assessment as soon as possible.

Re: spirometry (FEV₁) or Peak Expiratory Flow (PEF) – not available in most emergency departments
  ñ FEV₁ (or as second choice, PEF) should only be used in children aged 6 years and older, performed by healthcare personnel trained in spirometry. NOTE: results may not be reproducible during an exacerbation; however, if FEV₁ can be done reproducibly, its value should take precedence to guide therapy and consider discharge over the PRAM. PEF measurement is not recommended in children and adolescents unless spirometry is not available AND there is demonstrated reproducibility within 10%. If patient is unable to perform test ñ proceed with assessment and treatment based on the PRAM NOTE: Do not delay PRAM assessment or treatment to obtain FEV₁ or PEF
### Consent:
Consent (verbal and/or implied) must be provided by patient or substitute decision maker prior to commencing medical directive.

### Guidelines for Implementing the Order/Procedure:
This medical directive allows registered nurses, registered respiratory therapists and/or pharmacists to initiate pharmacotherapy with inhaled bronchodilators and oral corticosteroids as soon as possible to children and adolescents who present to the Emergency Department (ED) with a clinical picture consistent with asthma and who are entered into the Paediatric Emergency Department Asthma Clinical Pathway (Asthma Pathway).

Although it is intended that these patients will be treated by a physician according to the Asthma Pathway, the earliest possible therapy initiated by nurse / respiratory therapist / pharmacist will allow symptom relief while awaiting assessment by the physician and is anticipated to shorten the patient’s length of stay in the ED and reduce the rate of hospital admission.

Dosage, frequency and choice of medication will be determined by the patient’s age and degree of respiratory distress as described in the Asthma Pathway appended to this medical directive.

The Physician will be notified immediately at any time if the patient is not responding or is deteriorating with the planned treatment.

Any untoward event suspected to be related to the implementation of this directive will be reported immediately to the attending physician. The event will also be documented in the patient’s chart.

### Documentation and Communication:

### Review and Quality Monitoring Guidelines:

### Administrative Approvals (as applicable):

### Approving Physician(s)/Authorizer(s):
### Emergency Department Paediatric Asthma Medical Directive

#### Appendix A: Severity of asthma exacerbation

Assess and calculate Paediatric Respiratory Assessment Measure (PRAM) Score using the following scale.

<table>
<thead>
<tr>
<th>SIGN/SCORING</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>Patient’s Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. O₂ saturation (in room air)</td>
<td>≥ 95%</td>
<td>92-94%</td>
<td>&lt; 92%</td>
<td>______(max 2)</td>
<td></td>
</tr>
<tr>
<td>2. Suprasternal retraction</td>
<td>Absent</td>
<td>Present</td>
<td>______(max 2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Scalen muscle contraction</td>
<td>Absent</td>
<td>Present</td>
<td>______(max 2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Air entry*</td>
<td>Normal</td>
<td>at the base</td>
<td>at the apex and the base</td>
<td>Minimal or absent</td>
<td>______(max 3)</td>
</tr>
<tr>
<td>5. Wheezing§</td>
<td>Absent</td>
<td>Expiratory only</td>
<td>Inspiratory (expiration)</td>
<td>Audible without stethoscope or silent chest (minimal or no air entry)</td>
<td>______(max 3)</td>
</tr>
</tbody>
</table>

**PRAM Score Total:** ______(max 12)

* In case of asymmetry, the most severely affected (apex-base) lung field (right or left, anterior or posterior) will determine the rating of the criterion.

§ In case of asymmetry, the two most severely affected auscultation zones, irrespective of their location (RUL, RML, RLL, LUL, LLL), will determine the rating of the criterion.

### Asthma Severity Index

- Pram Score 0 – 3 indicates **MILD** Asthma
- Pram Score 4 – 7 indicates **MODERATE** Asthma
- Pram Score 8 – 12 indicates **SEVERE** Asthma

**IMPENDING RESPIRATORY FAILURE** is based on clinical presentation

### References:


Emergency Department Paediatric Asthma Medical Directive

Appendix B: Medical Directive Flowchart

**PRAM 0-3**
- **Mild**
  - Administer oxygen as required to keep SpO₂ ≥ 92%
  - Establish baseline FEV₁, if possible (patient age 6 yrs or older, able to follow directions, trained staff member available, able to demonstrate reproducibility* within 10%)
  - *results may not be reproducible during an exacerbation
  - Do not delay pharmacotherapy while obtaining FEV₁
  - If patient's condition worsens at any time, notify physician immediately

**PRAM 4-7**
- **Moderate**
  - Administer salbutamol metered dose inhaler (MDI) preferred, unless continuous oxygen required; dose by patient's age
    - 1 – 3 yrs = 4 puffs
    - 4 – 6 yrs = 6 puffs
    - 7 yrs and older = 8 puffs
    - via metered dose inhaler (MDI) and age appropriate spacer; allow 30 seconds between each puff.
  - *OR*
  - salbutamol (solution/nebule) via continuous nebulization, dose by patient's weight:
    - less than (<) 10kg = 1.25 mg
    - 10 – 20 kg = 2.5 mg
    - greater than (>) 20 kg = 5 mg
  - If necessary increase volume to 3mL with normal saline
  - **REPEAT:**
    - PRAM 0 to 3: q 60 minutes PRN, to a maximum of 2 doses in the first hour
    - PRAM 4 to 7: q 30 to 60 minutes PRN, to a maximum of 2 doses in first hour

**PRAM 8-12**
- **Severe**
  - Administer salbutamol metered dose inhaler (MDI) preferred, unless continuous oxygen required; dose by patient's age
    - 1 – 3 yrs = 4 puffs
    - 4 – 6 yrs = 6 puffs
    - 7 yrs and older = 8 puffs
  - AND
  - ipratropium bromide metered dose inhaler (MDI) – 3 puffs
  - via metered dose inhaler (MDI) and age appropriate spacer; allow 30 seconds between each puff of ipratropium bromide with salbutamol
  - **OR**
  - salbutamol (solution/nebule) via continuous nebulization, dose by patient's weight:
    - less than (<) 10kg = 1.25 mg
    - 10 – 20 kg = 2.5 mg
    - greater than (>) 20 kg = 5 mg
  - AND
  - ipratropium bromide (solution/nebule): 250 mcg mixed with salbutamol; add normal saline for total volume of 3mL
  - **REPEAT:** (both salbutamol and ipratropium bromide)
    - PRAM 8 to 12: q 20 minutes x 3 doses in the first hour
    - "Impending Respiratory Failure": repeat continuously

Assess patient regarding requirement for corticosteroids (except for "mild" severity):
- **YES**
  - Does patient have active or suspected chickenpox infection?
  - **NO**
  - **ADMINISTER**
    - ORAL CORTICOSTEROIDS*:
      - for "Moderate" (PRAM 4-7) **as soon as possible** and within 60 (sixty) minutes of triage:
      - for "Severe" (PRAM 8-12) and "Impending Respiratory Failure" **as soon as possible** and within 20 (twenty) minutes of triage:
      - prednisONE/prednisOLONE 2 mg/kg PO x 1 dose (maximum 50 mg/dose)
      - *if patient unable to take medication via oral route, notify MD immediately

**Impending Respiratory Failure**
- MD to assess STAT and remain in attendance until patient is stabilized

---

*Based on Medical Directive/Delegation Template of the Federation of Health Regulatory Colleges of Ontario

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