



# **Pediatric Emergency Department Asthma Clinical Pathway**

Information Package January 2021

# TABLE OF CONTENTS

Background .....	2
Pediatric Asthma Clinical Pathway Algorithm .....	4
Pediatric Emergency Department Asthma Clinical Pathway - Criteria .....	5
Order Set - Mild Asthma.....	6
Order Set - Moderate Asthma.....	8
Order Set - Severe Asthma.....	10
Order Set - Impending Respiratory Failure .....	12
Patient Education Checklist .....	14
Asthma Action Plan & Prescription.....	15
Pediatric EDACP Expert Working Group .....	17
References .....	18
Medical Directive and/or Delegation Template .....	20
Emergency Department Pediatric Asthma Medical Directive Appendix A: Severity of Asthma Exacerbation .....	23
Emergency Department Pediatric Asthma Medical Directive Appendix B: Medical Directive Flowchart .....	24

# 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."<sup>1,2</sup> One of the APA initiatives is the Emergency Department Asthma Care Pathway (EDACP), a standardized approach to the urgent treatment of asthma. The Lung Health Foundation, formerly the Ontario Lung Association, 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.<sup>3</sup>

The Ontario Lung Association 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 a comprehensive clinical pathway. 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, with initial dissemination in late 2008. Incorporating new evidence and feedback from clinical users, an updated A-EDACP was released in March 2013. A study in 2017 showed that although ED practice patterns varied across the province, the findings of the study supported an overall positive effect of pathway implementation on reducing return ED visits.<sup>4</sup> A pilot study<sup>5</sup> 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.

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.

<sup>1</sup>Young JG. Verdict explanation. In: Chief Coroner, Province of Ontario. Inquest touching the death of Joshua Fleuelling. Jury verdict and recommendations. Sept–Nov, 2000 (Toronto).

<sup>2</sup> Ontario Asthma Plan of Action <https://www.health.gov.on.ca/en/pro/programs/cdpm/asthma.aspx>

<sup>3</sup> Allen D, Gillen E, Rixson L. Systematic review of the effectiveness of integrated care pathways: what works, for whom, in which circumstances? *Int J Evid Based Healthc.* 2009 Jun; 7(2):61-74. DOI: 10.1111/j.1744-1609.2009.00127.x.

<sup>4</sup> Kwok C, Lajkosz K, Madeley C, et al. Effects of a standardized emergency department asthma care pathway on health services utilization. *European Respiratory Journal* 2018 52: Suppl. 62, OA5155

<sup>5</sup> Loughheed MD, Olajos-Clow J, Szpiro K, et al. Ontario Respiratory Outcomes Research Network. Multicentre evaluation of an emergency department asthma care pathway for adults. *CJEM* 2009 11(3):215-29.

Funded by the Government of Ontario within the Asthma and COPD Program, the EDACP is available at no cost to Ontario healthcare 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.

## P-EDACP Description

### **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 Pediatric Respiratory Assessment Measure (PRAM) score, a validated measure based on 5 clinical signs: suprasternal retraction, scalene muscle contraction, 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.<sup>6</sup>

### **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 provider **order sets** for each of the four severity levels, a **patient education checklist**, and **discharge instructions** with integrated prescription. To address treatment delays, an optional **medical directive** was developed to authorize administration of bronchodilators and systemic corticosteroids prior to physician assessment.

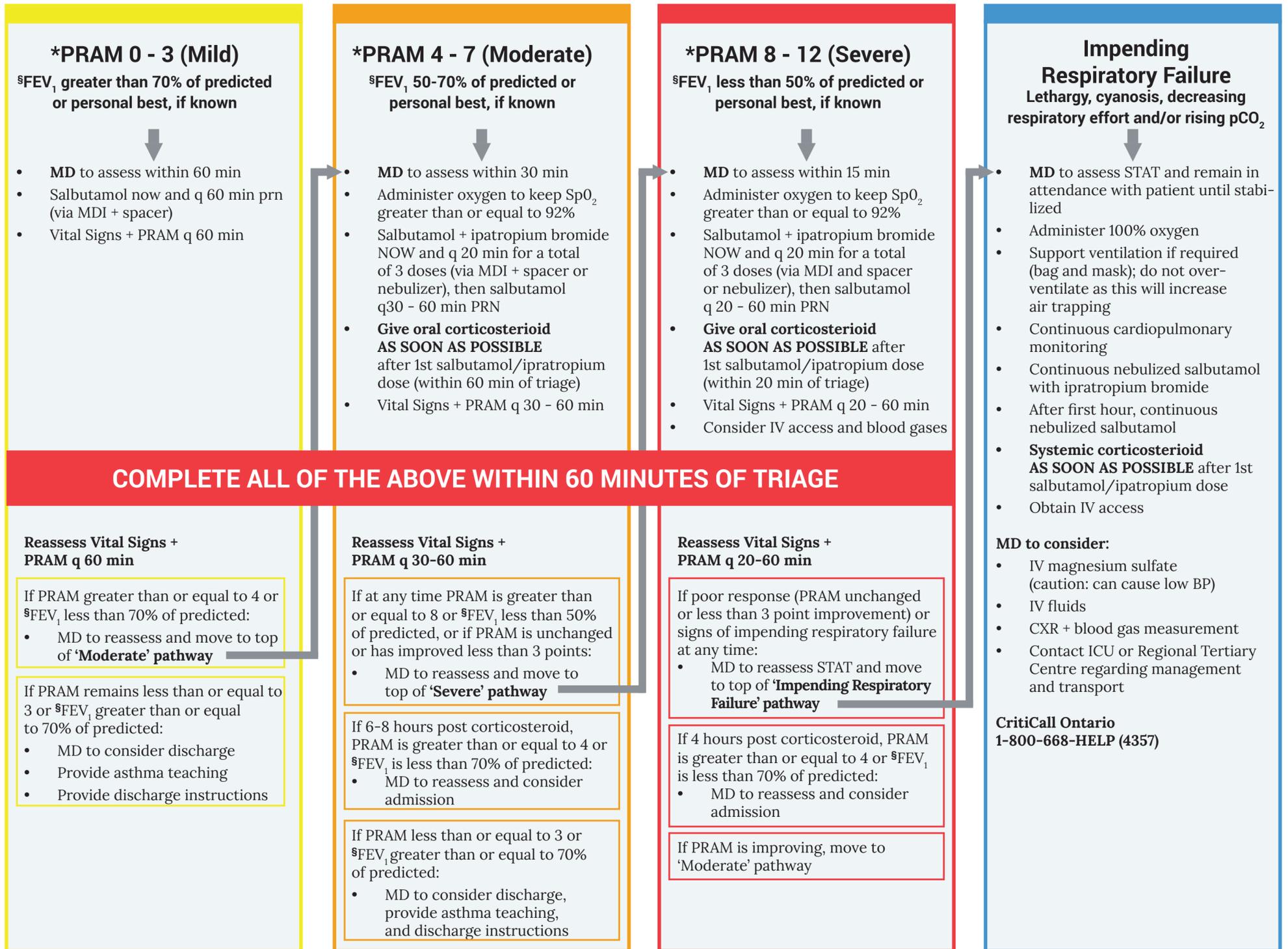
The discharge instructions are an adaptation, with permission, of a similar tool in use at the Children's Hospital of Eastern Ontario (CHEO). This tool includes instructions based on the stop- light colored zones of control depicted in many asthma action plans.

<sup>6</sup> Ducharme, F., Chalut, D., Plotnick L. et al. (2008). The Pediatric Respiratory Assessment Measure: A Valid Clinical Score for Assessing Acute Asthma Severity from Toddlers to Teenagers. *The Journal of Pediatrics*, 152 (4), 476-480.e1.

# PEDIATRIC ASTHMA CLINICAL PATHWAY

**Indications to start Pediatric Asthma Clinical Pathway:** Age 1-17 years with wheeze and/or cough **AND** asthma diagnosis and/or past history of wheeze.

**Physician assessment required prior to starting on clinical pathway if:** Any active chronic condition other than asthma **OR** Prior serious adverse reaction to salbutamol, ipratropium bromide, or oral corticosteroids **OR** Active chickenpox or suspected incubation of chickenpox **OR** Heart rate greater than or equal to 200 beats/min.



\* See below for PRAM scoring.  $\%FEV_1$  (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 healthcare personnel trained in spirometry. NOTE:  $FEV_1$  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 their best judgement to decide which parameter to use to manage the child. Do not delay treatment to obtain  $FEV_1$  and/or peak flow.

## MEDICATION GUIDELINES

BRONCHODILATORS	CORTICOSTEROIDS	PRAM SCORING TABLE																																																	
<p><b>Inhaled medication delivery by MDI and age appropriate valved spacer is preferred unless continuous oxygen is required because of increased efficiency and decreased side effects: tachycardia, tremor and decreased risk of transmission of respiratory infections.</b></p> <p><b>Metered Dose Inhaler (MDI)†</b> via age appropriate spacer, allow 30 sec between puffs</p> <p><b>salbutamol (100 mcg/puff)</b>                      less than 20 kg: 5 puffs/dose                      greater than or equal to 20kg: 10 puffs/dose</p> <p><b>ipratropium bromide (20 mcg/puff)</b>                      3 puffs/dose, alternate each puff with salbutamol</p> <p><b>Wet Nebulization†</b> driven by oxygen flow of 6-8 L/min via well-fitting mask</p> <p><b>salbutamol (5mg/mL solution or unit dose nebule)</b>                      less than 20 kg: dose = 2.5 mg; use 2.5 mg nebule OR 0.5 mL of 5mg/mL solution in 3 - 4 mL NaCL 0.9%                      greater than or equal to 20 kg: dose = 5 mg; use 2 x 2.5 mg nebule OR 5 mg nebule OR 1 mL of 5 mg/mL solution in 3 - 4 mL NaCL 0.9%</p> <p><b>ipratropium bromide</b>                      all patients: 250 mcg, mixed with salbutamol</p>	<p><b>Oral route</b></p> <p><b>dexamethasone</b> 0.6 mg/kg/dose x 1 (max 12 mg/dose)  <b>prednisone/prednisolone</b> 2 mg/kg/dose x 1 (max 50 mg/dose)</p> <p><b>Parenteral route</b></p> <p><b>hydrocortisone sodium succinate</b>                      8mg/kg/dose IV or IM (max 400 mg/dose) x1, then 5mg/kg/dose (max 400 mg/dose) q6h</p> <p><b>MAGNESIUM SULFATE</b></p> <p><b>magnesium sulfate (requires cardiorespiratory monitoring and frequent BP checks)</b>                      50 mg/kg/dose IV x 1 (max 2 g/dose), give over 20-30 min</p> <p>†Small volume nebulizer is an acceptable alternate.</p>	<table border="1"> <thead> <tr> <th>Criteria</th> <th>Description</th> <th>Score</th> </tr> </thead> <tbody> <tr> <td rowspan="3">O<sub>2</sub> saturation</td> <td>≥ 95%</td> <td>0</td> </tr> <tr> <td>92-94%</td> <td>1</td> </tr> <tr> <td>&lt; 92%</td> <td>2</td> </tr> <tr> <td rowspan="2">Suprasternal retraction</td> <td>Absent</td> <td>0</td> </tr> <tr> <td>Present</td> <td>2</td> </tr> <tr> <td rowspan="2">Scalene muscle contraction</td> <td>Absent</td> <td>0</td> </tr> <tr> <td>Present</td> <td>2</td> </tr> <tr> <td rowspan="4">Air entry *</td> <td>Normal</td> <td>0</td> </tr> <tr> <td>↓ at the base</td> <td>1</td> </tr> <tr> <td>↓ at the apex and the base</td> <td>2</td> </tr> <tr> <td>Minimal or absent</td> <td>3</td> </tr> <tr> <td rowspan="4">Wheezing ‡</td> <td>Absent</td> <td>0</td> </tr> <tr> <td>Expiratory only</td> <td>1</td> </tr> <tr> <td>Inspiratory (± expiratory)</td> <td>2</td> </tr> <tr> <td>Audible without stethoscope or silent chest (minimal or no air entry)</td> <td>3</td> </tr> <tr> <td colspan="2"><b>PRAM score : (max. 12)</b></td> <td></td> </tr> <tr> <td><b>Score</b></td> <td>0-3</td> <td>4-7</td> <td>8-12</td> </tr> <tr> <td><b>Severity</b></td> <td>Mild</td> <td>Moderate</td> <td>Severe</td> </tr> </tbody> </table>	Criteria	Description	Score	O <sub>2</sub> saturation	≥ 95%	0	92-94%	1	< 92%	2	Suprasternal retraction	Absent	0	Present	2	Scalene muscle contraction	Absent	0	Present	2	Air entry *	Normal	0	↓ at the base	1	↓ at the apex and the base	2	Minimal or absent	3	Wheezing ‡	Absent	0	Expiratory only	1	Inspiratory (± expiratory)	2	Audible without stethoscope or silent chest (minimal or no air entry)	3	<b>PRAM score : (max. 12)</b>			<b>Score</b>	0-3	4-7	8-12	<b>Severity</b>	Mild	Moderate	Severe
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**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, registered respiratory therapists and other healthcare providers, in deciding on the appropriate care required for a particular patient. At all times, physicians, nurses, registered 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 Lung Health Foundation document to specific pharmaceutical products as examples does not imply endorsement of any of these products. The views expressed are the views of the authors and do not necessarily reflect those of the Government of Ontario. Copyright © 2021 Lung Health Foundation. All rights reserved.

\* 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, irrespectively of their location (RUL, RML, RLL, LUL, LLL), will determine the rating of the criterion.

# EMERGENCY DEPARTMENT ASTHMA CLINICAL PATHWAY PEDIATRIC: 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 Pediatric Respiratory Assessment Measure (PRAM) assessment.

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

## INTRODUCTION

This is a proactive tool that provides considerations for asthma management based on the Pediatric Respiratory Assessment Measure (PRAM)<sup>1,2</sup>, 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, the Canadian Thoracic Society 2012 guideline update: Diagnosis and management of asthma in preschoolers, children and adults, the Canadian Thoracic Society and Canadian Paediatric Society 2015 position paper: Diagnosis and management of asthma in preschoolers, and other evidence from subsequent publications.

## INSTRUCTIONS

1. **TRIAGE** to determine patient eligibility for clinical pathway.
2. **Determine initial PRAM score** (see below).
3. **Nurse/RT** to begin Pediatric Emergency Department Asthma Clinical Pathway Medical Directive **OR Physician/NP** 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 order set for more information.
6. **Physician/Nurse Practitioner** to complete Patient Discharge Prescription.
7. **Physician/NP/RN/RT/Pharmacist** to review "Education Checklist" and "Discharge Instructions" with patient.

## Pediatric Respiratory Assessment Measure (PRAM)

Signs/Scoring	0	1	2	3	Patient's Score
O <sub>2</sub> saturation (in room air)	≥ 95%	92-94%	< 92%		(max 2)
Suprasternal retraction	Absent		Present		(max 2)
Scalene muscle contraction	Absent		Present		(max 2)
Air entry*	Normal	<b>decreased</b> at the base	<b>decreased</b> at the apex and base	Minimal or absent	(max 3)
Wheezing§	Absent	Expiratory only	Inspiratory (± expiratory)	Audible without stethoscope or silent chest (minimal or no air entry)	(max 3)

\*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 TOTAL SCORE:**

**(MAX 12)**

PRAM Score 0 – 3 **MILD** Asthma  
 PRAM Score 4 – 7 **MODERATE** Asthma  
 PRAM Score 8 –12 **SEVERE** Asthma  
**IMPENDING RESPIRATORY FAILURE** is based on clinical presentation

1 Chalut, D. S., Ducharme, F.M., & Davis, G. M. (2000). The Preschool Respiratory Assessment Measure (PRAM): A responsive index of acute asthma severity. The Journal of Pediatrics, 137 (6), 762- 768. 2

2 Ducharme, F., Chalut, D., Plotnick, L. et al. (2008). The Pediatric Respiratory Assessment Measure: A Valid Clinical Score for Assessing Acute Asthma Severity from Toddlers to Teenagers. The Journal of Pediatrics, 152 (4), 476-480.e1.

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EMERGENCY DEPARTMENT  
ASTHMA CLINICAL PATHWAY  
PEDIATRIC: 1 to 17 years  
ORDER SET

Drug Allergies: \_\_\_\_\_ Ht: \_\_\_\_\_ cm Wt: \_\_\_\_\_ kg

**MILD ASTHMA**

(PRAM Score 0 to 3 or \*FEV<sub>1</sub> greater than 70% of predicted or personal best, if known)

Refer to Medication Guidelines on Reverse

Transcription  
+ Nursing Notes

- physician to assess within 60 min
- HR, RR, SpO<sub>2</sub>, PRAM q 60 min

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

β<sub>2</sub>-agonist:

- salbutamol metered dose inhaler (MDI) with spacer (preferred): \_\_\_\_\_ puffs NOW and q 60 min PRN, (wait 30 sec and shake MDI between puffs)
- OR  salbutamol nebule: \_\_\_\_\_ mg NOW and q 60 min PRN
- OR  salbutamol solution (5 mg/mL): \_\_\_\_\_ mg in 3 mL NaCl 0.9% NOW and q 60 min PRN

**Additional Orders:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

MD Name	Signature	Date	Time
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**AFTER FIRST HOUR OF TREATMENT**

β<sub>2</sub>-agonist:

- salbutamol MDI with spacer (preferred): \_\_\_\_\_ puffs q 60 min PRN (wait 30 sec and shake MDI between puffs)
- OR  salbutamol nebule: \_\_\_\_\_ mg q 60 min PRN
- OR  salbutamol solution (5 mg/mL): \_\_\_\_\_ mg in 3 mL NaCl 0.9% q 60 min PRN

**Additional Orders:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**AT DISCHARGE OR ADMISSION, complete a consultation referral form for:** \_\_\_\_\_

- Respiratory Therapist
- Asthma Educator
- Specialist/Service \_\_\_\_\_

MD Name	Signature	Date	Time
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Nurse Name	Signature	Date	Time
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## MEDICATION GUIDELINES: MILD ASTHMA

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

**β<sub>2</sub>-agonist (salbutamol): one initial dose, then q 60 min PRN :**

*Preferred:* salbutamol metered dose inhaler (MDI): 100 mcg/puff + age-appropriate spacer  
(wait 30 seconds and shake MDI between puffs)

**Dose:** Less than 20 kg: 5 puffs/dose  
Greater than or equal to 20 kg: 10 puffs/dose

*Alternative:* salbutamol nebule or 5 mg/mL solution (add NaCl 0.9% for total volume 3-4 mL)

**Dose:** Less than 20 kg: dose = 2.5 mg; use 2.5 mg nebule OR 0.5 mL of 5mg/mL solution in 3 – 4 mL NaCl 0.9%  
Greater than or equal to 20 kg: dose = 5 mg; use 2 x 2.5 mg nebule OR 5 mg nebule OR  
1 mL of 5 mg/mL solution in 3 – 4 mL NaCl 0.9%

(MDI preferred over nebulizer because of increased efficiency, decreased side effects: tachycardia, tremor and decreased risk of transmission of respiratory infections)

### Reassess Vital Signs and PRAM every 60 minutes

If PRAM is greater than or equal to 4 or \*FEV<sub>1</sub> 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<sub>1</sub> is greater than or equal to 70% of predicted or personal best, if known:

- MD to consider discharge
- Provide asthma teaching
- Provide discharge instructions

\*FEV<sub>1</sub> (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 healthcare personnel trained in spirometry. NOTE: FEV<sub>1</sub> 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 FEV<sub>1</sub> 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 © 2021, Lung Health Foundation. All rights reserved. Without the prior written permission of the Lung Health Foundation, any and all copying, reproduction, distortion, mutilation, modification, or the authorization of any such acts is strictly prohibited. January 2021

EMERGENCY DEPARTMENT
ASTHMA CLINICAL PATHWAY
PEDIATRIC: 1 to 17 years
ORDER SET

Drug Allergies: \_\_\_\_\_ Ht: \_\_\_\_\_ cm Wt: \_\_\_\_\_ kg

MODERATE ASTHMA

(PRAM Score 4 to 7 or \*FEV1 50-70% of predicted or personal best, if known)

Refer to Medication Guidelines on Reverse

Transcription + Nursing Notes

- physician to assess within 30 min
HR, RR, SpO2, PRAM every 30 min x 1 hr, then q 30-60 min until PRAM less than 4
administer oxygen to keep SpO2 greater than or equal to (>=) 92%

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

Beta-agonist and anticholinergic:

- salbutamol metered dose inhaler (MDI) with spacer (preferred): \_\_\_\_\_ puffs AND ipratropium bromide MDI: 3 puffs q 20 min x 3 doses; (alternate medications, after last ipratropium bromide puff, wait 30 sec and shake MDI between salbutamol puffs)
OR salbutamol nebulized (nebule or 5 mg/mL solution): \_\_\_\_\_ mg MIXED WITH 250 mcg ipratropium bromide (125 mcg/mL or 250 mcg/mL) q 20 min x 3 doses

Oral Corticosteroid, AS SOON AS POSSIBLE, within 60 (SIXTY) min of triage:

- dexamethasone: \_\_\_\_\_ mg (0.6 mg/kg/dose; max 12 mg) PO x 1 dose
OR predniSONE: \_\_\_\_\_ mg (2 mg/kg/dose; max 50 mg) PO x 1 dose
OR predniSLONE: \_\_\_\_\_ mg (2 mg/kg/dose; max 50 mg) PO x 1 dose

AFTER FIRST HOUR OF TREATMENT

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

- salbutamol MDI with spacer (preferred): \_\_\_\_\_ puffs q \_\_\_\_\_ min and q \_\_\_\_\_ min PRN (wait 30 sec and shake MDI between puffs)
OR salbutamol nebule: \_\_\_\_\_ mg q \_\_\_\_\_ min and q \_\_\_\_\_ min PRN

DISCHARGE ORDERS (use Asthma Action Plan with prescription)

AT DISCHARGE OR ADMISSION, complete a consultation referral form for:

- Respiratory Therapist Asthma Educator Specialist/Service \_\_\_\_\_

Additional Orders: \_\_\_\_\_

MD Name Signature Date Time

Nurse Name Signature Date Time

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 © 2021, Lung Health Foundation. All rights reserved. Without the prior written permission of the Lung Health Foundation, any and all copying, reproduction, distortion, mutilation, modification, or the authorization of any such acts is strictly prohibited. January 2021

## MEDICATION GUIDELINES: MODERATE ASTHMA

(PRAM Score 4-7 or \*FEV<sub>1</sub> 50% to 70% of predicted or personal best, if known)

### **β<sub>2</sub>-agonist (salbutamol) q 20 min x 3 doses, then q 30-60 min PRN**

*Preferred:* salbutamol metered dose inhaler (100 mcg/puff + age-appropriate spacer (wait 30 sec and shake between puffs))

**Dose:** Less than 20 kg: 5 puffs/dose  
Greater than or equal to 20 kg: 10 puffs/dose

*Alternative:* salbutamol nebule or 5 mg/mL solution (add NaCl 0.9% for total volume 3-4 mL)

**Dose:** Less than 20 kg: dose = 2.5 mg; use 2.5 mg nebule OR 0.5 mL of 5mg/mL solution in 3 – 4 mL NaCL 0.9%  
Greater than or equal to 20 kg: dose = 5 mg; use 2 x 2.5 mg nebule OR 5 mg nebule OR 1 mL of 5 mg/mL solution in 3 – 4 mL NaCL 0.9%

(MDI preferred over nebulizer because of increased efficiency, decreased side effects: tachycardia, tremor and decreased risk of transmission of respiratory infections)

### AND

### **Anticholinergic (ipratropium bromide):**

*Preferred:* ipratropium bromide MDI (20 mcg/puff) + age-appropriate spacer: 3 puffs/dose q 20 min x 3 doses

*Alternative:* ipratropium bromide nebule or solution (125 mcg/mL or 250 mcg/mL):  
250 mcg q 20 min x 3 doses; mix with salbutamol; add NaCl 0.9% for a total volume of 3-4 mL

### PLUS

### **Oral Corticosteroid AS SOON AS POSSIBLE, within 60 (SIXTY) minutes of triage:**

dexamethasone: (0.6 mg/kg/dose; max 12 mg) PO x 1 dose

OR predniSONE: (2 mg/kg/dose; max 50 mg) PO x 1 dose

OR prednisoLONE: (2 mg/kg/dose; max 50 mg) PO x 1 dose

### **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** \*FEV<sub>1</sub> 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 \*FEV<sub>1</sub> 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 \*FEV<sub>1</sub> is greater than or equal to 70% of predicted or personal best, if known:

- MD to consider discharge
- provide asthma teaching
- provide discharge instructions

\*FEV<sub>1</sub> (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 healthcare personnel trained in spirometry. NOTE: FEV<sub>1</sub> 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 FEV<sub>1</sub> 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 © 2021, Lung Health Foundation. All rights reserved. Without the prior written permission of the Lung Health Foundation, any and all copying, reproduction, distortion, mutilation, modification, or the authorization of any such acts is strictly prohibited. January 2021

**EMERGENCY DEPARTMENT  
ASTHMA CLINICAL PATHWAY  
PEDIATRIC: 1 to 17 years  
ORDER SET**

Drug Allergies: \_\_\_\_\_ Ht: \_\_\_\_\_ cm Wt: \_\_\_\_\_ kg

**SEVERE ASTHMA**

**(PRAM Score 8 to 12 or \*FEV<sub>1</sub> less than 50% of predicted or personal best, if known)**

Refer to Medication Guidelines on Reverse

Transcription  
+ Nursing Notes

- physician to assess urgently  
 administer oxygen to keep S<sub>p</sub>O<sub>2</sub> greater than or equal to (≥) 92%  
 HR, RR, S<sub>p</sub>O<sub>2</sub>, PRAM q 20 min for 1 hour until PRAM less than 8, then q 30-60 min  
 continuous cardiopulmonary monitoring  
 blood gas:  arterial OR  capillary OR  venous  
 IV access:  saline lock OR  \_\_\_\_\_

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

β<sub>2</sub>-agonist and anticholinergic:

- salbutamol metered dose inhaler (MDI) with spacer: \_\_\_\_\_ puffs AND ipratropium bromide MDI with spacer (preferred): 3 puffs q 20 min x 3 doses; (alternate medications, after last ipratropium bromide puff, wait 30 sec and shake MDI between salbutamol puffs)  
 OR  salbutamol nebulized (nebule or 5 mg/mL solution): \_\_\_\_\_ mg MIXED WITH 250 mcg ipratropium bromide (125 mcg/mL or 250 mcg/mL) q 20 min x 3 doses

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

- dexamethasone: \_\_\_\_\_ mg (0.6 mg/kg/dose; max 12 mg) PO x 1 dose  
 OR  predniSONE: \_\_\_\_\_ mg (2 mg/kg/dose; max 50 mg) PO x 1 dose  
 OR  predniLONE: \_\_\_\_\_ mg (2 mg/kg/dose; max 50 mg) PO x 1 dose  
 OR  Hydrocortisone sodium succinate IV/IM: \_\_\_\_\_ mg (8 mg/kg/dose; max 400 mg/dose) x 1 dose  
**NOW then**  
 Hydrocortisone sodium succinate IV/IM: \_\_\_\_\_ mg (5 mg/kg/dose; max 400 mg/dose) q6h

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

- magnesium sulfate IV: \_\_\_\_\_ mg (50 mg/kg/dose; max 2 g/dose x 1 dose NOW; give over 20-30 min

**Note: may cause severe hypotension - check BP q 5 min during infusion and for 30 minutes after dose end**

If allergic reaction suspected, consider IM epinephrine

- epinephrine: \_\_\_\_\_ mg (0.01 mg/kg/dose IM, MAX 0.5 mg. Use 1 mg/ml formulation.)

**AFTER FIRST HOUR OF TREATMENT**

β<sub>2</sub>-agonist:

- salbutamol MDI with spacer (preferred): \_\_\_\_\_ puffs q \_\_\_\_\_ min and q \_\_\_\_\_ min PRN (wait 30 sec and shake MDI between puffs)  
 OR  salbutamol nebule: \_\_\_\_\_ mg q \_\_\_\_\_ min and q \_\_\_\_\_ min PRN  
 OR  salbutamol solution (5 mg/mL): \_\_\_\_\_ mg in 3 - 4 mL NaCl 0.9% q \_\_\_\_\_ min and q \_\_\_\_\_ min PRN

**AT DISCHARGE OR ADMISSION, complete a consultation referral form for:**

- Respiratory Therapist  Asthma Educator  Specialist/Service \_\_\_\_\_

MD Name

Signature

Date

Time

Nurse Name

Signature

Date

Time

## MEDICATION GUIDELINES: SEVERE ASTHMA

(PRAM Score 8 to 12 or \*FEV<sub>1</sub> less than 50% of predicted or personal best, if known)

### β<sub>2</sub>-agonist (salbutamol) q 20 min x 3 doses, then q 20-60 min PRN

*Preferred:* salbutamol metered dose inhaler (MDI) 100 mcg/puff + age-appropriate spacer (wait 30 sec and shake MDI between puffs)

**Dose:** Less than 20 kg: 5 puffs/dose  
Greater than or equal to 20 kg: 10 puffs/dose

*Alternative:* continuous nebulization with oxygen: salbutamol nebule or 5 mg/mL solution (add NaCl 0.9% for total volume 3-4 mL)

**Dose:** Less than 20 kg: dose = 2.5 mg; use 2.5 mg nebule OR 0.5 mL of 5mg/mL solution in 3 – 4 mL NaCL 0.9%  
Greater than or equal to 20 kg: dose = 5 mg; use 2 x 2.5 mg nebule OR 5 mg nebule OR 1 mL of 5 mg/mL solution in 3 – 4 mL NaCL 0.9%

(MDI preferred over nebulizer because of increased efficiency, decreased side effects: tachycardia, tremor and decreased risk of transmission of respiratory infections)

### AND

#### Anticholinergic (ipratropium bromide) q 20 minutes x 3 doses:

*Preferred:* ipratropium bromide MDI (20 mcg/puff) + age-appropriate spacer: 3 puffs/dose q 20 min x 3 doses

*Alternative:* ipratropium bromide nebule or solution (125 mcg/mL or 250 mcg/mL):  
250 mcg q 20 min x 3 doses; mix with salbutamol; add NaCl 0.9% for a total volume of 3-4 mL

### PLUS

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

dexamethasone: (0.6 mg/kg/dose; max 12 mg) PO x 1 dose  
OR predniSONE: (2 mg/kg/dose; max 50 mg) PO x 1 dose  
OR predniSLONE: (2 mg/kg/dose; max 50 mg) PO x 1 dose  
If there is a concern about reliability of oral route:  
hydrocortisone sodium succinate IV/IM: 8 mg/kg/dose (max 400 mg /dose) NOW;  
then 5 mg/kg/dose (max 400 mg/dose) q6h

#### If not improving, consider:

**Magnesium sulfate:** 50 mg/kg/dose IV ONCE (max 2 g/dose) over 20-30 minutes

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

#### If allergic reaction suspected, consider:

**epinephrine:** 0.01 mg/kg/dose IM, MAX 0.5 mg. Use 1 mg/mL formulation

#### 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 4 or \*FEV<sub>1</sub> 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

\*FEV<sub>1</sub> (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: FEV<sub>1</sub> 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 FEV<sub>1</sub> 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 © 2021, Lung Health Foundation. All rights reserved. Without the prior written permission of the Lung Health Foundation, any and all copying, reproduction, distortion, mutilation, modification, or the authorization of any such acts is strictly prohibited. January 2021

**EMERGENCY DEPARTMENT  
ASTHMA CLINICAL PATHWAY  
PEDIATRIC: 1 to 17 years  
ORDER SET**

**Drug Allergies:** \_\_\_\_\_ **Ht:** \_\_\_\_\_ **cm** **Wt:** \_\_\_\_\_ **kg**

**IMPENDING RESPIRATORY FAILURE**

**Lethargy, Cyanosis, Decreasing Respiratory Effort and/or Rising PCO2**

*Refer to Medication Guidelines on Reverse*

Transcription  
+ Nursing Notes

- 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, SpO<sub>2</sub>, PRAM q 15 min
- obtain IV access (if not already done): fluid \_\_\_\_\_ rate of infusion \_\_\_\_\_
- NPO
- blood gas:  arterial **OR**  capillary **OR**  venous
- 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**

*β2-agonist and anticholinergic:*

- salbutamol nebulized (nebulizer or 5mg/mL solution): \_\_\_\_\_ mg MIXED WITH 250 mcg ipratropium bromide (125 mcg/mL or 250 mcg/mL), continuously with oxygen, add NaCl 0.9% for a total volume of 3 to 4 ml. After 1st hour, continuous nebulized salbutamol

PLUS Systemic Corticosteroid AS SOON AS POSSIBLE after first salbutamol/ipratropium dose

- hydrocortisone sodium succinate IV/IM: \_\_\_\_\_ mg (8 mg/kg/dose; max 400 mg/dose) x 1 dose NOW then \_\_\_\_\_ mg (5 mg/kg/dose; max 400 mg/dose) q6h

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

- magnesium sulfate IV: \_\_\_\_\_ mg (50 mg/kg/dose; max 2 g/dose) x 1 dose NOW: give over 20 to 30 minutes

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

If allergic reaction suspected, consider IM epinephrine

- epinephrine: \_\_\_\_\_ mg (0.01 mg/kg/dose IM, MAX 0.5 mg. Use 1 mg/ml formulation.)

**AT DISCHARGE OR ADMISSION, complete a consultation referral form for:**

- Respiratory Therapist
- Asthma Educator
- Specialist/Service \_\_\_\_\_

**ADDITIONAL ORDERS:** \_\_\_\_\_

MD Name \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_

Nurse Name \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_

## MEDICATION GUIDELINES: IMPENDING RESPIRATORY FAILURE

### Lethargy, Cyanosis, Decreasing Respiratory Effort and/or Rising PCO<sub>2</sub>

#### **Bronchodilators (β<sub>2</sub>-agonist and Anticholinergic):**

continuous nebulization with oxygen; physician to reassess as necessary

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

Less than 20 kg: dose = 2.5 mg; use 2.5 mg nebule OR 0.5 mL of 5mg/mL solution in 3 – 4 mL NaCL 0.9%

Greater than or equal to 20 kg: dose = 5 mg; use 2 x 2.5 mg nebule OR 5 mg nebule OR

1 mL of 5 mg/mL solution in 3 – 4 mL NaCL 0.9%

AND

ipratropium bromide nebule or solution (125 mcg/mL or 250 mcg/mL):

250 mcg/dose; mix with salbutamol, add NaCL 0.9% for total volume of 3 - 4 mL

#### **PLUS**

#### **Systemic Corticosteroid, AS SOON AS POSSIBLE after first bronchodilator dose:**

Hydrocortisone sodium succinate IV/IM: 8 mg/kg/dose (max 400 mg /dose) NOW; then 5 mg/kg/dose (max 400 mg/dose) q6h

#### **If not improving:**

#### **Magnesium sulfate:**

50 mg/kg/dose IV ONCE (max 2 g/dose); give over 20-30 minutes

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

If allergic reaction suspected, consider IM epinephrine

epinephrine 0.01 mg/kg/dose IM, MAX 0.5 mg. Use 1 mg per mL formulation.

**EMERGENCY DEPARTMENT  
ASTHMA CLINICAL PATHWAY  
PEDIATRIC: 1 to 17 years  
EDUCATION CHECKLIST**

## Patient Education Checklist

Initials &amp; Comments

### Learning Goals Reviewed with Patient

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

#### 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 5 to 10 times (higher end for younger patients). 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:

**a. Relievers** (e.g. Airomir®, Apo-Salvent®, Bricanyl®, Novo-salmol®, salbutamol, or Ventolin®)  
– (often blue containers)

- Relax smooth muscle around airways
- Rapid relief

**b. Controllers** (e.g. Advair®, Alvesco®, Arnuity™, Ellipta®, Asmanex®, Flovent®, Pulmicort®, QVAR™, Symbicort®, or Zenhale®)

- Treat airway inflammation and mucus;
- Need to be taken **daily** even when feeling well

**c. Oral Steroids** (e.g. dexamethasone, prednisone or prednisolone)

- Treats severe airway inflammation and mucous
- Short term therapy

#### 6. Arrange regular follow-up within 2 – 7 days

- Family Physician, Pediatrician, Asthma Educator, Specialist

#### 7. Asthma Action Plan and Prescription

- Given and explained
- If no drug plan, refer to Social Work or Trillium Fund (available through most pharmacies)

#### 8. Provide asthma booklet from hospital or the Lung Health Foundation

\_\_\_\_\_  
Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Status

\_\_\_\_\_  
Date (YYYY/MM/DD)

\_\_\_\_\_  
Time

# Emergency Department Asthma Action Plan & Prescription (Pediatric 1-17 years)

**Prescriber :** Complete & initial beside selected orders.

**Pharmacist :** Label short-acting (reliever) inhaler as "take as directed per Asthma Action Plan". Fill other medications as directed by physician

**NAME :** \_\_\_\_\_

**DATE :** \_\_\_\_\_ **WEIGHT :** \_\_\_\_\_ **kg**

## Go: Maintain Therapy

### DESCRIPTION

You/your child has **ALL** of the following:

- Use of reliever puffer **no more than** 3 times per week\*
- Daytime symptoms (cough, wheeze or breathing problems) **no more than** 3 times per week\*
- Ability to do physical activity (playing, running, or sports) without difficulty
- No nighttime asthma symptoms
- Not missing regular activities or school
- No symptoms of a cold

\*1 time a week if 1 to 5 years old.



### INSTRUCTIONS

#### Controller medicine

- Flovent® 125 mcg/puff, 1 puff twice daily (≥ 12 months)
- Alvesco® 200 mcg/puff, 1 puff once daily (≥ 6 years)
- QVAR® 100 mcg/puff, 1 puff twice daily (≥ 5 years)
- Other: \_\_\_\_\_  
(Rx: 1 inhaler, Refill 3)

#### Reliever medicine (blue puffer)

- Salbutamol (Ventolin® 100 mcg/puff) 2 puffs every 4 to 6 hours
- Salbutamol (Ventolin® 100 mcg/puff) before exercise 2 puffs as needed
- Other: \_\_\_\_\_  
(Rx: 1 inhaler, Refill 3)

#### Spacer device

- 0-18 months
- 1-5 years
- Mouthpiece for 5 years and older  
(Rx: 1 device, Refill 1)

## Caution: Step Up Therapy

### DESCRIPTION

You/your child has **ANY** of the following:

- Use your reliever puffer **more than** 3 times per week\*
- Daytime symptoms (cough, wheeze or breathing problems) **more than** 3 times per week\*
- Difficulty with physical activity (playing, running or sports)
- Asthma symptoms 1 or more nights per week
- Missing regular activities or school
- Symptoms of a cold

\*1 time a week if 1 to 5 years old.



### INSTRUCTIONS

- Take blue reliever 2 to 4 puffs every 4 hours as needed, and:
- Continue to take your **Go: Maintain Therapy** medications
- If reliever puffer is needed consistently every 4 hours, or if there is no improvement in your symptoms in 2-3 days, contact your healthcare provider

## Stop: Get Help Now

### DESCRIPTION

You/your child has **ANY** of the following:

- Reliever puffer lasts **less than** 3 hours
- "Pulling in" of skin in the neck/between or below ribs
- Feeling very short of breath
- Difficulty talking
- Continuous wheeze or cough



### INSTRUCTIONS

**Take blue reliever 4-6 puffs every 15-20 minutes and:  
Call 911 or go directly to the emergency department**  
Asthma can be a life-threatening illness - **DO NOT WAIT!**  
Bring this asthma action plan with you to the emergency department

**!** Today your child was seen in the **Emergency Department** for a significant asthma exacerbation. To treat this attack :

- Continue your **controller** medicine, AND
  - Take your **reliever** medicine (blue puffer) \_\_\_\_\_ puffs every 4 to 6 hours as needed
- AND for all moderate or severe exacerbations, MD/NP to choose one of the following to start next day :
- Dexamethasone \_\_\_\_\_ mg (0.6mg/kg, MAX 12mg) daily for 1 day (Refill 0) **OR**
  - Prednisolone **OR** Prednisone \_\_\_\_\_ mg (1 mg/kg, MAX 50mg) daily for 4 days (Refill 0)

Tablet/liquid may be dispensed as per patient preference. Tablet can be crushed and added to small amount of food.

Additional Instructions:

Schedule appointment with :  Family doctor  Asthma educator  Specialist **WITHIN 2-7 DAYS**

**Prescriber :** \_\_\_\_\_ **License # :** \_\_\_\_\_ **Signature :** \_\_\_\_\_ **Date :** \_\_\_\_\_

# Pediatric Asthma Action Plan

(Pediatric 1-17 years)

**The goal of asthma treatment is to live a healthy, active life.**

This Asthma Action Plan outlines steps for you to self-manage asthma when you start having more symptoms. Your healthcare provider might also change your usual asthma treatment according to the level of asthma control over time. Review all symptoms and this plan regularly with your healthcare provider.

## Asthma Triggers



**Colds** are the most common trigger - wash hands often



**Smoking** or being in a house or a car where someone smokes



**Fumes, chemicals and strong scents**

Check the Air Quality Health Index before you leave home: [airhealth.ca](http://airhealth.ca)

## Allergies may be triggering your asthma

Follow the instructions below if you are allergic to any of these :  
(have allergy skin testing if you are unsure)



**Pets with fur or feathers** - If you have pets, wash them regularly and keep them out of bedrooms.



**Pollen and grass** - Try to stay inside on high pollen days and avoid freshly cut grass.



**Dust and dust mites** - Wash bedsheets in hot water and vacuum with a HEPA filter or central vacuum regularly; consider mattress and pillow covers.



**Mould** - Keep bathroom and basement dry, clean visible mould, avoid decomposing leaves in the fall.

## Simple ways to take care of your asthma

- Avoid triggers
- Know your medication and how and when to take it
- Take controller medications regularly
- Follow your action plan
- Always have your reliever medication with you
- Use appropriate spacer (holding chamber) with metered dose inhaler



## How to avoid another emergency visit

An emergency room visit is a sign that your (child's) asthma is not well controlled.

Schedule a follow-up appointment with your healthcare provider

**within the next 2-7 days to review:**

- control of asthma symptoms
- regular use of asthma medications
- correct inhaler technique
- how to avoid asthma triggers

This asthma action plan was adapted from Gupta S, et al. Respiration 2012; 84(5):406-15. Pictograms in the asthma action plan were adapted from Tulloch J., et. al. Can Respir J. 2012 Jan-Feb;19(1):26-31 Instructions were designed to align with: Ducharme FM, Dell SD, Radhakrishnan D, et al. Diagnosis and management of asthma in preschoolers: A Canadian Thoracic Society and Canadian Paediatric Society position paper. Can Respir J 2015; 22(3):135-143 and Lougheed MD, Lemiere C, Ducharme F, et al. Canadian Thoracic Society 2012 guideline update: Diagnosis and management of asthma in preschoolers, children and adults. Can Respir J 2012; Vol 19(2), 127-64.

For information on how this action plan was developed, or to download a copy of this action plan and/or for associated resources, please visit <https://hcp.lunghealth.ca/programs-tools/clinical-tools/>

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# MEDICAL DIRECTIVE AND/OR DELEGATION TEMPLATE

Template for Use by Physicians or Authorizers with Ordering Authority

Title : **Emergency Department Asthma Medical Directive  
– Pediatric Age 1 to 17**

Number : \_\_\_\_\_  
(set by hospital)

Activation Date : \_\_\_\_\_  
(set by hospital)

Review due by : \_\_\_\_\_  
(set by hospital)

Sponsoring/Contact Person(s) : \_\_\_\_\_  
(name, position, contact particulars) (hospital based site champion e.g. professional practice advisor(s), clinical educator)

Order and/or Delegated Procedure:

Appendix Attached

Yes

No

Title: **Appendix B - Flowchart**

- Supplemental oxygen to keep SaO<sub>2</sub> at 92% or greater.
- salbutamol: metered dose inhaler (MDI) with spacer device (100 mcg/puff) 5 or 10 puffs per dose or nebulized 2.5 mg or 5 mg per dose in 3-4 mL NaCl 0.9%, 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.
- 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. Alternate with salbutamol (if MDI) or mixed with salbutamol (if nebulized). See flowchart (Appendix B) for specific number of doses and frequency.
- dexamethasone: 0.6 mg/kg to a maximum of 12 mg PO once, OR predniSONE: 2 mg/kg to a maximum of 50 mg PO once, OR predniLONE: 2 mg/kg to a maximum of 50 mg PO once as soon as possible following first salbutamol/ ipratropium dose: 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.
- Spirometry (FEV<sub>1</sub>) or Peak Expiratory Flow (PEF) in children 6 years and over, performed by healthcare personnel trained in spirometry. See flowchart (Appendix B).

Recipient Patients:

Appendix Attached

Yes

No

Title: **Appendix A - Severity of Asthma Exacerbation**

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 Pediatric Respiratory Assessment Measure (PRAM) assessment (Appendix A).

Exclusion Criteria:

ED visit for prescription refill only.

Authorized Implementers:

Appendix Attached

Yes

No

Title:

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.

<b>Indications and Contraindications:</b>	<b>Appendix Attached</b>	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<b>Title:</b>
<p><u>Indications:</u>  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 Pediatric Respiratory Assessment Measure (PRAM) score.</p> <p><u>Contraindications:</u>  Re: medical directive in whole  <input checked="" type="checkbox"/> if patient has any active chronic conditions other than asthma, suspend medical directive and obtain physician assessment and orders for care.  Re: salbutamol  <input checked="" type="checkbox"/> heart rate greater than 200 beats/min; and/or  <input checked="" type="checkbox"/> allergic to salbutamol <input checked="" type="checkbox"/> hold salbutamol and proceed with rest of medical directive. Obtain physician assessment as soon as possible.  Re: ipratropium bromide  <input checked="" type="checkbox"/> allergic to ipratropium bromide <input checked="" type="checkbox"/> hold ipratropium bromide and proceed with rest of medical directive  Re: dexamethasone, predniSONE, prednisoLONE  <input checked="" type="checkbox"/> patient unable to take medication via oral route <input checked="" type="checkbox"/> request physician assessment and orders and proceed with remainder of medical directive.  <input checked="" type="checkbox"/> patient with active or suspected incubation of chickenpox infection <input checked="" type="checkbox"/> hold dexamethasone, predniSONE or prednisoLONE and proceed with rest of medical directive. Obtain physician assessment as soon as possible.  <input checked="" type="checkbox"/> patient allergic to dexamethasone, predniSONE, or prednisoLONE <input checked="" type="checkbox"/> hold dexamethasone, predniSONE or prednisoLONE and proceed with rest of medical directive. Obtain physician assessment as soon as possible.  Re: spirometry (FEV<sub>1</sub>) or Peak Expiratory Flow (PEF) – not available in most emergency departments  <input checked="" type="checkbox"/> FEV<sub>1</sub> (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 FEV<sub>1</sub> 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 <input checked="" type="checkbox"/> proceed with assessment and treatment based on the PRAM.  NOTE: Do not delay PRAM assessment or treatment to obtain FEV<sub>1</sub>, or PEF</p>				

<b>Consent:</b>	<b>Appendix Attached</b>	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<b>Title:</b>
<p>Consent (verbal and/or implied) must be provided by patient or substitute decision maker prior to commencing medical directive.</p>				

<b>Guidelines for Implementing the Order/ Procedure:</b>	<b>Appendix Attached</b>	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<b>Title:</b>
<p>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 Pediatric Emergency Department Asthma Clinical Pathway (Asthma Pathway).</p> <p>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.</p> <p>Dosage, frequency and choice of medication will be determined by the patient's weight and degree of respiratory distress as described in the Asthma Pathway appended to this medical directive.</p> <p>The Physician will be notified immediately at any time if the patient is not responding or is deteriorating with the planned treatment.</p> <p>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.</p>				

<b>Documentation and Communication:</b>	<b>Appendix Attached</b> <input type="checkbox"/> Yes <input type="checkbox"/> No
	<b>Title:</b>

<b>Review and Quality Monitoring Guidelines:</b>	<b>Appendix Attached</b> <input type="checkbox"/> Yes <input type="checkbox"/> No
	<b>Title:</b>

<b>Administrative Approvals (as applicable):</b>	<b>Appendix Attached</b> <input type="checkbox"/> Yes <input type="checkbox"/> No
	<b>Title:</b>

<b>Approving Physician(s) / Authorizer(s):</b>	<b>Appendix Attached</b> <input type="checkbox"/> Yes <input type="checkbox"/> No
	<b>Title:</b>

## Emergency Department Pediatric Asthma Medical Directive

### Appendix A: Severity of asthma exacerbation

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

Signs/Scoring	0	1	2	3	Patient's Score
O <sub>2</sub> saturation (in room air)	≥ 95%	92-94%	< 92%		_____ (max 2)
Suprasternal retraction	Absent		Present		_____ (max 2)
Scalene muscle contraction	Absent		Present		_____ (max 2)
Air entry*	Normal	<b>decreased</b> at the base	<b>decreased</b> at the apex and base	Minimal or absent	_____ (max 3)
Wheezing†	Absent	Expiratory only	Inspiratory (± expiratory)	Audible without stethoscope or silent chest (minimal or no air entry)	_____ (max 3)
<b>PRAM TOTAL SCORE :</b>					<b>_____ (MAX 12)</b>

\* 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

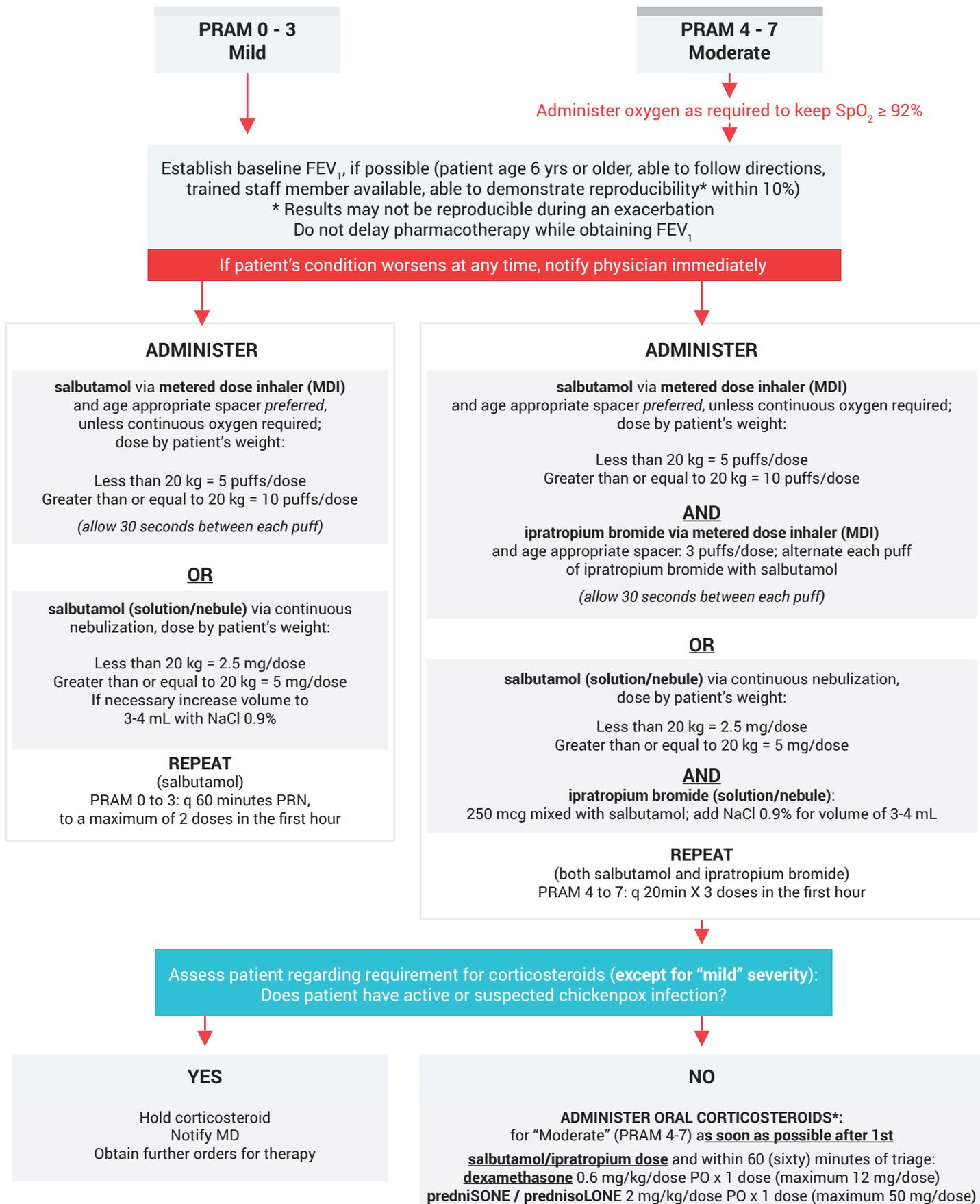
**IMPENDING RESPIRATORY FAILURE** is based on clinical presentation

#### References:

Chalut, D. S., Ducharme, F. M., & Davis, G. M. (2000). The Preschool Respiratory Assessment Measure (PRAM): A responsive index of acute asthma severity. *The Journal of Pediatrics*, 137 (6), 762-768.

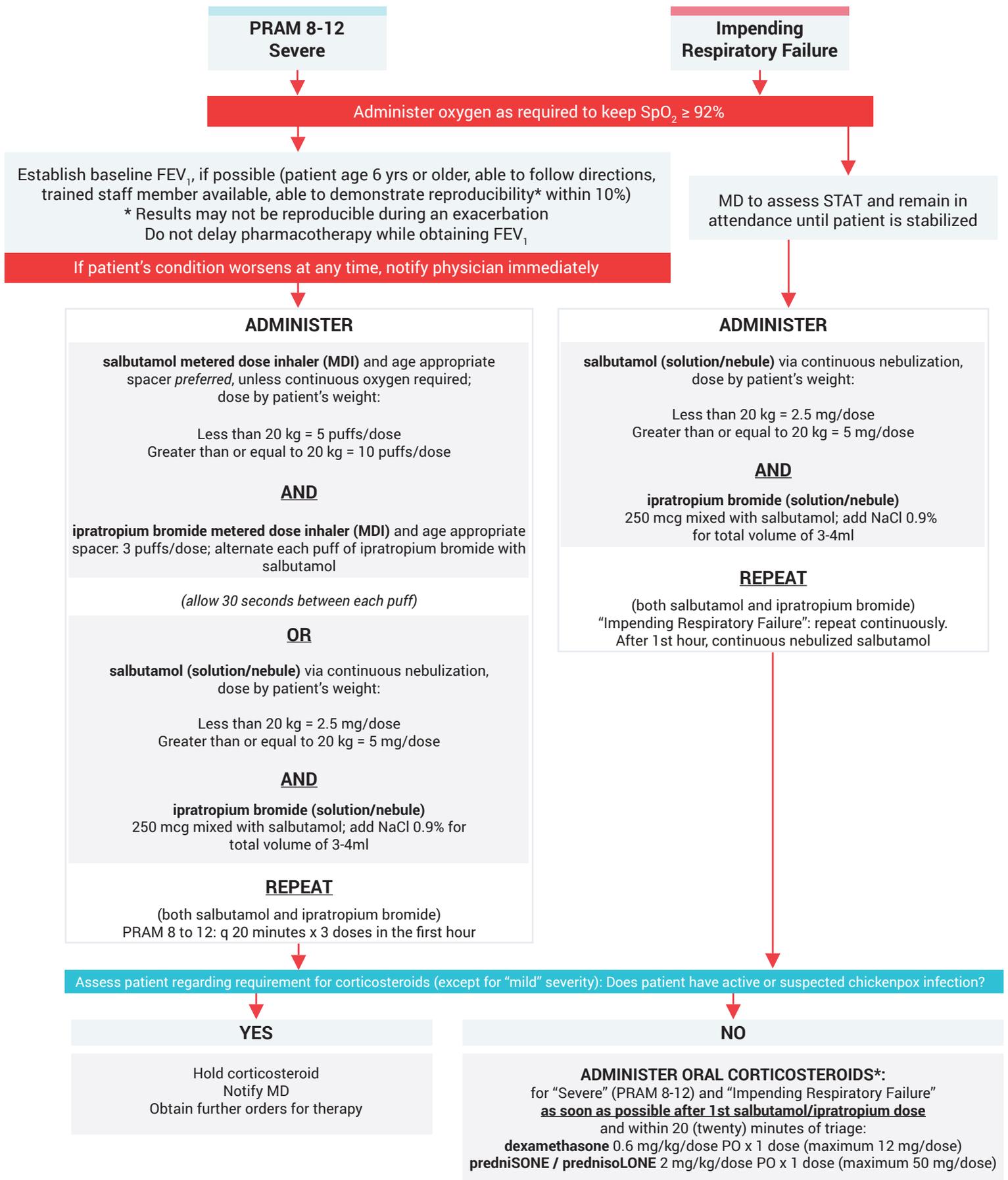
Ducharme, F., Chalut, D., Plotnick, L., et al. (2008). The Pediatric Respiratory Assessment Measure: A Valid Clinical Score for Assessing Acute Asthma Severity from Toddlers to Teenagers. *The Journal of Pediatrics*, 152 (4), 476-480.e1.

**Emergency Department Pediatric Asthma Medical Directive**  
**Appendix B: Medical Directive Flowchart (page 1 of 2)**



\*if patient unable to take medication via oral route, notify MD immediately

**Emergency Department Pediatric Asthma Medical Directive**  
**Appendix B: Medical Directive Flowchart (page 2 of 2)**



\*if patient unable to take medication via oral route, notify MD immediately