

# Provincial Clinical Knowledge Topic

## *Asthma, Adult – Emergency*

### V 1.1

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### Revision History

Version	Date of Revision	Description of Revision	Revised By
1.0	March 2017	Topic completed and disseminated	See <a href="#">Acknowledgements</a>
1.1	October 2017	<p>Table 2: Continued smoking removed as risk factor</p> <p>Figure 1: change PEFR to PEF</p> <p>Medications:</p> <ul style="list-style-type: none"> <li>- salbutamol neb solution dose changed to 2.5 to 5 mg</li> <li>- Hydrocortisone added to 'Systemic Corticosteroids'</li> <li>- Guidance added for use of 'Inhaled Corticosteroids'</li> </ul> <p>Disposition Planning</p> <ul style="list-style-type: none"> <li>- Point 1. Changed to Considerations for admission (or continued observation)</li> </ul>	Dr Hall, Sarah Searle

## Important Information Before You Begin

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

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

## Goals of Management

1. Early treatment with special attention to patients who are at high risk of asthma-related death
2. Ventilatory support (invasive or non-invasive) in the critically ill decompensating patient
3. Correction of severe hypoxemia
4. Rapid reversal of airflow obstruction and inflammation via early treatment with bronchodilators, corticosteroids, and adjunctive therapies
5. Appropriate disposition decision-making

## Clinical Decision Support

### Clinical Assessment Tools

<b>Severity</b>	<b>Mild</b>	<b>Moderate</b>	<b>Severe</b>	<b>Life Threatening</b>
<b>Symptoms</b>	Dyspnea with activity	Dyspnea interferes with or limits usual activity	Dyspnea at rest, interferes with conversation	Too dyspneic to speak
<b>Physical Exam</b>	Usually no accessory muscle use; moderate wheeze	Accessory muscle use common; loud wheezes	Accessory muscle use; loud wheezes; usually agitated;	Paradoxical thoracoabdominal movement; drowsy; absent wheezes
<b>PEF (% predicted.)</b>	Greater than 70%	40 to 69%	Less than 40%	Less than 25% (but typically not measured)
<b>Heart Rate (HR)</b>	Less than 100 bpm	100 to 120 bpm	Greater than 120 bpm	Greater than 120 bpm, but may be bradycardic
<b>O<sub>2</sub> Sat (room air)</b>	Greater than 95%	90 to 95%	May be less than 90%	Less than 90%
<b>PaCO<sub>2</sub></b>	Less than 42 mmHg	Less than 42 mmHg	Greater than or equal to 42 mmHg	Greater than or equal to 42 mmHg

<ul style="list-style-type: none"> <li>• Previous ventilation, ICU admissions, or hypercapneic asthma attacks</li> <li>• Previous admissions for asthma especially if in the last year</li> <li>• Requiring multiple classes of asthma medication</li> <li>• Heavy / increasing reliance on beta-2 (<math>\beta_2</math>) agonists</li> <li>• Repeated attendances at ED for asthma care especially if in the last year</li> <li>• Pattern of sudden attacks</li> <li>• Poor adherence with medications for asthma</li> <li>• Older age</li> <li>• Poor perception of breathlessness</li> <li>• Current or recent use of systemic corticosteroids</li> <li>• Not currently using inhaled corticosteroids</li> <li>• Lack of asthma action plan</li> <li>• Psychological dysfunction (psychosis, anxiety, depression)</li> <li>• Socioeconomic factors (family discord, low income, ethnicity)</li> </ul>
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**Table 3: Predictors of Admission in acute asthma**<sup>3</sup>

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- Age (older = higher risk)
  - More than 8 puffs salbutamol used in previous 24 hrs
  - CTAS score 1 or 2
  - Respiratory rate greater than 22 / min at presentation
  - Oxygen saturation less than 95% on room air at presentation
  - Previous admissions for asthma in the past 2 years
- 

### Initial Decision Making

1. Assess severity of current exacerbation (see [Table 1](#))
  - Focussed history and physical examination as above
  - Early assessment of PEF / FEV<sub>1</sub> when clinically feasible
2. Initiate intubation / mechanical ventilation when indicated (see [Table 4](#); [Figure 1](#))
  - Maximize medical therapies prior to intubation when possible
  - Intubation technique must take into account that sedative and paralytic agents may result in unanticipated hemodynamic collapse in patients with severe asthma. Intubation must be approached cautiously by the most experienced personnel available. Ventilation strategies also require specialized attention.
  - The role of non-invasive positive pressure ventilation in asthma is poorly defined. Ideal candidates are likely those exhibiting persistent airflow obstruction and respiratory fatigue but with otherwise stable vital signs and respiratory parameters. Use should be highly selective and performed by individuals with expertise in this area.
3. Initiate medical therapy in accordance with illness severity (see [Figure 1](#))
  - Assess response to therapy; escalate as appropriate
4. Determine disposition based on response to ongoing therapy (see [Figure 1](#))

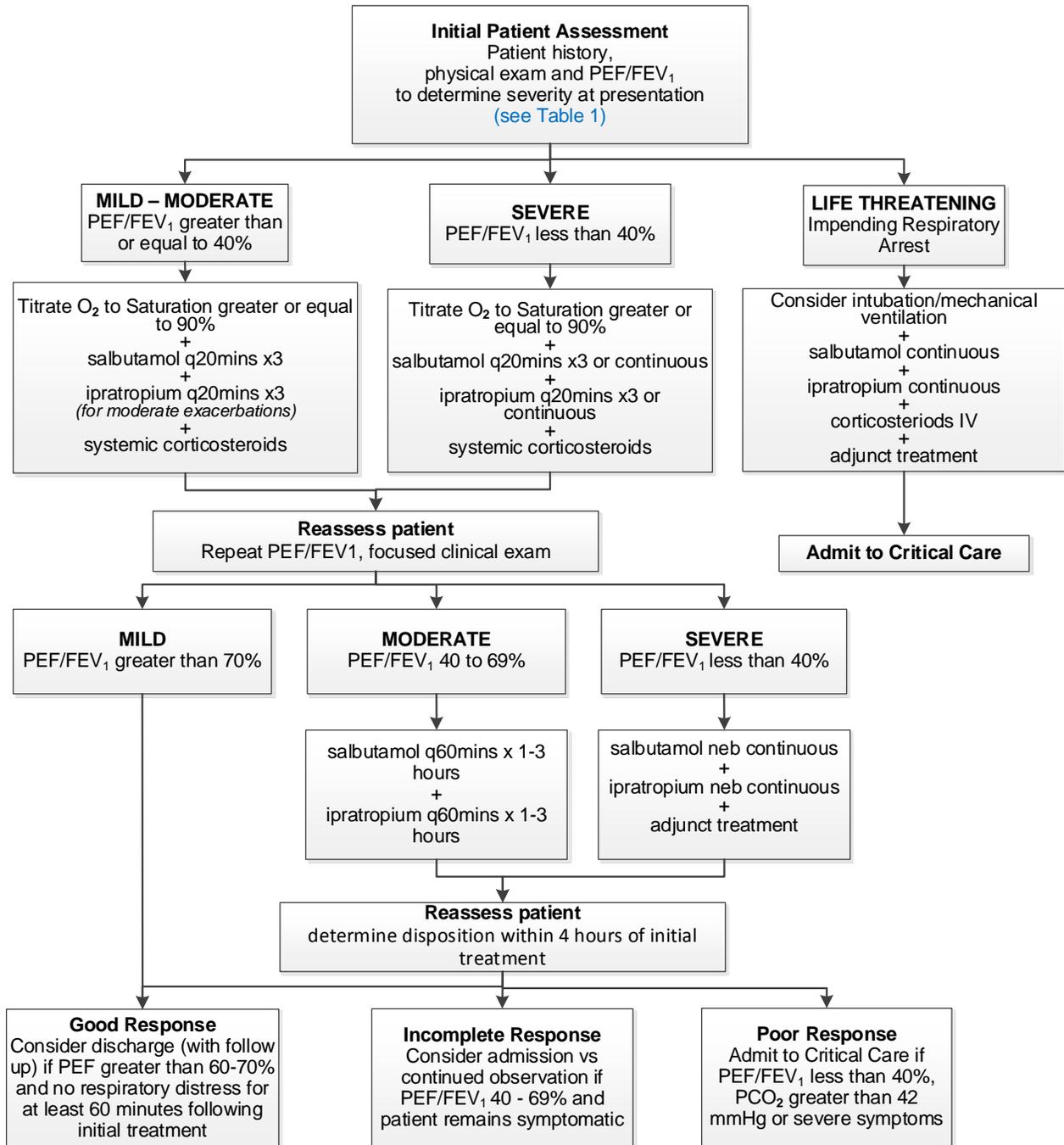
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**Table 4: Indications for intubation in severe asthma**<sup>4</sup>

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- deteriorating LOC
  - exhaustion / fatiguing respiratory efforts / silent chest
  - onset / progression of hypercarbia
  - cyanosis / inability to maintain oxygenation with noninvasive means
  - persistent severe acidemia (pH less than 7.10)
  - hemodynamic instability
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**Figure 1: Asthma Clinical Pathway**



Adapted from: National Lung, Heart, and Blood Institute National Asthma Education and Prevention Program. Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma, 2007

## Order Set: Asthma Adult Emergency Department Orders

**Order Set Keywords:** Dyspnea; Wheezing

**Order Set Requirements:** Allergies

**Risk Assessment / Scoring Tools / Screening:** [see Clinical Decision Support](#)

### Goals of Care Designation

- Goals of Care Designation: \_\_\_\_\_

### Intravenous Therapy (*consider in severe cases only*)

- Intravenous Cannula – Insert: Initiate IV  
 IV Peripheral Saline Flush/Lock: Saline Lock

#### IV Bolus or Rapid infusion

- 0.9% sodium chloride infusion \_\_\_\_\_ mL as fast as possible  
 \_\_\_\_\_ (specify fluid) \_\_\_\_\_ mL IV as fast as possible

#### Maintenance IV Solutions

- 0.9% NaCl infusion at \_\_\_\_\_ mL/hour  
 D5W - 0.9% NaCl infusion at \_\_\_\_\_ mL/hour  
 D5W - 0.45% NaCl infusion at \_\_\_\_\_ mL/hour  
 Other: \_\_\_\_\_ at \_\_\_\_\_ mL/hour

### Lab Investigations

**Lab investigations are not indicated in the majority of asthma exacerbations; reserve for severe cases or those requiring admission.**

#### Hematology

- Complete Blood Count (CBC)

#### Chemistry

- Electrolytes (Na, K, Cl, CO<sub>2</sub>)  
 Glucose Random  
 Creatinine

#### Blood Gases

*Consider if SpO<sub>2</sub> less than 92% or other signs of severe / life-threatening asthma*

- Blood Gas Arterial – Room Air  
 Blood Gas Arterial – Current Therapy  
 Blood Gas Venous (*Caution!! Accuracy of results is affected by tourniquet use. Draw sample without a tourniquet*)

#### Urine Tests

- Urine Dipstick Testing – POCT  
 Pregnancy Test, Urine – POCT

## Diagnostic Investigations

### Lung Function Measurement

- Peak Expiratory Flow Rate – Bedside: Peak Expiratory Flow (PEF) or FEV<sub>1</sub>
  - pre-treatment or upon arrival to the Emergency Department
  - every 1 hour post treatment with bronchodilators
  - at discharge

### General Radiography

*Consider CXR in acute asthma when clinical presentation suspicious for pneumonia, pneumothorax, or severe illness / poor response to treatment.*

*NOT routinely required for uncomplicated asthma exacerbations.*

- X-Ray Chest, 2 Projections: PA and Lateral (GR Chest, 2 Projections)
- X-Ray Chest, Portable, 1 Projection (GR Chest, 1 Projection)

### Other

*Consider ECG if suspected myocardial ischemia or cardiac arrhythmia*

- Electrocardiogram - 12 Lead (ECG)

## Medications

### Bronchodilators

*All MDI should be used with a holding chamber. Immediately before each use, shake inhaler well.*

*Ipratropium is indicated in moderate to severe exacerbations only*

- salbutamol MDI 4 puffs every 20 minutes x 3 doses
- salbutamol MDI 4 puffs every 60 minutes PRN for wheeze x 3 doses
- salbutamol MDI \_\_\_\_\_ puffs \_\_\_\_\_
- ipratropium MDI 4 puffs every 20 minutes x 3 doses
- ipratropium MDI 4 puffs every 60 minutes PRN for wheeze x 3 doses
- ipratropium MDI \_\_\_\_\_ puffs \_\_\_\_\_

*Nebulizers should be used when the patient is hypoxic (a peripheral oxygen saturation [O<sub>2</sub> Sat] of less than 85% on room air), severely dyspneic, or unable to follow directions for chamber use*

- salbutamol neb solution 2.5 to 5 mg via nebulizer every 20 minutes x 3 doses
- salbutamol neb solution 2.5 to 5 mg via nebulizer every 60 minutes PRN for wheeze x 3 doses
- salbutamol neb solution \_\_\_\_\_ mg via nebulizer \_\_\_\_\_
- ipratropium bromide neb solution 0.5 mg via nebulizer every 20 minutes x 3 doses
- ipratropium bromide neb solution 0.5 mg via nebulizer every 60 minutes PRN for wheeze x 3 doses
- ipratropium bromide neb solution \_\_\_\_\_ mg via nebulizer \_\_\_\_\_

### Systemic Corticosteroids

*Systemic corticosteroids are indicated in all acute asthma exacerbations.*

*Oral and parenteral agents are considered equivalent; consider IV administration if actively vomiting, too dyspneic to swallow, severe exacerbations, or high likelihood of requiring airway intervention.*

- predniSONE 50 mg PO once
- hydrocortisone (Solu-CORTEF) 250 mg IV x 1 dose
- methylprednisolone (Solu-MEDROL) 40 mg IV once

### Inhaled Corticosteroids

*Inhaled corticosteroids (CS) in ED may reduce admission rates but recent evidence is conflicting.*

*Consider ICS as an **adjunct** therapy in patients who have failed initial management with bronchodilators and systemic corticosteroids and who might otherwise be admitted.*

- fluticasone 500 mcg inhaled every 20 minutes x 1 hour

### Other Adjunctive Therapies

*Consider magnesium sulfate in moderate/severe exacerbations with persistent airflow obstruction despite maximal medical therapy*

- magnesium sulphate 2 g IV over 20 minutes

*Consider epinephrine in severe airflow obstruction if allergic asthma suspected*

- epiNEPHrine 0.3 mg IM once
- epiNEPHrine 0.1 mg IV once given over 10 to 15 minutes

### Patient Care

#### Diet / Nutrition

- NPO
- NPO – May Have Sips, May Take Meds
- Clear Fluids
- Regular Diet
- Other Diet : \_\_\_\_\_

#### Vital Signs

*These orders need to be re-evaluated when the patient stabilizes or by two hours, whichever occurs first.*

- Vital Signs
  - Frequency as per provincial guideline default
  - every \_\_\_\_\_ hourly
  - every \_\_\_\_\_ minute(s)
- Continuous cardiac monitoring

#### Respiratory Care

*If oxygen saturation is already greater than 90%, typically no supplemental oxygen is required*

- O<sub>2</sub> Therapy – titrate to maintain saturation greater than or equal to 90%

#### Consults

- Consult respirology / pulmonary medicine
- Consult hospitalist
- Consult internal medicine
- Consult critical care / ICU

## Disposition Planning

1. Considerations for admission (or continued observation)
  - Life-threatening or near-fatal asthma attack
  - Asthma that does not resolve after four hours of aggressive treatment
  - Concerns remain about symptoms, previous history or psychosocial issues
  - See [Table 3](#) for predictors of admission in acute asthma
2. Considerations for admission to Intensive Care
  - Decreasing PEF
  - Persisting or worsening hypoxia
  - Hypercapnia
  - Arterial blood gas analysis showing fall in pH or rising pCO<sub>2</sub>
  - Exhaustion, feeble respiration
  - Drowsiness, confusion, altered conscious state
  - Respiratory arrest
3. Considerations for discharge
  - Adequate oxygenation
  - Good response of airflow obstruction to treatment (ideally PEF and/or FEV<sub>1</sub> greater than 70% predicted, but recognizing some patients may have baseline values lower than this)
  - Patient able to manage symptom burden as an outpatient and reliable / able to return if deteriorating
4. Discharge Medications
  - Continue predniSONE 50 mg daily for 5 to 10 days
  - Initiate inhaled corticosteroid (ICS) if not already taking<sup>15</sup>
  - Evaluate for addition of combination agents (ICS/long-acting β<sub>2</sub>-agonist {LABA}) in patients with frequent exacerbations despite adequate ICS therapy
5. Outpatient follow-up
  - Follow up with primary care provider within the next 1 to 2 weeks
6. Patient education / discharge instructions
  - If questions or concerns call Health Link
  - For additional resources visit [www.ab.lung.ca](http://www.ab.lung.ca)
  - Patient Care Handouts:
    - [Asthma Attack: Care Instructions](#)
    - [Asthma: Your Action Plan](#)
    - [Learning About Asthma Triggers](#)

## Rural Considerations

1. Availability of non-invasive ventilation (NIV) and mechanical ventilators and familiarity with ventilation technique in severe asthma
2. Out of hospital transport times for patients exhibiting severe respiratory distress and/or deterioration
3. Lower threshold for observation / admission due to distance from emergency care

## Analytics

1. Key Outcomes
  - Clinical
    - Reduced proportion of patients requiring admission
    - Reduced need for ventilator support (NIV / intubation)
    - Reduced time to MD assessment for moderate – severe exacerbations
    - Reduced rates of unplanned return to ED for asthma within 72hours of discharge
  - Process
    - Early identification of acute asthma exacerbation at triage
    - Use of PEF and / or FEV<sub>1</sub>
    - Time to corticosteroid (CS) and SABA / SAAC administration
    - Use of MDI instead of nebulizers
  - Patient Experience
    - Received early treatment as per asthma pathway to improve subjective symptom relief
2. Data Elements for Capture
  - Patient demographics
  - CEDIS presenting complaint and CTAS score
  - ED time markers (triage to physician, physician to consult and then to admission or physician to discharge) and outcome markers (identified as clinical decision unit patient (CDU), consulted for admission, admitted to ICU or ward, died)
  - ED diagnoses for asthma using ICD-10 (J45)
  - Site and Zone identifiers
  - Time to bronchodilator use (salbutamol, ipratropium) and dosing / schedule used
  - Time to steroid use (predniSONE, hydrocortisone, methylPREDNISisolone), dosage, duration
  - NIV use
  - Intubation + mechanical ventilation use
  - Discharge destination (home, home care, respiratory outreach, family physician)
  - Discharge medications (SABA, ICS, systemic CS)
3. Proposed Reports
  - Number (%) of ED patients triaged as asthma and frequency this order set is applied

- Number (%) of ED patients (by site/zone/hospital type or location [e.g. inner city]) for whom this order set is applied and frequency of early steroid use
- Number (%) of ED patients (by site/zone/hospital type or location [e.g. inner city]) for whom PEF and/or FEV<sub>1</sub> measurements were recorded
- Number (%) of ED asthma patients (by site/zone/hospital type or location [e.g. inner city]) treated with NIV and/or were intubated
- Number (%) of ED asthma patients (by site/zone/hospital type or location [e.g. inner city]) admitted from the ED to ward / ICU
- ED Length of stay for admitted and discharged patients with acute asthma
- 72-hour 'unplanned' ED return visits for asthma

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## Acknowledgements

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

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*Thank you to the following clinicians who participated in the colleague review process. Your time spent reviewing the knowledge topics and providing valuable feedback is appreciated. Dawn Peta, Elan Heinrichs, Lori Jordens, Margaret Dymond, Brian Rowe, Brian Holroyd, Jennifer Nicol, Kristine Smith.*

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