Pediatric Severe Asthma Algorithm

For children age ≥ 12 months

**Recognition of Severe Asthma (age ≥12 months)**

**Severe Respiratory Difficulty**
- Pediatric Resp Assessment Measure (PRAM) Score ≥8
- Increased work of breathing (WOB), wheeze or silent chest, cough

**Impending Respiratory Failure**
- Lethargy, cyanosis, decreasing respiratory effort and/or rising PCO₂
  
  *May not have asthma diagnosis or previous wheeze*

**PRAM Scoring Table**

<table>
<thead>
<tr>
<th>SIGNS</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suprasternal indrawing</td>
<td>Absent</td>
<td>Present</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scalenae retractions</td>
<td>Absent</td>
<td>Present</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheezing</td>
<td>Absent</td>
<td>Expiratory only</td>
<td>Inspiratory &amp; expiratory</td>
<td>Audible wheeze / silent chest / minimal air entry</td>
</tr>
<tr>
<td>Air entry</td>
<td>Normal</td>
<td>Decreased at bases</td>
<td>Widespread decrease</td>
<td>Absent / minimal</td>
</tr>
<tr>
<td>O₂ Saturation (R/A)</td>
<td>&gt;94%</td>
<td>92 – 94%</td>
<td>&lt;92%</td>
<td></td>
</tr>
</tbody>
</table>

**Initial Management**

- Continuous cardiopulmonary monitoring
- Administer oxygen to maintain SpO₂ >92%
- Administer salbutamol + ipratropium q20 min x 3 consecutive treatments, via nebulizer or metered dose inhaler (MDI) as per table below:

<table>
<thead>
<tr>
<th>Weight</th>
<th>Salbutamol</th>
<th>Ipratropium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 20 kg</td>
<td>MDI: 5 puffs OR</td>
<td>MDI: 4 puffs OR</td>
</tr>
<tr>
<td></td>
<td>Nebule: 2.5 mg</td>
<td>Nebule: 250 mcg</td>
</tr>
<tr>
<td>Greater than or equal to 20 kg</td>
<td>MDI: 10 puffs OR</td>
<td>MDI: 4 puffs OR</td>
</tr>
<tr>
<td></td>
<td>Nebule: 5 mg</td>
<td>Nebule: 250 mcg</td>
</tr>
</tbody>
</table>

- Administer oral steroid as soon as possible
  - Dexamethasone 0.6 mg/kg (MAX 12 mg)
- Assess perfusion, consider IV access and fluids
- If impending respiratory failure administer:
  - Magnesium sulfate 50 mg/kg IV (MAX 2 g) over 20 min; check BP q5 min during infusion, then q30 min

**Reassess vitals and SpO₂, WOB, perfusion and PRAM score**

**PRAM Score 4 – 7 (Improved)**

- Continue salbutamol q30–60 min PRN
- Monitor closely for any clinical deterioration
- Assess need for admission/transfer at 4 hours post steroid administration and discuss with Pediatric Referral Site
- Ensure adequate hydration via PO/IV fluids

**PRAM 8 or IMPENDING RESPIRATORY FAILURE**

- Continuous nebulized salbutamol at above doses
- IV access x 2; IO access if 2 failed IV attempts
  - IV NS bolus 20 mL/kg over 15 min
  - Administer (if not already given):
    - IV steroid: Hydrocortisone 8 mg/kg IV (MAX 400 mg)
    - Magnesium sulfate 50 mg/kg IV (MAX 2 g) over 20 min; check BP q5 min during infusion, then q30 min
    - Consider IM epinephrine if allergy suspected
      - Dose: 0.01 mg/kg (1 mg/mL), MAX 0.5 mg
      - Consider CXR

**Management of Respiratory Failure**

**STEPWISE STRATEGY:**
1. Administer high flow O₂, if available
2. CPAP MIN 5 cm H₂O (MAX 10 cm H₂O)
3. Transition to BIPAP if needed, PEEP min 5 cm H₂O, keeping a minimum delta P of 5
- Assess for pneumothorax/barotrauma
- Intubation is a high-risk procedure and is rarely required

**Pediatric Referral Centre Discussion**

**CONSIDERATION OF:**
- Airway management
- Difficult vascular access
- Persistent/severe resp distress/impending resp failure
- Concern for underlying cardiac problem
- Pneumothorax or other barotrauma

**CAUTION!**

- Avoid intubation
- Magnesium sulfate may cause severe hypotension
  - Decrease infusion rate and treat with bolus fluids
- Consider other diagnoses if clinical status deteriorates with fluid administration (myocarditis/cardiogenic shock)
- Consider pneumothorax in patients who deteriorate/Fail to improve

**Discuss with Pediatric Referral Centre**