# Acute Asthma Exacerbation

<table>
<thead>
<tr>
<th>Asthma</th>
<th>Asthma Exacerbation</th>
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</thead>
<tbody>
<tr>
<td>A common, chronic inflammatory disorder of the airways characterized by reversible airflow obstruction, airway hyper-responsiveness, and recurring symptoms of wheezing, coughing, chest tightness, and shortness of breath.</td>
<td>A potentially life-threatening acute worsening of symptoms causing significant distress necessitating attention by healthcare professionals or administration of systemic corticosteroids.</td>
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</tbody>
</table>

- **Common triggers:** viral respiratory tract infections, suboptimal baseline control of asthma, and allergen exposures.
- **Asthma exacerbations** are the leading cause of pediatric hospitalizations and account for 3-7% of pediatric ED visits.
- 50% of children presenting to the ED with an asthma exacerbation are < 5 years old.

## Immediate & Objective Assessment of the Asthma Exacerbation Severity

### Clinical Features for the Different Classifications of Asthma Severity

<table>
<thead>
<tr>
<th>MENTAL STATUS</th>
<th>MILD</th>
<th>MODERATE</th>
<th>SEVERE</th>
<th>IMPENDING RESP. FAILURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>Normal activity, exertional dyspnea</td>
<td>↓ activity, ↓ feeding (infants)</td>
<td>↓ activity, stops feeding</td>
<td>Drowsy, confused (signs of cerebral hypoxemia)</td>
</tr>
<tr>
<td>SPEECH</td>
<td>Normal speech</td>
<td>Speaks in phrases</td>
<td>Speaks in words</td>
<td>Unable to speak</td>
</tr>
<tr>
<td>WORK OF BREATHING</td>
<td>Minimal intercostal retractions</td>
<td>Intercostal and substernal retractions</td>
<td>Significant respiratory distress. Involves all accessory muscles, nasal flaring, paradoxical thoraco-abdominal movement.</td>
<td>Marked respiratory distress at rest. Involves all accessory muscles, nasal flaring, paradoxical thoraco-abdominal movement.</td>
</tr>
<tr>
<td>CHEST AUSCULTATION</td>
<td>Moderate wheeze</td>
<td>Pan-expiratory and inspiratory wheeze</td>
<td>Audible wheeze without stethoscope</td>
<td>Silent chest (no air entry), absence of wheeze</td>
</tr>
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</table>

### Pediatric Respiratory Assessment Measure (PRAM) Scoring

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Description</th>
<th>Score</th>
<th>Important tips</th>
</tr>
</thead>
<tbody>
<tr>
<td>O₂ saturation</td>
<td>≥ 95%, 92-94%, &lt; 92%</td>
<td>0, 1, 2</td>
<td>The patient must be breathing room air for this measurement.</td>
</tr>
<tr>
<td>Suprasternal retractions</td>
<td>Absent</td>
<td>0</td>
<td>Visual assessment.</td>
</tr>
<tr>
<td></td>
<td>Present</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Scalene retractions</td>
<td>Absent</td>
<td>0</td>
<td>Palpable assessment, as scalenes are deep muscles that cannot be visualized.</td>
</tr>
<tr>
<td></td>
<td>Present</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Air entry</td>
<td>Normal at bases, widespread ↓</td>
<td>0, 1</td>
<td>Use lung fields to grade air entry. If asymmetric, the rating is determined by the most severely affected field.</td>
</tr>
<tr>
<td></td>
<td>Minimal or absent</td>
<td>2, 3</td>
<td>≥ 2 auscultation zones must be affected. If there is asymmetry, the rating is determined by the most severely affected zones.</td>
</tr>
<tr>
<td>Wheezing</td>
<td>Absent, Expiratory only, Inspiratory ± expiratory</td>
<td>0, 1, 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Audible without stethoscope or silent chest (no air entry)</td>
<td>3</td>
<td></td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>PRAM Score</th>
<th>Severity</th>
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<tbody>
<tr>
<td>0-3</td>
<td>MILD</td>
</tr>
<tr>
<td>4-7</td>
<td>MODERATE</td>
</tr>
<tr>
<td>8-12</td>
<td>SEVERE</td>
</tr>
</tbody>
</table>
**MILD**
- Keep O₂ sats ≥ 94%
- Salbutamol q20 mins x 1-3 doses
- Consider inhaled corticosteroids (ICS)

**MODERATE**
- Keep O₂ sats ≥ 94%
- Salbutamol q20 mins x 3 doses
- Oral steroids (prednisone, prednisolone, dexamethasone)
- Consider ipratropium x 3 doses in 1 hour

**SEVERE**
- Keep O₂ sats ≥ 94%
- Consider 100% O₂
- Salbutamol and ipratropium x 3 doses
- Oral steroids
- Consider IV methylprednisolone, continuous aerosolized β2-agonist, IV MgSO₄
- Keep patient NPO

**IMPENDING RESPIRATORY FAILURE**
- Maintain O₂ sats ≥ 94%, non-rebreather mask with 100% O₂
- Continuous aerosolized salbutamol and ipratropium x 3 doses
- Keep patient NPO
- Establish IV access
- Continuous cardiac monitoring
- O₂ monitoring
- IV methylprednisolone
- Consider: IV MgSO₄, IV aminophylline, or IV salbutamol
- Blood gases, electrolytes
- Consider SC epinephrine
- If deteriorating, call PICU and consider rapid sequence intubation

Reassess the patient 1 hour after initial treatment & re-categorize severity.

Effective medical intervention decreases respiratory distress and improves oxygenation.

Reassess the patient & re-categorize severity. What is the severity after 2 hours of treatment?

**EMERGENCY DEPARTMENT DISCHARGE CRITERIA**
- Use of β2-agonist less often than q4 hours
- SpO₂ ≥ 94% on room air
- Improved air entry
- Minimal or no signs of respiratory distress

**FOLLOW-UP PLAN**
- Complete course of oral steroids
- Use of β2-agonist q4 hours, then pm
- Review inhaler techniques
- F/U with GP
- Referral to specialist if needed

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**ACUTE ASTHMA EXACERBATION**

**MANAGEMENT ALGORITHM**

**INITIAL ASSESSMENT**
- Vital signs, pulse oximetry
- Spirometry: peak flows should be compared to normal values or the child’s personal best, if known
- Focused medical history: previous meds, allergies, risk factors for ICU admission (previous ICU admissions, intubation, previous life-threatening asthma exacerbations, etc.)
- Physical exam: LOC, speech, activity, accessory muscle use, air entry, wheezing (see previous page)
- Categorize disease severity: Pediatric Respiratory Assessment Measure (PRAM) (see previous page)
- Ancillary tests, such as chest x-rays and blood gases, are not routinely recommended

**THE SEVERITY OF THE ASTHMA EXACERBATION DETERMINES THE INITIAL TREATMENT (1 HOUR)**

**MILD**
- Observe in the ED for 2 hours
- If no further treatment is required, continue ICS at home and follow-up with physician

**MODERATE**
- Keep O₂ sats ≥ 94%
- Salbutamol q1 hour
- Reassess in 2 hours

**SEVERE**
- Keep O₂ sats ≥ 94%
- Salbutamol q20 mins, until able to tolerate q1 hour
- Reassess frequently

**IMPENDING RESP. FAILURE**
- Same as above
- If deteriorating, call PICU and consider rapid sequence intubation

- Admit to Hospital

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