Comer Emergency Department (ED) Clinical Guidelines:
Asthma Acute Care

Physical Examination:
- Rapid cardiopulmonary assessment
- Evaluation of work of breathing
  - Asthma Score: 5 components scored 1-3 scale (see Asthma Severity Assessment)
    - Respiratory rate
    - Oxygen saturation (on room air if possible)
    - Auscultation
    - Retractions
    - Degree of Dyspnea
  - % Predicted Peak Flow in selected cases
- Evaluation of perfusion
- General physical examination for evidence of focal infection, hydration status

History:
- Determine primary clues as to the severity of the child’s asthma
  - Number of hospitalizations in past year, missed days of school
  - Ever been/number of times in the PICU or intubated
  - Last time/number of times on steroids
- Medications
  - Recent usage of quick relief medications (inhaler/neb use) over past 24hrs
  - Usual daily regimen when not sick
  - Taking adjunctive/prophylaxis medications (leukotriene inhib/inhaled steroid/cromolyn)
- Allergies/Triggers/allergens
- Fever, productive cough, history of pneumonia, immunocompromise, comorbidities

Diagnostic Evaluation:
- A CXR is generally not indicated unless there is a fever to R/O pneumonia, or severe respiratory distress to R/O some other unusual process (pneumothorax). However, all patients going to either the PICU OR stepdown should have a PCXR.
- A CBC with differential and blood culture may be helpful if the patient has a high fever or is ill in appearance, particularly if the patient is younger, or has other comorbidities or complicating factors. Not all patients with clinical pneumonias, however, require labwork. This is particularly true for older children (over 2 years) who are fully immunized, are well in appearance and have reliable parents with good followup.
- Blood gas analysis (ABG, CBG) is generally not necessary for tracking oxygenation, but is invaluable in terms of evaluating ventilation (pCO2) and acid-base balance (pH). It should be reserved for these specific questions.
- Attempts should be made to access the medical records. The electronic medical record often contains detailed clinic notes and discharge summaries with a wealth of information (i.e., lab summaries, discharge medications, dosages, prior complications).
Asthma Severity Assessment

Asthma Score

Circle the appropriate five clinical criteria to determine the Total Asthma Score.

<table>
<thead>
<tr>
<th>RESP RATE</th>
<th>1 Point</th>
<th>2 Points</th>
<th>3 Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;3 yrs</td>
<td>≤ 34</td>
<td>35-39</td>
<td>≥ 40</td>
</tr>
<tr>
<td>4-5 yrs</td>
<td>≤ 30</td>
<td>31-35</td>
<td>≥ 36</td>
</tr>
<tr>
<td>6-12 yrs</td>
<td>≤ 26</td>
<td>27-30</td>
<td>≥ 31</td>
</tr>
<tr>
<td>&gt; 12 yrs</td>
<td>≤ 23</td>
<td>24-27</td>
<td>≥ 28</td>
</tr>
<tr>
<td>O₂ SATURATION (Room Air)</td>
<td>&gt; 95%</td>
<td>90-95%</td>
<td>&lt; 90%</td>
</tr>
</tbody>
</table>

AUSCULTATION
- Nil to mild end-expiratory wheezing
- Expiratory wheezing
- Insp + Exp wheezing, or Diminished BS

RETRACTIONS
- None, or Intercostal
- Intercostal + Substernal
- Intercostal, Substernal, + Supraclavicular

DYSPNEA
- Speaks in sentences or coos and babbles
- Speaks in partial sentences, or utters short cries
- Speaks in single words or short phrases, or grunts


Severity Assessment

Circle the appropriate objective indicators for Severity of Asthma.

<table>
<thead>
<tr>
<th>Asthma Score</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Predicted Pk Flow</td>
<td>&gt; 70%</td>
<td>50-70%</td>
<td>&lt; 50%</td>
</tr>
</tbody>
</table>
Severity Stratification and Therapeutic Management:

- **MILD** (Asthma Score 5-7; Pk Flow > 70% predicted)
  - Albuterol 2.5mg nebulizer x 1
  - Prednisolone/prednisone 1-2mg/kg PO (max 60mg)
  - Asthma severity reassessment documented ½ hr following respiratory treatment
  - **DISPOSITION**: Likely discharge

- **MODERATE** (Asthma Score 8-11; Pk Flow 50-70% predicted)
  - Albuterol continuous (15mg/hr) x 1hr
  - Atrovent 1mg (added into first hour of continuous nebulization)
  - Prednisolone/prednisone 1-2mg/kg PO (max 60mg), or
  - Methylprednisolone (Solumedrol®) 1-2mg/kg IV (max 125mg) as initial dose
  - Consider MgSO4 if not improving after one hour of continuous nebs
  - If giving MgSO4, give IVF (20mg/kg 0.9NS) and reassess
  - Asthma severity reassessments documented ½ hr following the respiratory treatment, and at minimum every 2 hours until discharge/transfer
  - **DISPOSITION**: Likely needs several hours of respiratory tx’s ➔ **Admit to ER OBS Status**. If still needs ongoing treatment after 6-8 hours consider admission to COMER/Intermediate Unit
  - **Asthma Teaching** (verbal and written instructions with follow-up) given and documented if discharged

- **SEVERE** (Asthma Score 12-15; Pk Flow < 50% predicted)
  - IV access, oxygen, monitor
  - IVF’s. Most patients are relatively dehydrated due to decreased oral intake and increased insensible losses. An IV fluid bolus (20 cc/kg) should be given, may repeat if needed after assessment of child. Then place on maintenance IVF.
  - Albuterol continuous nebulization (15mg/hr)
  - Atrovent 1mg (added into first hour of continuous nebulization)
  - Prednisolone/prednisone 2mg/kg PO (max 60mg), or
  - Methylprednisolone (Solumedrol®) 1-2mg/kg IV (max 125mg) as initial dose
  - MgSO4 50mg/kg (2g max) IV over ½ hr.
    - Requires continues pulse oximetry and cardiac monitor.
    - May cause pain at the IV site. Pain may be decreased by using a larger bore IV catheter, increasing the rate of administration of a piggyback fluid, and/or by decreasing the actual rate of medication delivery.
    - Hypotension and weakness are rare in children at these doses.
  - Asthma severity reassessments documented ½ hr following the end of any respiratory treatment, and at minimum every hour until discharge/admission
  - **Consider Chest xray**
  - **Consider VBG/ABG**
  - **DISPOSITION**: Likely needs admission to Intermediate Unit or PICU. However, if improves significantly with treatment revert to Moderate Severity Pathway.
Comer Emergency Department (ED) Clinical Guidelines:
Asthma Acute Care

If not improving:
- Consider Epinephrine: 0.01 mg/kg IM (max 0.3mg)
  - Potent alpha and beta agonist (reserved for severe asthmatics)
- Consider Terbutaline: Requires both an IV bolus, and continuous drip infusion
  - Terbutaline bolus 2-10mcg/kg (max 300mcg) over 1-2min
  - Terbutaline drip 0.5-2.0 mcg/kg/min
  - High side-effect profile. Tolerated better in younger patients. Titrate to maximum tolerated heart rate for age. **Consider an EKG prior to starting terbutaline.**
  - Best reserved for those with markedly decreased air entry in whom inhaled beta agonists have limited absorption.
  - Consider Heliox (70:30 or 60:40 mix): Child must be able to tolerate FIO2 < 40%
  - Consider high flow oxygen
  - Consider BiPAP

- **CRITICAL/MORIBUND** (Refractory hypoxemia, progressive ventilatory failure or obtundation)
  - All of the above, and
  - Consider pneumothorax/tension pneumothorax (chest wall crepitations)
  - Consider the need for rapid sequence intubation and begin preparing for it.
  - **DISPOSITION:** Admission to PICU
Comer Emergency Department (ED) Clinical Guidelines:  
Asthma Acute Care

MILD  
(AS 5-7)  
(PF > 70%)

Albuterol 2.5mg neb x 1  
Prednisolone/Prednisone 1-2mg/kg PO (60mg max)

Re-Eval after ½ hr off neb

<table>
<thead>
<tr>
<th>Improved</th>
<th>No change or Worse</th>
</tr>
</thead>
<tbody>
<tr>
<td>(AS &lt; 7)</td>
<td>(AS &gt; 7)</td>
</tr>
<tr>
<td>Objectively/subjectively improved</td>
<td>Move to Moderate Algorithm</td>
</tr>
<tr>
<td>Back to baseline</td>
<td></td>
</tr>
</tbody>
</table>

Discharge
- Generally not a candidate for ER Obs Status (Discharge in less than 6-8hrs)
- Refill baseline inhalers/meds
- Give Rx for 4 days of prednisolone/prednisone (unless not indicated)
- Consider/assess for future prophylactic therapy (see NHLBI guidelines)
- Give written and verbal teaching instructions
- Ensure adequate follow-up
**MODERATE**

(AS 8-11)  
(PF 50-70%)

- Continuous Albuterol 15mg/hr x 1hr
- Atrovent® 1mg added into first neb
- Continuous Pulse Oximetry
- Prednisone/Prednisolone 1-2mg/kg PO (60mg max), or Methylprednisolone (Solumedrol®) 1-2mg/kg IV (125 mg max)  
  [alternative is dexamethasone 0.5mg/kg IV/IM (12 mg max)]

Re-Eval after ½ hr off treatment

- Improved (AS 5-7)  
- No change (AS 8-11)  
- Worse (AS 12-15)

Observe ½-2hrs  
Severe  
D/C vs  
ER Obs Status

- Continuous Albuterol 15mg/hr x 1hr  
- Admit to ER OBS Status  
  Re-Eval ½ hr after treatment

- Improved (AS 5-7)  
- No change or Worse (AS 8-11)

ER OBS Status (6-8hrs)  
Albuterol 2.5mg nebs q2hr  
q2hr → consider admission  
Weaned to >q2hr → D/C  
ER OBS Status (6-8hrs)  
Still requiring cont nebs  
Admit COMER/Intermed
**SEVERE**
(AS 12-15)
(PF < 50%)

**IV, O₂, Monitor**

**Albuterol** 15mg/hr x 2hrs
[alternative is levalbuterol (Xopenex®) 5mg/hr x 2hrs]

**Atrovent®** 1mg added into first neb

**Methylprednisolone** (Solumedrol®) 1-2mg/kg IV (125 mg max)
[alternative is dexamethasone 0.5mg/kg IV (12 mg max) OR
Prednisolone/prednisone 2mg/kg PO (max 60mg)]

**MgSO₄** 50mg/kg IV (2g max) IV over ½ hr

**Consider Epinephrine** 0.01mg/kg IM (0.3mg max)

**Reassess** ½-1hr into initial management

**Significant Improvement**

- Continuous neb treatments
- **Admit to ER Obs Status** (6-8hr)
- Re-evaluate every ½-1hr
- Still requiring Continuous
- **Admit to Intermediate Unit**

**Minimal improvement or Worse**

- **Admit to PICU**
  - Consider other therapies:
  - Heliox (no hypoxia)
  - Terbutaline
  - Repeat MgSO₄ 25mg/kg (total 4g max)
  - BiPAP/High Flow oxygen
  - Ketamine
  - possible Intubation
  - Eval for pneumothorax
  - Consider VBG/ABG
*ER OBS Status* is intended for patients in the *Moderately Severe* category who when re-evaluated after 1hr of continuous appear likely will require multiple hours of continuous nebs.
REFERENCES:

General

Beta receptor/bronchodilator therapy

BiPAP/Noninvasive Positive Pressure Ventilation

Corticosteroids:

Heliox
Comer Emergency Department (ED) Clinical Guidelines:
Asthma Acute Care


Ipratropium


Ketamine

Hanazaki M, Jones KA, Warner DO: Effects of intravenous anesthetics on Ca2+ sensitivity in canine tracheal smooth muscle. Anesthesiology 2000;92:133-.


Magnesium
Comer Emergency Department (ED) Clinical Guidelines:
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Methylxanthines (theophylline, aminophylline, doxofylline)


Terbutaline (continuous infusion)


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DISCLAIMER:
This clinical guideline has been developed for the purpose of unifying the general emergency care of patients with asthma. It is intended to aid, rather than substitute for, professional judgment. It is not intended to serve as a rigid protocol or a written proxy for the standard of care. Failure to comply with this guideline does not represent a breach of the standard of care.