Managing Severe Asthma
ED and Critical Care Approaches

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Outline

- Pharmacotherapies
- Non-Invasive Ventilatory Support
- Rapid Sequence Intubation
- Ventilatory Strategies

Pharmacotherapies

- In severe asthma, start:
  - **albuterol** 10 mg/hr neb x 1 hr
  - **ipratropium** 0.5 mg neb
  - **methylprednisolone** 125 mg IV
- If not improving, add:
  - **magnesium sulfate** 2 mg IV over 20 mins
- If worsening, near death, or concern for anaphylaxis:
  - **epinephrine** 0.3 mg IM

Smooth muscle constriction
- albuterol
- magnesium sulfate

Airway inflammation and edema
- steroids

Mucus secretion
- ipratropium

Normal

Asthma

normal

asthma
Non-Invasive Ventilatory Support

Bi-level positive airway pressure (BIPAP):

- Decreases airway resistance and work of breathing
- Recruits collapsed alveoli
- Rests muscles of respiration

Non-Invasive Ventilatory Support

- Have RT set up in-line nebulized medications
- Patients may need coaching in order to tolerate BIPAP
- Consider giving patients a break, then trying again
- Start with lower settings, then work up (i.e., start 8/4, then work to 12/5)
- Consider small doses of analgesics, anxiolytics, or ketamine to facilitate BIPAP use
- Turn down FiO2 as tolerated
Indications for intubation of asthmatic patient:

- Severe bronchoconstriction
- Severe exhaustion
- Symptoms progressing
- Additional therapies unlikely to cause reversal

WARNING
During intubation, asthmatics are at risk for:

- Decompensation with sedation or paralysis
- Rapid desaturation
- Hypotension from dehydration

Prepare and preoxygenate:

- Upright until last moment
- Preoxygenate using BIPAP
- High-flow O2 by nasal cannula
- Large ET tube and backup airway equipment
- Pretreatment with lidocaine
Rapid Sequence Intubation

Intubate:

- Induction medications: ketamine 1-2 mg/kg, propofol 1-2 mg/kg, etomidate 0.3 mg/kg
- Paralysis preferred with succinylcholine over rocuronium (shorter acting)
- May need gentle cricoid pressure to compress esophagus

Pharmacotherapies

Non-Invasive Ventilatory Support

Rapid Sequence Intubation

Ventilatory Strategies

Goals of post-intubation care of the asthmatic:

1. Prevent barotrauma and pneumothorax from elevated pulmonary pressures
2. Maintain cardiac output and prevent hypotension
3. Reverse acidosis and maintain oxygenation
4. Reverse airway obstruction

<table>
<thead>
<tr>
<th></th>
<th>Asthma/COPD</th>
<th>ARDS</th>
<th>Normal</th>
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<tbody>
<tr>
<td>Tidal Volume</td>
<td>5-8 ml/kg</td>
<td>6-8 ml/kg</td>
<td>8-12 ml/kg</td>
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<tr>
<td>Rate</td>
<td>6-10 breath/min</td>
<td>10-25 breath/min</td>
<td>10-14 breath/min</td>
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<td>PEEP</td>
<td>0-5 cmH2O</td>
<td>5 cmH2O</td>
<td>5 cmH2O</td>
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<tr>
<td>FIO2</td>
<td>100% decrease ASAP</td>
<td>100% decrease ASAP</td>
<td>100% decrease ASAP</td>
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<td>1:3 to 1:5</td>
<td>1:2</td>
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Ventilatory Strategies

Paralysis and Sedation:
- Facilitate ventilatory goals
- Prevent complications

Sedation: ketamine or propofol + fentanyl
Paralysis: vecuronium 0.1 mg/kg/min

Troubleshooting:
1. Disconnect ventilator
2. Manual decompression of chest
3. Adjust ventilator settings

Complications of elevated pressures:
- Pneumothorax
- ARDS
- Hypotension

Prevent hypotension:
- Minimize sedating agents that may worsen hypotension
- Bolus fluids
- Adjust ventilator settings to decrease pressures and increase expiratory time

Dynamic hyperinflation creates intrinsic PEEP, raising the plateau pressure with each breath
**Acid-Base and Oxygenation**

- Focus on **ventilation**, not oxygenation
- Permissive hypercapnea
- Reverse severe acidosis, but goal is not to normalize

**Reverse Airway Obstruction:**

- Time
- Heliox
- Extracorporeal membrane oxygenation (ECMO)
- Inhaled anesthetics

**Inhaled Anesthetics in Asthma**

- Call Anesthesia consult for general anesthesia in OR
- **Halothane** or **isoflurane**
  - Potent bronchodilatory effect
  - Rapid improvement in ventilatory parameters
  - Few adverse effects
- THINK about it in every intubated asthmatic
severe asthma summary

- BIPAP can prevent need for intubation or preoxygenate prior to RSI
- Be careful intubating the asthmatic (poor reserve, rapid desaturation, hypotension)
- Sedate and **paralyze** post intubation
- **Low volumes, slow rate, and long expiratory time**
- May need to disconnect ventilator and manually decompress chest
- Do not try to normalize physiologic parameters (tolerate **mild hypoxia, hypercarbia**, and **acidosis**)
- Consider **inhaled anesthetics** in refractory cases