IN THE NAME OF GOD

Management of asthma exacerbation

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Asthma is a common chronic inflammatory disorder of the airways characterized by recurrent wheezing, breathlessness, and coughing.

Acute exacerbations of asthma can be life-threatening; annual worldwide estimated mortality 250,000 and most of these deaths are preventable.

Risk factors

- Exercise
- Air pollutants
- Certain weather conditions
- Viral infections of the upper respiratory tract (particularly rhinovirus and respiratory syncytial virus)
- Allergen exposure

The presentation of asthma attack varies by severity, asthmatic trigger, and patient age.

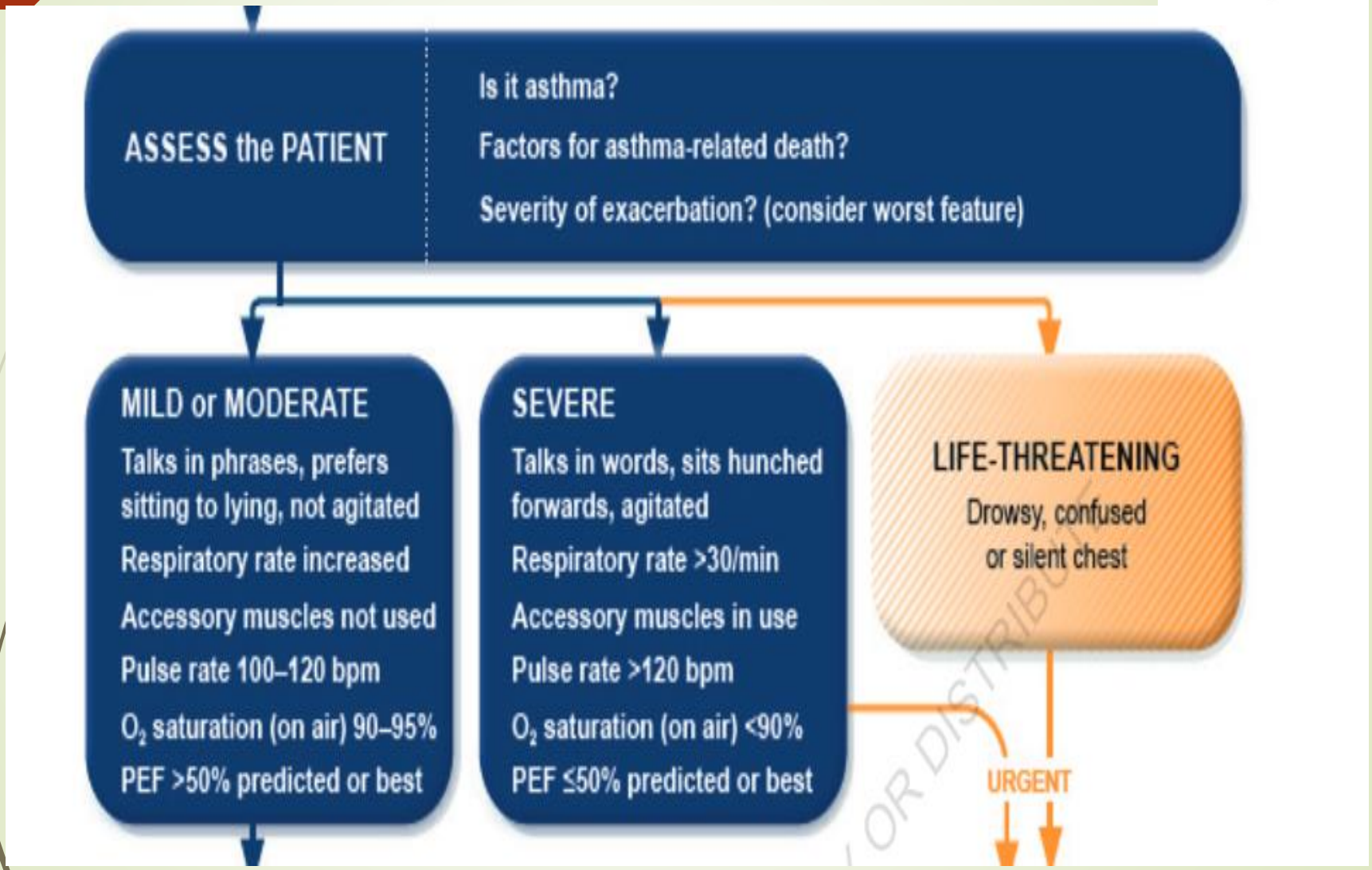
Most children present:

- Cough
- Wheezing
- Increased work of breathing
- Dyspnea
- Retraction

The goals of treatment:

- Adequate arterial oxygen saturation with supplemental oxygen
- Relief of airflow obstruction
- Reduction of airway inflammation

Assessment of asthma exacerbations in primary care:



Asthma attack

Oxygen

- ✓ Hypoxemia in sever attack
- ✓ V/Q mismatch due to SABA
- ✓ Oxygen to keep pulse oximetry > 93%

Oxygen:

- Relieve dyspnea
- Aids in bronchodilation
- Supports myocardium
- Prevent arrhythmia

Asthma attack

Beta$_2$ Agonist Therapy (salbutamol)

Peak of action:30 min

Duration of action: 4-6 h

- **Improvement of airway mucociliary clearance**
- **Relieve bronchospasm**
- **Reducing vascular permeability and reducing airway edema**

✓ Mode of delivery: Inhaler, Intravenous , Nebulizer

Asthma attack

Beta$_2$ Agonist Therapy

First hour, β2-agonists can be inhaled 4-8puffs every 20 minutes for three times, followed by once every 2 to 4 hours according to the patient's condition.

For intermittent nebulization, the recommended dosages are 2.5 mg to 5 mg of salbutamol according to the patient's age.

Continuously nebulized:(0.15mg/kg/h. Max:15 mg)

Side effects: **Tremor, Hypokalemia, Tachycardia, Agitation**

Anticholinergic

- Anticholinergic Agents are now a standard of care in the treatment of acute asthma in children in combination with β2-agonists.

- Inhaled ipratropium bromide in combination with β2 agonist significantly reduced hospitalizations and improved spirometric parameters in pediatric patients with asthma.

Effects:

- **Relieve bronchospasm**
- **Decreased mucus secretion**
- **Using B blocker**

Anticholinergic

- Ipratropium bromide can be delivered either by aerosol or MDI. Initial dose range is **250–500** mcg (if nebulized) or **4 to 8** puffs (if via MDI) administered every 20 min for up to three doses. The subsequent recommended dosing interval is every 4–6 h.

Asthma attack
Epinephrine

No advantage over inhaled β agonists

Increased side effects

Indications:

- Inability to cooperate with inhalation therapy
- Rapidly decompensating patient
- Failure to respond to inhaled beta-agonists
- **1:1000 epinephrine is 0.01 ml/kg/20 min for 3 times and the maximum dose less than 0.3ml each time**

Asthma attack

Methyl xanthine

- Use of methyl xanthine is infrequent in acute exacerbations of asthma because they are less effective than the β2 agonists and associated with severe side effects.
- Methyl xanthine therapy may be helpful in those critically ill children who are not responsive to steroids, inhaled and IV β2 agonist, and O2. Aminophylline is administered by continuous IV infusion following a loading dose of 5–7 mg/kg infused over 20min.

Toxicity includes nausea and vomiting, tachycardia, and agitation. Severe and life-threatening toxicity in the form of cardiac arrhythmias, hypotension, seizures, and death is usually associated with high theophylline serum concentrations.

Asthma attack

IV or oral Corticosteroids

- Corticosteroids are included as first line of therapy in the management of acute asthma.
- Oral or parenteral corticosteroids have equal efficacy but parenteral steroids are preferred for critically ill children.
- Recommended dose:

Prednisone or methylprednisolone

  - Suggested initial dose 1 -2mg/kg max:40-60mg
  - Then 1-2 mg/kg divided 12 hours for 5 days

Asthma attack
Magnesium Sulfate

- Bronchodilator:
  - Inhibits cellular ca++ uptake/release → smooth-muscle relaxation
  - Stabilizes most cell membranes

- The usual dose of magnesium is 50 mg/kg/dose over 30 min or by continuous infusion at a rate of 10–20 mg/kg/ hr. It may be repeated once or twice after 4–6 h.

Asthma attack

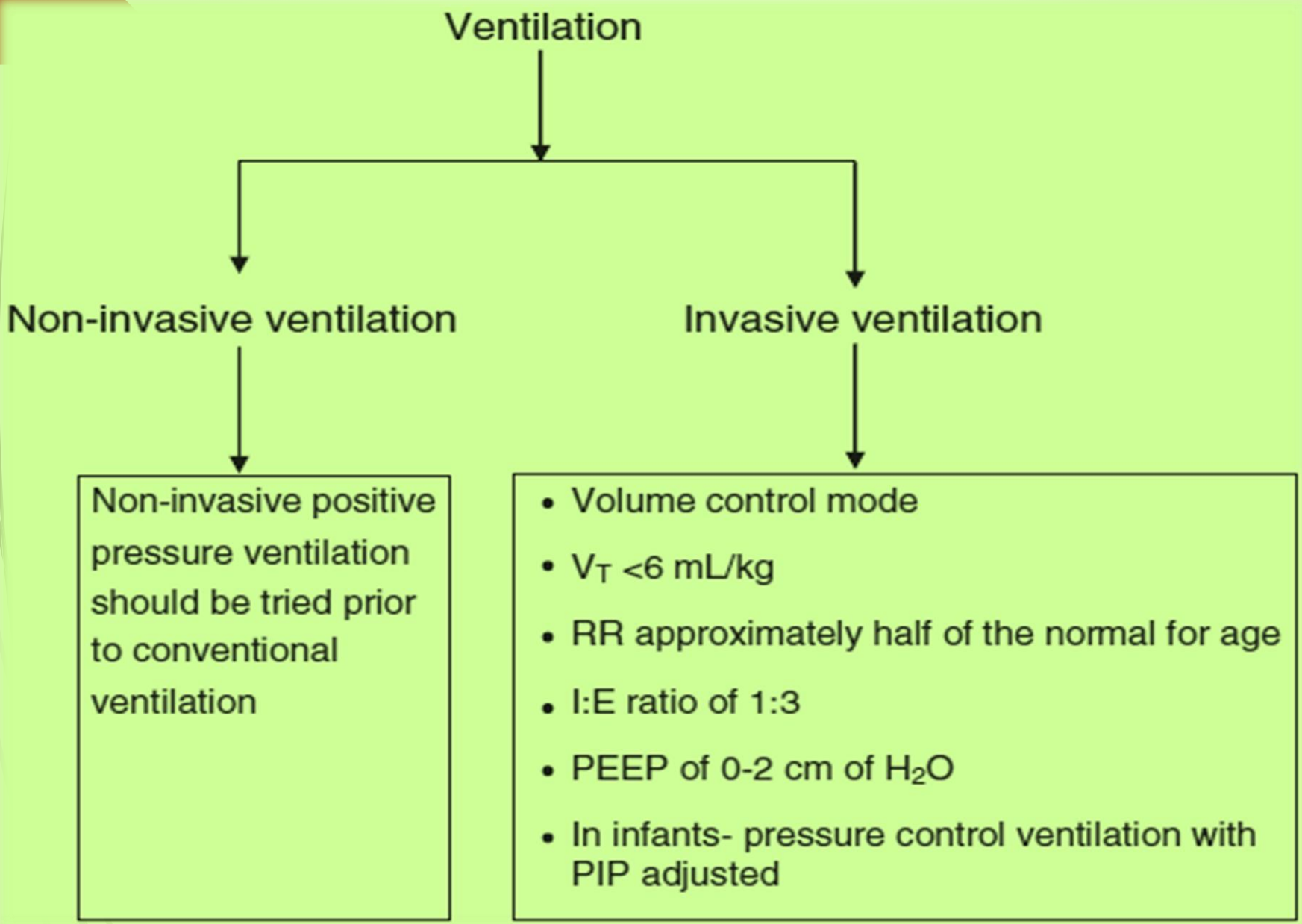
Helium - Oxygen (HELIOX)

- Blend of 80:20 helium: oxygen
- Major effects to reduce resistance:
  - Reduces turbulence
  - Used in upper airway obstruction

ICU admission:

Severe dyspnea
Inability to lie flat
Severe wheezing
Use of accessory muscles
Impending to respiratory failure
Failure to respond to initial treatment

Ventilation in treatment of children with status asthmaticus



Asthma attack

Non invasive Ventilation

- Positive-pressure by nasal mask (BiPAP)
- Potential benefits:
  - Airway stenting
  - Improve V/Q match

Indications for intubation and MV:

(1) Apnea or respiratory arrest

(2) Diminished or absent breathing sound or absent wheezing

(3) Limitation of chest movement because of over ventilation and airway muscle fatigue

(4) Drowsiness or confusion, coma

(5) Progressive central cyanosis despite supplemental oxygen

(6) Paco2≥45 mm hg.PO2<60

(7) Sever acidosis

- For older children, one may begin with volume control mode using settings of VT of 6-8 mL/kg, RR approximately half of the normal for age, I: E ratio of 1:3 and PEEP of 2–3 cm of H2O.

- Tracheal extubation should be attempted as soon as possible.

Mechanical Ventilation

Volume-control mode is recommended

- Permissive hypercapnia ("controlled hypoventilation")
- Tolerate PCO_2 to keep pH > 7.20 - 7.25
- Prolonged expiratory time
- Rate ↓ , Inspiratory time ↓
- Tidal volume ↓
- PEEP ↓: auto-PEEP

Therapies NOT Recommended:

- Antibiotics
- Empiric, aggressive hydration
- Chest PT
- Mucolytic
- Sedation

Management of asthma exacerbations in primary care