



Acute Asthma Exacerbation in Children

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Pathophysiology

Asthma is a **chronic inflammatory disorder of the airways**. During an acute exacerbation, triggers such as viral infections, allergens, or cold air induce a cascade of immune responses.

1

Immune Activation

IgE, eosinophils, and pro-inflammatory mediators are released in response to triggers

2

Airway Changes

Smooth muscle bronchospasm, mucosal edema, and excessive thick mucus production

3

Obstruction & Mismatch

Airflow obstruction, hyperinflation, and V/Q mismatch resulting in **hypoxemia**

Brief Report

Asthma exacerbations are acute or subacute episodes of progressively worsening shortness of breath, cough, wheezing, and chest tightness – or some combination of these symptoms – characterized by **decreases in expiratory airflow**.

These episodes require a change in treatment and can **rapidly progress to life-threatening respiratory failure** if left untreated.

⚠ Early recognition and prompt intervention are critical to preventing deterioration in pediatric patients.





Clinical Features

Severity of presentation guides immediate management decisions. Recognize the spectrum from mild to life-threatening.

● Mild

- Wheezing
- Mild dyspnea
- Worsening cough
- Shortness of breath

● Moderate / Severe

- Use of accessory muscles
- Prominent retractions
- Nasal flaring
- Tachypnea & tachycardia
- Difficulty completing sentences

● Life-Threatening

- Silent chest
- Bradycardia
- Cyanosis
- Altered mental status
- Severe fatigue
- Pulsus paradoxus

Risk Factors

Identifying high-risk patients allows for targeted monitoring and preventive strategies.

Previous Severe Exacerbation

History of intubation or intensive care admission significantly increases future risk

High SABA Use

Frequent reliance on short-acting beta-agonists signals poorly controlled asthma

Poor ICS Adherence

Non-adherence to daily inhaled corticosteroids leaves airways chronically inflamed

Recent URTI

Upper respiratory tract infections are a leading trigger for acute exacerbations in children

Allergen Exposure

High environmental allergen burden (dust mites, pollen, pet dander) drives airway inflammation

Socioeconomic Barriers

Low socioeconomic status or psychosocial problems limiting access to routine care

Investigations

Exacerbations are **primarily diagnosed clinically**. Investigations are targeted and reserved for specific indications.



Pulse Oximetry

Continuous monitoring is **essential for all patients** to detect hypoxemia. Target $\text{SpO}_2 \geq 94\%$.



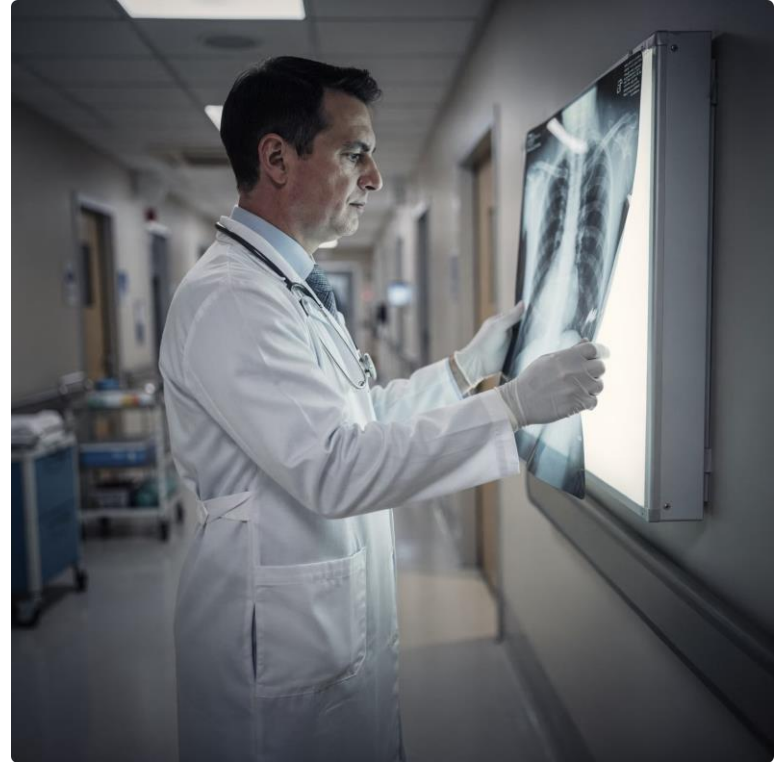
Chest X-Ray (CXR)

Not routinely recommended. Reserve for complications such as pneumonia, pneumothorax, or therapy-unresponsive patients. Typical finding: bilateral hyperinflation.



Blood Gases (ABG)

Reserved for **severe respiratory distress** unresponsive to initial therapy. Early findings: mild hypoxia with respiratory alkalosis.



Management

The primary goals of treatment are **reversal of airflow obstruction** and **correction of hypoxemia**.



Supplemental Oxygen

Administer oxygen to maintain **SpO₂ ≥ 94%** in all hypoxemic patients.



Inhaled SABA (Albuterol)

Cornerstone of therapy. Via MDI with valved holding chamber or nebulizer — **every 20 minutes for the first hour**.



Systemic Corticosteroids

Early administration decreases admission rates and prevents relapse. Oral **dexamethasone** (0.6 mg/kg) or **prednisone/prednisolone** (1-2 mg/kg/day) for 3-5 days.



Anticholinergics (Ipratropium)

Added to SABA in **severe cases** in the emergency department — reduces hospitalization rates.



Adjunct Therapies (Refractory)

IV Magnesium Sulfate (promotes smooth muscle relaxation) or systemic β_2 -agonists for cases unresponsive to standard therapy.

Key Home Messages

Discharge planning is as critical as acute management. Every patient must leave with a clear, actionable plan.

Written Asthma Action Plan

Provide an individualized, written plan the family can follow at home during worsening symptoms.

Inhaler Technique Review

Review technique with patient and family – always emphasize the use of a **spacer device**.

Oral Corticosteroid Course

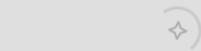
Prescribe a short course if dexamethasone was not administered in the emergency department.

Maintenance Therapy Step-Up

Initiate or escalate maintenance therapy – particularly **Inhaled Corticosteroids (ICS)**.

Trigger Identification & Avoidance

Identify the patient's specific triggers and counsel the family on practical avoidance strategies.



A comprehensive discharge plan significantly reduces the risk of repeat exacerbations and emergency visits.