

Continuous Medical Education

Childhood bronchial asthma: acute exacerbation diagnosis and treatment

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Asthma is a major cause of chronic morbidity and mortality throughout the world and there is evidence that its prevalence has increased considerably over the past 20 years, especially in children. The prevalence of asthma symptoms in children varies from 1 to more than 30 percent in different populations and is increasing in most countries, especially among young children.¹

Asthma is a chronic inflammatory disorder of the airways. Chronically inflamed airways are hyperresponsive; they become obstructed and limit the airflow (by bronchoconstriction, mucus plugs, and increased inflammation) when airways are exposed to various risk factors.²

Asthma can be effectively treated and most patients can achieve good control of their disease. *When asthma is under control children can:*³

- Avoid troublesome symptoms night and day
- Use little or no reliever medication
- Have productive, physically active lives
- Have (near) normal lung function
- Avoid serious attacks

Asthma causes recurring episodes of wheezing, breathlessness, chest tightness, and coughing, particularly at night or in the early morning. Asthma attacks (or exacerbations) are episodic, but airway inflammation is chronically present.³

Diagnosis of asthma exacerbations⁴⁻⁶

Exacerbations of asthma (asthma attacks) are episodes of progressive increase in shortness of breath, cough, wheezing, or chest tightness, or a combination of these symptoms. The outcome of an attack should not be underestimated; severe asthma attacks may be life threatening.

Children/adolescents at high risk for asthma-related death require closer attention and should be encouraged to seek urgent care early in the course of their exacerbations. *These patients include those:*

- With a history of near-fatal asthma
- Who have had a hospitalization or emergency visit for asthma within the past year, or prior intubation for asthma
- Who are currently using or have recently stopped using oral glucocorticosteroids

- Who are overdependent on rapid-acting inhaled β_2 -agonists
- With a history of psychosocial problems or denial of asthma or its severity
- With a history of noncompliance with asthma medication plan

Patients should immediately seek medical care if:

- The attack is severe.
- The patient is breathless at rest, is hunched forward, talks in words rather than sentences (infant stops feeding), agitated, drowsy or confused.
- Has bradycardia, or a respiratory rate greater than 30 per minute.
- Wheeze is loud or absent.
- Pulse is greater than:
 - 160/min for infants
 - 120/min for children 1-2 years
 - 110/min for children 2-8 years
- The peak expiratory flow (PEF) rate is less than 60 percent of predicted or personal best even after initial treatment.
- The child is exhausted.
- The response to the initial bronchodilator treatment is not prompt and sustained for at least 3 hours.
- There is no improvement within 2 to 6 hours after oral glucocorticosteroid treatment is started
- There is further deterioration.

Mild attacks, defined by a reduction in PEF of less than 20%, nocturnal awakening, and increased use of rapid-acting β_2 -agonists, can usually be treated at home if the patient is prepared and has a personal asthma management plan that includes action steps. Moderate attacks may require, and severe attacks usually require, care in a clinic or hospital.

Management of asthma exacerbations⁶

Asthma attacks require prompt treatment

- Oxygen is given at health centers or hospitals if the patient is hypoxemic (achieve O₂ saturation of 95%).
- Inhaled rapid-acting β_2 -agonists in adequate doses are essential. Begin with 2 to 4 puffs every 20 minutes for the first hour; then mild exacerbations will require 2 to 4 puffs every 3 to 4 hours.

4 hours and moderate exacerbations 6 to 10 puffs every 1 to 2 hours.

- Oral glucocorticosteroids (0.5 to 1 mg of prednisolone/kg body weight or equivalent during a 24-hour period) introduced early in the course of a moderate or severe attack help to reverse the inflammation and speed recovery.
- Methylxanthines are not recommended in addition to high doses of inhaled B2-agonists. However, theophylline can be used if inhaled B2-agonists are not available. If the patient is already taking theophylline on a daily basis, serum concentration should be measured before adding short-acting theophyllin.

Therapies not recommended for treating attacks include:⁶

- Sedatives (strictly avoid).
- Mucolytic drugs (may worsen cough).
- Chest physical therapy/physiotherapy (may increase patient discomfort).
- Hydration with large volumes of fluid for adults and older children (may be necessary for younger children and infants).
- Antibiotics (do not treat attacks but are indicated for patients who also have pneumonia or bacterial infection such as sinusitis).
- Epinephrine (adrenaline) is indicated for acute treatment of anaphylaxis and angioedema but is not necessary during asthma attacks.
- Intravenous magnesium sulphate has not been studied in young children.

Monitor response to treatment

Evaluate symptoms and, as much as possible, PEF. In the hospital, also assess oxygen saturation; consider arterial blood gas measurement in patients with suspected hypoventilation, exhaustion, severe distress, or PEF that is 30-50 percent of predicted.^{3,6}

Follow up:

After the exacerbation is resolved, the factors that precipitated the exacerbation should be identified and strategies for their future avoidance implemented, and the patient's medication plan reviewed.^{3,6}

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