Childhood asthma: diagnosis

Asthma is usually diagnosed on the basis of the history of symptoms along with physical examination. In selected cases, measurement of lung function, reversibility of airway obstruction may enhance diagnostic accuracy.

The following are important diagnostic hints of asthma:

**History**
1. Coughing is the commonest symptom of asthma especially in young children.
2. Wheezing: a common symptom of asthma but the absence of wheezing attacks does not exclude the diagnosis.
3. Breathing difficulty.
4. The chance of asthma increases if the above symptoms occur:
   - recurrently or persistently
   - during or after a cold
   - on exercise
   - when in contact with animals
   - when in contact with pollen or some plants
4. A family history of atopy and allergic diseases.
5. Past history of atopic diseases.

**Physical examination**
1. Signs of airway obstruction:
   - chest hyperinflation
   - obstructed expiration: spontaneous wheeze or forced expiratory wheeze
   - diminished air movement in the chest
   - physical examination may be normal in children with mild asthma
2. Signs of other allergies or complication:
   - eczema, allergic rhinitis, growth failure, sinusitis, chest deformity

**Investigations**
1. In older children (6 or above) who are able to perform simple lung function testing (peak flow rate or spirometry), demonstrate variable airflow obstruction with diary cards and peak flow monitoring, or use bronchodilator inhalation to demonstrate improvement in spirometry.
2. In younger children, demonstrate immediate improvement of signs with bronchodilator inhalation, or a therapeutic trial of asthma medications to look for improvement over time.
3. Other supportive diagnostic modalities: Exhaled Nitric oxide measurement, skin-prick test, infant lung function measurement if available.

**Special note**
1. Often a period of observation is required to ascertain the diagnosis.
2. Asthma is a chronic disease and patients have to be reassessed on a regular basis to adjust the prescribed treatment.
## Treatment Guideline for Managing Asthma in Children Older Than 5 years of Age: Treatment

### Quick Relief

**All Patients**
- Short-acting bronchodilator: 2-4 puffs short-acting inhaled beta₂-agonists as needed for symptoms.
- Intensity of treatment will depend on severity of exacerbation; up to 3 treatments at 20-minute intervals as needed. Course of systemic corticosteroids may be needed. MDI with spacer is just as effective as the nebulizer in most situations of mild to moderate attacks.
- **Use of short-acting beta₂-agonists >2 times a week in intermittent asthma (daily, or increasing use in persistent asthma) may indicate the need to start long-term-control therapy.**

### Step down
- Review treatment every 1 to 6 months; a gradual stepwise reduction in treatment may be possible.

### Step up
- If control is not maintained, consider step up. First, review patient medication technique, adherence, and environmental control.

### Goals of Therapy: Optimal Asthma Control

- Minimal or no chronic symptoms day or night
- Minimal or no exacerbations
- No limitations on activities; no school/work missed
- Maintain (near) normal pulmonary function
- Minimal use of short-acting inhaled beta₂-agonist
- Minimal or no adverse effects from medications

### Classify Severity: Clinical Features Before Treatment or Recommended Medications Required To Maintain Adequate Control

<table>
<thead>
<tr>
<th>Step</th>
<th>Severe Persistent</th>
<th>Symptoms/Day Symptoms/Nights</th>
<th>PEF or FEV1</th>
<th>Daily Asthma Control</th>
</tr>
</thead>
</table>
| Step 4 | Continual | <60% | <30% | Preferred treatment:  
- High-dose inhaled corticosteroids (>800 mcg of budesonide or equivalent) AND  
- Long-acting inhaled beta₂-agonists AND if needed,  
- Corticosteroid tablets: a short course of steroid may be needed to suppress airway inflammation.  
- Alternative treatment:  
  - High dose inhaled corticosteroids AND either leukotriene modifier or theophylline. |
| Step 3 | Moderate Persistent | Daily >1 night/week | >60% - <80% | >30% | Preferred treatment:  
- Low to medium dose inhaled corticosteroids (200-800 mcg of budesonide or equivalent) and long-acting inhaled beta₂-agonists.  
- Alternative treatment:  
  - Increase inhaled corticosteroids within medium-dose range OR  
  - Low-to-medium dose inhaled corticosteroids and either leukotriene modifier or theophylline. |
| Step 2 | Mild Persistent | >2/week but <1x/day | >80% | 20-30% | Preferred treatment:  
- Low-dose inhaled corticosteroids (<400 mcg of budesonide or equivalent).  
- Alternative treatment options: cromolyn, leukotriene modifier, nedocromil, OR sustained-release theophylline to keep serum concentration of 5-15 mcg/mL. |
| Step 1 | Mild Intermittent | <2 days/week | ≥80% | <20% | No daily medication needed.  
- Inhaled (preferred) or oral bronchodilators may be prescribed and use as needed. |
# Treatment Guideline for Managing Infants and Young Children (5 years of Age and Younger) with Asthma

## Classify Severity: Clinical Features Before Treatment or Adequate Control

<table>
<thead>
<tr>
<th>Symptoms/Day</th>
<th>Symptoms/Nights</th>
<th>Medications Required To Maintain Long-Term Control</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 4</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| **Severe Persistent** | Continual Frequent | • Preferred treatment:  
- High-dose inhaled corticosteroids (>800 mcg of budesonide or equivalent) AND  
- Long-acting inhaled beta₂-agonists AND if needed,  
- Corticosteroid tablets: a short course of steroid may be needed to suppress airway inflammation (2 mg/kg/day). |
| **Step 3**   |                 |                                                   |
| **Moderate Persistent** | Daily >1 night/week | • Preferred treatment:  
- Low-dose inhaled corticosteroids (<400 mcg of budesonide or equivalent) and long-acting inhaled beta₂-agonists OR  
- Medium-dose inhaled (400-800 mcg of budesonide or equivalent) corticosteroids.  
• Alternative treatment:  
- Low-dose inhaled corticosteroids and either leukotriene receptor antagonist or theophylline. |
| **Step 2**   |                 |                                                   |
| **Mild Persistent** | >2/week but <1x/day >2 nights/month | • Preferred treatment:  
- Low-dose inhaled corticosteroids (with MDI with holding chamber with or without face mask or nebulizer).  
• Alternative treatment (listed alphabetically):  
- Cromolyn (MDI with holding chamber or nebulizer) OR oral leukotriene receptor antagonist. |
| **Step 1**   |                 |                                                   |
| **Mild Intermittent** | ≤2 days/week ≤2 nights/month | • No daily medication needed.  
• Inhaled (preferred) or oral bronchodilators may be prescribed and use as needed. |

### Quick Relief

**All Patients**
- Bronchodilator as needed for symptoms. Intensity of treatment will depend upon severity of exacerbation.  
  - Preferred treatment: Short-acting inhaled beta₂-agonists by face mask and space/holding chamber or nebulizer  
  - Alternative treatment: Oral beta₂-agonist  
- With viral respiratory infection  
  - Bronchodilator q 4-6 hours up to 24 hours - Consider systemic corticosteroid if exacerbation is severe or patient has history of previous severe exacerbations  
- Use of short-acting beta₂-agonists >2 times a week in intermittent asthma (daily, or increasing use in persistent asthma) may indicate the need to start long-term-control therapy.

### Step down

Review treatment every 1 to 6 months; a gradual stepwise reduction in treatment may be possible.

### Step up

If control is not maintained, consider step up. First, review patient medication technique, adherence, and environmental control.

### Goals of Therapy: Optimal Asthma Control

- Minimal or no chronic symptoms day or night  
- Minimal or no exacerbations  
- No limitations on activities; no school/parent's work missed  
- Minimal use of short-acting inhaled beta₂-agonist  
- Minimal or no adverse effects from medications
Steroid equivalent table:

<table>
<thead>
<tr>
<th>Drug</th>
<th>Low Daily Dose (µg)</th>
<th>Medium Daily Dose (µg)</th>
<th>High Daily Dose (µg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Adult</td>
<td>Child</td>
<td>Adult</td>
</tr>
<tr>
<td>Beclomethasone</td>
<td>200-500</td>
<td>100-250</td>
<td>500-1000</td>
</tr>
<tr>
<td>Budesonide-DPI</td>
<td>200-600</td>
<td>100-200</td>
<td>600-1000</td>
</tr>
<tr>
<td>Budesonide-Neb</td>
<td>250-500</td>
<td></td>
<td>500-1000</td>
</tr>
<tr>
<td>Inhalation suspension</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluticasone</td>
<td>100-250</td>
<td>100-200</td>
<td>250-500</td>
</tr>
<tr>
<td>Mometasone furoate</td>
<td>200-400</td>
<td></td>
<td>400-800</td>
</tr>
</tbody>
</table>

Notes:

The most important determinant of appropriate dosing is the clinician’s judgment of the patient’s response to therapy. The clinician must monitor the patient’s response in terms of a combination of clinical parameters and adjust the dose accordingly. The stepwise approach to therapy emphasizes that once control of asthma is achieved, the dose of medication should be carefully titrated to the minimum dose required to maintain control, thus reducing the potential for adverse effects. Actual delivered dose may vary according to the device used for delivery of inhaled steroids.