

Adults and Children More Than 5 Years of Age

Goals of therapy

- Minimal or no chronic symptoms day or night
- Minimal or no episodes
- No limitations on activities; no school/work missed
- PEF \geq 80% of personal best
- Minimal use of inhaled short-acting beta₂-agonist (<1 per day)
- No or minimal adverse effects from medications

Clinical Features Before Treatment to Classify Severity

| | Days With Symptoms | Nights With Symptoms | PEF or FEV ₁ PEF variability | Long Term Control—Daily Medications |
|---------------------------------------|--------------------|----------------------|---|--|
| Step 4 Severe Persistent | Continual | Frequent | \leq 60% <hr/> $>$ 30% | Inhaled steroid—high dose* plus Long-acting inhaled beta₂-agonist —adult 2 puffs (child 1-2 puffs) q 12 hours, sustained-release theophylline, or oral long-acting beta ₂ -agonists plus Steroid tablets or syrup long term; make repeated attempts to reduce oral steroids. |
| Step 3 Moderate Persistent | Daily | \geq 5/month | $>$ 60%– $<$ 80% <hr/> $>$ 30% | Inhaled steroid—medium dose* or Inhaled steroid—low-to-medium dose* plus long-acting inhaled beta₂-agonist —adult 2 puffs (child 1-2 puffs) q 12 hours, sustained-release theophylline or oral long-acting beta ₂ -agonists If needed, increase medications up to: Inhaled steroid—high dose plus long-acting inhaled beta ₂ -agonist, sustained-release theophylline, or oral long-acting beta ₂ -agonists |
| Step 2 Mild Persistent | 3-6/week | 3-4/month | \geq 80% <hr/> 20-30% | Inhaled steroid—low dose* or Cromolyn —adult 2-4 puffs (child 1-2 puffs) tid-qid, or 1 ampule by nebulizer tid-qid, or Nedocromil —adult 2-4 puffs (child 1-2 puffs) bid-qid Sustained-release theophylline to serum concentration 5-15 mcg/mL is an alternative, but not preferred, therapy. Zafirlukast or zileuton may also be considered for patients \geq 12 years of age, although their position in therapy is not fully established. |
| Step 1 Mild Intermittent | \leq 2/week | \leq 2/month | \geq 80% <hr/> $<$ 20% | No daily medications |

All Patients **2-4 puffs of short-acting inhaled beta₂-agonist for exacerbations.** Up to three treatments at 20-minute intervals or single nebulizer treatment, as needed. Course of oral steroids may be needed.

Starting Point

Gain control as quickly as possible. Either start with aggressive therapy (e.g., add a course of oral steroids or a higher dose of inhaled steroids to the therapy that corresponds to the patient's initial step of severity); or start at the step that corresponds to the patient's initial severity and step up treatment, if necessary.

Step Down

Review treatment every 1 to 6 months. If control is sustained for at least 3 months, a gradual stepwise reduction in treatment may be possible.

Step Up

If control is not maintained, consider step up. Inadequate control is indicated by increased use of short-acting beta₂-agonists and in step 1 when patient uses a short-acting beta₂-agonist more than two times a week; steps 2 and 3

when patient uses short-acting beta₂-agonist on a daily basis OR more than three to four times in 1 day. But before stepping up: Review patient inhaler technique, compliance, and environmental control (avoidance of allergens or other precipitant factors). A course of oral steroids may be needed at any time and at any step.

Exercise-Induced Bronchospasm

Patients with exercise-induced bronchospasm should take two to four puffs of an inhaled beta₂-agonist 5 to 60 minutes before exercise.

Referral

Referral to an asthma specialist for consultation or co-management is *recommended* if there is difficulty maintaining control or if the patient requires step 4 care. Referral may be *considered* for step 3 care.

Notes on classifying severity:

- Patients should be assigned to the most severe step in which *any* feature occurs.
- Patients at any level of severity can have mild, moderate, or severe exacerbations.
- Two or more asthma exacerbations per week (i.e., progressively worsening symptoms that may last hours or days) indicates moderate-to-severe persistent asthma.

Patient Education/Environmental Control

—Help patients identify and control precipitants of asthma episodes. Provide education on self-management.

* Use spacer/holding chamber and mouth rinsing after inhalation.

The stepwise approach presents general guidelines to assist clinical decision making. Asthma is highly variable; clinicians should tailor specific medication plans to the needs of individual patients.

Estimated Comparative Daily Dosages for Inhaled Steroids:

Adults

| Inhaled Steroid | Low Dose | Medium Dose | High Dose |
|--|---|---|---|
| Beclomethasone dipropionate 42 mcg/puff 84 mcg/puff | 168-504 mcg 4-12 puffs—42 mcg 2-6 puffs—84 mcg | 504-840 mcg 12-20 puffs—42 mcg 6-10 puffs—84 mcg | >840 mcg >20 puffs—42 mcg >10 puffs—84 mcg |
| Budesonide DPI 200 mcg/dose | 200-400 mcg 1-2 inhalations | 400-600 mcg 2-3 inhalations | >600 mcg >3 inhalations |
| Flunisolide 250 mcg/puff | 500-1,000 mcg 2-4 puffs | 1,000-2,000 mcg 4-8 puffs | >2,000 mcg >8 puffs |
| Fluticasone MDI: 44, 110, 220 mcg/puff DPI: 50, 100, 250 mcg/dose | 88-264 mcg 2-6 puffs—44 mcg or 2 puffs—110 mcg 2-6 inhalations—50 mcg | 264-660 mcg 2-6 puffs—110 mcg 3-6 inhalations—100 mcg | >660 mcg >6 puffs—110 mcg or >3 puffs—220 mcg >6 inhalations—100 mcg or >2 inhalations—250 mcg |
| Triamcinolone acetonide 100 mcg/puff | 400-1,000 mcg 4-10 puffs | 1,000-2,000 mcg 10-20 puffs | >2,000 mcg >20 puffs |

Children ≤ 12 years

| Inhaled Steroid | Low Dose | Medium Dose | High Dose |
|--|--|--|---|
| Beclomethasone dipropionate 42 mcg/puff 84 mcg/puff | 84-336 mcg 2-8 puffs—42 mcg 1-4 puffs—84 mcg | 336-672 mcg 8-16 puffs—42 mcg 4-8 puffs—84 mcg | >672 mcg >16 puffs—42 mcg >8 puffs—84 mcg |
| Budesonide DPI 200 mcg/dose | 100-200 mcg | 200-400 mcg 1-2 inhalations—200 mcg | >400 mcg >2 inhalations—200 mcg |
| Flunisolide 250 mcg/puff | 500-750 mcg 2-3 puffs | 1,000-1,250 mcg 4-5 puffs | >1,250 mcg >5 puffs |
| Fluticasone MDI: 44, 110, 220 mcg/puff DPI: 50, 100, 250 mcg/dose | 88-176 mcg 2-4 puffs—44 mcg 2-4 inhalations—50 mcg | 176-440 mcg 4-10 puffs—44 mcg or 2-4 puffs—110 mcg 2-4 inhalations—100 mcg | >440 mcg >4 puffs—110 mcg or >2 puffs—220 mcg >4 inhalations—100 mcg or >2 inhalations—250 mcg |
| Triamcinolone acetonide 100 mcg/puff | 400-800 mcg 4-8 puffs | 800-1,200 mcg 8-12 puffs | >1,200 mcg >12 puffs |

- Clinician judgment of patient response is essential to appropriate dosing. Once asthma is controlled, medication doses should be carefully titrated to the minimum dose required to maintain control, thus reducing the potential for adverse effect.
- Data from *in vitro* and clinical trials suggest that different inhaled corticosteroid preparations are not equivalent on a per puff or microgram basis. However, few data directly

compare the preparations. The Expert Panel developed recommended dose ranges for different preparations based on available data.

- Inhaled corticosteroid safety data suggest dose ranges for children equivalent to beclomethasone dipropionate 200-400 mcg/day (low dose), 400-800 mcg/day (medium dose), and >800 mcg/day (high dose).