

Care Guide ^{for} Asthma

MEDICATION STEP APPROACH¹

These guidelines are intended as an educational reference and do not supersede the clinical judgment of the treating physician with respect to appropriate and necessary care for a particular patient. The clinical references from which these guidelines are taken are listed at the end of this document.

CLINICAL FEATURES BEFORE TREATMENT*

TREATMENT

STEP	DAYTIME SYMPTOMS**	NIGHTTIME SYMPTOMS	LUNG FUNCTION	ADULTS and CHILDREN OVER 5 YEARS OF AGE Daily Medications	LONG-TERM CONTROL	INFANTS and CHILDREN UNDER 5 YEARS OF AGE Daily Medications
Step 4 Severe Persistent	Continual symptoms	Frequent	<ul style="list-style-type: none"> FEV₁ or PEF ≤ 60% predicted PEF Variability > 30% 	<ul style="list-style-type: none"> Preferred treatment: <ul style="list-style-type: none"> High-dose inhaled corticosteroids AND Long-acting inhaled beta₂-agonists AND, if needed, Corticosteroid tablets or syrup long term (2 mg/kg/day, generally do not exceed 60 mg per day). (Make repeat attempts to reduce systemic corticosteroids and maintain control with high-dose inhaled corticosteroids.) 		<ul style="list-style-type: none"> Preferred treatment: <ul style="list-style-type: none"> High-dose inhaled corticosteroids AND Long-acting inhaled beta₂-agonists AND, if needed, Corticosteroid tablets or syrup long term (2 mg/kg/day, generally do not exceed 60 mg per day). (Make repeat attempts to reduce systemic corticosteroids and maintain control with high-dose inhaled corticosteroids.)
Step 3 Moderate Persistent	Daily symptoms	> 1 night a week	<ul style="list-style-type: none"> FEV₁ or PEF > 60% – < 80% predicted PEF Variability > 30% 	<ul style="list-style-type: none"> Preferred treatment: <ul style="list-style-type: none"> Low-to-medium dose inhaled corticosteroids and long-acting inhaled beta₂-agonists. Alternative treatment (listed alphabetically): <ul style="list-style-type: none"> Increase inhaled corticosteroids within medium-dose range <p>OR</p> <ul style="list-style-type: none"> Low-to-medium dose inhaled corticosteroids and either leukotriene modifier or theophylline. <p><i>If needed (particularly in patients with recurring severe exacerbations):</i></p> <ul style="list-style-type: none"> Preferred treatment: <ul style="list-style-type: none"> Increase inhaled corticosteroids within medium-dose range and add long-acting inhaled beta₂-agonists. Alternative treatment (listed alphabetically): <ul style="list-style-type: none"> Increase inhaled corticosteroids within medium-dose range and add either leukotriene modifier or theophylline. 		<ul style="list-style-type: none"> Preferred treatments: <ul style="list-style-type: none"> Low-dose inhaled corticosteroids and long-acting inhaled beta₂-agonists OR Medium-dose inhaled corticosteroids. Alternative treatment: <ul style="list-style-type: none"> Low-dose inhaled corticosteroids and either leukotriene receptor antagonist or theophylline. <p><i>If needed (particularly in patients with recurring severe exacerbations):</i></p> <ul style="list-style-type: none"> Preferred treatment: <ul style="list-style-type: none"> Medium-dose inhaled corticosteroids and long-acting beta₂-agonists. Alternative treatment: <ul style="list-style-type: none"> Medium-dose inhaled corticosteroids and either leukotriene receptor antagonist or theophylline.
Step 2 Mild Persistent	> 2 times a week but < 1 time a day	> 2 nights a month	<ul style="list-style-type: none"> FEV₁ or PEF ≥ 80% predicted PEF Variability 20 – 30% 	<ul style="list-style-type: none"> Preferred treatment: <ul style="list-style-type: none"> Low-dose inhaled corticosteroids. Alternative treatment (listed alphabetically): cromolyn, leukotriene modifier, nedocromil, OR sustained release theophylline to serum concentration of 5–15 mcg/mL. 		<ul style="list-style-type: none"> Preferred treatment: <ul style="list-style-type: none"> Low-dose inhaled corticosteroid (with nebulizer or MDI with holding chamber with or without face mask or DPI). Alternative treatment (listed alphabetically): <ul style="list-style-type: none"> Cromolyn (nebulizer is preferred or MDI with holding chamber) OR leukotriene receptor antagonist.
Step 1 Mild Intermittent	≤ 2 times a week	≤ 2 nights a month	<ul style="list-style-type: none"> FEV₁ or PEF ≥ 80% predicted PEF Variability < 20% 	<ul style="list-style-type: none"> No daily medication needed. Severe exacerbations may occur, separated by long periods of normal lung function and no symptoms. A course of systemic corticosteroids is recommended. 		<ul style="list-style-type: none"> No daily medication needed.

QUICK RELIEF

ADULTS and CHILDREN OVER 5 YEARS OF AGE

INFANTS and CHILDREN UNDER 5 YEARS OF AGE

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 or a single nebulizer treatment as needed. Course of systemic corticosteroids may be needed.
- 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 initiate (increase) long-term control therapy.

- Bronchodilator as needed for symptoms. Intensity of treatment will depend upon severity of exacerbation.
 - Preferred treatment: Short-acting inhaled beta₂-agonists by nebulizer or face mask and space/holding chamber
 - Alternative treatment: Oral beta₂-agonists
- 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 initiate (increase) long-term control therapy.

- With viral respiratory infection
 - Bronchodilator q 4–6 hours up to 24 hours (longer with physician consult); in general, repeat no more than once every 6 weeks
 - Consider systemic corticosteroid if exacerbation is severe or patient has history of previous severe exacerbations

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USUAL DOSAGES FOR LONG-TERM-CONTROL MEDICATION

MEDICATION	DOSAGE FORM	ADULT DOSE	CHILD DOSE [†]
Inhaled Corticosteroids	<i>(See Estimated Comparative Daily Dosages for Inhaled Corticosteroids.)</i>		
Systemic Corticosteroids	<i>(Applies to all three corticosteroids.)</i>		
Methylprednisolone (Medrol [™]) Prednisolone (Pediapred [™])	2, 4, 8, 16, 32 mg tablets 5 mg tablets, 5 mg/5 cc, 15 mg/5 cc	<ul style="list-style-type: none"> 7.5–60 mg daily in a single dose in a.m. or qod as needed for control Short-course “burst” to achieve control: 40–60 mg per day as single or 2 divided doses for 3–10 days 	<ul style="list-style-type: none"> 0.25–2 mg/kg daily in single dose in a.m. or qod as needed for control Short-course “burst”: 1–2 mg/kg/day, maximum 60 mg/day for 3–10 days
Prednisone (Deltasone [™])	1, 2.5, 5, 10, 20, 50 mg tablets; 5 mg/cc, 5 mg/5 cc		
Long-Acting Inhaled Beta₂-Agonists	<i>(Should not be used for symptom relief or for exacerbations. Use with inhaled corticosteroids.)</i>		
Salmeterol (Serevent [™])	MDI 21 mcg/puff DPI 50 mcg/blister	2 puffs q 12 hours 1 blister q 12 hours	1–2 puffs q 12 hours 1 blister q 12 hours
Formoterol (Foradil [™])	DPI 12 mcg/single-use capsule	1 capsule q 12 hours	1 capsule q 12 hours
Combined Medication			
Fluticasone/Salmeterol Advair Diskus	DPI 100, 250, or 500 mcg/50 mcg	1 inhalation bid; dose depends on severity of asthma	1 inhalation bid; dose depends on severity of asthma
Cromolyn and Nedocromil			
Cromolyn (Intal [™])	MDI 1 mg/puff Nebulizer 20 mg/ampule	2–4 puffs tid-qid 1 ampule tid-qid	1–2 puffs tid-qid 1 ampule tid-qid
Nedocromil (Tilade [™])	MDI 1.75 mg/puff	2–4 puffs bid-qid	1–2 puffs bid-qid
Leukotriene Modifiers			
Montelukast (Singulair [™])	4 or 5 mg chewable tablet 10 mg tablet	10 mg qhs	4 mg qhs (2–5 yrs) 5 mg qhs (6–14 yrs) 10 mg qhs (> 14 yrs)
Zafirlukast (Accolate [™]) Zileuton (Zyflo [™])	10 or 20 mg tablet 300 or 600 mg tablet	40 mg daily (20 mg tablet bid) 2,400 mg daily (give tablets qid)	20 mg daily (7–11 yrs) (10 mg tablet bid)
Methylxanthines	<i>(Serum monitoring is important [serum concentration of 5–15 mcg/mL at steady state].)</i>		
Theophylline	Liquids, sustained-release tablets, and capsules	Starting dose 10 mg/kg/day up to 300 mg max; usual max 800 mg/day	Starting dose: 10 mg/kg/day; usual max: <ul style="list-style-type: none"> <1 year of age: 0.2 (age in weeks) + 5 = mg/kg/day ≥ 1 year of age: 16 mg/kg/day

ESTIMATED COMPARATIVE DAILY DOSAGES FOR INHALED CORTICOSTEROIDS

DRUG	LOW DAILY DOSE ADULT	CHILD [†]	MEDIUM DAILY DOSE ADULT	CHILD [†]	HIGH DAILY DOSE ADULT	CHILD [†]
Belomethasone CFC 42 or 84 mcg/puff (Vanceril, Beclovent/Becotide [™])	168–504 mcg	84–336 mcg	504–840 mcg	336–672 mcg	> 840 mcg	> 672 mcg
Belomethasone HFA 40 or 80 mcg/puff (QVAR [™])	80–240 mcg	80–160 mcg	240–480 mcg	160–320 mcg	> 480 mcg	> 320 mcg
Budesonide DPI 200 mcg/inhalation (Pulmicort Turbuhaler [™])	200–600 mcg	200–400 mcg	600–1,200 mcg	400–800 mcg	> 1,200 mcg	> 800 mcg
Inhalation suspension for nebulization (child dose) (Pulmicort Respules [™])		0.5 mg		1.0 mg		2.0 mg
Flunisolide 250 mcg/puff (AeroBid, Aero Bid-M [™])	500–1,000 mcg	500–750 mcg	1,000–2,000 mcg	1,000–1,250 mcg	> 2,000 mcg	> 1,250 mcg
Fluticasone						
MDI: 44, 110, or 220 mcg/puff (Flovent [™])	88–264 mcg	88–176 mcg	264–660 mcg	176–440 mcg	> 660 mcg	> 440 mcg
DPI: 50, 100, or 250 mcg/inhalation (Flovent Rotadisk [™])	100–300 mcg	100–200 mcg	300–600 mcg	200–400 mcg	> 600 mcg	> 400 mcg
Triamcinolone acetonide 100 mcg/puff (Azmacort [™])	400–1,000 mcg	400–800 mcg	1,000–2,000 mcg	800–1,200 mcg	> 2,000 mcg	> 1,200 mcg

[†] Children ≤ 12 years of age

GOALS OF THERAPY: ASTHMA CONTROL

- Minimal or no chronic symptoms day or night
- Minimal or no exacerbations
- No limitations on activities; no school/parent’s work missed
- Maintain (near) normal pulmonary function in adults and children > than 5 years.
- Minimal use of short-acting inhaled beta₂-agonist (< 1 x per day, < 1 canister/month)
- Minimal or no adverse effects from medications

NOTES

- The stepwise approach presents general guidelines to assist clinical decision-making. Asthma is highly variable; clinicians should tailor medication plans to the needs of individual patients.
- 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.
- 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.
- For children under 5, referral to an asthma specialist for consultation or co-management is recommended for patients requiring step 3 or 4 care. Referral may be considered for step 2 care.
- Classify severity: assign patient to most severe step in which any feature occurs (For adults and children > 5 years, PEF is % of personal best; FEV₁ is % predicted).
- Gain control as quickly as possible (Adults and children > 5 years, a course of short systemic corticosteroids may be required; Young children ≤ 5 years, consider a short course of systemic corticosteroids); then step down to the least medication necessary to maintain control.
- There are very few studies on asthma therapy for infants.
- Provide education on self-management and controlling environmental factors that make asthma worse (e.g., allergens and irritants).
- For children ≤ 5 years, provide parent education on asthma management and controlling environmental factors that make asthma worse (e.g., allergies and irritants).

* The presence of one of the features of severity is sufficient to place a patient in that category. An individual should be assigned to the most severe grade in which any feature occurs. The characteristics noted in this figure are general and may overlap because asthma is highly variable. Furthermore, an individual’s classification may change over time.

** Patients at any level of severity can have mild, moderate or severe exacerbations. Some patients with intermittent asthma experience severe and life-threatening exacerbations separated by long periods of normal lung function and no symptoms.