



CLINICAL PRACTICE GUIDELINE

Guideline Number: DHMP_CG1007

Effective Date: 12/2010

Guideline Subject: Management of Asthma in Adults and Children

Revision Date: 12/2011

Pages: 1 of 1

Obsoletes: 1/99, 3/01, 3/04, 7/04, 9/05, 9/06, 09/07, 12/09


Medical Management Committee Chair


Date

I. PURPOSE:

To define the care for management of Asthma in Adults and Children.

II. POPULATION:

All currently enrolled Denver Health Medical Plan members.

III. GUIDELINE:

DHMP supports the attached nationally defined protocols and algorithms for the appropriate tiered management strategies for members with sustained reactive airways disease or asthma. DHMP encourages providers to develop and review our Asthma Action Plan (see attachment) for all patients with asthma.

Rationale:

Asthma, which can lead to COPD, is among the 10 leading chronic conditions in the US, which restrict activity and contribute to illness in children. About 15 million persons in the US are affected by asthma and this is a rapidly growing health problem. Asthma contributes to a significant number of hospitalizations and deaths as well as frequent emergency department visits. Effective management can prevent this morbidity and mortality, including use of inhaled anti-inflammatory agents, smoking cessation among patients and their families and proper education about these of chronic maintenance and rescue drugs.

IV. REFERENCES:

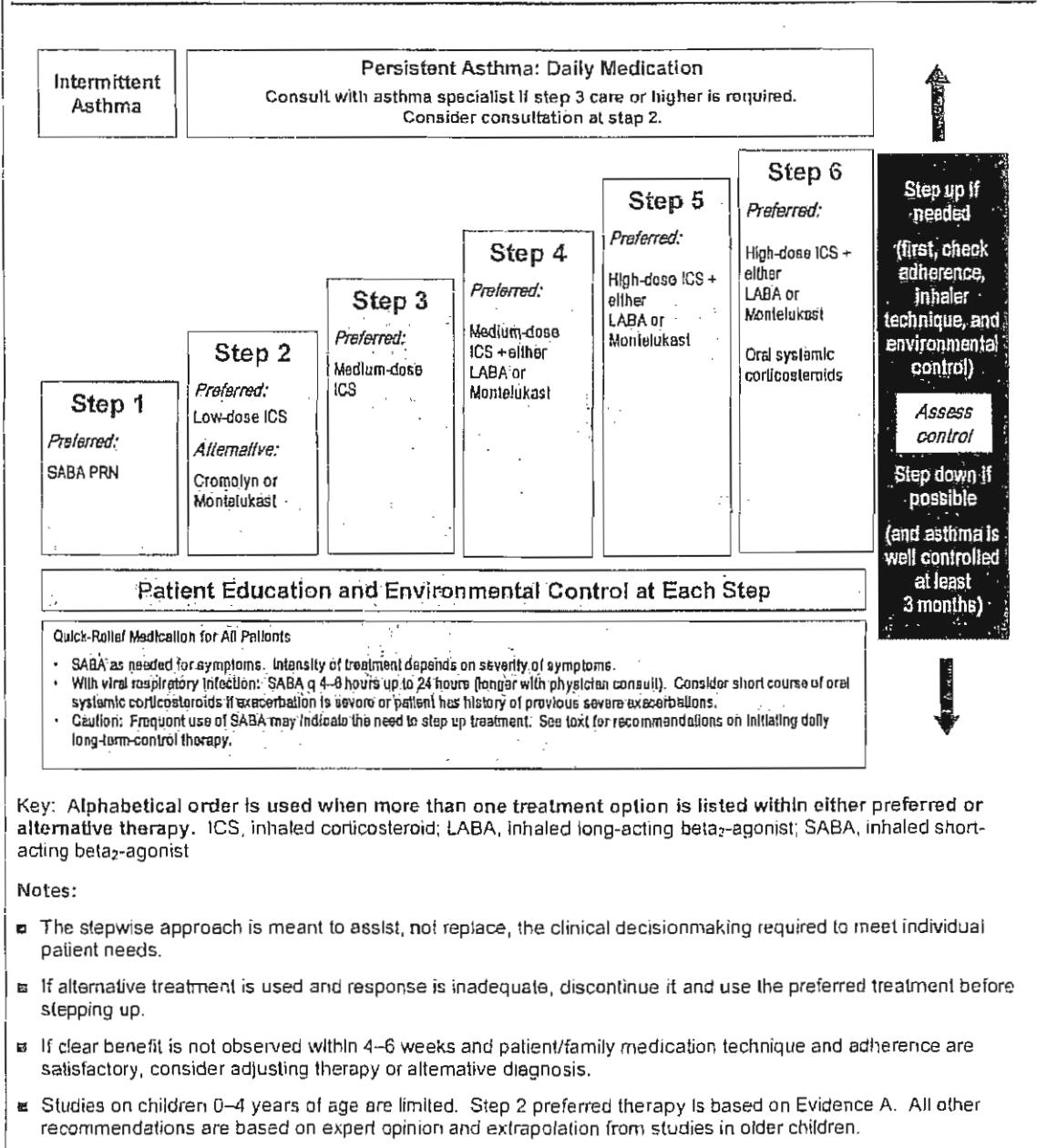
1. National Heart, Blood and Lung Institute Expert Panel Report (EPR 3): Guidelines for the Diagnosis and Management of Asthma. NIH Publication #08-4051 August 2007.
Full report available at: www.nhlbi.nih.gov/guidelines/asthma/asthgdin.htm

V. ATTACHMENTS:

1. Figure 4-1a. Stepwise Approach for Managing Asthma in Children 0-4 Years of Age
2. Figure 4-1b. Stepwise Approach for Managing Asthma in Children 5-11 Years of Age
3. Figure 4-5. Stepwise Approach for Managing Asthma in Youths > 12 Years of Age and Adults
4. Denver Health Asthma Action Plan
5. CCGC Asthma Management Resources

NOTE:
This guideline is designed to assist providers by providing an analytical framework for the evaluation and treatment of patients, and is not intended either to replace a clinician's judgment or to establish a protocol for all patients with a particular condition.

FIGURE 4–1a. STEPWISE APPROACH FOR MANAGING ASTHMA IN CHILDREN 0–4 YEARS OF AGE



Key: Alphabetical order is used when more than one treatment option is listed within either preferred or alternative therapy. ICS, inhaled corticosteroid; LABA, inhaled long-acting beta₂-agonist; SABA, inhaled short-acting beta₂-agonist

Notes:

- The stepwise approach is meant to assist, not replace, the clinical decisionmaking required to meet individual patient needs.
- If alternative treatment is used and response is inadequate, discontinue it and use the preferred treatment before stepping up.
- If clear benefit is not observed within 4–6 weeks and patient/family medication technique and adherence are satisfactory, consider adjusting therapy or alternative diagnosis.
- Studies on children 0–4 years of age are limited. Step 2 preferred therapy is based on Evidence A. All other recommendations are based on expert opinion and extrapolation from studies in older children.

FIGURE 4–2a. CLASSIFYING ASTHMA SEVERITY AND INITIATING TREATMENT IN CHILDREN 0–4 YEARS OF AGE

Assessing severity and initiating therapy in children who are not currently taking long-term control medication

Components of Severity		Classification of Asthma Severity (0–4 years of age)			
		Intermittent	Mild	Persistent Moderate	Persistent Severe
Impairment	Symptoms	≤2 days/week	>2 days/week but not daily	Daily	Throughout the day
	Nighttime awakenings	0	1–2x/month	3–4x/month	>1x/week
	Short-acting beta ₂ -agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week but not daily	Daily	Several times per day
	Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
Risk	Exacerbations requiring oral systemic corticosteroids	0–1/year	≥2 exacerbations in 6 months requiring oral systemic corticosteroids, or ≥4 wheezing episodes/1 year lasting >1 day AND risk factors for persistent asthma		
		← Consider severity and interval since last exacerbation. Frequency and severity may fluctuate over time. →			
Recommended Step for Initiating Therapy (See figure 4–1a for treatment steps.)		Step 1	Step 2	Step 3 and consider short course of oral systemic corticosteroids	
		In 2–6 weeks, depending on severity, evaluate level of asthma control that is achieved. If no clear benefit is observed in 4–6 weeks, consider adjusting therapy or alternative diagnoses.			

Key: EIB, exercise-induced bronchospasm

Notes

- The stepwise approach is meant to assist, not replace, the clinical decisionmaking required to meet individual patient needs.
- Level of severity is determined by both impairment and risk. Assess impairment domain by patient's/caregiver's recall of previous 2–4 weeks. Symptom assessment for longer periods should reflect a global assessment such as inquiring whether the patient's asthma is better or worse since the last visit. Assign severity to the most severe category in which any feature occurs.
- At present, there are inadequate data to correspond frequencies of exacerbations with different levels of asthma severity. For treatment purposes, patients who had ≥2 exacerbations requiring oral systemic corticosteroids in the past 6 months, or ≥4 wheezing episodes in the past year, and who have risk factors for persistent asthma may be considered the same as patients who have persistent asthma, even in the absence of impairment levels consistent with persistent asthma.

FIGURE 4–3a. ASSESSING ASTHMA CONTROL AND ADJUSTING THERAPY IN CHILDREN 0–4 YEARS OF AGE

Components of Control		Classification of Asthma Control (0–4 years of age)		
		Well Controlled	Not Well Controlled	Very Poorly Controlled
Impairment	Symptoms	≤2 days/week	>2 days/week	Throughout the day
	Nighttime awakenings	≤1x/month	>1x/month	>1x/week
	Interference with normal activity	None	Some limitation	Extremely limited
	Short-acting beta ₂ -agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week	Several times per day
Risk	Exacerbations requiring oral systemic corticosteroids	0–1/year	2–3/year	>3/year
	Treatment-related adverse effects	Medication side effects can vary in intensity from none to very troublesome and worrisome. The level of intensity does not correlate to specific levels of control but should be considered in the overall assessment of risk.		
Recommended Action for Treatment (See figure 4–1a for treatment steps.)		<ul style="list-style-type: none"> • Maintain current treatment. • Regular followup every 1–6 months. • Consider step down if well controlled for at least 3 months. 	<ul style="list-style-type: none"> • Step up (1 step) and Reevaluate in 2–6 weeks. • If no clear benefit in 4–6 weeks, consider alternative diagnoses or adjusting therapy. • For side effects, consider alternative treatment options. 	<ul style="list-style-type: none"> • Consider short course of oral systemic corticosteroids, • Step up (1–2 steps), and • Reevaluate in 2 weeks. • If no clear benefit in 4–6 weeks, consider alternative diagnoses or adjusting therapy. • For side effects, consider alternative treatment options.

Key: EIB, exercise-induced bronchospasm

Notes:

- The stepwise approach is meant to assist, not replace, the clinical decisionmaking required to meet individual patient needs.
- The level of control is based on the most severe impairment or risk category. Assess impairment domain by caregiver's recall of previous 2–4 weeks. Symptom assessment for longer periods should reflect a global assessment such as inquiring whether the patient's asthma is better or worse since the last visit.
- At present, there are inadequate data to correspond frequencies of exacerbations with different levels of asthma control. In general, more frequent and intense exacerbations (e.g., requiring urgent, unscheduled care, hospitalization, or ICU admission) indicate poorer disease control. For treatment purposes, patients who had ≥2 exacerbations requiring oral systemic corticosteroids in the past year may be considered the same as patients who have not-well-controlled asthma, even in the absence of impairment levels consistent with not-well-controlled asthma.
- Before step up in therapy:
 - Review adherence to medications, inhaler technique, and environmental control.
 - If alternative treatment option was used in a step, discontinue it and use preferred treatment for that step.

FIGURE 4-1b. STEPWISE APPROACH FOR MANAGING ASTHMA IN CHILDREN 5–11 YEARS OF AGE

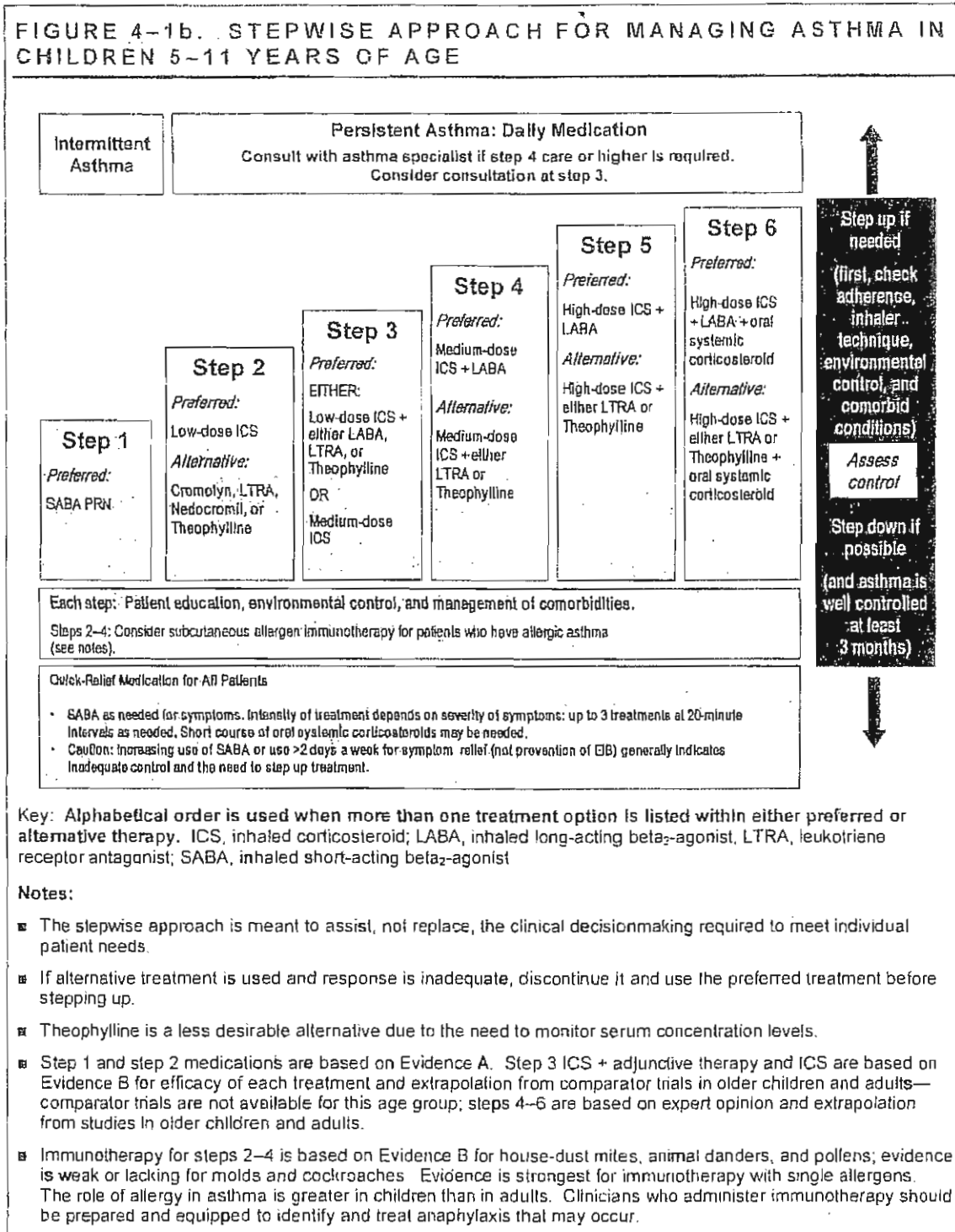


FIGURE 4–2b. CLASSIFYING ASTHMA SEVERITY AND INITIATING TREATMENT IN CHILDREN 5–11 YEARS OF AGE

Assessing severity and initiating therapy in children who are not currently taking long-term control medication

Components of Severity		Classification of Asthma Severity (5–11 years of age)			
		Intermittent	Mild	Persistent Moderate	Persistent Severe
Impairment	Symptoms	≤2 days/week	>2 days/week but not daily	Daily	Throughout the day
	Nighttime awakenings	≤2x/month	3–4x/month	>1x/week but not nightly	Often 7x/week
	Short-acting beta ₂ -agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week but not daily	Daily	Several times per day
	Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
Lung function	Normal FEV ₁ between exacerbations				
		• FEV ₁ >80% predicted • FEV ₁ /FVC >85%	• FEV ₁ = >80% predicted • FEV ₁ /FVC >80%	• FEV ₁ = 60–80% predicted • FEV ₁ /FVC = 75–80%	• FEV ₁ <60% predicted • FEV ₁ /FVC <75%
Risk	Exacerbations requiring oral systemic corticosteroids	0–1/year (see note)		≥2/year (see note)	
		Consider severity and interval since last exacerbation; frequency and severity may fluctuate over time for patients in any severity category. Relative annual risk of exacerbations may be related to FEV ₁ .			
Recommended Step for Initiating Therapy		Step 1	Step 2	Step 3, medium-dose ICS option	Step 3, medium-dose ICS option, or Step 4 and consider short course of oral systemic corticosteroids
(See figure 4–1b for treatment steps.)		In 2–6 weeks, evaluate level of asthma control that is achieved, and adjust therapy accordingly.			

Key: EIB, exercise-induced bronchospasm; FEV₁, forced expiratory volume in 1 second; FVC, forced vital capacity; ICS, inhaled corticosteroids

Notes

- The stepwise approach is meant to assist, not replace, the clinical decisionmaking required to meet individual patient needs.
- Level of severity is determined by both impairment and risk. Assess impairment domain by patient's/caregiver's recall of the previous 2–4 weeks and spirometry. Assign severity to the most severe category in which any feature occurs.
- At present, there are inadequate data to correspond frequencies of exacerbations with different levels of asthma severity. In general, more frequent and intense exacerbations (e.g., requiring urgent, unscheduled care, hospitalization, or ICU admission) indicate greater underlying disease severity. For treatment purposes, patients who had ≥2 exacerbations requiring oral systemic corticosteroids in the past year may be considered the same as patients who have persistent asthma, even in the absence of impairment levels consistent with persistent asthma.

FIGURE 4–3b. ASSESSING ASTHMA CONTROL AND ADJUSTING THERAPY IN CHILDREN 5–11 YEARS OF AGE

Components of Control		Classification of Asthma Control (5–11 years of age)		
		Well Controlled	Not Well Controlled	Very Poorly Controlled
Impairment	Symptoms	≤2 days/week but not more than once on each day	>2 days/week or multiple times on ≤2 days/week	Throughout the day
	Nighttime awakenings	≤1x/month	≥2x/month	≥2x/week
	Interference with normal activity	None	Some limitation	Extremely limited
	Short-acting beta ₂ -agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week	Several times per day
	Lung function			
	FEV ₁ or peak flow	>80% predicted/personal best	60–80% predicted/personal best	<60% predicted/personal best
	FEV ₁ /FVC	>80%	75–80%	<75%
	Exacerbations requiring oral systemic corticosteroids	0–1/year	≥2/year (see note)	
		Consider severity and interval since last exacerbation.		
Risk	Reduction in lung growth Treatment-related adverse effects	Evaluation requires long-term followup. Medication side effects can vary in intensity from none to very troublesome and worrisome. The level of intensity does not correlate to specific levels of control but should be considered in the overall assessment of risk.		
	Recommended Action for Treatment (See figure 4–1b for treatment steps.)	<ul style="list-style-type: none"> • Maintain current step. • Regular followup every 1–6 months. • Consider step down if well controlled for at least 3 months. 	<ul style="list-style-type: none"> • Step up at least 1 step and reevaluate in 2–6 weeks. • For side effects, consider alternative treatment options. 	<ul style="list-style-type: none"> • Consider short course of oral systemic corticosteroids. • Step up 1–2 steps, and reevaluate in 2 weeks. • For side effects, consider alternative treatment options.

Key: EIB, exercise-induced bronchospasm; FEV₁, forced expiratory volume in 1 second; FVC, forced vital capacity

Notes:

- The stepwise approach is meant to assist, not replace, the clinical decisionmaking required to meet individual patient needs.
- The level of control is based on the most severe impairment or risk category. Assess impairment domain by patient's/caregiver's recall of previous 2–4 weeks and by spirometry/or peak flow measures. Symptom assessment for longer periods should reflect a global assessment such as inquiring whether the patient's asthma is better or worse since the last visit.
- At present, there are inadequate data to correspond frequencies of exacerbations with different levels of asthma control. In general, more frequent and intense exacerbations (e.g., requiring urgent, unscheduled care, hospitalization, or ICU admission) indicate poorer disease control. For treatment purposes, patients who had ≥2 exacerbations requiring oral systemic corticosteroids in the past year may be considered the same as patients who have persistent asthma, even in the absence of impairment levels consistent with persistent asthma.
- Before step up in therapy:
 - Review adherence to medications, inhaler technique, environmental control, and comorbid conditions.
 - If alternative treatment option was used in a step, discontinue it and use preferred treatment for that step

FIGURE 4–4b. ESTIMATED COMPARATIVE DAILY DOSAGES FOR INHALED CORTICOSTEROIDS IN CHILDREN

Drug	Low Daily Dose		Medium Daily Dose		High Daily Dose	
	Child 0–4	Child 5–11	Child 0–4	Child 5–11	Child 0–4	Child 5–11
Beclomethasone HFA 40 or 80 mcg/puff	NA	80–160 mcg	NA	>160–320 mcg	NA	>320 mcg
Budesonide DPI 90, 180, or 200 mcg/inhalation	NA	180–400 mcg	NA	>400–800 mcg	NA	>800 mcg
Budesonide inhaled Inhalation suspension for nebulization (child dose)	0.25–0.5 mg	0.5 mg	>0.5–1.0 mg	1.0 mg	>1.0 mg	2.0 mg
Flunisolide 250 mcg/puff	NA	500–750 mcg	NA	1,000–1,250 mcg	NA	>1,250 mcg
Flunisolide HFA 80 mcg/puff	NA	160 mcg	NA	320 mcg	NA	≥640 mcg
Fluticasone HFA/MDI: 44, 110, or 220 mcg/puff	176 mcg	88–176 mcg	>176–352 mcg	>176–352 mcg	>352 mcg	>352 mcg
DPI: 50, 100, or 250 mcg/inhalation	NA	100–200 mcg	NA	>200–400 mcg	NA	>400 mcg
Mometasone DPI 200 mcg/inhalation	NA	NA	NA	NA	NA	NA
Triamcinolone acetonide 75 mcg/puff	NA	300–600 mcg	NA	>600–900 mcg	NA	>900 mcg

Key: HFA, hydrofluoroalkane; NA, not approved and no data available for this age group

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 on several 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 effect.
- Some doses may be outside package labeling, especially in the high-dose range. Budesonide nebulizer suspension is the only ICS with FDA approved labeling for children <4 years of age.
- Metered-dose Inhaler (MDI) dosages are expressed as the actuator dose (the amount of the drug leaving the actuator and delivered to the patient), which is the labeling required in the United States. This is different from the dosage expressed as the valve dose (the amount of drug leaving the valve, not all of which is available to the patient), which is used in many European countries and in some scientific literature. Dry powder inhaler (DPI) dosages are expressed as the amount of drug in the inhaler following activation.
- For children <4 years of age: The safety and efficacy of ICSs in children <1 year has not been established. Children <4 years of age generally require delivery of ICS (budesonide and fluticasone HFA) through a face mask that should fit snugly over nose and mouth and avoid nebulizing in the eyes. Wash face after each treatment to prevent local corticosteroid side effects. For budesonide, the dose may be administered 1–3 times daily. Budesonide suspension is compatible with albuterol, ipratropium, and levosalbuterol nebulizer solutions in the same nebulizer. Use only jet nebulizers, as ultrasonic nebulizers are ineffective for suspensions.
- For fluticasone HFA, the dose should be divided 2 times daily; the low dose for children <4 years is higher than for children 5–11 years of age due to lower dose delivered with face mask and data on efficacy in young children.

FIGURE 4-5. STEPWISE APPROACH FOR MANAGING ASTHMA IN YOUTHS ≥12 YEARS OF AGE AND ADULTS

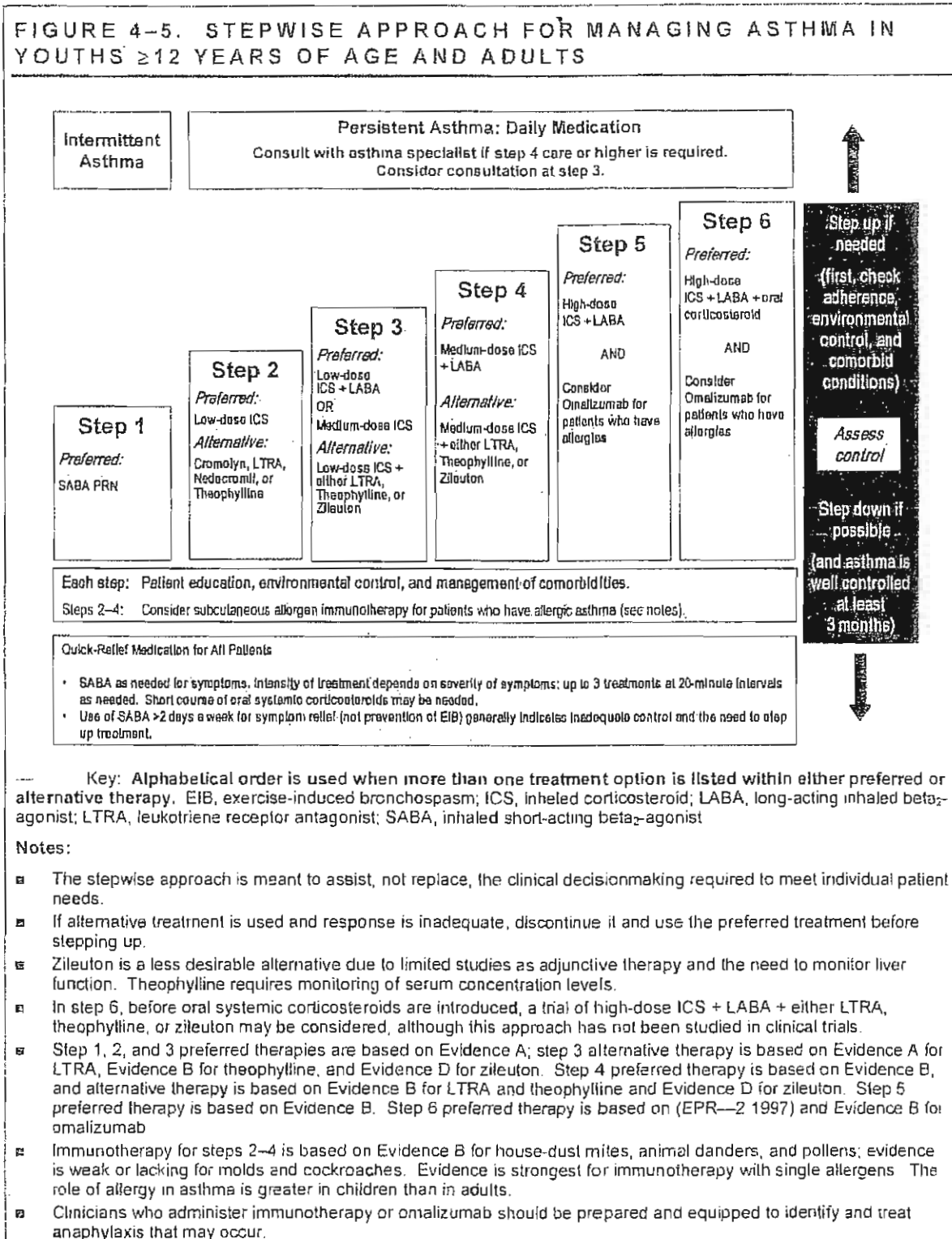


FIGURE 4-6. CLASSIFYING ASTHMA SEVERITY AND INITIATING TREATMENT IN YOUTHS ≥12 YEARS OF AGE AND ADULTS

Assessing severity and initiating treatment for patients who are not currently taking long-term control medications

Components of Severity		Classification of Asthma Severity ≥12 years of age			
		Intermittent	Mild	Persistent Moderate	Persistent Severe
Impairment	Symptoms	≤2 days/week	>2 days/week but not daily	Daily	Throughout the day
	Nighttime awakenings	≤2x/month	3-4x/month	>1x/week but not nightly	Often 7x/week
	Short-acting beta ₂ -agonist use for symptom control (not prevention of EIB)	≤2 days/week	≥2 days/week but not daily, and not more than 1x on any day	Daily	Several times per day
Normal FEV ₁ /FVC:	Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
	8-19 yr: 85%	Normal FEV ₁ between exacerbations	Minor limitation	Some limitation	Extremely limited
20-39 yr: 80%	Lung function	• FEV ₁ >80% predicted	• FEV ₁ >80% predicted	• FEV ₁ >60% but <80% predicted	• FEV ₁ <60% predicted
40-59 yr: 75%		• FEV ₁ /FVC normal	• FEV ₁ /FVC normal	• FEV ₁ /FVC reduced 5%	• FEV ₁ /FVC reduced >5%
60-80 yr: 70%	Risk	0-1/year (see note)	≥2/year (see note)	Consider severity and interval since last exacerbation. Frequency and severity may fluctuate over time for patients in any severity category. Relative annual risk of exacerbations may be related to FEV ₁ .	
Exacerbations requiring oral systemic corticosteroids					
Recommended Step for Initiating Treatment		Step 1	Step 2	Step 3	Step 4 or 5
(See figure 4-5 for treatment steps.)		In 2-5 weeks, evaluate level of asthma control that is achieved and adjust therapy accordingly.			

Key: FEV₁, forced expiratory volume in 1 second; FVC, forced vital capacity; ICU, intensive care unit

Notes:

- The stepwise approach is meant to assist, not replace, the clinical decisionmaking required to meet individual patient needs
- Level of severity is determined by assessment of both impairment and risk. Assess impairment domain by patient's/caregiver's recall of previous 2-4 weeks and spirometry. Assign severity to the most severe category in which any feature occurs.
- At present, there are inadequate data to correspond frequencies of exacerbations with different levels of asthma severity. In general, more frequent and intense exacerbations (e.g., requiring urgent, unscheduled care, hospitalization, or ICU admission) indicate greater underlying disease severity. For treatment purposes, patients who had ≥2 exacerbations requiring oral systemic corticosteroids in the past year may be considered the same as patients who have persistent asthma, even in the absence of impairment levels consistent with persistent asthma.

FIGURE 4-7. ASSESSING ASTHMA CONTROL AND ADJUSTING THERAPY IN YOUTHS ≥12 YEARS OF AGE AND ADULTS

Components of Control		Classification of Asthma Control (≥12 years of age)		
		Well Controlled	Not Well Controlled	Very Poorly Controlled
Impairment	Symptoms	≤2 days/week	>2 days/week	Throughout the day
	Nighttime awakenings	≤2x/month	1-3x/week	≥4x/week
	Interference with normal activity	None	Some limitation	Extremely limited
	Short-acting beta ₂ -agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week	Several times per day
	FEV ₁ or peak flow	>80% predicted/ personal best	60-80% predicted/ personal best	<60% predicted/ personal best
	Validated questionnaires			
	ATAQ ACQ ACT	0 0.75* ≥20	1-2 ≥1.5 16-19	3-4 N/A ≤15
Risk	Exacerbations requiring oral systemic corticosteroids	0-1/year		
	Progressive loss of lung function Treatment-related adverse effects	≥2/year (see note) Consider severity and interval since last exacerbation		
Recommended Action for Treatment (see figure 4-5 for treatment steps)		<ul style="list-style-type: none"> Maintain current step. Regular followups every 1-6 months to maintain control. Consider step down if well-controlled for at least 3 months. 	<ul style="list-style-type: none"> Step up 1 step and Reevaluate in 2-6 weeks. For side effects, consider alternative treatment options. 	<ul style="list-style-type: none"> Consider short course of oral systemic corticosteroids. Step up 1-2 steps, and Reevaluate in 2 weeks. For side effects, consider alternative treatment options.

--- ACQ values of 0.76-1.4 are indeterminate regarding well-controlled asthma.
 — Key: EIB, exercise-induced bronchospasm; ICU, intensive care unit

Notes:

- The stepwise approach is meant to assist, not replace, the clinical decisionmaking required to meet individual patient needs.
- The level of control is based on the most severe impairment or risk category. Assess impairment domain by patient's recall of previous 2-4 weeks and by spirometry/or peak flow measures. Symptom assessment for longer periods should reflect a global assessment, such as inquiring whether the patient's asthma is better or worse since the last visit.
- At present, there are inadequate data to correspond frequencies of exacerbations with different levels of asthma control. In general, more frequent and intense exacerbations (e.g., requiring urgent, unscheduled care, hospitalization, or ICU admission) indicate poorer disease control. For treatment purposes, patients who had ≥2 exacerbations requiring oral systemic corticosteroids in the past year may be considered the same as patients who have not-well-controlled asthma, even in the absence of impairment levels consistent with not-well-controlled asthma.
- Validated Questionnaires for the impairment domain (the questionnaires do not assess lung function or the risk domain)
 - ATAQ = Asthma Therapy Assessment Questionnaire® (See sample in "Component 1: Measures of Asthma Assessment and Monitoring.")
 - ACQ = Asthma Control Questionnaire® (user package may be obtained at www.qoltech.co.uk or Juniper@qoltech.co.uk)
 - ACT = Asthma Control Test™ (See sample in "Component 1: Measures of Asthma Assessment and Monitoring.")
 - Minimal Important Difference: 1.0 for the ATAQ; 0.5 for the ACQ; not determined for the ACT.

Before step up in therapy:

- Review adherence to medication, inhaler technique, environmental control, and comorbid conditions
- If an alternative treatment option was used in a step, discontinue and use the preferred treatment for that step

FIGURE 4-8b. ESTIMATED COMPARATIVE DAILY DOSAGES FOR INHALED CORTICOSTEROIDS FOR YOUTHS ≥ 12 YEARS OF AGE AND ADULTS

Drug	Low Daily Dose Adult	Medium Daily Dose Adult	High Daily Dose Adult
Beclomethasone HFA 40 or 80 mcg/puff	80–240 mcg	>240–480 mcg	>480 mcg
Budesonide DPI 90, 180, or 200 mcg/inhalation	180–600 mcg	>600–1,200 mcg	>1,200 mcg
Flunisolide 250 mcg/puff	500–1,000 mcg	>1,000–2,000 mcg	>2,000 mcg
Flunisolide HFA 80 mcg/puff	320 mcg	>320–640 mcg	>640 mcg
Fluticasone HFA/MDI: 44, 110, or 220 mcg/puff DPI: 50, 100, or 250 mcg/inhalation	88–264 mcg 100–300 mcg	>264–440 mcg >300–500 mcg	>440 mcg >500 mcg
Mometasone DPI 200 mcg/inhalation	200 mcg	400 mcg	>400 mcg
Triamcinolone acetonide 75 mcg/puff	300–750 mcg	>750–1,500 mcg	>1,500 mcg

Key: DPI, dry powder inhaler; HFA, hydrofluoroalkane; MDI, metered-dose inhaler


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 on several 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 effect.
- Some doses may be outside package labeling, especially in the high-dose range.
- MDI dosages are expressed as the actuator dose (the amount of the drug leaving the actuator and delivered to the patient), which is the labeling required in the United States. This is different from the dosage expressed as the valve dose (the amount of drug leaving the valve, not all of which is available to the patient), which is used in many European countries and in some scientific literature. DPI doses are expressed as the amount of drug in the inhaler following activation.
- Comparative dosages are based on published comparative clinical trials (Adams et al. 2005; Barnes et al. 1998; Kelly 1998; Lasserson et al. 2005; Pedersen and O'Byrne 1997). The rationale for some key comparisons is summarized as follows:
 - The high dose is the dose that appears likely to be the threshold beyond which significant hypothalamic-pituitary-adrenal (HPA) axis suppression is produced, and, by extrapolation, the risk is increased for other clinically significant systemic effects if used for prolonged periods of time (Martin et al. 2002; Szefler et al. 2002).
 - The low- and medium-doses reflect findings from dose-ranging studies in which incremental efficacy within the low- to medium-dose ranges was established without increased systemic effect as measured by overnight cortisol excretion. The studies demonstrated a relatively flat dose-response curve for efficacy at the medium-dose range, that is, increasing the dose of high-dose range did not significantly increase efficacy but did increase systemic effect (Adams et al. 2001; Martin et al. 2002; Szefler et al. 2002).
 - The dose for budesonide DPI is based on recently available comparative data with other medications. These new data, including meta-analyses, show that budesonide DPI is comparable to approximately twice the microgram dose of fluticasone MDI or DPI (Adams et al. 2005; Barnes et al. 1998; Nielsen and Dahl 2000).

Asthma Action Plan

Name: _____ Date: _____
 Physician or Clinic: _____ Phone Number: () _____ - _____

GREEN ZONE
Doing Well



- No coughing, wheezing, or difficulty breathing
- Can do usual activities

OR

- if a peak flow meter is used, your peak flow is at least: _____
- (80% or more of best* peak flow)
 Best* peak flow: _____

(*This is the personal best peak flow that you have consistently reached when doing well in the past year.)


Personal Asthma Goal: _____

Take these medicines every day for long-term control:

Name of medication:	How much to take:	How often (or when):
_____	_____	_____
_____	_____	_____
_____	_____	_____

- For metered dose inhalers, use of a spacer with valve is recommended.
- Avoid tobacco smoke and what you are allergic to (if unknown, discuss tests with your doctor).
- See your doctor every 3 to 6 months for preventive care.
- Take 2 puffs of quick relief medication 10-60 minutes before exercise, if needed.

YELLOW ZONE
Caution



Coughing Wheezing Tight Chest Waking up at night

- Coughing, or wheezing, or shortness of breath, or
- Nighttime awakenings with symptoms

OR

- Peak flow is between _____ and _____ (50% to 80% of best)

Take your GREEN ZONE meds *plus* for quick symptom relief take:

Name of medication:	How much to take:	How often (or when):
_____	_____	_____
_____	_____	_____
_____	_____	_____


If you have been in the yellow zone for over 24 hours, call your doctor.

RED ZONE
Medical Alert!



IF EXTREMELY SHORT OF BREATH, CALL 911 IMMEDIATELY.

GREEN ZONE
Doing Well



- No coughing, wheezing, or difficulty breathing
- Can do usual activities

OR

- if a peak flow meter is used, your peak flow is at least: _____

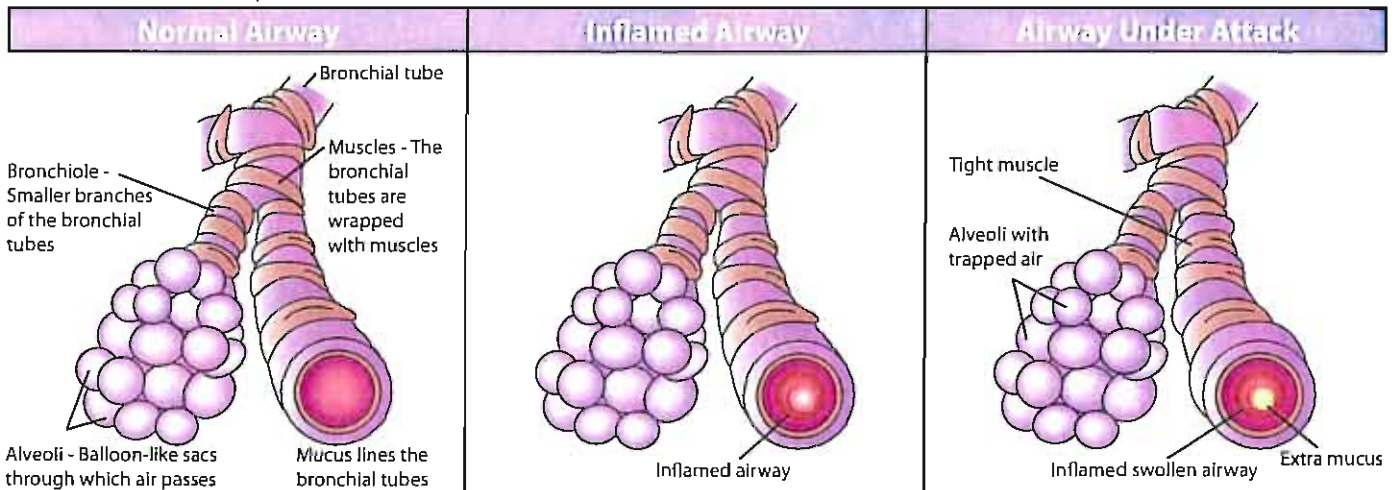
Personal Asthma Goal: _____

Take these medicines every day for long-term control:

Name of medication:	How much to take:	How often (or when):
_____	_____	_____
_____	_____	_____
_____	_____	_____

- For metered dose inhalers, use of a spacer with valve is recommended.

Asthma Patient Handout



Asthma

Asthma occurs when the airways in the lungs become inflamed (swollen) and constrict (become smaller), making breathing difficult. No two people with asthma are alike. Asthma *symptoms* may come and go, but the *asthma condition* never completely goes away.

Asthma affects the airways in three ways:

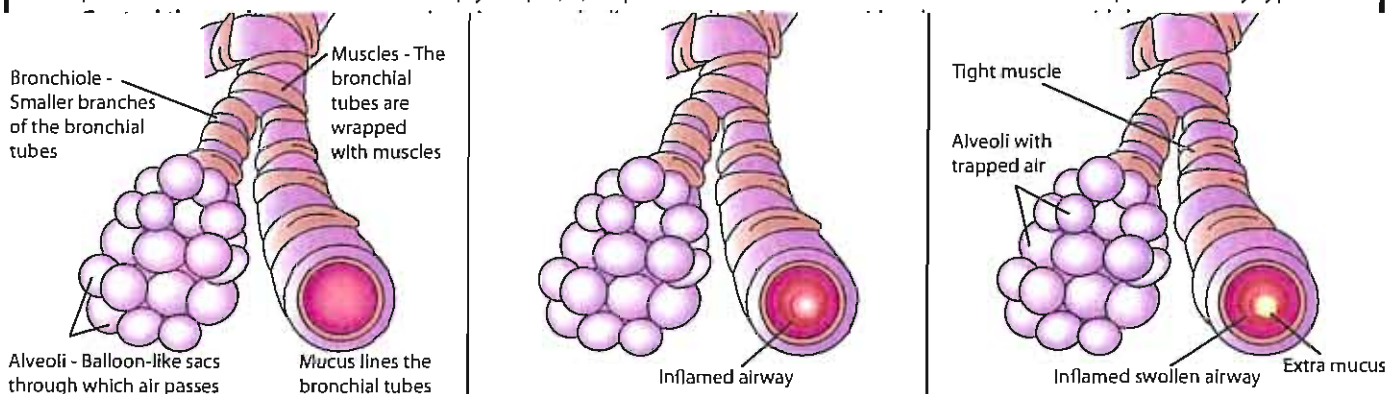
- 1) All people with asthma have **inflammation (irritation and swelling)** of the lining of the airways. When the airway lining is inflamed, there is less room for air to flow in and out.
- 2) **Bronchospasm** is caused by a tightening of the muscles that surround the airways. This narrows the airway and prevents air from getting in or leaving the lungs.
- 3) **Extra mucus** is produced and often blocks the airways.

Asthma triggers are anything that can make asthma worse. Each person has his or her own types of triggers. These include: • Tobacco smoke • Viral infections in the lungs (colds, bronchitis, flu) • Exercise • Perfumes and other strong odors • Cold air • Air pollution • Weather/climate changes • Pollens • House dust • Molds • Animal dander

Many people with asthma need **daily asthma control medicine** to manage symptoms and prevent flare-ups. The best asthma control medicine is an **Inhaled steroid** because it treats the inflammation of the airways. **This medicine must be taken every day as prescribed by the doctor to keep asthma under control.**

Tools for Managing Asthma

- » **Healthcare Provider:** Partner with them to manage your asthma and see them at least once a year.
- » **Medicine:** 1) *Take the inhaled steroid control medicine every day* as prescribed by your doctor, whether you are having symptoms or not, 2) Limit the use of a quick relief medicine such as albuterol to acute symptoms and to pretreat for exercise when that is a trigger.
- » **Limit tobacco smoke exposure:** 1) *Quit smoking:* call the Colorado QuitLine (1-800-QUITNOW) and ask your healthcare provider about other resources to help you quit, 2) *Keep the home and car smoke-free* and avoid smoke exposure of any type.



Asthma Medications

Inhaled Corticosteroid Controller Medications	FDA approved age (yrs)	Adult Doses* (Total Daily Inhalations)		
		Low	Medium	High
Advair® HFA (fluticasone/salmeterol) MDI	12+	(45/21) 4	(115/21) 4	(230/21) 4
Advair® Diskus® (fluticasone/salmeterol) DPI	4+	(100/50) 2	(250/50) 2	(500/50) 2
Aerospan® HFA (flunisolide) 80 mcg MDI	6+	4	4 - 8	> 8
Azmacort® HFA (triamcinolone) 75 mcg MDI	6+	4 - 10	10 - 20	> 20
Asmanex® (mometasone) 220 mcg DPI	12+	1	2	> 2
Asmanex® (mometasone) 110 mcg DPI	4+	2	4	>4
Flovent® HFA (fluticasone) 44 MDI	4+	2 - 6	7 - 10	> 10
Flovent® HFA (fluticasone) 110 MDI	4+	1 - 3	4	> 4
Flovent® HFA (fluticasone) 220 MDI	4+	1	2	> 2
Flovent® Diskus® (fluticasone) 50 DPI	4+	2 - 6	7 - 10	> 10
Pulmicort Flexhaler™ (budesonide) DPI 90 mcg	6+	2 - 6	7 - 13	> 13
Pulmicort Flexhaler™ (budesonide) DPI 180 mcg	6+	1 - 3	4 - 6	> 6
Pulmicort Respules® (budesonide) 0.25, 0.5, or 1 mg	1+	0.5 mg	1 mg	2 mg
Symbicort® 80/4.5 (budesonide/formoterol) MDI	12+	4	4	n/a
Symbicort® 160/4.5 (budesonide/formoterol) MDI	12+	n/a	4	4
QVAR® 40 HFA (beclomethasone) MDI	5+	2 - 6	6 - 12	> 12
QVAR® 80 HFA (beclomethasone) MDI	5+	1 - 3	4 - 6	> 6

*Adult doses listed. Children under 12 years use 60 to 80% of the listed dosages.

All LABAs and combination agents containing LABAs have a black box warning.

Check product information for dosing frequency.

Key: HFA = hydrofluoroalkane (new propellant); MDI = Metered Dose Inhaler; DPI = Dry Powder Inhaler

Leukotriene Blocker Controller Medications	FDA approved age for asthma	Dosage		
Accolate® (zafirlukast) 10 mg tablet	5 - 11 yrs	One tab twice daily		
Accolate® (zafirlukast) 20 mg tablet	12+ yrs	One tab twice daily		
Singulair® (montelukast) 4 mg granule packet	12 - 23 months	One packet once daily (evening)		
Advair® HFA (fluticasone/salmeterol) MDI	12+	(45/21) 4	(115/21) 4	(230/21) 4
Advair® Diskus® (fluticasone/salmeterol) DPI	4+	(100/50) 2	(250/50) 2	(500/50) 2
Aerospan® HFA (flunisolide) 80 mcg MDI	6+	4	4 - 8	> 8
Azmacort® HFA (triamcinolone) 75 mcg MDI	6+	4 - 10	10 - 20	> 20
Asmanex® (mometasone) 220 mcg DPI	12+	1	2	> 2
Asmanex® (mometasone) 110 mcg DPI	4+	2	4	>4
Flovent® HFA (fluticasone) 44 MDI	4+	2 - 6	7 - 10	> 10
Flovent® HFA (fluticasone) 110 MDI	4+	1 - 3	4	> 4
Flovent® HFA (fluticasone) 220 MDI	4+	1	2	> 2

Asthma Management for Children and Adults

Consider the diagnosis of "asthma" if:

1. **RECURRENT** coughing, wheezing, or shortness of breath relieved by a bronchodilator
2. Objective response by spirometry ($\geq 12\%$ increase of FEV₁ post bronchodilator)
3. Rule out conditions such as aspiration, GERD, airway anomaly, foreign body, cystic fibrosis, vocal cord dysfunction, or COPD. GERD is a common co-morbidity. (If diagnosis in doubt, consult with an asthma specialist.)

Assess Asthma Severity: Persistent vs. Intermittent

Persistent Asthma

1. Symptoms > 2 days per week **OR**
2. Awakened at night from asthma $> 2X$ per month **OR**
3. Limitation of activities, despite pretreatment for exercise induced asthma **OR**
4. More than 2 steroid bursts in 1 year **OR**
5. FEV₁ $< 80\%$ predicted **OR** low FEV₁/FVC ratio (see below)
6. For children < 4 years consider "persistent" if more than 4 episodes of wheezing in a year **AND** parental history of asthma or eczema or wheezing between illnesses.

Treatment for Persistent Asthma: Daily Inhaled Corticosteroids (steps 2, 3 or higher)

Assess Response within 2-6 weeks

"Well Controlled" Asthma

1. Daytime symptoms < 2 days per week **AND**
2. Awakening at night from asthma $< 2X$ per month **AND**
3. No limitation of activities **AND**
4. Less than 2 steroid bursts per year
5. FEV₁ $\geq 80\%$ predicted
6. FEV₁/FVC \rightarrow

FEV ₁ /FVC:	
5-19 yrs	$\geq 85\%$
20-39 yrs	$\geq 80\%$
40-59 yrs	$\geq 75\%$
60-80 yrs	$\geq 70\%$

YES

NO

2. Objective response by spirometry ($\geq 12\%$ increase of FEV₁ post bronchodilator)
3. Rule out conditions such as aspiration, GERD, airway anomaly, foreign body, cystic fibrosis, vocal cord dysfunction, or COPD. GERD is a common co-morbidity. (If diagnosis in doubt, consult with an asthma specialist.)

Assess Asthma Severity: Persistent vs. Intermittent

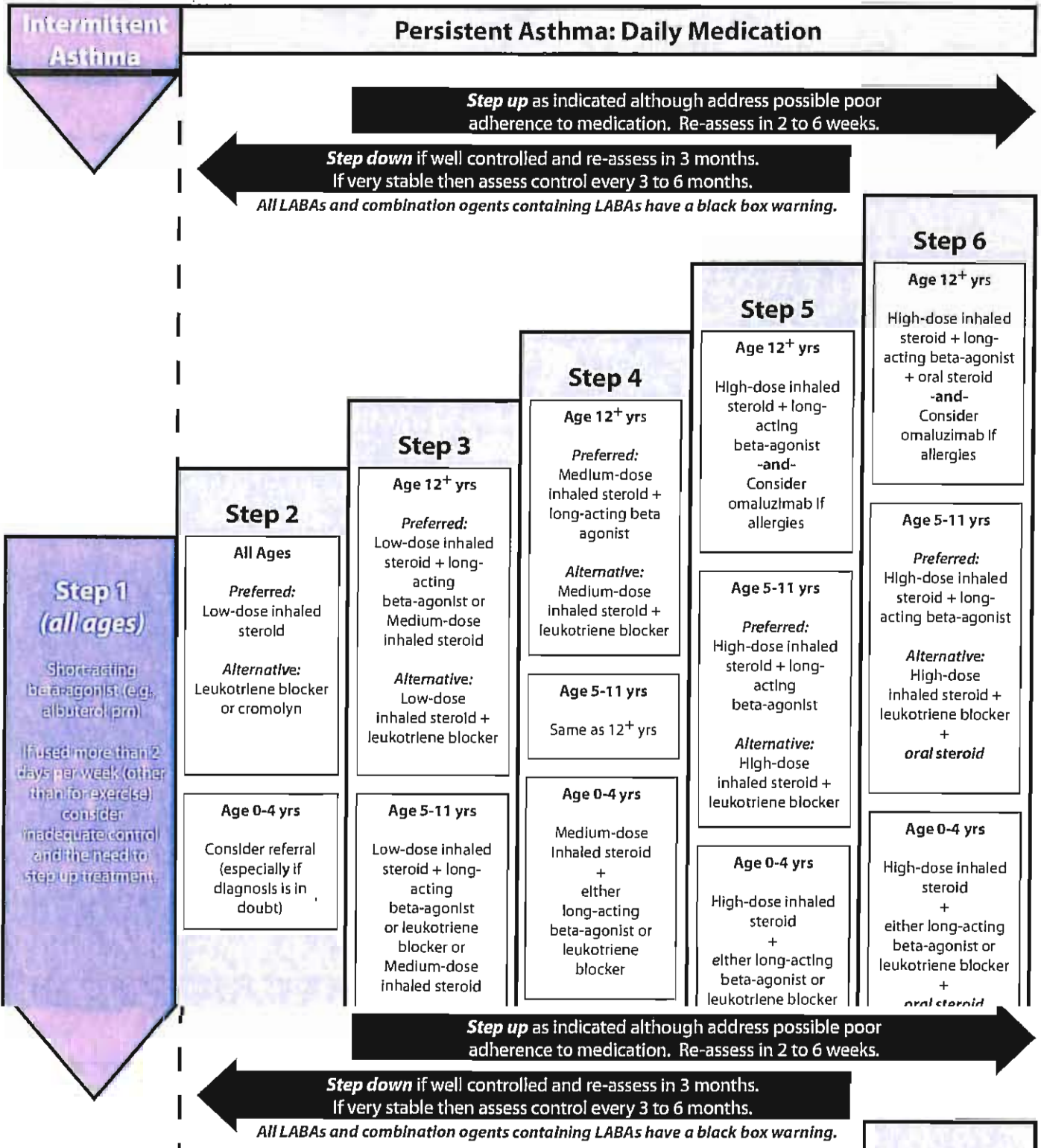
Persistent Asthma

1. Symptoms > 2 days per week **OR**
2. Awakened at night from asthma $> 2X$ per month **OR**
3. Limitation of activities, despite pretreatment for exercise induced asthma **OR**
4. More than 2 steroid bursts in 1 year **OR**
5. FEV₁ $< 80\%$ predicted **OR** low FEV₁/FVC ratio (see below)
6. For children < 4 years consider "persistent" if more than 4 episodes of wheezing in a year

Quick Tips for All Patients with Asthma

- Environmental Control:** identify and avoid triggers such as tobacco smoke, pollens, molds, animal dander, cockroaches, and dust mites.
- Flu Vaccine:** recommend annually.
- Spirometry:** at diagnosis and at least annually.
- Asthma Score:** use tools such as ACQ[®], ACT[™] or ATAQ[®] to assess asthma control.
- Asthma Education:** review correct inhaled medication device technique every visit, if needed.
- Asthma Action Plan:** at diagnosis; review and update at each visit.
- Short-Acting Beta-Agonist (e.g., albuterol):** 1) for quick relief every 4-6 hours as needed (see step 1), 2) pretreat with 2 puffs for exercise-induced bronchospasm 10-60 minutes before exercise.
- Oral Corticosteroids:** consider for acute exacerbation.
- Spacer with Valve:** if spacer selected, use spacer with valve.
- Mask:** use with spacer with valve and with nebulizer for children < 5 years and anyone unable to use correct

Asthma Stepwise Approach



**CCGC Guideline for Asthma Management for Children and Adults 2008
Literature List**

Primary Reference

1. National Asthma Education and Prevention Program Expert Panel. *National Asthma Education and Prevention Program Expert Panel. 3: Guidelines for the Diagnosis and Management of Asthma*. August 2007. <http://www.nhlbi.nih.gov/guidelines/asthma/>

Additional Reference

2. American College of Chest Physicians. (2004, p. 5). Controlling Your Asthma Patient Education Guide [Brochure].

Asthma Management Resources

American Academy of Asthma, Allergy, and Immunology

- www.aaaai.org
This site has both consumer and professional information including information about allergens. There are also links to help find an allergy/asthma specialist as well as a multitude of educational opportunities.

American Academy of Pediatrics

- www.aap.org/healthtopics/asthma.cfm
General site for parents for answers to basic questions about asthma.
- www.aap.org
General pediatric medicine, education courses, and resources.

American Association of Respiratory Care

- www.aarc.org
A professional site for resources and education opportunities.

American College of Chest Physicians (CHEST)

- www.chestnet.org
A professional resource for education, journals, and continuing education.

American Lung Association

- www.lungcolorado.org
This site leads to information about tobacco, smoking, lung disease, and local events.
- www.lungusa.org
This is a national site on allergies, asthma, COPD, and more.

American Thoracic Society

- www.thoracic.org
Resources for professionals including patient education, continuing education opportunities, research, and more.

Association of Asthma Educators

- www.asthmaeducators.org
Resource for asthma educators or those interested in becoming an asthma educator.

Asthma and Allergy Foundation of America

- www.aafa.org
Information about indoor and outdoor allergies. For professionals, patients, and parents.

Asthma and Allergy Network/Mothers of Asthmatics

- www.aanma.org
This site has useful information for families and schools. Information about allergens. There are also links to help find an allergy/asthma specialist as well as a multitude of educational opportunities.

American Academy of Pediatrics

- www.aap.org/healthtopics/asthma.cfm
General site for parents for answers to basic questions about asthma.
- www.aap.org
General pediatric medicine, education courses, and resources.

American Association of Respiratory Care

- www.aarc.org
A professional site for resources and education opportunities.

American College of Chest Physicians (CHEST)

Champ Camp/American Lung Association

- www.lungcolorado.org/champcamp.htm

Children's Hospital

- www.thechildrenshospital.org/conditions/lung/healthcare_professionals/index.aspx
Resources for Providers.
- www.thechildrenshospital.org/conditions/lung/conditions/asthma/asthma.aspx
Resources for families.

Colorado Asthma Coalition

- <http://asthmacolorado.org/>

Colorado Asthma Program

- <http://www.cdphe.state.co.us/ps/asthma/>
This site connects you to a "link" page which has the links to 18 different resource sites including AANMA, EPA, CDC, etc.

Colorado Clinical Guidelines Collaborative (CCGC)

- www.coloradoguidelines.org/guidelines/asthma.asp
This link connects you with the printable asthma guidelines for professionals.

Environmental Protection Agency (EPA)

- www.epa.gov/iaq/asthma
Resource for both professional and patients/parents to find environmental trigger information/resources.
- www.noattacks.org
This site is produced by the EPA and has trigger information as well as action plans for home and school plus much more.

National Asthma Education and Prevention Program (NAEPP)

- www.nhlbi.nih.gov/about/naepp
This link has information for both patients and professionals. It includes resources for assessing and implementing asthma education programs.

National Institute of Health (NIH)

- www.nih.gov
This site has health information from A-Z as well as a multitude of other resources including research and grant information.

National Jewish Medical and Research Center

- www.nationaljewish.org
All kinds of information on all topics surrounding the asthma-allergy-atopic dermatitis triad. For professionals, patients and parents.

Children's Hospital

- www.thechildrenshospital.org/conditions/lung/healthcare_professionals/index.aspx
Resources for Providers.
- www.thechildrenshospital.org/conditions/lung/conditions/asthma/asthma.aspx
Resources for families.

Colorado Asthma Coalition

- <http://asthmacolorado.org/>

Colorado Asthma Program

- <http://www.cdphe.state.co.us/ps/asthma/>
This site connects you to a "link" page which has the links to 18 different resource sites including AANMA, EPA, CDC, etc.