

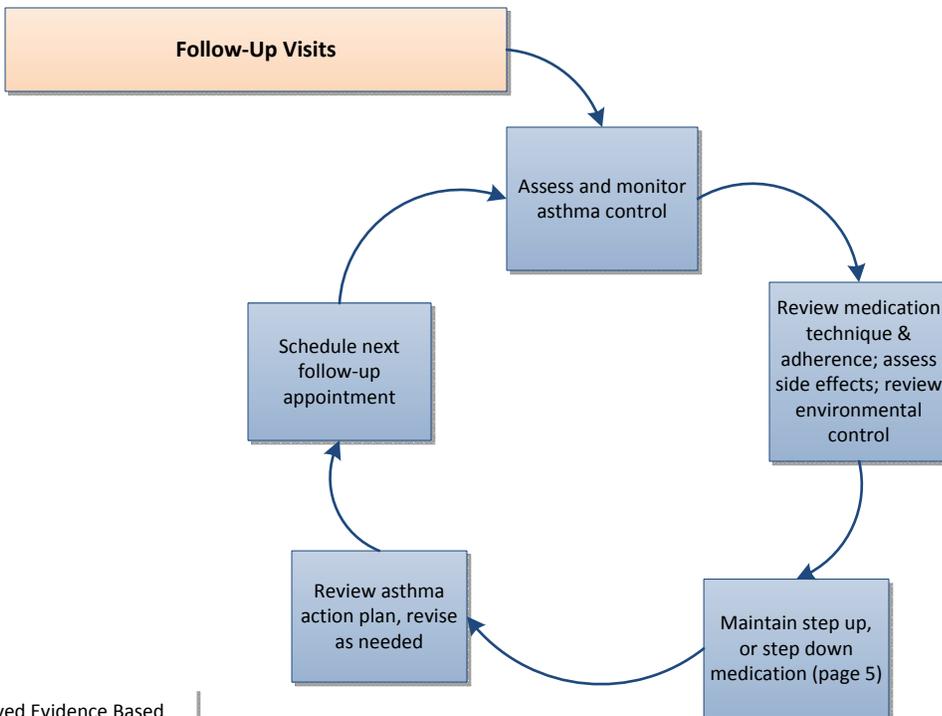
**Goals for Asthma Care**

Quality asthma care involves not only initial diagnosis and treatment to achieve asthma control, but also long-term regular follow-up care to maintain control.

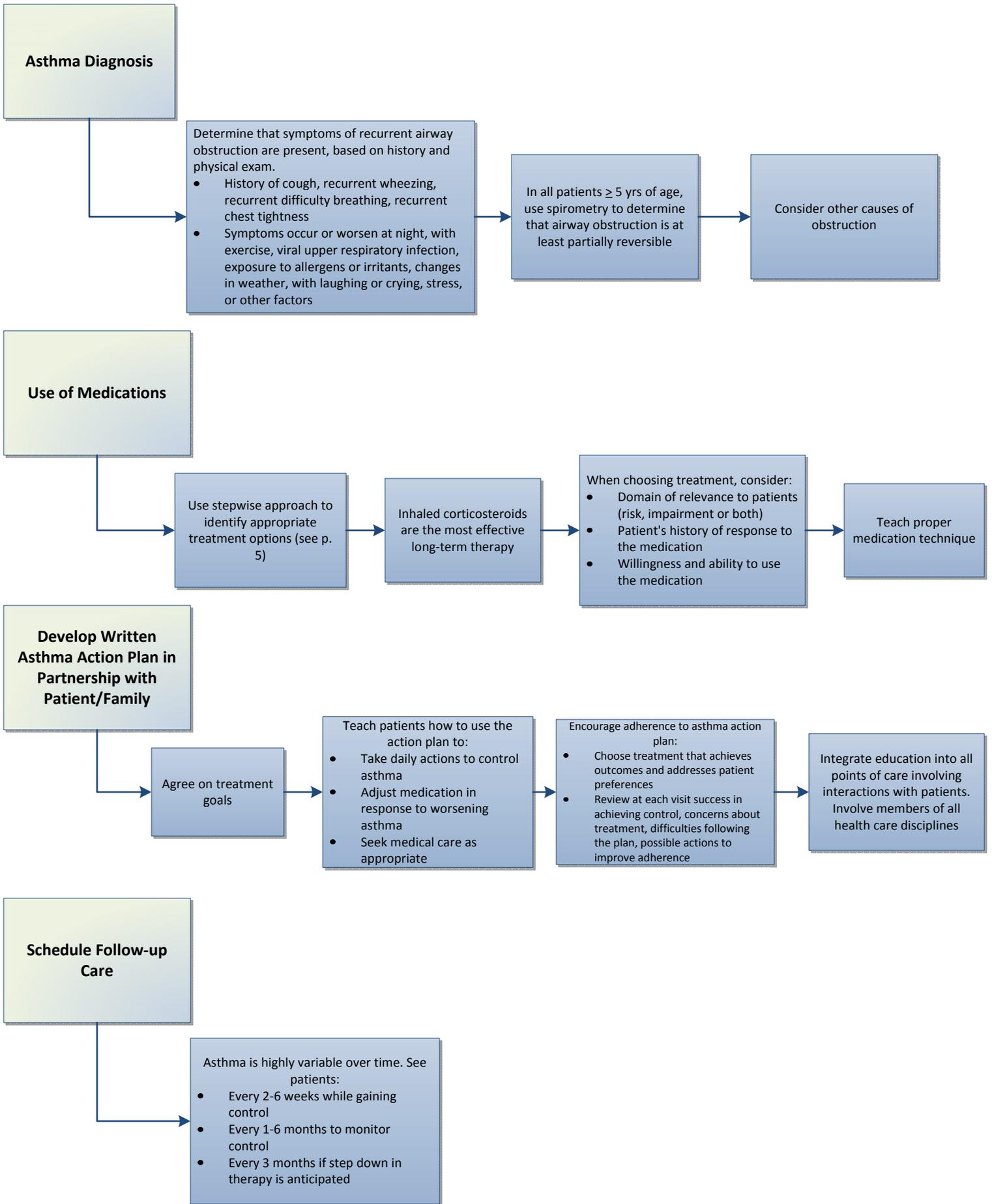
Asthma control focuses on two domains: 1) **reducing impairment** – the frequency and intensity of symptoms and functional limitations currently or recently experienced by a patient; and 2) **reducing risk** – the likelihood of future asthma attacks, progressive decline in lung function or lung growth, or medication side effects.

Achieving and maintaining asthma control requires providing appropriate medication, addressing environmental factors that cause worsening symptoms, help patients learn self-management skills, and monitoring over the long term to assess control and adjust therapy accordingly.

The diagram (left) illustrates the steps involved in providing quality asthma care.



This guideline summarizes recommendations developed by the National Asthma Education and Prevention Program's expert panel after conducting a systematic review of the scientific literature on asthma care, September 2012; National Heart, Lung and Blood Institute



# INITIAL VISIT: CLASSIFYING ASTHMA SEVERITY AND INITIATING THERAPY

(in patients who are not currently taking long-term control medications)

Level of severity (Columns 2–5) is determined by events listed in Column 1 for both impairment (frequency and intensity of symptoms and functional limitations) and risk (of exacerbations). Assess impairment by patient's or caregiver's recall of events during the previous 2–4 weeks; assess risk over the last year. Recommendations for initiating therapy based on level of severity are presented in the last row.

Components of Severity	Intermittent						Persistent								
	Ages 0–4 years			Ages 5–11 years			Ages 0–4 years			Ages 5–11 years			Ages ≥12 years		
	Mild			Moderate			Severe								
Impairment	Symptoms	≤2 days/week			>2 days/week but not daily			Daily			Throughout the day				
	Nighttime awakenings	0	≤2x/month		1–2x/month	3–4x/month		3–4x/month	>1x/week but not nightly		>1x/week	Often 7x/week			
	SABA* use for symptom control (not to prevent 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	Not applicable	Normal FEV <sub>1</sub> between exacerbations		Normal FEV <sub>1</sub> between exacerbations		Not applicable	>80%	>80%	Not applicable	60–80%	60–80%	Not applicable	<60%	<60%
	→ FEV <sub>1</sub> * (% predicted)		>80%	>80%	>80%	>80%		75–80%	Reduced 5%†		<75%	Reduced >5%†			
→ FEV <sub>1</sub> /FVC*	>85%	Normal†		>80%	Normal†		75–80%	Reduced 5%†	<75%	Reduced >5%†					
Risk	Asthma exacerbations requiring oral systemic corticosteroids‡	0–1/year			≥2 exacerb. in 6 months, or wheezing ≥4x per year lasting >1 day AND risk factors for persistent asthma										
		0–1/year			≥2/year										
<p>Consider severity and interval since last asthma exacerbation. Frequency and severity may fluctuate over time for patients in any severity category. Relative annual risk of exacerbations may be related to FEV<sub>1</sub>.*</p>															
<p><b>Recommended Step for Initiating Therapy</b></p> <p>(See “Stepwise Approach for Managing Asthma Long Term,” page 7)</p> <p>The stepwise approach is meant to help, not replace, the clinical decisionmaking needed to meet individual patient needs.</p>															
Step 1		Step 2				Step 3	Step 3 medium-dose ICS* option	Step 3	Step 3	Step 3 medium-dose ICS* option or Step 4	Step 4 or 5				
<p>Consider short course of oral systemic corticosteroids.</p> <p>In 2–6 weeks, depending on severity, assess level of asthma control achieved and adjust therapy as needed. For children 0–4 years old, if no clear benefit is observed in 4–6 weeks, consider adjusting therapy or alternate diagnoses.</p>															

\* Abbreviations: EIB, exercise-induced bronchospasm; FEV<sub>1</sub>, forced expiratory volume in 1 second; FVC, forced vital capacity; ICS, inhaled corticosteroid; SABA, short-acting beta<sub>2</sub>-agonist.

† Normal FEV<sub>1</sub>/FVC by age: 8–19 years, 85%; 20–39 years, 80%; 40–59 years, 75%; 60–80 years, 70%.

‡ Data are insufficient to link frequencies of exacerbations with different levels of asthma severity. Generally, more frequent and intense exacerbations (e.g., requiring urgent care, hospital or intensive care admission, and/or oral corticosteroids) indicate greater underlying disease severity. For treatment purposes, patients with ≥2 exacerbations may be considered to have persistent asthma, even in the absence of impairment levels consistent with persistent asthma.

## FOLLOW-UP VISITS: ASSESSING ASTHMA CONTROL AND ADJUSTING THERAPY

Level of control (Columns 2-4) is based on the most severe component of impairment (symptoms and functional limitations) or risk (exacerbations). Assess impairment by patient's or caregiver's recall of events listed in Column 1 during the previous 2-4 weeks and by spirometry and/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. Assess risk by recall of exacerbations during the previous year and since the last visit. Recommendations for adjusting therapy based on level of control are presented in the last row.

Components of Control		Well Controlled			Not Well Controlled			Very Poorly Controlled		
		Ages 0-4 years	Ages 5-11 years	Ages ≥12 years	Ages 0-4 years	Ages 5-11 years	Ages ≥12 years	Ages 0-4 years	Ages 5-11 years	Ages ≥12 years
Impairment	Symptoms	≤2 days/week	≤2 days/week but not more than once on each day	≤2 days/week	>2 days/week	>2 days/week or multiple times on ≤2 days/week	>2 days/week	Throughout the day		
	Nighttime awakenings	≤1x/month		≤2x/month	>1x/month	≥2x/month	1-3x/week	>1x/week	≥2x/week	≥4x/week
	Interference with normal activity	None			Some limitation			Extremely limited		
	SABA* use for symptom control (not to prevent EIB*)	≤2 days/week			>2 days/week			Several times per day		
	Lung function									
	➔ FEV <sub>1</sub> * (% predicted) or peak flow (% personal best)	Not applicable	>80%	>80%	Not applicable	60-80%	60-80%	Not applicable	<60%	<60%
	➔ FEV <sub>1</sub> /FVC*		>80%	Not applicable		75-80%	Not applicable		<75%	Not applicable
Validated questionnaires†										
➔ ATAQ*	Not applicable	Not applicable	0	Not applicable	Not applicable	1-2	Not applicable	Not applicable	3-4	
➔ ACQ*			≤0.75‡			≥1.5			Not applicable	
➔ ACT*			≥20			16-19			≤15	
Risk	Asthma exacerbations requiring oral systemic corticosteroids§	0-1/year			2-3/year	≥2/year		>3/year	≥2/year	
		<i>Consider severity and interval since last asthma exacerbation.</i>								
	Reduction in lung growth/Progressive loss of lung function	Not applicable	Evaluation requires long-term follow-up care.		Not applicable	Evaluation requires long-term follow-up care.		Not applicable	Evaluation requires long-term follow-up care.	
Treatment-related adverse effects	<i>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.</i>									
<b>Recommended Action for Treatment</b>	Maintain current step. Regular follow-up every 1-6 months. Consider step down if well controlled for at least 3 months.			Step up 1 step	Step up at least 1 step	Step up 1 step	Consider short course of oral systemic corticosteroids. Step up 1-2 steps. Reevaluate in 2 weeks to achieve control.			
<i>(See "Stepwise Approach for Managing Asthma Long Term," page 7)</i>				Reevaluate in 2-6 weeks to achieve control. For children 0-4 years, if no clear benefit observed in 4-6 weeks, consider adjusting therapy or alternative diagnoses.						
<i>The stepwise approach is meant to help, not replace, the clinical decisionmaking needed to meet individual patient needs.</i>				Before step up in treatment: Review adherence to medication, inhaler technique, and environmental control. If alternative treatment was used, discontinue and use preferred treatment for that step. For side effects, consider alternative treatment options.						

\* Abbreviations: ACQ, Asthma Control Questionnaire; ACT, Asthma Control Test™; ATAQ, Asthma Therapy Assessment Questionnaire; EIB, exercise-induced bronchospasm; FVC, forced vital capacity; FEV<sub>1</sub>, forced expiratory volume in 1 second; SABA, short-acting beta<sub>2</sub>-agonist.

† Minimal important difference: 1.0 for the ATAQ; 0.5 for the ACQ; not determined for the ACT.

‡ ACQ values of 0.76-1.4 are indeterminate regarding well-controlled asthma.

§ Data are insufficient to link frequencies of exacerbations with different levels of asthma control. Generally, more frequent and intense exacerbations (e.g., requiring urgent care, hospital or intensive care admission, and/or oral corticosteroids) indicate poorer asthma control.

## STEPWISE APPROACH FOR MANAGING ASTHMA LONG TERM

The stepwise approach tailors the selection of medication to the level of asthma severity (see page 5) or asthma control (see page 6). The stepwise approach is meant to help, not replace, the clinical decisionmaking needed to meet individual patient needs.

ASSESS CONTROL:		STEP UP IF NEEDED (first, check medication adherence, inhaler technique, environmental control, and comorbidities)					
		STEP DOWN IF POSSIBLE (and asthma is well controlled for at least 3 months)					
		STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6
At each step: Patient education, environmental control, and management of comorbidities							
0-4 years of age		<b>Intermittent Asthma</b>	<b>Persistent Asthma: Daily Medication</b> Consult with asthma specialist if step 3 care or higher is required. Consider consultation at step 2.				
	Preferred Treatment†	SABA* as needed	low-dose ICS*	medium-dose ICS*	medium-dose ICS* + either LABA* or montelukast	high-dose ICS* + either LABA* or montelukast	high-dose ICS* + either LABA* or montelukast + oral corticosteroids
	Alternative Treatment††		cromolyn or montelukast				
	Quick-Relief Medication	<p>If clear benefit is not observed in 4-6 weeks, and medication technique and adherence are satisfactory, consider adjusting therapy or alternate diagnoses.</p> <ul style="list-style-type: none"> <li>SABA* as needed for symptoms; intensity of treatment depends on severity of symptoms.</li> <li>With viral respiratory symptoms: SABA every 4-6 hours up to 24 hours (longer with physician consult). Consider short course of oral systemic corticosteroids if asthma exacerbation is severe or patient has history of severe exacerbations.</li> <li>Caution: Frequent use of SABA may indicate the need to step up treatment.</li> </ul>					
5-11 years of age		<b>Intermittent Asthma</b>	<b>Persistent Asthma: Daily Medication</b> Consult with asthma specialist if step 4 care or higher is required. Consider consultation at step 3.				
	Preferred Treatment†	SABA* as needed	low-dose ICS*	low-dose ICS* + either LABA*, LTRA*, or theophylline <sup>‡</sup>	medium-dose ICS* + LABA*	high-dose ICS* + LABA*	high-dose ICS* + LABA* + oral corticosteroids
	Alternative Treatment††		cromolyn, LTRA*, or theophylline <sup>‡</sup>	OR medium-dose ICS	medium-dose ICS* + either LTRA* or theophylline <sup>‡</sup>	high-dose ICS* + either LTRA* or theophylline <sup>‡</sup>	high-dose ICS* + either LTRA* or theophylline <sup>‡</sup> + oral corticosteroids
	Quick-Relief Medication	<p>Consider subcutaneous allergen immunotherapy for patients who have persistent, allergic asthma.**</p> <ul style="list-style-type: none"> <li>SABA* as needed for symptoms. The intensity of treatment depends on severity of symptoms: up to 3 treatments every 20 minutes as needed. Short course of oral systemic corticosteroids may be needed.</li> <li>Caution: Increasing use of SABA or use &gt;2 days/week for symptom relief (not to prevent EIB*) generally indicates inadequate control and the need to step up treatment.</li> </ul>					
≥12 years of age		<b>Intermittent Asthma</b>	<b>Persistent Asthma: Daily Medication</b> Consult with asthma specialist if step 4 care or higher is required. Consider consultation at step 3.				
	Preferred Treatment†	SABA* as needed	low-dose ICS*	low-dose ICS* + LABA* OR medium-dose ICS*	medium-dose ICS* + LABA*	high-dose ICS* + LABA* AND consider omalizumab for patients who have allergies††	high-dose ICS* + LABA* + oral corticosteroid <sup>‡‡</sup> AND consider omalizumab for patients who have allergies††
	Alternative Treatment††		cromolyn, LTRA*, or theophylline <sup>‡</sup>	low-dose ICS* + either LTRA*, theophylline <sup>‡</sup> , or zileuton <sup>‡‡</sup>	medium-dose ICS* + either LTRA*, theophylline <sup>‡</sup> , or zileuton <sup>‡‡</sup>		
	Quick-Relief Medication	<p>Consider subcutaneous allergen immunotherapy for patients who have persistent, allergic asthma.**</p> <ul style="list-style-type: none"> <li>SABA* as needed for symptoms. The intensity of treatment depends on severity of symptoms: up to 3 treatments every 20 minutes as needed. Short course of oral systemic corticosteroids may be needed.</li> <li>Caution: Use of SABA &gt;2 days/week for symptom relief (not to prevent EIB*) generally indicates inadequate control and the need to step up treatment.</li> </ul>					

\* Abbreviations: EIB, exercise-induced bronchospasm; ICS, inhaled corticosteroid; LABA, inhaled long-acting beta<sub>2</sub>-agonist; LTRA, leukotriene receptor antagonist; SABA, inhaled short-acting beta<sub>2</sub>-agonist.

† Treatment options are listed in alphabetical order, if more than one.

†† If alternative treatment is used and response is inadequate, discontinue and use preferred treatment before stepping up.

‡ Theophylline is a less desirable alternative because of the need to monitor serum concentration levels.

\*\* Based on evidence for dust mites, animal dander, and pollen; evidence is weak or lacking for molds and cockroaches. Evidence is strongest for immunotherapy with single allergens. The role of allergy in asthma is greater in children than in adults.

†† Clinicians who administer immunotherapy or omalizumab should be prepared to treat anaphylaxis that may occur.

‡‡ Zileuton is less desirable because of limited studies as adjunctive therapy and the need to monitor liver function.

‡‡ Before oral corticosteroids are introduced, a trial of high-dose ICS + LABA + either LTRA, theophylline, or zileuton, may be considered, although this approach has not been studied in clinical trials.

## ESTIMATED COMPARATIVE DAILY DOSAGES: INHALED CORTICOSTEROIDS FOR LONG-TERM ASTHMA CONTROL

Daily Dose	0-4 years of age			5-11 years of age			≥12 years of age		
	Low	Medium*	High*	Low	Medium*	High*	Low	Medium*	High*
<b>MEDICATION</b>									
<b>Beclomethasone MDI†</b>	N/A	N/A	N/A	80-160 mcg	>160-320 mcg	>320 mcg	80-240 mcg	>240-480 mcg	>480 mcg
40 mcg/puff				1-2 puffs 2x/day	3-4 puffs 2x/day		1-3 puffs 2x/day	4-6 puffs 2x/day	
80 mcg/puff				1 puff 2x/day	2 puffs 2x/day	≥3 puffs 2x/day	1 puff am, 2 puffs pm	2-3 puffs 2x/day	≥4 puffs 2x/day
<b>Budesonide DPI†</b>	N/A	N/A	N/A	180-360 mcg	>360-720 mcg	>720 mcg	180-540 mcg	>540-1,080 mcg	>1,080 mcg
90 mcg/inhalation				1-2 inhs† 2x/day	3-4 inhs† 2x/day		1-3 inhs† 2x/day		
180 mcg/inhalation					2 inhs† 2x/day	≥3 inhs† 2x/day	1 inh† am, 2 inhs† pm	2-3 inhs† 2x/day	≥4 inhs† 2x/day
<b>Budesonide Nebules</b>	0.25-0.5 mg	>0.5-1.0 mg	>1.0 mg	0.5 mg	1.0 mg	2.0 mg	N/A	N/A	N/A
0.25 mg	1-2 nebs†/day			1 neb† 2x/day					
0.5 mg	1 neb†/day	2 nebs†/day	3 nebs†/day	1 neb†/day	1 neb† 2x/day				
1.0 mg		1 neb†/day	2 nebs†/day		1 neb†/day	1 neb† 2x/day			

Daily Dose	0-4 years of age			5-11 years of age			≥12 years of age		
	Low	Medium*	High*	Low	Medium*	High*	Low	Medium*	High*
<b>MEDICATION</b>									
<b>Fluticasone MDI†</b>	176 mcg	>176-352 mcg	>352 mcg	88-176 mcg	>176-352 mcg	>352 mcg	88-264 mcg	>264-440 mcg	>440 mcg
44 mcg/puff	2 puffs 2x/day	3-4 puffs 2x/day		1-2 puffs 2x/day	3-4 puffs 2x/day		1-3 puffs 2x/day		
110 mcg/puff		1 puff 2x/day	≥2 puffs 2x/day		1 puff 2x/day	≥2 puffs 2x/day		2 puffs 2x/day	3 puffs 2x/day
220 mcg/puff								1 puffs 2x/day	≥2 puffs 2x/day
<b>Mometasone DPI†</b>	N/A	N/A	N/A	110 mcg	220-440 mcg	>440 mcg	110-220 mcg	>220-440 mcg	>440 mcg
110 mcg/inhalation				1 inh†/day	1-2 inhs† 2x/day	≥3 inhs† 2x/day	1-2 inhs† pm	3-4 inhs† pm or 2 inhs† 2x/day	≥3 inhs† 2x/day
220 mcg/inhalation					1-2 inhs†/day	≥3 inhs† divided in 2 doses	1 inh† pm	1 inh† 2x/day or 2 inhs† pm	≥3 inhs† divided in 2 doses

Medication	0-4 years of age	5-11 years of age	≥12 years of age
<b>Combined Medication (inhaled corticosteroid + long-acting beta<sub>2</sub>-agonist)</b>			
<b>Fluticasone/Salmeterol —</b> DPI† 100 mcg/50 mcg, 250 mcg/50 mcg, or 500 mcg/50 mcg MDI† 45 mcg/21 mcg, 115 mcg/21 mcg, or 230 mcg/21 mcg	N/A†	1 inhalation 2x/day; dose depends on level of severity or control	1 inhalation 2x/day; dose depends on level of severity or control
<b>Budesonide/Formoterol —</b> MDI† 80 mcg/4.5 mcg or 160 mcg/4.5 mcg	N/A†	2 puffs 2x/day; dose depends on level of severity or control	2 puffs 2x/day; dose depends on level of severity or control
<b>Mometasone/Formoterol —</b> MDI† 100 mcg/5 mcg	N/A†	N/A†	2 inhalations 2x/day; dose depends on severity of asthma