

DIAGNOSING ASTHMA

Avoid underdiagnosing asthma—this is particularly important for children aged ≤ 4 years, since the chronic airway inflammatory response and structural changes associated with asthma can develop in the preschool years.⁴ To establish a diagnosis of asthma:

- Determine that recurrent symptoms of airflow obstruction are present.
- Document that obstructive symptoms are at least partially reversible.
- Exclude alternate diagnoses.

The work-up should include:⁴

- Detailed medical history, including symptoms, precipitating factors, and family history of asthma.
- Physical examination, focusing on the upper respiratory tract, chest, and skin (i.e., atopic dermatitis or eczema).
- Spirometry for every patient ≥ 5 years of age as an objective measure of airflow obstruction and reversibility.⁷ Peak flow values are NOT an adequate diagnostic substitute for spirometry.⁴

SPIROMETRY

Spirometry is a breathing test that measures the total amount of air a patient can exhale (forced vital capacity, or FVC) and the volume of air exhaled in the first second (forced expiratory volume over 1 second, or FEV₁). Spirometry can reveal obstruction that is much more severe than suggested by the history and physical examination.^{7,9} Without spirometry, clinicians could overestimate the degree of asthma control and therefore prescribe suboptimal treatment. Primary care providers and asthma specialists should use spirometry:⁴

- at the initial assessment to establish a diagnosis;
- after treatment is initiated and symptoms and peak expiratory flow (PEF) have stabilized;
- during periods of progressive or prolonged loss of asthma control; and
- at least once every 1 to 2 years (or more frequently, depending on response to therapy).

ASSESSING ASTHMA SEVERITY

The primary goal of assessing severity is to classify a patient's asthma as "intermittent" or "persistent" and thus determine the need for an ICS. Asthma severity classification is determined by the patient's impairment and risk. *Impairment* refers to the frequency and intensity of symptoms, night-time awakenings, use of short-acting beta-agonists (SABAs) for symptom control, and functional limitations that a patient experiences over the short term (i.e., the past 2-4 weeks). *Risk* is the likelihood that the patient will experience asthma exacerbations, progressive loss of pulmonary function (or, for small children, loss of lung growth), and adverse medication effects. Risk is assessed by examining the course of the disease over the past 6-12 months (i.e., the need for oral corticosteroids to treat exacerbations). Age-specific guidelines for assessing asthma severity are shown in **Table 1**. *A patient who meets any of the impairment or risk criteria for persistent asthma should be diagnosed as having persistent asthma and prescribed an ICS.*⁴ While it is optimal to assess severity before initiating treatment, it is possible to infer severity from the amount of medication a patient is already taking to control symptoms.

TREATING ASTHMA—THE STEPWISE APPROACH

All patients with asthma need a SABA for fast symptom relief. Patients with persistent asthma should also use daily ICSs; the dosage depends on the level of severity—mild, moderate, or severe—which is determined by age-specific criteria.⁴

Recommended treatment regimens for asthma are given in 6 steps (**Table 2**). Step 1 is indicated for intermittent asthma, Steps 2 through 6 for persistent asthma based on severity. If a patient meets impairment or risk criteria for mild persistent asthma, initiate therapy with Step 2 care or a low-dose ICS. For patients who meet impairment or risk criteria for moderate persistent or severe persistent asthma, initiate therapy with at least Step 3 care and consider

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TABLE 1. ASSESSING ASTHMA SEVERITY⁴

- Determine the level of severity according to patient’s **age and most serious risk or impairment feature**. For example, a 3-year-old patient who has 2 night-time awakenings per week due to respiratory symptoms would be classified as severe persistent, even if other features fell into a less severe category.
- A patient who meets **any** of the risk **or** impairment criteria for persistent asthma should be prescribed an ICS.

Age Group	Risk	Impairment					Level of Severity	Recommended Initial Treatment	
	Exacerbations Requiring OCS	Symptoms	Night-time Awakenings	Use of SABA for Symptom Relief	Interference with Normal Activity	Lung Function ^b			
A 0-4 Years	0-1/year	≤2 days/wk	0	≤2 days/wk	None	NA	Intermittent	Step 1	See Table 2A
	≥2 in 6 months; or ≥4 wheezing episodes/1 year lasting >1 day AND at risk for persistent asthma. ^a	>2 days/wk, not daily	1-2x/month	>2 days/wk, not daily	Minor limitation	NA	Mild persistent	Step 2	
		Daily	3-4x/month	Daily	Some limitation	NA	Moderate persistent	Step 3 and consider short course of OCS	
		Throughout the day	>1x/wk	Several x/day	Extremely limited	NA	Severe persistent		
B 5-11 Years	0-1/year	≤2 days/wk	≤2x/month	≤2 days/wk	None	FEV ₁ normal between exacerbations (>80%); FEV ₁ /FVC >85%	Intermittent	Step 1	See Table 2B
	≥2/year	>2 days/wk, not daily	3-4x/month	>2 days/wk, not daily	Minor limitation	FEV ₁ >80%; FEV ₁ /FVC >80%	Mild persistent	Step 2	
		Daily	>1x/wk, not nightly	Daily	Some limitation	FEV ₁ = 60-80%; FEV ₁ /FVC = 75-80%	Moderate persistent	Step 3 medium-dose option and consider short course of OCS	
		Throughout the day	Often 7x/wk	Several x/day	Extremely limited	FEV ₁ <60%; FEV ₁ /FVC <75%	Severe persistent	Step 3 medium-dose option OR Step 4 and consider short course of OCS	
C 12 Years to Adult	0-1/year	≤2 days/wk	≤2x/month	≤2 days/wk	None	FEV ₁ normal between exacerbations (>80%); FEV ₁ /FVC normal	Intermittent	Step 1	See Table 2C
	≤2/year	>2 days/wk, not daily	3-4x/month	>2 days/wk, not daily or >1x/day	Minor limitation	FEV ₁ >80%; FEV ₁ /FVC normal	Mild persistent	Step 2	
		Daily	>1x/wk, not nightly	Daily	Some limitation	FEV ₁ >60% but <80%; FEV ₁ /FVC reduced 5%	Moderate persistent	Step 3 and consider short course of OCS	
		Throughout the day	Often 7x/wk	Several x/day	Extremely limited	FEV ₁ <60%; FEV ₁ /FVC reduced >5%	Severe persistent	Step 4 or 5 and consider short course of OCS	

FEV₁, forced expiratory volume over 1 second; FVC, forced vital capacity; ICS, inhaled corticosteroid; OCS, oral corticosteroid; SABA, short-acting beta-agonist.

^aThat is, children who have a positive asthma predictive index, as described on page 282 in the NAEPP guidelines (www.nhlbi.nih.gov/guidelines/asthma).

^bNormal FEV₁/FVC: 8-19 years, 85%; 20-39 years, 80%; 40-59 years, 75%; 60-80 years, 70%. Use predicted value for FEV₁.

TABLE 2. ASTHMA TREATMENT STEPS⁴

- Begin treatment at the lowest appropriate step for degree of severity (see **Table 1**). At each step, emphasize adherence and environmental controls.
- Reevaluate every 2 weeks to achieve control and every 1-6 months to maintain control (see **Table 4**).
- Step up if needed. First, check adherence, inhaler technique, environmental control, and comorbid conditions. Step down if asthma is controlled for ≥ 3 months, as confirmed by spirometry or validated questionnaire.

Age Group	Treatment Stages					
A 0-4 Years			Steps 3-6: Consult with Asthma Specialist			
	Step 1 Preferred: SABA as needed.	Step 2 Preferred: low-dose ICS. Alternative: cromolyn or montelukast.	Step 3 Preferred: medium-dose ICS.	Step 4 Preferred: medium-dose ICS + either LABA or montelukast.	Step 5 Preferred: high-dose ICS + either LABA or montelukast.	Step 6 Preferred: high-dose ICS + either LABA or montelukast + OCS.
B 5-11 Years	Steps 2-4		Steps 4-6: Consult with Asthma Specialist			
	Step 1 Preferred: SABA as needed.	Step 2 Preferred: low-dose ICS. Alternative: cromolyn, LTRA, nedocromil, or theophylline.	Step 3 Preferred: either low-dose ICS + either LABA, LTRA, or theophylline or medium-dose ICS.	Step 4 Preferred: medium-dose ICS + LABA. Alternative: medium-dose ICS + either LTRA or theophylline.	Step 5 Preferred: high-dose ICS + LABA. Alternative: high-dose ICS + either LTRA or theophylline.	Step 6 Preferred: high-dose ICS + LABA + OCS. Alternative: high-dose ICS + either LTRA or theophylline + OCS.
C 12 Years to Adult	Steps 2-4		Steps 4-6: Consult with Asthma Specialist			
	Step 1 Preferred: SABA as needed.	Step 2 Preferred: low-dose ICS. Alternative: cromolyn, LTRA, nedocromil, or theophylline.	Step 3 Preferred: either low-dose ICS + LABA or medium-dose ICS. Alternative: low-dose ICS + either LTRA, theophylline, or zileuton.	Step 4 Preferred: medium-dose ICS + LABA. Alternative: medium-dose ICS + either LTRA, theophylline, or zileuton.	Step 5 Preferred: high-dose ICS + LABA and consider omalizumab ^a for patients who have allergies.	Step 6 Preferred: high-dose ICS + LABA + OCS and consider omalizumab ^a for patients who have allergies.

Quick-relief medication: SABA as needed for symptoms; intensity of treatment depends on severity of symptoms. Ages 0-4 years: with viral respiratory infection, every 4-6 hours up to 24 hours (longer with physician consult); consider short course of OCS if exacerbation is severe or patient has history of severe exacerbations. Ages 5 years to adult: up to 3 treatments at 20-minute intervals; short course of OCS may be needed.

Caution: Increasing use of SABA or use >2 days/week for symptom relief (not prevention of exercise-induced bronchospasm) generally indicates inadequate control and the need to step up treatment.

ICS, inhaled corticosteroid; **LABA,** long-acting beta-agonist (note: LABA should be used only in conjunction with an ICS); **LTRA,** leukotriene-receptor antagonist; **OCS,** oral corticosteroid; **SABA,** short-acting beta-agonist.

^aOmalizumab should only be administered in a setting equipped to treat acute anaphylaxis.

TABLE 3. ESTIMATED COMPARATIVE DOSES FOR INHALED CORTICOSTEROIDS⁴

- 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. Once control of asthma is achieved, the dose should be carefully titrated to the minimum dose required to maintain control.
- Preparations are not interchangeable on a microgram or per-puff basis. This table presents estimated comparable daily doses. See National Asthma Education and Prevention Program Guidelines for full discussion (www.nhlbi.nih.gov/guidelines/asthma).

Inhaled Corticosteroid (ICS)	A			B			C		
	Ages 0-4 Years			Ages 5-11 Years			Ages 12 Years to Adult		
	Low Daily Dose	Medium Daily Dose	High Daily Dose	Low Daily Dose	Medium Daily Dose	High Daily Dose	Low Daily Dose	Medium Daily Dose	High Daily Dose
Beclomethasone HFA (QVAR®): 40 or 80 µg/puff	NA	NA	NA	80-160	>160-320	>320	80-240	>240-480	>480
Budesonide DPI (Pulmicort Flexhaler™): 90, 180, or 200 µg/inhalation	NA	NA	NA	180-400	>400-800	>800	180-600	>600-1200	>1200
Budesonide inhalation suspension for nebulization (Pulmicort Respules®)	0.25-0.5 mg	>0.5-1.0 mg	>1.0	0.5 mg	1.0 mg	2.0 mg	NA	NA	NA
Flunisolide (Aerobid®, Aerobid-M®): 250 µg/puff	NA	NA	NA	500-750	1000-1250	>1250	500-1000	>1000-2000	>2000
Flunisolide HFA (Aerospan™ HFA): 80 µg/puff	NA	NA	NA	160	320	≥640	320	>320-640	>640
Fluticasone HFA/MDI (Flovent® HFA): 44, 110, or 220 µg/puff	176	>176-352	>352	88-176	>176-352	>352	88-264	>264-440	>440
DPI (Flovent® Discus): 50, 100, or 250 µg/inhalation	NA	NA	NA	100-200	>200-400	>400	100-300	>300-500	>500
Mometasone DPI (Asmanex®): 200 µg/inhalation	NA	NA	NA	NA	NA	NA	200	400	>400
Triamcinolone acetone (Azmacort® Inhalation Aerosol): 75 µg/puff	NA	NA	NA	300-600	>600-900	>900	300-750	>750-1500	>1500

DPI, dry powder inhaler; **HFA**, hydrofluoroalkane; **MDI**, metered-dose inhaler; **NA**, not available (i.e., not approved, no data available or safety and efficacy not established for this age group). Use of brand names is for informational purposes only and does not imply endorsement by the NYC DOHMH.

FATAL ASTHMA

While the overall risk of death from asthma is low, especially among children, about 150 asthma deaths per year occur in NYC. Patients who survive near-fatal asthma exacerbations (e.g., intubation or intensive care unit admission) are at greatly increased risk for future life-threatening or fatal asthma attacks. Other risk factors for fatal asthma include:⁴

- Major psychosocial problems or psychiatric illness.
- Comorbidities (e.g., cardiovascular disease, chronic lung disease).
- History of poor adherence to asthma medications, missed clinic visits.
- Illicit drug use.
- Smoking (or secondhand smoke exposure).
- Low socioeconomic status.
- Poorly controlled asthma (e.g., multiple hospital admissions or emergency department [ED] visits, use of >2 canisters of SABA per month).

Patients at high risk for asthma-related death require special attention. During ED and hospital discharge, review the Asthma Action Plan (with special emphasis on the warning signs that should prompt emergency medical care, including when to call an ambulance), proper technique for using a valved holding chamber or spacer, and goals for asthma control. Consider medical-alert bracelets or wallet cards for these patients.^{10,11}

IMMUNIZE AGAINST INFLUENZA!

Administer the **injectable** inactivated influenza vaccine—not the intranasal spray live attenuated flu vaccine, which is contraindicated in people with asthma—to all patients with asthma, regardless of severity. While immunization may not reduce the frequency or severity of asthma symptoms or exacerbations, it has been shown to reduce the risk of influenza's sometimes life-threatening complications. Individuals with asthma are at greater risk for these complications.⁴

SWITCHING TO ALBUTEROL HFA INHALERS

Beginning January 1, 2009, albuterol chlorofluorocarbon (CFC)-propelled inhalers will no longer be available and will be replaced by inhalers with hydrofluoroalkane (HFA) propellant. Clinicians must ensure that patients understand the instructions before using the HFA inhaler.

Inform patients that:¹²

- Albuterol HFA inhalers contain the same active medicine, and they are safe and effective.
- Medication leaves the canister more slowly in HFA inhalers, so the spray may feel softer.
- HFA inhalers have different priming instructions and need to be cleaned more frequently.

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a short course of oral systemic corticosteroids to suppress inflammation and gain prompt control. Estimated comparative doses of ICSs are given in **Table 3**. For a list of all asthma medications, see www.nhlbi.nih.gov/guidelines/asthma.⁴

Encourage use of valved holding chambers (spacers). If used properly, a metered-dose inhaler (MDI) with a valved holding chamber (VHC) can effectively deliver at least as much inhaled medication to the lungs as a nebulizer machine; it is therefore preferred over a nebulizer for all patients/caregivers who can demonstrate correct technique. Teach patients of all ages the proper technique for using an MDI/VHC. At each visit, review and reinforce proper use of the device.⁴

ACHIEVING AND MAINTAINING ASTHMA CONTROL

Assess control. After initiating treatment, follow up in 2-6 weeks to assess whether asthma is well controlled, not well controlled, or very poorly controlled as outlined in **Table 4**. For patients aged ≥12 years, use validated questionnaires, such as the Asthma Therapy Assessment Questionnaire (ATAQ),¹³ the Asthma Control Questionnaire (ACQ),¹⁴ or the Asthma Control Test™ (ACT)¹⁵ (**Resources**).

TABLE 4. ASSESSING ASTHMA CONTROL⁴

- Determine the level of control according to patient’s **age and most serious risk or impairment feature**. For example, a 25-year-old patient with FEV₁ <60% of predicted level would be classified as having very poorly controlled asthma, even if no other asthma features fell into that category.
- The stepwise approach is meant to assist, not replace, clinical decision-making required to meet individual patients’ needs.

Age Group	Risk ^a	Impairment ^b					Level of Control	Recommended Action
		Exacerbations Requiring OCS	Symptoms	Night-time Awakenings	Use of SABA for Symptom Relief	Interference with Normal Activity		
A 0-4 Years	0-1/year	≤2 days/wk	≤1x/month	≤2 days/wk	None	NA	Well controlled	Maintain current treatment with regular follow-up every 1-6 months. Consider step-down if well controlled for ≥3 months.
	2-3/year	>2 days/wk	>1x/month	>2 days/wk	Some limitation	NA	Not well controlled	Step up by 1 step and reevaluate in 2-6 wks; if no clear benefit in 4-6 wks, consider alternative diagnosis or adjusting therapy. For side effects, consider alternative treatment options.
	>3/year	Throughout the day	>1x/wk	Several x/day	Extremely limited	NA	Very poorly controlled	Consider short course of OCS. Step up 1-2 steps and reevaluate in 2 wks or sooner; if no clear benefit in 4-6 wks, consider alternative diagnosis or adjusting therapy. For side effects, consider alternative treatment options.
B 5-11 Years	0-1/year	≤2 days/wk, not >1x/day	≤1x/month	≤2 days/wk	None	FEV ₁ or peak flow >80%; ^c FEV ₁ /FVC >80%	Well controlled	Maintain current treatment with regular follow-up every 1-6 months. Consider step-down if well controlled for ≥3 months.
	≥2/year	>2 days/wk or multiple times on ≤2 days/wk	≥2x/month	>2 days/wk, not daily	Some limitation	FEV ₁ or peak flow = 60-80%; ^c FEV ₁ /FVC = 75-80%	Not well controlled	Step up 1 step and reevaluate in 2-6 wks. For side effects, consider alternative treatment options.
		Throughout the day	≥2x/wk	Several x/day	Extremely limited	FEV ₁ or peak flow <60%; ^c FEV ₁ /FVC <75%	Very poorly controlled	Consider short course of OCS. Step up 1-2 steps and reevaluate in 2 wks or sooner. For side effects, consider alternative treatment options.
C 12 Years to Adult	0-1/year	≤2 days/wk	≤2x/month	≤2 days/wk	None	FEV ₁ or peak flow >80%; ^c	Well controlled	Maintain current step with regular follow-up every 1-6 months to maintain control. Consider step-down if well controlled for ≥3 months.
	≥2/year	>2 days/wk	1-3x/wk	>2 days/wk	Some limitation	FEV ₁ or peak flow = 60-80%; ^c	Not well controlled	Step up 1 step and reevaluate in 2-6 wks. For side effects, consider alternative treatment options.
		Throughout the day	≥4x/wk	Several x/day	Extremely limited	FEV ₁ or peak flow <60%; ^c	Very poorly controlled	Consider short course of OCS. Step up 1-2 steps and reevaluate in 2 wks or sooner. For side effects, consider alternative treatment options.

^aAdditional risk considerations: Reduction in lung growth (ages 5-11 years) and progressive loss of lung function (ages 12 years to adult) can occur; evaluation requires long-term follow-up. Medication side effects can vary in intensity from none to very troublesome and worrisome. Level of intensity does not correlate to specific levels of control but should be considered in overall assessment of risk.

^bAges 12 years to adult only: Impairment can be assessed with validated questionnaires, including the Asthma Therapy Assessment Questionnaire (ATAQ), the Asthma Control Questionnaire (ACQ), and the Asthma Control Test™ (ACT). See NAEPP guidelines for full discussion (www.nhlbi.nih.gov/guidelines/asthma).

^cUse predicted value for FEV₁ and personal best for peak flow.

OCS, oral corticosteroid; SABA, short-acting beta-agonist; FEV₁, forced expiratory volume over 1 second; FVC, forced vital capacity.

Use stepwise approach to adjust medications.

Medications should be adjusted in a stepwise manner, based on level of control.⁴

- Until control is achieved, reevaluate every 2 weeks—or sooner, if indicated—if very poorly controlled and every 2-6 weeks if not well controlled. Step up therapy by 1-2 steps and consider a short course of oral systemic corticosteroids to suppress inflammation and gain prompt control.
- Prior to stepping up therapy, always assess medication adherence, delivery device technique, environmental control, and treatment of comorbid conditions (see box below).
- If a patient's asthma is well controlled for ≥ 3 months, consider stepping down treatment after confirming control with spirometry and/or a validated questionnaire. The recommended rate by which to step down is about 25% per visit, with follow-up every 1-6 months to ensure that the patient is maintaining control. Monitor closely and step up treatment as necessary to maintain control.

Involve other specialists when needed. Seek consultation with an asthma specialist (allergist or pulmonologist) for co-management when:⁴

- a patient is not meeting the goals of therapy after 3-6 months;
- a patient requires ≥ 2 short courses of oral systemic corticosteroids in 1 year or has an exacerbation requiring hospitalization;

COMORBID CONDITIONS THAT MAY AFFECT ASTHMA MANAGEMENT⁴

- Gastroesophageal reflux disease
- Obesity
- Rhinitis or sinusitis
- Vocal cord dysfunction
- Stress and depression
- Obstructive sleep apnea
- Cough-variant asthma
- Allergic bronchopulmonary aspergillosis

- a patient requires Step 4 level of care or higher (Step 3 care or higher for children aged ≤ 4 years);
- immunotherapy or omalizumab (Xolair®, anti-IgE) is being considered; or
- additional testing is indicated (e.g., allergy testing, pulmonary function studies, bronchoscopy).

Refer patients to mental health support when needed; mental health problems have been shown to interfere with adherence to treatment.

PROMOTING SELF-MANAGEMENT

Create an Asthma Action Plan (Figure 1). Partner with patients and caregivers to develop a customized Asthma Action Plan (**Resources**) that includes instructions for daily management (including long-term control medication for patients with persistent asthma) and actions to manage worsening asthma. At every visit, review the action plan to reinforce key educational messages:⁴

- the need to take an ICS daily for persistent asthma;
- the signs, symptoms, and peak expiratory flow (PEF) measurements (if used for a patient's daily home monitoring) that indicate worsening asthma;
- the medications to take in response; and
- the signs and symptoms that indicate the need for immediate medical attention.

The Asthma Action Plan is organized by action color zones and is guided by symptoms, peak flow meter ranges, or a combination of the two.⁴

Form a partnership. Collaborate with the patient and family to tailor self-management approaches and treatment goals to their needs and literacy levels, maintaining sensitivity to cultural beliefs and ethnocultural practices (such as the use of traditional medicines).^{16,17} Refer patients with poorly controlled asthma or special needs to case-management programs offered by managed care health plans and community providers.⁴ Complete a Medication Administration Form (MAF) for all school-aged patients so that albuterol or, when necessary, ICS can be administered in school (**Resources**).

FIGURE 1. ASTHMA ACTION PLAN

Asthma Action Plan

[To be completed by Health Care Provider]

Medical Record #:	Updated On:
_____	_____

Name _____	Date of Birth _____
Address _____	Emergency Contact/Phone _____
Health Care Provider Name _____	Phone _____ Fax _____

Asthma Severity: Intermittent Mild Persistent Moderate Persistent Severe Persistent

Asthma Triggers: Colds Exercise Animals Dust Smoke Food Weather Other

If Feeling Well (Green Zone) Take Every Day Long – Term Control Medicines

You have all of these:

- Breathing is good
- No cough or wheeze
- Can work/play
- Sleeps all night

Peak flow in this area: _____ to _____

MEDICINE:	HOW MUCH:	WHEN TO TAKE IT:

5-15 minutes before exercise use this

Green Zone: Emphasize to patients with “persistent” asthma the importance of using a controller medication every day, even when they have no symptoms, in order to prevent airway changes that lead to symptoms.

If Not Feeling Well (Yellow Zone) Take Every Day Medicines and Add these Quick-Relief Medicines

You have any of these:

- Cough
- Wheeze
- Tight chest
- Coughing at night

Peak flow in this area: _____ to _____

MEDICINE:	HOW MUCH:	WHEN TO TAKE IT:

Call doctor if these medicines are used more than

Yellow Zone: Instruct patients to continue to follow green-zone instructions and to use quick relief medication at the first sign of a cold, exposure to a known trigger, or early, mild asthma symptoms.

If Feeling Very Sick (Red Zone) Take These Medicines and Get help from a Doctor NOW!

Your asthma is getting worse fast:

- Medicine is not helping
- Breathing is hard and fast
- Nose opens wide
- Can't walk or talk well
- Ribs show

Peak flow reading below: _____

MEDICINE:	HOW MUCH:	WHEN TO TAKE IT:

SEEK EMERGENCY CARE or CALL 911 NOW if: Lips Getting worse fast, Hard to breathe, Can't talk or cry breathing or has passed out

Make an appointment with your primary care provider within two days of a

Red Zone: Review the specific symptoms of worsening asthma for which a patient should seek medical attention. Instruct patients to continue to follow green- and yellow-zone instructions **and** to use up to 3 treatments of albuterol at 20-minute intervals as a final step before seeking emergency medical attention.

Health Care Provider Signature _____ Date _____

Patient/Guardian Signature [I have read and understood these instructions] _____

TABLE 5. ENVIRONMENTAL CONTROLS: RECOMMENDATIONS FOR PATIENTS⁴

Secondhand smoke

- If you smoke, ask your doctor for help in quitting and call 311 for cessation information. Ask family members to quit smoking, too.
- Do not allow smoking in your home, car, or around you.

Animal dander

- Keep pets with fur or hair out of the home.
- If it is not possible to keep the pet outdoors, then:
 - Keep the pet out of the bedroom and keep the bedroom door closed.
 - Remove carpets and furniture covered with cloth, when possible.

Cockroaches

- Keep all food out of the bedroom.
- Keep food and garbage in closed containers; never leave food out.
- Clean regularly.
- Caulk cracks and holes where roaches can enter and hide.

Mold and mildew

- Fix leaking faucets, pipes, or other sources of water.
- Clean moldy surfaces.
- Use air conditioners.
- Avoid humidifiers.

Strong odors

- Try to stay away from strong odors, like the smells of fresh paint and new carpet.

Reduce asthma triggers. Explain that exposure to environmental allergens and irritants at home, school, and at work can worsen asthma symptoms, and teach patients to recognize both immediate and delayed reactions to triggers. Provide specific guidance on identifying and removing allergens and irritants from the home—particularly in the bedroom, where a child may spend up to 10 hours per day—and other environments (e.g., a baby sitter's or a relative's home) where a child may also spend a lot of time.⁴ Since most individuals with respiratory allergies are sensitized to

PROMOTE ASTHMA SELF-MANAGEMENT AT EVERY OPPORTUNITY⁴

The health care team includes primary care practices, emergency departments, hospitals, pharmacies, schools, and family. All members of the health care team should:

- Provide basic asthma facts, including the role of airway inflammation.
- Explain the differences between controllers and quick relievers.
- Promote self-monitoring to assess asthma control and detect signs of worsening asthma.
- Review the written Asthma Action Plan and emphasize its usefulness as a home management tool.
- Demonstrate how to use medication delivery devices and observe how the patient uses them.
- Review simple steps for minimizing environmental triggers (see **Table 5**).
- Explain that asthma is chronic and that controlling asthma requires daily attention, even when a patient is feeling well and asymptomatic.

more than one allergen,¹⁸ it is likely that addressing multiple allergens will be more effective than targeting just one (**Table 5**).¹⁹ Strongly encourage patients and their families to maintain a smoke-free home²⁰ (**Resources**). If possible, refer patients to programs for self-management education and for assistance in reducing home environmental exposures.^{4,19}

ASTHMA IN SPECIAL SITUATIONS

Exercise-induced bronchospasm (EIB). EIB is suggested by a history of cough, shortness of breath, chest pain or tightness, wheezing, or endurance problems associated with exercise; it should be anticipated in all asthma patients. Encourage pretreatment with an inhaled bronchodilator before exercising to prevent exercise-induced symptoms. Frequent or severe EIB may indicate the need to initiate or step up long-term control medications.⁴

Pregnancy. Controlling asthma during pregnancy is important for the health and well-being of both the mother and fetus. Albuterol is the preferred SABA,

and ICSs are the preferred long-term control medication. Budesonide is preferred over other ICSs because of the availability of data on its safety in pregnancy; however, no data indicate that other ICS preparations are unsafe during pregnancy.⁴

Surgery. Patients who have asthma are at risk for respiratory complications during and after surgery. Consider a short course of oral systemic corticosteroids prior to surgery to optimize lung function.⁴

Allergic rhinitis. Seek co-management with a board-certified allergist for patients with allergy symptoms, as upper airway inflammation may contribute to lower airway inflammation. Subcutaneous immunotherapy may be considered in patients ≥ 5 years of age at Steps 2 to 4 of care when a clear relationship exists between symptoms and exposure to an allergen (**Table 2**). Immunotherapy, often underutilized in urban settings, can be an effective means of improving asthma control by reducing allergen sensitization. Omalizumab may also be considered as adjunctive therapy for patients aged ≥ 12 years who have allergies and severe persistent asthma not responsive to Step 5 or 6 care (**Table 2**).⁴

Individuals exposed to the World Trade Center (WTC) disaster. Adults and children exposed to the WTC disaster may have respiratory symptoms^{21,22} and should be treated according to the recommendations outlined here. If symptoms fail to improve or concomitant physical or mental health conditions are present, consider referral to a WTC Center of Excellence (**Resources**).

MANAGING EXACERBATIONS

Asthma exacerbations are acute or subacute episodes of progressively worsening shortness of breath, cough, wheezing, and chest tightness, or some combination of these symptoms. Early treatment by the patient at home is the best strategy for preventing progression of an asthma exacerbation.

Instruct patients to:⁴

- Follow the instructions in the written Asthma Action Plan for treating signs and symptoms of an exacerbation.

- Recognize early indicators of an exacerbation, including worsening PEF.
- Adjust medication at the earliest sign of an exacerbation, including using up to 3 treatments of albuterol at 20-minute intervals.
- Remove or minimize exposure to allergens or irritants in the environment that may contribute to the exacerbation.
- Monitor response to treatment and promptly tell a provider about worsening symptoms or PEF or decreased responsiveness to albuterol.

Also, bear in mind that:

- Doubling the dose of an ICS does not effectively reduce the severity or prevent the progression of asthma exacerbations.²³ Treat with oral corticosteroids instead to decrease airway inflammation in moderate or severe exacerbations or in patients who fail to respond promptly and completely to SABA treatment.
- There is no need to taper doses or prescribe divided daily doses for patients on short courses of oral corticosteroids (< 10 days), since adverse effects from discontinuation of short-term use are unlikely.²⁴
- When a patient visits the emergency department (ED) with an exacerbation that requires oral systemic corticosteroids, ED providers should initiate ICS therapy at discharge and recommend follow-up with the patient's primary care provider. This is an important bridge between emergency and primary care management of asthma.²⁵

SUMMARY

Health care providers play an essential role in assessing asthma severity and control, developing a treatment plan using the stepwise approach, and promoting self-management. Achieving and maintaining asthma control requires an ongoing partnership between the provider and patient. Prescribe an ICS for patients with persistent asthma, and monitor asthma control to ensure optimal treatment for your patients. ♦

MANAGING ASTHMA

REFERENCES

1. New York City Department of Health and Mental Hygiene. Community Health Survey. www.nyc.gov/html/doh/html/survey/survey.shtml. Accessed October 27, 2008.
2. Schwarz AG, McVeigh KH, Matte T, Goodman A, Kass D, Kerker B. Childhood asthma in New York City. *NYC Vital Signs*. 2008;7(1):1-4.
3. New York State Department of Health. *New York State Asthma Surveillance Summary Report - October 2007*. www.nyhealth.gov/statistics/ny_asthma/pdf/2007_asthma_surveillance_summary_report.pdf. Accessed October 27, 2008.
4. National Heart, Lung, and Blood Institute, National Asthma Education and Prevention Program. *Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma, Summary Report, October 2007*. NIH Pub. No. 08-5846. www.nhlbi.nih.gov/guidelines/asthma/. Accessed August 26, 2008.
5. Navaratnam P, Jayawant SS, Pedersen CA, Balkrishnan R. Physician adherence to the national asthma prescribing guidelines: evidence from national outpatient survey data in the United States. *Ann Allergy Asthma Immunol*. 2008;100(3):216-221.
6. Sawicki GS, Smith L, Bokhour B, et al. Periodic use of inhaled steroids in children with mild persistent asthma: what are pediatricians recommending? *Clin Pediatr (Phila)*. 2008;47(5):446-451.
7. Stout JW, Visness CM, Enright P, et al. Classification of asthma severity in children: the contribution of pulmonary function testing. *Arch Pediatr Adolesc Med*. 2006;160(8):844-850.
8. Nair SJ, Daigle KL, DeCuir P, Lapin CD, Schramm CM. The influence of pulmonary function testing on the management of asthma in children. *J Pediatr*. 2005;147(6):797-801.
9. Russell NJ, Crichton NJ, Emerson PA, Morgan AD. Quantitative assessment of the value of spirometry. *Thorax*. 1986;41(5):360-363.
10. Barnes PJ. Blunted perception and death from asthma. *N Engl J Med*. 1994;330(19):1383-1384.
11. Rainbow J, Browne GJ. Fatal asthma or anaphylaxis? *Emerg Med J*. 2002;19(5):415-417.
12. FDA advises patients to switch to HFA-propelled albuterol inhalers now. [press release]. Bethesda, MD: U.S. Food and Drug Administration; May 30, 2008. www.fda.gov/bbs/topics/NEWS/2008/NEW01842.html. Accessed August 11, 2008.
13. Vollmer WM, Markson LE, O'Connor E, et al. Association of asthma control with health care utilization and quality of life. *Am J Respir Crit Care Med*. 1999;160(5, pt 1):1647-1652.
14. Juniper EF, O'Byrne PM, Guyatt GH, Ferrie PJ, King DR. Development and validation of a questionnaire to measure asthma control. *Eur Respir J*. 1999;14(4):902-907.
15. Nathan RA, Sorkness CA, Kosinski M, et al. Development of the asthma control test: a survey for assessing asthma control. *J Allergy Clin Immunol*. 2004;113(1):59-65.
16. Bearison DJ, Minian N, Granowetter L. Medical management of asthma and folk medicine in a Hispanic community. *J Pediatr Psychol*. 2002;27(4):385-392.
17. Pachter LM, Cloutier MM, Bernstein BA. Ethnomedical (folk) remedies for childhood asthma in a mainland Puerto Rican community. *Arch Pediatr Adolesc Med*. 1995;149(9):982-988.
18. Gergen PJ, Turkeltaub PC. The association of individual allergen reactivity with respiratory disease in a national sample: data from the second National Health and Nutrition Examination Survey, 1976-80 (NHANES II). *J Allergy Clin Immunol*. 1992;90(4, pt 1):579-588.
19. Morgan WJ, Crain EF, Gruchalla RS, et al; Inner City Asthma Study Group. Results of a home-based environmental intervention among urban children with asthma. *N Engl J Med*. 2004;351(11):1068-1080.
20. Tran N. Treating tobacco addiction. *City Health Information*. 2008;27(1):1-8.
21. Thomas PA, Brackbill R, Thalji L, et al. Respiratory and other health effects reported in children exposed to the World Trade Center disaster of September 11, 2001. *Environ Health Perspect*. 2008;116(10):1383-1390. www.ehponline.org/members/2008/11205/11205.pdf. Accessed December 10, 2008.
22. Wheeler K, McKelvey W, Thorpe L, et al. Asthma diagnosed after 11 September 2001 among rescue and recovery workers: findings from the World Trade Center Health Registry. *Environ Health Perspect*. 2007;115(11):1584-1590. www.ehponline.org/members/2007/10248/10248.pdf. Accessed August 28, 2008.
23. Rice-McDonald G, Bowler S, Staines G, Mitchell C. Doubling daily inhaled corticosteroid dose is ineffective in mild to moderately severe attacks of asthma in adults. *Intern Med J*. 2005;35(12):693-698.
24. O'Driscoll BR, Kalra S, Wilson M, Pickering CA, Carroll KB, Woodcock AA. Double-blind trial of steroid tapering in acute asthma. *Lancet*. 1993;341(8841):324-327.
25. Edmonds ML, Camargo CA Jr, Saunders LD, Brenner BE, Rowe BH. Inhaled steroids in acute asthma following emergency department (ED) discharge. *Cochrane Database Syst Rev*. 2000;(3):CD002316.

Continuing Education Activity

Managing Asthma

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CITY HEALTH INFORMATION

NOVEMBER/DECEMBER 2008 VOL 27(10):79-90

Objectives

At the conclusion of this activity, participants should:

1. Assess asthma severity and control in their patients with asthma.
2. Understand the importance of office spirometry as an objective measure of lung function.
3. Offer specific recommendations to patients on avoiding environmental triggers.
4. Promote asthma self-management through education, joint development of treatment goals, and use of an asthma action plan.
5. Understand when to refer a patient to an asthma specialist for referral and/or co-management.

CME Accreditation Statement

The New York City Department of Health and Mental Hygiene is accredited by the Medical Society of the State of New York to sponsor continuing medical education for physicians. The New York City Department of Health and Mental Hygiene designates this continuing medical education activity for a maximum of 1.5 AMA PRA Category 1 credit(s).™ Each physician should only claim credit commensurate with the extent of their participation in the activity.

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The New York City Department of Health and Mental Hygiene is an approved provider of continuing nursing education by the New York State Nurses Association, an accredited approver by the American Nurses Credentialing Center's Commission on Accreditation.

This CNE activity has been awarded 1.5 contact hours.

It has been assigned code 6WXLFX-PRV-078.

Participants are required to submit name, address, and professional degree. This information will be maintained in the Department's CME/CNE program database. If you request, the CME/CNE Program will verify your participation and whether you passed the exam. We will *not* share information with other organizations without your permission, except in certain emergencies when communication with health care providers is deemed by the public health agencies to be essential or when required by law. Participants who provide e-mail addresses may receive electronic announcements from the Department about future CME/CNE activities as well as other public health information.

Participants must submit the accompanying exam by December 31, 2011.

CME/CNE Activity Faculty:

Mamta Reddy, MD
Andrew Goodman, MD, MPH
Lorna E. Davis, MS
Jean Sale-Shaw, MPH, BSN

Dr. Goodman, Ms. Davis, and Ms. Sale-Shaw are affiliated with New York City DOHMH. The faculty does not have any financial arrangements or affiliations with any commercial entities whose products, research, or services may be discussed in these materials.

CME/CNE Activity Managing Asthma

1. All of the following are true EXCEPT:

- A. Self-management education should be integrated into all points of care where a patient interacts with a member of the health care team.
- B. For patients with persistent asthma, prescribe an inhaled corticosteroid to suppress airway inflammation and gain prompt control.
- C. Providers should avoid prescribing inhaled medications in children younger than 5 years old.
- D. Early treatment by the patient at home is the best strategy for preventing progression of an asthma exacerbation.

2. In considering asthma severity, all of the following statements are true EXCEPT:

- A. Asthma severity is based on an assessment of impairment and risk.
- B. Impairment is a measure of control over the past 2–4 weeks.
- C. The main goal of classifying severity is to determine if a patient's asthma is "intermittent" or "persistent."
- D. For a patient to be classified as "persistent," both impairment and risk criteria must be met.

3. Regarding the use of office spirometry, all of the following are correct EXCEPT:

- A. Office spirometry should be performed at the initial visit to establish a diagnosis and during periods of progressive or prolonged loss of asthma control.
- B. Ascertaining peak flow values serves as an adequate diagnostic substitute for spirometry and should be encouraged as a method of home monitoring.
- C. Beginning at age 5, classifying asthma severity should involve assessing lung function by performing office spirometry.
- D. Without spirometry, clinicians often overestimate the degree of asthma control.

November/December 2008

4. In reducing exposure to triggers, which of the following statements is correct?

- A. Control roaches by keeping food and garbage in closed containers, and caulk cracks and holes where roaches can hide.
- B. If there are pets present, keep them out of the bedroom belonging to the person with asthma.
- C. Do not allow smoking in the home, car, or anywhere else the person with asthma spends time.
- D. All of the above.

5. How well did this continuing education activity achieve its educational objectives?

- A. Very well.
- B. Adequately.
- C. Poorly.

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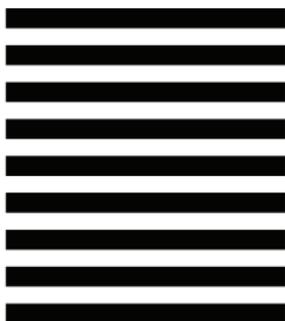
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