Approximately 1 million New Yorkers have had asthma at some time in their lives, and the disease now affects about 260,000 adults and 170,000 children aged ≤17 years. In 2006, there were approximately 26,000 asthma-related hospitalizations in NYC; nearly 9,000 of these occurred in children under 15 years of age. Asthma disproportionately impacts residents of low-income communities, with childhood hospitalization rates in the poorest communities more than twice as high as in the wealthiest neighborhoods.

The goal of asthma management is to minimize symptoms and exacerbations so people with asthma can lead full, active lives. To achieve this goal, primary care providers must prescribe therapy appropriate for the level of asthma severity, adjust treatment as needed to maintain symptom control, and ensure that patients have good self-management skills. The recently updated National Asthma Education and Prevention Program Guidelines distinguish between the initial assessment of asthma severity and the ongoing assessment of asthma control. While severity classification guides the initiation of therapy, control classification guides adjustments to therapy.

The cornerstone of preventive therapy for persistent asthma is inhaled corticosteroids (ICSs), which reduce airway inflammation in order to prevent asthma symptoms. Despite strong evidence that daily use of ICSs leads to improved asthma outcomes and quality of life, physicians often do not follow the national guidelines for prescribing them.
**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. 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:

- 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. Peak flow values are NOT an adequate diagnostic substitute for spirometry.

---

**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.

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.

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**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.

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

(Continued on page 84)
**TABLE 1. ASSESSING ASTHMA SEVERITY**

- 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.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Risk</th>
<th>Impairment</th>
<th>Level of Severity</th>
<th>Recommended Initial Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A 0-4 Years</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exacerbations Requiring OCS</td>
<td>Symptoms</td>
<td>Night-time Awakenings</td>
<td>Use of SABA for Symptom Relief</td>
<td>Interference with Normal Activity</td>
</tr>
<tr>
<td>0-1/year</td>
<td>≤2 days/wk</td>
<td>0</td>
<td>≤2 days/wk</td>
<td>None</td>
</tr>
<tr>
<td>≥2 in 6 months; or ≥4 wheezing episodes/1 year lasting &gt;1 day AND at risk for persistent asthma</td>
<td>&gt;2 days/wk, not daily</td>
<td>&gt;2 days/wk</td>
<td>Minor limitation</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Daily</td>
<td>3-4x/month</td>
<td>Daily</td>
<td>Some limitation</td>
</tr>
<tr>
<td></td>
<td>Throughout the day</td>
<td>&gt;1x/wk</td>
<td>Several x/day</td>
<td>Extremely limited$^c$</td>
</tr>
<tr>
<td><strong>B 5-11 Years</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exacerbations Requiring OCS</td>
<td>Symptoms</td>
<td>Night-time Awakenings</td>
<td>Use of SABA for Symptom Relief</td>
<td>Interference with Normal Activity</td>
</tr>
<tr>
<td>0-1/year</td>
<td>≤2 days/wk</td>
<td>≤2x/month</td>
<td>≤2 days/wk</td>
<td>None</td>
</tr>
<tr>
<td>≥2 in 6 months; or ≥4 wheezing episodes/1 year lasting &gt;1 day AND at risk for persistent asthma</td>
<td>&gt;2 days/wk, not daily</td>
<td>3-4x/month</td>
<td>&gt;2 days/wk, not daily</td>
<td>Minor limitation</td>
</tr>
<tr>
<td></td>
<td>Daily</td>
<td>&gt;1x/wk, not nightly</td>
<td>Daily</td>
<td>Some limitation</td>
</tr>
<tr>
<td></td>
<td>Throughout the day</td>
<td>Often 7x/wk</td>
<td>Several x/day</td>
<td>Extremely limited$^d$</td>
</tr>
<tr>
<td><strong>C 12 Years to Adult</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exacerbations Requiring OCS</td>
<td>Symptoms</td>
<td>Night-time Awakenings</td>
<td>Use of SABA for Symptom Relief</td>
<td>Interference with Normal Activity</td>
</tr>
<tr>
<td>0-1/year</td>
<td>≤2 days/wk</td>
<td>≤2x/month</td>
<td>≤2 days/wk</td>
<td>None</td>
</tr>
<tr>
<td>≥2 in 6 months; or ≥4 wheezing episodes/1 year lasting &gt;1 day AND at risk for persistent asthma</td>
<td>&gt;2 days/wk, not daily</td>
<td>3-4x/month</td>
<td>&gt;2 days/wk, not daily or &gt;1x/day</td>
<td>Minor limitation</td>
</tr>
<tr>
<td></td>
<td>Daily</td>
<td>&gt;1x/wk, not nightly</td>
<td>Daily</td>
<td>Some limitation</td>
</tr>
<tr>
<td></td>
<td>Throughout the day</td>
<td>Often 7x/wk</td>
<td>Several x/day</td>
<td>Extremely limited</td>
</tr>
</tbody>
</table>

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

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

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

$^c$ FEV₁ normal between exacerbations (>80%); FEV₁/FVC >85%.

$^d$ FEV₁ >60%; FEV₁/FVC <75%.
### Table 2. Asthma Treatment Steps

- 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

<table>
<thead>
<tr>
<th>Treatment Stages</th>
<th>Steps 3-6: Consult with Asthma Specialist</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong> 0-4 Years</td>
<td><strong>Step 1</strong> Preferred: SABA as needed.</td>
</tr>
<tr>
<td></td>
<td><strong>Step 2</strong> Preferred: medium-dose ICS.</td>
</tr>
<tr>
<td></td>
<td><strong>Step 3</strong> Preferred: high-dose ICS + LABA or montelukast.</td>
</tr>
<tr>
<td><strong>B</strong> 5-11 Years</td>
<td><strong>Step 1</strong> Preferred: SABA as needed.</td>
</tr>
<tr>
<td></td>
<td><strong>Step 2</strong> Preferred: low-dose ICS.</td>
</tr>
<tr>
<td></td>
<td><strong>Step 3</strong> Preferred: high-dose ICS + LABA or montelukast.</td>
</tr>
<tr>
<td><strong>C</strong> 12 Years to Adult</td>
<td><strong>Step 1</strong> Preferred: SABA as needed.</td>
</tr>
<tr>
<td></td>
<td><strong>Step 2</strong> Preferred: low-dose ICS.</td>
</tr>
<tr>
<td></td>
<td><strong>Step 3</strong> Preferred: high-dose ICS + LABA and consider omalizumab a for patients who have allergies.</td>
</tr>
</tbody>
</table>

**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.
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).

<table>
<thead>
<tr>
<th>Inhaled Corticosteroid (ICS)</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ages 0-4 Years</td>
<td>Ages 5-11 Years</td>
<td>Ages 12 Years to Adult</td>
</tr>
<tr>
<td><strong>Low Daily Dose</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beclomethasone HFA (QVAR®): 40 or 80 µg/puff</td>
<td>NA</td>
<td>80-160</td>
<td>80-240</td>
</tr>
<tr>
<td>Budesonide DPI (Pulmicort Flexhaler™): 90, 180, or 200 µg/inhalation</td>
<td>NA</td>
<td>180-400</td>
<td>180-600</td>
</tr>
<tr>
<td>Budesonide inhalation suspension for nebulization (Pulmicort Respules®)</td>
<td>0.25-0.5 mg</td>
<td>&gt;0.5-1.0 mg</td>
<td>NA</td>
</tr>
<tr>
<td>Flunisolide (Aerobid®, Aerobid-M®): 250 µg/puff</td>
<td>NA</td>
<td>500-750</td>
<td>500-1000</td>
</tr>
<tr>
<td>Flunisolide HFA (Aerospan™ HFA): 80 µg/puff</td>
<td>NA</td>
<td>160</td>
<td>320</td>
</tr>
<tr>
<td>Fluticasone HFA/MDI (Flovent® HFA): 44, 110, or 220 µg/puff</td>
<td>176</td>
<td>88-176</td>
<td>88-264</td>
</tr>
<tr>
<td>DPI (Flovent® Discus): 50, 100, or 250 µg/inhalation</td>
<td>NA</td>
<td>100-200</td>
<td>100-300</td>
</tr>
<tr>
<td>Mometasone DPI (Asmanex®): 200 µg/inhalation</td>
<td>NA</td>
<td>NA</td>
<td>200</td>
</tr>
<tr>
<td>Triamcinolone acetonide (Azmacort® Inhalation Aerosol): 75 µg/puff</td>
<td>NA</td>
<td>300-600</td>
<td>300-750</td>
</tr>
</tbody>
</table>

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:

- 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.

(Continued from page 80)

**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:

- 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.

**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.

(Continued from page 80)

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.

**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.

**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 CONTROL

- 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.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Risk*</th>
<th>Symptoms</th>
<th>Night-time Awakenings</th>
<th>Use of SABA for Symptom Relief</th>
<th>Interference with Normal Activity</th>
<th>Lung Function</th>
<th>Level of Control</th>
<th>Recommended Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 0-4 Years</td>
<td>0-1/year</td>
<td>≤2 days/wk</td>
<td>≤1x/month</td>
<td>≤2 days/wk</td>
<td>None</td>
<td>NA</td>
<td>Well controlled</td>
<td>Maintain current treatment with regular follow-up every 1-6 months. Consider step-down if well controlled for ≥3 months.</td>
</tr>
<tr>
<td></td>
<td>2-3/year</td>
<td>&gt;2 days/wk</td>
<td>&gt;1x/month</td>
<td>&gt;2 days/wk</td>
<td>Some limitation</td>
<td>NA</td>
<td>Not well controlled</td>
<td>Consider short course of OCS. Step up 1-2 steps and reevaluate in 2-6 wks. For side effects, consider alternative treatment options.</td>
</tr>
<tr>
<td></td>
<td>&gt;3/year</td>
<td>Throughout the day</td>
<td>&gt;1x/wk</td>
<td>Several x/day</td>
<td>Extremely limited</td>
<td>NA</td>
<td>Very poorly controlled</td>
<td>Consider short course of OCS. Step up 1-2 steps and reevaluate in 2-6 wks. For side effects, consider alternative treatment options.</td>
</tr>
<tr>
<td>B 5-11 Years</td>
<td>0-1/year</td>
<td>≤2 days/wk, not &gt;1x/day</td>
<td>≤1x/month</td>
<td>≤2 days/wk</td>
<td>None</td>
<td>FEV1 or peak flow &gt;80%;* FEV1/FVC &gt;80%</td>
<td>Well controlled</td>
<td>Maintain current treatment with regular follow-up every 1-6 months. Consider step-down if well controlled for ≥3 months.</td>
</tr>
<tr>
<td></td>
<td>≥2/year</td>
<td>&gt;2 days/wk or multiple times on ≤2 days/wk</td>
<td>≥2x/month</td>
<td>&gt;2 days/wk, not daily</td>
<td>Some limitation</td>
<td>FEV1 or peak flow = 60-80%; FEV1/FVC = 75-80%</td>
<td>Not well controlled</td>
<td>Step up 1 step and reevaluate in 2-6 wks. For side effects, consider alternative treatment options.</td>
</tr>
<tr>
<td></td>
<td>Throughout the day</td>
<td>≥2x/wk</td>
<td>Several x/day</td>
<td>Extremely limited</td>
<td>FEV1 or peak flow &lt;60%;* FEV1/FVC &lt;75%</td>
<td>Very poorly controlled</td>
<td>Consider short course of OCS. Step up 1-2 steps and reevaluate in 2 wks or sooner. For side effects, consider alternative treatment options.</td>
<td></td>
</tr>
<tr>
<td>C 12 Years to Adult</td>
<td>0-1/year</td>
<td>≤2 days/wk</td>
<td>≤2x/month</td>
<td>≤2 days/wk</td>
<td>None</td>
<td>FEV1 or peak flow &gt;80%</td>
<td>Well controlled</td>
<td>Maintain current step with regular follow-up every 1-6 months to maintain control. Consider step-down if well controlled for ≥3 months.</td>
</tr>
<tr>
<td></td>
<td>≥2/year</td>
<td>&gt;2 days/wk</td>
<td>1-3x/wk</td>
<td>&gt;2 days/wk</td>
<td>Some limitation</td>
<td>FEV1 or peak flow = 60-80%</td>
<td>Not well controlled</td>
<td>Step up 1 step and reevaluate in 2-6 wks. For side effects, consider alternative treatment options.</td>
</tr>
<tr>
<td></td>
<td>Throughout the day</td>
<td>≥4x/wk</td>
<td>Several x/day</td>
<td>Extremely limited</td>
<td>FEV1 or peak flow &lt;60%</td>
<td>Very poorly controlled</td>
<td>Consider short course of OCS. Step up 1-2 steps and reevaluate in 2 wks or sooner. For side effects, consider alternative treatment options.</td>
<td></td>
</tr>
</tbody>
</table>

---

*Additional risk considerations: Reduction in lung growth (ages 5-11 years) and progressive loss of lung function (ages 12 years to adulthood) 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.

*Ages 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).

*Use 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;
- 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).

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
FIGURE 1. ASTHMA ACTION PLAN

Asthma Action Plan
[To be completed by Health Care Provider]

Name
Address
Health Care Provider Name

Date of Birth
Emergency Contact/Phone
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)
You have all of these:
• Breathing is good
• No cough or wheeze
• Can work/play
• Sleeps all night

Peak flow in this area:
_____ to _____

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.

5-15 minutes before exercise use this

Take Every Day Long – Term Control Medicines
MEDICINE: HOW MUCH:

If Not Feeling Well (Yellow Zone)
You have any of these:
• Cough
• Wheeze
• Tight chest
• Coughing at night

Peak flow in this area:
_____ to _____

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.

Take Every Day Medicines and Add these Quick-Relief Medicines
MEDICINE: HOW MUCH:

If Feeling Very Sick (Red Zone)
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:
_____ 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

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.

Take These Medicines and Get help from a Doctor Right Away
MEDICINE: HOW MUCH: WHEN TO TAKE IT:

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

Medical Record #: [To be completed by Health Care Provider]

Can work/play

Health Care Provider Signature

Date

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

Updated On:

New York City Department of Health and Mental Hygiene
Michael R. Bloomberg, Mayor
Thomas R. Farley, M.D., MPH, Commissioner
nyc.gov/health

New York City Asthma
Adapted from Finger Lakes Asthma Action Plan and NHLBI

COPY FOR PATIENT

HPD X46041 09-08
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. Since most individuals with respiratory allergies are sensitized to more than one allergen, it is likely that addressing multiple allergens will be more effective than targeting just one (Table 5). Strongly encourage patients and their families to maintain a smoke-free home (Resources). If possible, refer patients to programs for self-management education and for assistance in reducing home environmental exposures.

### 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.

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

### TABLE 5. ENVIRONMENTAL CONTROLS: RECOMMENDATIONS FOR PATIENTS

<table>
<thead>
<tr>
<th>Secondhand smoke</th>
</tr>
</thead>
<tbody>
<tr>
<td>• If you smoke, ask your doctor for help in quitting and call 311 for cessation information. Ask family members to quit smoking, too.</td>
</tr>
<tr>
<td>• Do not allow smoking in your home, car, or around you.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Animal dander</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Keep pets with fur or hair out of the home.</td>
</tr>
<tr>
<td>• If it is not possible to keep the pet outdoors, then:</td>
</tr>
<tr>
<td>• Keep the pet out of the bedroom and keep the bedroom door closed.</td>
</tr>
<tr>
<td>• Remove carpets and furniture covered with cloth, when possible.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cockroaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Keep all food out of the bedroom.</td>
</tr>
<tr>
<td>• Keep food and garbage in closed containers; never leave food out.</td>
</tr>
<tr>
<td>• Clean regularly.</td>
</tr>
<tr>
<td>• Caulk cracks and holes where roaches can enter and hide.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mold and mildew</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Fix leaking faucets, pipes, or other sources of water.</td>
</tr>
<tr>
<td>• Clean moldy surfaces.</td>
</tr>
<tr>
<td>• Use air conditioners.</td>
</tr>
<tr>
<td>• Avoid humidifiers.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strong odors</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Try to stay away from strong odors, like the smells of fresh paint and new carpet.</td>
</tr>
</tbody>
</table>
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 symptoms21,22 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. 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. Ascertainment of 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.

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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Address ____________________________________________________City ____________________________ State __________ Zip __________
Date ______________ Telephone ________________________________E-mail address ________________________________________________
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Instructions

Read this issue of City Health Information for the correct answers to questions. To receive continuing education credit, you must answer 3 of the first 4 questions correctly.

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2. Select your answers to the questions and check the corresponding boxes on the response card.
3. Return the response card or a photocopy of the card postmarked no later than December 31, 2011. Mail to: CME/CNE Administrator; NYC Department of Health and Mental Hygiene, 2 Lafayette Street, CN-65, New York, NY 10277-1632.

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