

# Keeping asthma at bay

The latest evidence-based guidelines highlight ways to help patients control the disorder.

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**IF YOU'VE NEVER SEEN** a patient struggling for air during an acute asthma attack, chances are you will. Asthma prevalence is rising. About 22 million Americans have the disorder—6 million of them children. Every year, asthma puts nearly half a million people in the hospital and kills an estimated 4,000.

But thanks in part to better diagnosis and management, the big picture is improving. Asthma has been causing fewer deaths than before, and the overall hospitalization rate has been relatively stable in the last decade. Also, fewer patients say the disease limits their activities, and more are getting formal asthma education.

## New clinical practice guidelines

In August 2007, the National Asthma Education and Prevention Program (part of the National Heart, Lung, and Blood Institute) issued a comprehensive update of clinical guidelines for asthma diagnosis and management. (The first guidelines were issued in 1991 and updated in 1997; a 2002 update addressed selected topics.)

Known as the Expert Panel Re-

port 3 (EPR-3), the 2007 guidelines stress the need to control asthma, describe new approaches for asthma monitoring, and add a new age-group to childhood asthma management. They also offer new recommendations on drug therapy, patient teaching in myriad settings, and control of environmental factors that trigger asthma symptoms.

Recognizing that asthma can change over time and varies among

individuals and by age-groups, EPR-3 underscores the importance of regularly monitoring the patient's level of asthma control. Like earlier guidelines, it recommends inhaled corticosteroids as the best long-term control treatment for patients of all ages, based on the emergence of even stronger evidence that these drugs reduce inflammation safely and effectively.

This article discusses key points of EPR-3.

## Main components of asthma care

EPR-3 organizes asthma care around four components:

- assessment and monitoring measures
- education for a partnership in asthma care
- control of environmental factors and comorbid conditions that affect asthma
- drug therapy.

## Assessment and monitoring measures

In a new approach, EPR-3 uses multiple measures of the patient's level of current impairment and future risk for asthma assessment and monitoring. (Some patients can be at high risk for frequent exacerbations despite having few day-to-day effects of asthma.)

- *Impairment* refers to symptom frequency and intensity, as well as the patient's current or recent functional limitations.
- *Risk* is the likelihood that the patient will experience asthma exacerbations, progressive decline in lung function (or in children, lung growth), or adverse drug effects. Impairment and risk represent different manifestations of asthma. They may not correlate with each other and may respond differently to treatment.

## Goal of asthma therapy

According to EPR-3, monitoring the patient's asthma control is the goal of therapy. The new guidelines refine the key elements of assessment

CE: 1.6 contact hours



Rx: 1.0 contact hours

## LEARNING OBJECTIVES

1. Describe at least four major highlights of the latest Expert Panel Report on asthma diagnosis and management.
2. Discuss the role of pharmacology and environmental control in asthma management.
3. Explain basic patient management principles during an asthma exacerbation.
4. Discuss the educational needs of patients with asthma.

and monitoring to include the separate but related concepts of severity, control, and responsiveness to treatment.

- *Severity* refers to the intrinsic intensity of the disease. Clinicians should assess severity to guide the patient's initial therapy. Measuring severity is easiest in a patient not on long-term control therapy.
- *Control* is the degree to which therapeutic interventions minimize asthma and the goals of therapy are met. Clinicians should use the level of control to assess and monitor a patient's asthma control and guide decisions to maintain or adjust therapy.
- *Responsiveness* refers to the ease with which therapy achieves asthma control. (See *Goals of long-term asthma care*.)

### Other key changes from previous guidelines

In classifying asthma severity, EPR-3 has changed the *mild intermittent* category to *intermittent*—underscoring the reality that severe exacerbations can occur in patients who have any severity level. With any category of persistent asthma, acute exacerbations may be mild, moderate, or severe.

In another change from earlier guidelines, EPR-3 stresses use of the *ratio* of forced expiratory volume in 1 second (FEV<sub>1</sub>) to forced vital capacity to classify severity in children—because this ratio may be a more sensitive measure than FEV<sub>1</sub> alone.

### Education for a partnership in asthma care

EPR-3 identifies the following goals of patient education:

- Increase the patient's understanding of asthma.
- Improve self-treatment skills.
- Enhance patient satisfaction.
- Boost patient confidence.
- Increase the patient's and family's adherence with the treatment program.

## Goals of long-term asthma care

According to the Expert Panel Report 3, the primary goals of long-term asthma care are to decrease both the impairment and risk associated with asthma.

- To decrease *impairment*, clinicians should strive to:
- prevent chronic and troublesome symptoms (such as coughing or breathlessness during the day, at night, or after exercise)
  - reduce the need for inhaled short-acting beta<sub>2</sub>-agonists for quick symptom relief to less than 2 days weekly (except when used to prevent exercise-induced bronchospasm)
  - maintain (near) normal pulmonary functions
  - maintain normal activity levels, including exercise, other physical activity, and school or work attendance
  - meet the patient's and family's expectations of, and satisfaction with, asthma care.

- To decrease *risk*, clinicians should make every effort to:
- prevent recurrent asthma exacerbations and minimize the need for emergency department visits or hospitalizations
  - prevent loss of lung function or, in children, prevent reduced lung growth
  - provide optimal drug therapy with few or no adverse effects.



Providing asthma self-management education allows patients to gain the skills they need to control asthma and improve outcomes. EPR-3 advises clinicians to integrate asthma self-management teaching into all aspects of asthma care.

It also emphasizes the many points of care outside the physician's office, clinic, or hospital setting in which patients can receive asthma education. Increasing evidence shows the benefits of patient education programs delivered in a wide range of points of care; educating patients at these points promotes a network of support outside the clinician's office.

### Essential self-management teaching

Asthma self-management education should include:

- asthma information and training in asthma management skills
- self-monitoring (based on either symptoms or peak flow)
- a written asthma action plan that addresses daily management as well as recognition and handling of worsening asthma
- regular assessment by a consistent clinician.

A review of 22 studies found that self-management training led to significant benefits (reduced morbidity and decreased use of health-care services) and that these benefits were greatest when written self-management asthma action plans were used.

### Nurse's role in education

Effective patient education calls for a partnership between the patient and healthcare provider. Nurses play a major role in asthma education. Recent studies showed that patients taught by nurses had significantly lower symptom scores and fewer physician visits and urgent care visits for asthma after 6 months. When teaching patients, be sure to use simple language. (See *Essential patient teaching*.)

### Control of environmental factors and comorbid conditions

To manage asthma successfully long-term, EPR-3 urges clinicians to help patients identify and reduce exposure to known allergens and irritants and to control comorbid conditions and other factors that worsen symptoms or trigger exacerbations.



## Essential patient teaching

The Expert Panel Report 3 recommends that healthcare providers teach and reinforce the following points with asthma patients at every opportunity.

- **Basic facts about asthma:** contrast between normal airways and airways of a person with asthma, what happens to the airways during an asthma attack, and the role of inflammation
- **Role of medications:** difference between the two main types of asthma drugs (long-term controller medications and quick-relief drugs)
- **Patient skills:** how to take medications correctly (including correct use of an inhaler, valved holding chamber, spacer, and nebulizer); how to identify and avoid environmental exposures that worsen asthma (such as tobacco smoke, allergens, and irritants); how to perform self-monitoring to assess the level of asthma control, monitor symptoms and (if prescribed) peak flow, and recognize when asthma is getting worse; and how to use the written asthma action plan for guidance

- To control allergen-induced asthma, patients should reduce exposure to indoor and outdoor allergens to which they're sensitive.
- When asthma can't be well-controlled, clinicians should evaluate patients for chronic comorbid conditions, such as allergic bronchopulmonary aspergillosis, gastroesophageal reflux, obesity, obstructive sleep apnea, rhinitis, sinusitis, and chronic stress or depression. These conditions can impede asthma management; evidence suggests that treating them can improve asthma control.

## Drug therapy

Drug therapy is used to prevent and control asthma symptoms, improve quality of life, decrease frequency and severity of exacerbations, and reverse airflow obstruction. Regarding drug therapy, EPR-3 diverges from earlier recommendations in several important areas. (See *Medications: Key changes from earlier guidelines.*)

Drugs used to treat asthma fall into two general classes:

- long-term controller medications used daily to achieve and maintain control of persistent asthma
- quick-relief medications that promptly reverse acute airflow obstruction caused by bronchoconstriction.

### Long-term controller medications

The most effective drugs for long-term therapy are those with anti-inflammatory effects. Long-term medications include corticosteroids (inhaled and systemic), cromolyn sodium and nedocromil, immunomodulators, leukotriene modifiers, long-acting beta<sub>2</sub>-agonists (LABAs), and methylxanthines (theophylline).

**Corticosteroids.** These are the most potent anti-inflammatory drugs. Asthma patients may receive inhaled or systemic forms.

*Inhaled corticosteroids (ICSs)* are the most effective long-term control drugs for persistent asthma. At recommended dosages, they're generally safe and well-tolerated.

ICSs inhibit both airway microvascular leakage and increased mucus secretion in the airways. They also augment expression of beta receptors on smooth-muscle cells, which magnifies beta-adrenergic bronchodilator responsiveness. In both children and adults, ICSs improve asthma control more effectively than any other single long-term control drug, reducing both impairment and the exacerbation risk. However, they don't influence disease progression or severity in children.

At doses of 400 mcg/day or lower, adverse effects are rare. Although ICSs may inhibit linear growth in children, such inhibition hasn't been

reported with daily doses of 100 to 200 mcg. At 400 mcg/day, reduced growth velocity may occur—but this effect arises early in the course of therapy and by the end of 1 year, growth velocity usually returns to normal. Higher doses may cause dermal thinning and suppression of the hypothalamic-pituitary-adrenal axis. However, ICSs rarely cause adrenal insufficiency.

*Systemic corticosteroids.* EPR-3 recommends chronic systemic (oral) corticosteroids as long-term controller medications only for the most severe, hard-to-control asthma, because of the risk of adverse effects. Alternate-day regimens (a single early-morning dose every 48 hours) have proven effective and cause substantially fewer adverse effects than daily dosing. These drugs also play a role in acute asthma. (See "Quick-relief medications," pages 23 and 24.)

**Cromolyn sodium and nedocromil sodium.** These agents stabilize mast cells and impede chloride channel function. Taken by inhalation, they have modest anti-inflammatory effects. They're used as alternative (not preferred) therapy for mild persistent asthma, and to prevent attacks before exercise or unavoidable allergen exposure. Both drugs have excellent safety profiles.

**Immunomodulators.** Omalizumab is a humanized monoclonal anti-immunoglobulin (Ig) E antibody that binds to IgE on mast cells and basophils. Given monthly by injection, it's intended for patients with moderate to severe asthma who don't respond to other treatments. The drug reduces exacerbations and the need for rescue medication, decreases use of emergency departments (EDs) and other resources, and lowers symptom scores in the few patients who require it.

High cost is a major deterrent to omalizumab use. Also, the drug may cause anaphylaxis. In clinical trials, it

# IMPORTANT

## Medications: Key changes from earlier guidelines

The Expert Panel Report 3 provides updated information and recommendations on asthma medications. Here are some of the most important changes:

- New drugs (immunomodulators) are now available for long-term control.
- New safety information on long-acting beta<sub>2</sub>-agonists (LABAs) has emerged. For patients age 12 and older with moderate persistent asthma or asthma inadequately controlled on low-dose inhaled corticosteroids (ICSs), clinicians should give equal weight to the options of increasing the dosage of a medium-dose ICS and adding a LABA to a low-dose ICS.
- The estimated clinical comparability of different ICSs is updated.

caused bruising and injection-site pain in up to 20% of patients.

**Leukotriene modifiers.** Cysteinyl leukotrienes derive from cell membrane phospholipids perturbed by allergic reactions and certain other factors. Potent bronchoconstrictors, leukotrienes increase microvascular permeability, causing edema. They also increase mucus secretion and reduce mucus transport.

Leukotriene modifiers include two categories:

- leukotriene-receptor antagonists (LTRAs)—namely, montelukast and zafirlukast
- zileuton, a 5-lipoxygenase inhibitor.

EPR-3 classifies leukotriene modifiers as alternative but not preferred therapy for patients with mild persistent asthma. LTRAs also can be used as adjunctive therapy along with ICSs; however, for patients age 12 and older, adding LABAs is preferred to LTRAs. Patients concerned about taking ICSs also may be LTRA candidates.

LTRAs aren't recommended as monotherapy; their main indication is as add-on therapy in patients who continue to have significant asthma despite moderate- to high-dose ICS therapy.

Montelukast is approved for asthma treatment in children as young as age 2; it has an excellent safety profile. Zafirlukast, approved for asthma treatment in children age 7 and older, requires twice-daily dosing; drug interactions are a potential problem, as the drug is metabolized in the liver and inhibits

hepatic CYP450 activity.

Zileuton hasn't been studied in children younger than age 12. It may increase hepatic enzyme levels, so liver function monitoring is essential during therapy.

**LABAs.** Inhaled LABAs (such as salmeterol and formoterol) relax airway smooth muscle by stimulating beta<sub>2</sub>-receptors, which in turn increases cyclic adenosine monophosphate and antagonizes bronchoconstriction. LABAs are the preferred adjunctive therapy to combine with ICSs for long-term symptom control and prevention in patients age 12 and older who have moderate or severe persistent asthma.

LABAs provide bronchodilation for at least 12 hours after a single dose; formoterol has a faster onset than salmeterol. Neither drug provides significant anti-inflammatory effects and shouldn't be used as monotherapy for long-term control. EPR-3 doesn't recommend them for treating acute symptoms or exacerbations.

Generally, daily doses shouldn't exceed 100 mcg salmeterol or 24 mcg formoterol. A fixed salmeterol-fluticasone combination (Advair) may be used when fluticasone alone doesn't provide optimal therapeutic effect. Salmeterol and the salmeterol-fluticasone combination carry a black-box warning about an increased risk of asthma-related death.

**Methylxanthines.** Theophylline, a bronchodilator that may have mild anti-inflammatory effects, is no longer widely used to treat asthma. It has a narrow therapeutic

index and may cause many drug interactions. EPR-3 recommends sustained-release theophylline as alternative (not preferred) therapy for mild persistent asthma or as adjunctive therapy with ICSs in patients age 5 and older. During therapy, serum theophylline levels must be measured.

### Quick-relief medications

Drugs used to relieve acute asthma symptoms and exacerbations include short-acting beta<sub>2</sub>-agonists (SABAs), anticholinergics, and systemic corticosteroids.

**SABAs.** Inhaled bronchodilators, such as albuterol, levalbuterol, and pirbuterol, relax smooth muscle. EPR-3 recommends these agents as the preferred therapy to relieve acute symptoms and prevent exercise-induced bronchoconstriction (EIB).

SABAs are best used as rescue drugs on an as-needed basis. Suspect inadequate asthma control and the need to begin or step up anti-inflammatory therapy in patients who need to increase their SABA use or take these drugs more than 2 days weekly to prevent symptoms (but not to prevent EIB). EPR-3 advises against prolonged regular daily use.

SABAs cause few adverse cardiovascular effects. Usually, they're prescribed in a metered-dose inhaler. Stimulation of skeletal-muscle beta<sub>2</sub>-receptors can cause an annoying hand tremor—but this typically disappears over several weeks. (See *Teaching patients how to use an inhaler.*)

**Anticholinergics.** These drugs (such as ipratropium bromide) block acetylcholine released by airway cholinergic receptors and reduce the airway's intrinsic vagal tone. According to EPR-3, ipratropium confers added benefits when given in multiple doses along with SABAs in ED patients with moderate or severe exacerbations. Patients with more severe airway ob-

struction seem to benefit the most.

Patients who can't tolerate SABAs may use ipratropium as an alternative bronchodilator. The drug has a short duration (6 hours, at most) and isn't indicated for day-to-day asthma management. As a class, anticholinergics are safe, although they can cause adverse effects.

**Systemic (oral) corticosteroids.** These drugs suppress, control, and reverse airway inflammation, speeding resolution of airflow obstruction. For asthma therapy, they're used almost exclusively as rescue medications in acute asthma (given in conjunction with SABAs) to speed recovery and prevent recurrence of exacerbations.

A short course, preferably using prednisone or prednisolone, can halt progression of an acute asthma attack and prevent hospitalization. For an acute exacerbation, oral prednisone has proven to be superior to high-dose ICSs. If a patient needs multiple courses of these drugs (especially more than three per year), the clinician should reevaluate the asthma management plan.

Unlike long-term use, which can cause a host of serious problems, short-term use (less than 10 days) rarely causes severe effects. The risk of such effects varies with dosage and duration.

### Stepwise approach to drug therapy

EPR-3 recommends a stepwise approach to long-term asthma management, in which medications are increased (stepped up) as needed and decreased (stepped down), if possible, to achieve and maintain asthma control. This approach applies to all patients, although it must be tailored to the needs of individuals or patient groups. Clinicians must consider the patient's age because the disease course may change over time. Also, the relevance of various assessment measures and the potential short- and long-term im-



## Teaching patients how to use an inhaler

Some studies report incorrect inhaler technique in up to 50% of patients who use metered-dose inhalers (MDIs). When providing education to asthma patients using MDIs, be sure to teach them to inhale slowly and hold their breath for up to 10 seconds, if possible.

Children younger than age 5 and elderly patients who can't master this technique should use a valved holding chamber with the MDI to enhance aerosol delivery to the airway. Dry-powder inhalers (DPIs) are available and don't require a propellant. To assure DPI efficacy, verify that the inspiratory flow rate is adequate, especially in a very young or very old patient who's acutely ill.

Many patients who can't use MDIs are using compressor-generated aerosols instead. However, studies show that when used properly with a spacer or holding chamber, MDIs deliver drugs as well as compressor-generated aerosols.



pact of drugs may be age-related.

### New age-group classifications

Unlike earlier guidelines, EPR-3 presents recommendations for three age-groups:

- children up to age 4
- children ages 5 to 11 (previously combined with adults)
- children age 12 or older and adults.

Be aware that certain EPR-3 recommendations for agents and dosages vary slightly for each age-group. For details, see the full report (available at [www.nhlbi.nih.gov/guidelines/asthma/](http://www.nhlbi.nih.gov/guidelines/asthma/)). Medication choices and dosages hinge on both daytime and nighttime symptom frequency, FEV<sub>1</sub> or peak expiratory flow (PEF), and diurnal PEF variation.

### New expansion of the stepwise approach

EPR-3 has expanded the stepwise approach from four steps to six to simplify the actions within each step, and has revised treatment options within the steps. For example, in children up to age 4 who aren't well-controlled on low-dose ICSs, EPR-3 recommends increasing the ICS dosage to medium before adding adjunctive therapy. For the other age-groups, increasing the ICS dosage to medium or adding adjunctive therapy to a low-dose ICS are now considered equal options.

### New severity classifications

EPR-3 classifies asthma in terms of severity—intermittent to mild persistent, moderate persistent, and severe persistent. It has eliminated the mild intermittent category.

- *Intermittent* asthma requires no daily medication. Occasional flare-ups can be treated symptomatically with a short course of systemic corticosteroids and albuterol. *Mild persistent* asthma is best treated with low-dose (400 mcg or less) ICSs. Alternative treatments include cromolyn, nedocromil, an LTRA, or extended-release theophylline.
- *Moderate persistent* asthma calls for stepped-up treatment, such as a low- to medium-dose ICS combined with a LABA. For some patients, a medium-dose ICS may be an alternative.
- *Severe persistent* asthma requires a high-dose ICS, a LABA, and, if needed, oral corticosteroids (preferably in an alternate-day regimen).

Once asthma is controlled, clinicians should make periodic attempts to step therapy *down* by reducing the dosage or dosing frequency. They should consider stepping therapy *up* after assessing therapeutic adherence, environmental control, and comorbid conditions. Based on the same considerations, they should make step-down decisions when asthma has been well-controlled for at least 3 months.

## Managing moderate or severe asthma exacerbations

The main goals of treating asthma exacerbations are to:

- correct significant hypoxemia by administering oxygen
- rapidly reverse airflow obstruction
- decrease the risk of relapse or recurrence of severe airflow obstruction by intensifying therapy.

Meeting these goals calls for careful assessment and monitoring. Compared to earlier guidelines, EPR-3 simplifies classification of exacerbation severity. Also, it acknowledges the limited value of pulmonary function measures in managing very severe exacerbations. Repeated measurements of lung function can be useful in assessing adults for exacerbation severity; however, in children, no single assessment tool appears to be best for evaluating exacerbation severity or monitoring response to treatment.

### Therapeutic recommendations

The best way to manage moderate to severe asthma exacerbations is to ensure early treatment. For ED patients, EPR-3 recommends administering oxygen to relieve hypoxemia, along with a SABA (plus inhaled ipratropium for severe exacerbations) and systemic corticosteroids if the patient doesn't respond completely to the SABA. Clinicians should monitor response to therapy with serial lung function measurements. For exacerbations, EPR-3 has added levalbuterol as SABA therapy.

## Teaching patients how to manage exacerbations at home

EPR-3 recommends that patients start treatment at home to avoid treatment delays and prevent exacerbations from getting severe. To prepare patients for home management, clinicians should:

- teach patients how to monitor symptoms so they can promptly recognize deterioration (such as inability to speak, use of accessory chest muscles, and PEF of 40% or less of personal best)
- consider teaching selected patients how to monitor lung function
- give patients a written asthma action plan and encourage them to follow it
- urge patients with moderate or severe persistent asthma or a history of severe exacerbations to keep required medication and equipment at home to treat exacerbations.

## Promoting a full, active life despite asthma

EPR-3 reflects the latest scientific evidence on asthma. Using it as a resource in your nursing practice can help you ensure that patients benefit from the best available data and achieve the ultimate goal of therapy—controlling asthma to help them lead full, active lives. ★

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For drug therapy at a glance and to learn more about allergen avoidance and written action plans, visit [www.AmericanNurseToday.com](http://www.AmericanNurseToday.com).

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