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Dr. Stoloff served on the
panel that issued the *National
Asthma Education and
Prevention Program (NAEPP)
Expert Panel Report 3:
Guidelines for the Diagnosis
and Management of Asthma*

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Help patients gain better asthma control

The latest government guidelines—which have more steps and an additional breakout for kids—make it easier for you to initiate, individualize, and adjust treatment

Practice recommendations

- Assess asthma severity before initiating treatment; monitor asthma control to guide adjustments in therapy using measures of impairment (**B**) and risk (**C**) (National Heart, Lung, and Blood Institute [NHLBI] and National Asthma Education and Prevention Program [NAEPP] third expert panel report [EPR-3]).
- Base treatment decisions on recommendations specific to each age group (0-4 years, 5-11 years, and ≥ 12 years) (**A**).
- Use spirometry in patients ≥ 5 years of age to diagnose asthma, classify severity, and assess control (**C**).
- Provide each patient with a written asthma action plan with instructions for daily disease management, as well as identification of, and response to, worsening symptoms (**B**).

EPR-3 evidence categories:

- A Randomized, controlled trials (RCTs), rich body of data
- B RCTs, limited body of data
- C Nonrandomized trials and observational studies
- D Panel consensus judgment

JJ, a 4-year-old boy, was taken to an urgent care clinic 3 times last winter for “recurrent bronchitis” and given a 7-day course of prednisone and antibiotics at each visit. His mother reports that “his colds always seem to go to his chest” and his skin is always dry. She was given a nebulizer and albuterol for use when JJ begins wheezing, which often happens when he has a cold, plays vigorously, or visits a friend who has cats.

JJ is one of approximately 6.7 million children—and 22.9 million US residents—who have asthma.¹ To help guide the care of patients like JJ, the National Heart, Lung, and Blood Institute (NHLBI) and National Asthma Education and Prevention Program (NAEPP) released the third expert panel report (EPR-3) in 2007. Available at <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdn.htm>, the EPR-3 provides the most comprehensive evidence-based guidance for the diagnosis and management of asthma to date.²

The guidelines were an invaluable resource for JJ’s family physician, who referred to them to categorize the severity of JJ’s asthma as “mild persistent.” In initiating treatment, JJ’s physician relied on specific recommendations for children 0 to 4 years of age to prescribe low-dose inhaled

The EPR-3: What's changed

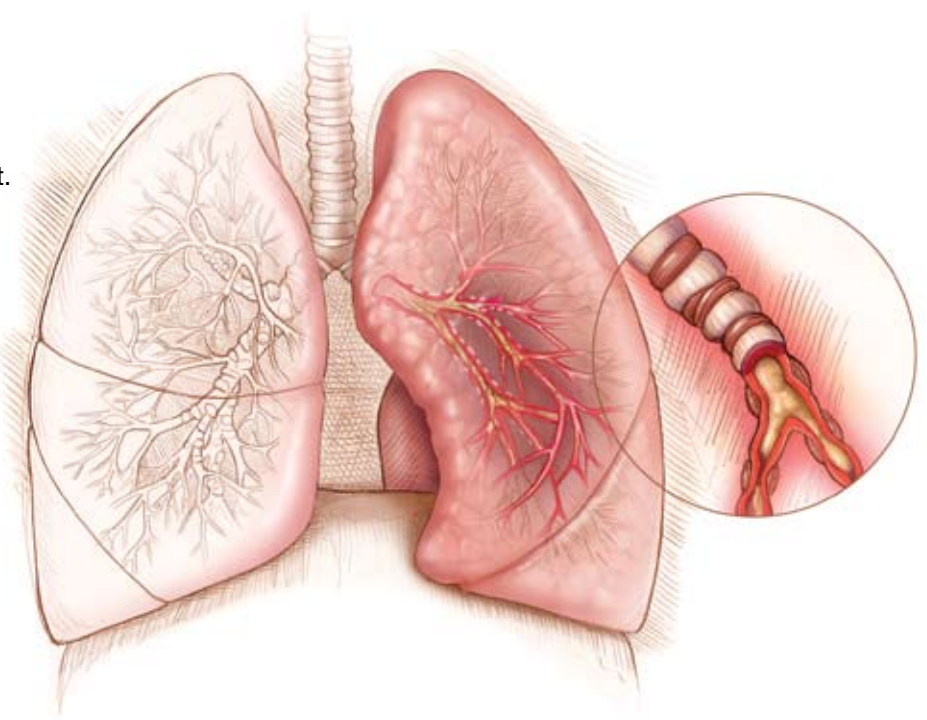
The 2007 guidelines:

Recommend assessing asthma severity before starting treatment and assessing asthma control to guide adjustments in treatment.

Address both severity and control in terms of impairment and risk.

Feature 3 age breakdowns (0-4 years, 5-11 years, and ≥ 12 years) and a 6-step approach to asthma management.

Make it easier to individualize and adjust treatment.



corticosteroids (ICS). Without the new guidelines, which underscore the safety of controller medication for young children, JJ's physician would likely have been reluctant to place a 4-year-old on ICS.

This review highlights the EPR-3's key recommendations to encourage widespread implementation by family physicians.

What's changed?

There's a new paradigm

The 2007 update to guidelines released in 1997 and 2002 reflects a paradigm shift in the overall approach to asthma management. The change in focus addresses the highly variable nature of asthma² and the recognition that asthma severity and asthma control are distinct concepts serving different functions in clinical practice.

Severity and control in 2 domains.

Asthma severity—a measure of the intrinsic intensity of the disease process—is

ideally assessed before initiating treatment. In contrast, asthma control is monitored over time to guide adjustments to therapy. The guidelines call for assessing severity and control within the domains of:

- **impairment**, based on asthma symptoms (identified by patient or caregiver recall of the past 2-4 weeks), quality of life, and functional limitations; and
- **risk**, of asthma exacerbations, progressive decline in pulmonary function (or reduced lung growth in children), or adverse events. Predictors of increased risk for exacerbations or death include persistent and/or severe airflow obstruction; at least 2 visits to the emergency department or hospitalizations for asthma within the past year; and a history of intubation or admission to intensive care, especially within the past 5 years.

The specific criteria for determining asthma severity and assessing asthma control are detailed in **FIGURES 1 AND 2**, respectively. Because treatment affects

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Peak expiratory flow testing is not a reliable measure of asthma severity

impairment and risk differently, this dual assessment helps ensure that therapeutic interventions minimize all manifestations of asthma as much as possible.

More steps and age-specific interventions. The EPR-3's stepwise approach to asthma therapy has gone from 4 steps to 6, and the recommended treatments, as well as the levels of severity and criteria for assessing control that guide them, are now divided into 3 age groups: 0 to 4 years, 5 to 11 years, and ≥ 12 years (**FIGURE 3**). The previous guidelines, issued in 2002, divided treatment recommendations into 2 age groups: ≤ 5 years and > 5 years. The EPR-3's expansion makes it easier for physicians to initiate, individualize, and adjust treatment.

Putting guidelines into practice begins with the history

A detailed medical history and a physical examination focusing on the upper respiratory tract, chest, and skin are needed to arrive at an asthma diagnosis. JJ's physician asked his mother to describe recent symptoms and inquired about comorbid conditions that can aggravate asthma. He also identified viral respiratory infections, environmental causes, and activity as precipitating factors.

In considering an asthma diagnosis, try to determine the presence of episodic symptoms of airflow obstruction or bronchial hyperresponsiveness, as well as airflow obstruction that is at least partly reversible (an increase in forced expiratory volume in 1 second [FEV₁] of > 200 mL and $\geq 12\%$ from baseline or an increase of $\geq 10\%$ of predicted FEV₁), and to exclude alternative diagnoses.

EPR-3 emphasizes spirometry

Recognizing that patients' perception of airflow obstruction is highly variable and that pulmonary function measures do not always correlate directly with symptoms,^{3,4} the EPR-3 recommends spirometry for patients ≥ 5 years of age, both before and after bronchodilation. In addition to helping to confirm an

asthma diagnosis, spirometry is the preferred measure of pulmonary function in classifying severity, because peak expiratory flow (PEF) testing has not proven reliable.^{5,6}

Objective measurement of pulmonary function is difficult to obtain in children < 5 years of age. If diagnosis remains uncertain for patients in this age group, a therapeutic trial of medication is recommended. In JJ's case, however, 3 courses of oral corticosteroids (OCS) in less than 6 months were indicative of persistent asthma.

Spirometry is often underutilized. For patients ≥ 5 years of age, spirometry is a vital tool, but often underutilized in family practice. A recent study by Yawn and colleagues found that family physicians made changes in the management of approximately half of the asthma patients who underwent spirometry.⁷ (Information about spirometry training is available through the National Institute for Occupational Safety and Health at <http://www.cdc.gov/niosh>.) Referral to a specialist is recommended if the physician has difficulty making a differential diagnosis or is unable to perform spirometry on a patient who presents with atypical signs and symptoms of asthma.

What is the patient's level of severity?

In patients who are not yet receiving long-term controller therapy, severity level is based on an assessment of impairment and risk (**FIGURE 1**). For patients who are already receiving treatment, severity is determined by the minimum pharmacologic therapy needed to maintain asthma control.

The severity classification—intermittent asthma or persistent asthma that is mild, moderate, or severe—is determined by the most severe category in which any feature occurs. (In children, FEV₁/FVC [forced vital capacity] ratio has been shown to be a more sensitive determinant of severity than FEV₁,⁴ which may be more useful in predicting exacerbations.⁸)

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FAST TRACK

Low-dose inhaled corticosteroids are safe and effective for the youngest asthma patients

FIGURE 1

Classifying asthma severity and initiating therapy in children, adolescents, and adults

Components of severity	Intermittent			Mild			Persistent			
	Ages 0-4	Ages 5-11	Ages ≥12	Ages 0-4	Ages 5-11	Ages ≥12	Ages 0-4	Moderate	Severe	
Symptoms	≤2 days/week			≤2 days/week but not daily			Daily			
Nighttime awakenings	0	≤2x/month		1-2x/month	3-4x/month		3-4x/month	Daily	>1x/week	Often 7x/week
SABA use for symptom control (not prevention of EIB)	≤2 days/week			>2 days/week but not daily			Daily			Several times per day
Impairment	None			Minor limitation			Some limitation			Extremely limited
Interference with normal activity										
Lung function	Normal FEV ₁ between exacerbations			>80%			N/A			N/A
• FEV ₁ (predicted) or peak flow (personal best)	>80%			>80%			60%-80%			<60%
• FEV ₁ /FVC	Normal*			Normal*			75%-80%			<75%
Risk	Exacerbations requiring OCS (consider severity and interval since last exacerbation)			≥2 in 6 months requiring OCS, or ≥4 wheezing episodes in 1 year lasting >1 day AND risk factors for persistent asthma			≥2 in 6 months requiring OCS, or ≥4 wheezing episodes in 1 year lasting >1 day AND risk factors for persistent asthma			≥2 in 6 months requiring OCS, or ≥4 wheezing episodes in 1 year lasting >1 day AND risk factors for persistent asthma
Relative annual risk may be related to FEV ₁	0-1/year			≥2/year†			≥2/year†			Relative annual risk may be related to FEV ₁
Recommended step for initiating therapy (See FIGURE 3 for treatment steps.)	Step 1			Step 2			Step 3			Step 3 and Step 4 or 5
The stepwise approach is meant to assist, not replace, the clinical decision making required to meet individual patient needs.	In 2-6 weeks, depending on severity, evaluate level of asthma control that is achieved. Children ages 0-4 years: if no clear benefit is observed in 4-6 weeks, stop treatment and consider alternative diagnoses or adjusting therapy. Children ages 5-11 years and patients ages ≥12 years: Adjust therapy accordingly.			Step 3: medium-dose ICS and consider option of short course of OCS			Step 3: medium-dose ICS and consider option of short course of OCS			Step 3: medium-dose ICS and consider option OR Step 4 and consider short course of OCS

EIB, exercise-induced bronchospasm; FEV₁, forced expiratory volume in 1 second; FVC, forced vital capacity; ICS, inhaled corticosteroids; NA, not applicable; OCS, oral corticosteroids; SABA, short-acting β₂-adrenergic agonist.

*Normal FEV₁/FVC values are defined according to age: 8-19 years (85%), 20-39 years (80%), 40-59 years (75%), 60-80 years (70%).

†For treatment purposes, children with at least 2 exacerbations (eg, requiring urgent, unscheduled care; hospitalization; or intensive care unit admission) or adolescents/adults with at least 2 exacerbations requiring OCS in the past year may be considered the same as patients who have persistent asthma, even in the absence of impairment levels consistent with persistent asthma.

Adapted from: National Heart, Lung, and Blood Institute (NHLBI).²

FIGURE 2

Assessing asthma control and adjusting therapy

Components of control	Well controlled			Not well controlled			Very poorly controlled		
	Ages 0-4	Ages 5-11	Ages ≥12 years	Ages 0-4	Ages 5-11	Ages ≥12 years	Ages 0-4	Ages 5-11	Ages ≥12 years
Symptoms	≤2 days/week	≤2 days/week but not >1x/day	≤2 days/week	>2 days/week	>2 days/week or multiple times on ≤2 days/week	>2 days/week	>1x/week	≥2x/week	≥4x/week
Nighttime awakenings	≤1x/month	≤2x/month	≤2x/month	>1x/month	≥2x/month	1-3x/week	>1x/week	≥2x/week	≥4x/week
Interference with normal activity	None			Some limitation			Extremely limited		
SABA use for symptom control (not prevention of EIB)	≤2 days/week			>2 days/week			Several times per day		
Lung function	N/A	>80%	>80%	N/A	60%–80%	60%–80%	N/A	<60%	<60%
• FEV ₁ (predicted) or peak flow personal best	N/A	>80%	N/A	N/A	75%–80%	N/A	N/A	<75%	N/A
• FEV ₁ /FVC	N/A	N/A	Score 0	N/A	N/A	N/A	N/A	N/A	Score 3-4
Validated questionnaires	N/A	N/A	Score 0	N/A	N/A	N/A	N/A	N/A	Score 3-4
• ATAQ	N/A	N/A	Score 0	N/A	N/A	N/A	N/A	N/A	Score 3-4
• ACQ	N/A	N/A	Score 0	N/A	N/A	N/A	N/A	N/A	Score 3-4
• ACT	N/A	N/A	Score 0	N/A	N/A	N/A	N/A	N/A	Score 3-4
Exacerbations requiring systemic OCS	0-1/year	Consider severity and interval since last exacerbation	0-1/year	2-3/year	Consider severity and interval since last exacerbation	≥2/year [†]	>3/year	Consider severity and interval since last exacerbation	≥2/year [†]
Reduction in lung function (growth in children)	N/A	Requires long-term follow-up	Requires long-term follow-up	N/A	Requires long-term follow-up	Requires long-term follow-up	N/A	Requires long-term follow-up	Requires long-term follow-up
Treatment-related adverse effects	Medication side effects can vary in intensity from none to very troublesome and worrisome. The level of intensity does not correlate to specific levels of control but should be considered in the overall assessment of risk.								
Recommended action for treatment (See FIGURE 3 for treatment steps.)	<ul style="list-style-type: none"> Maintain current treatment/step Regular follow-up every 1-6 months to maintain control Consider step down if well controlled for ≥3 months 			<ul style="list-style-type: none"> Step up 1 step and reevaluate in 2-6 weeks Children ages 0-4 years: if no clear benefit is observed in 4-6 weeks, consider alternative diagnoses or adjusting therapy For side effects, consider alternative treatment options 			<ul style="list-style-type: none"> Consider short course of systemic OCS Step up 1-2 steps and reevaluate in 2 weeks Children ages 0-4: if no clear benefit is observed in 4-6 weeks, consider alternative diagnoses or adjusting therapy For side effects, consider alternative treatment options 		
The stepwise approach is meant to assist, not replace, clinical decision making required to meet individual patient needs.	<p>ACQ, Asthma Control Questionnaire; ACT, Asthma Control Test; ATAQ, Asthma Therapy Assessment Questionnaire; EIB, exercise-induced bronchospasm; FEV₁, forced expiratory volume in 1 second; FVC, forced vital capacity; N/A, not applicable; OCS, oral corticosteroids; SABA, short-acting β₂-adrenergic agonist.</p> <p>[†]For treatment purposes, children with at least 2 exacerbations (eg, requiring urgent, unscheduled care; hospitalization; or intensive care unit admission) or adolescents/adults with at least 2 exacerbations requiring OCS in the past year may be considered the same as patients who have asthma that is not well controlled, even in the absence of impairment levels consistent with that classification.</p> <p>Adapted from: National Heart, Lung, and Blood Institute (NHLBI).²</p>								

FIGURE 3

Stepwise approach for managing asthma

		Step up if needed (first check inhaler technique, adherence, environmental control, and comorbid conditions)					
		Assess Control					
		Step down if possible (and asthma is well controlled ≥3 months)					
		Step 1	Step 2	Step 3	Step 4	Step 5	Step 6
Controller therapy		Intermittent asthma	Persistent asthma: daily medication				
		Consult with asthma specialist if Step 3 (ages 0–4) or Step 4 care (ages 5–11 and ≥12) or higher is required					
		Consider consultation at Step 2 (ages 0–4) or Step 3 (ages 5–11 and ≥12)					
Children 0–4 years	Preferred	SABA PRN	Low-dose ICS	Medium-dose ICS	Medium-dose ICS + either LABA or montelukast	High-dose ICS + either LABA or montelukast	High-dose ICS + either LABA or montelukast + OCS
	Alternative		Cromolyn or montelukast				
		Each step: patient education and environmental control					
Children 5–11 years	Preferred	SABA PRN	Low-dose ICS	EITHER Low-dose ICS + LABA, LTRA, or theophylline	Medium-dose ICS + LABA	High-dose ICS + LABA	High-dose ICS + LABA + OCS
	Alternative		Cromolyn, LTRA, nedocromil, or theophylline	OR medium-dose ICS	Medium-dose ICS + either LTRA or theophylline	High-dose ICS + either LTRA or theophylline	High-dose ICS + either LTRA or theophylline + OCS
		Each step: patient education, environmental control, and management of comorbidities					
		Steps 2–4: Consider subcutaneous allergen immunotherapy for patients who have persistent, allergic asthma					
Adolescents ≥12 years and adults	Preferred	SABA PRN	Low-dose ICS	Low-dose ICS + LABA OR medium-dose ICS	Medium-dose ICS + LABA	High-dose ICS + LABA AND consider omalizumab for patients who have allergies	High-dose ICS + LABA + OCS AND consider omalizumab for patients who have allergies
	Alternative		Cromolyn, LTRA, nedocromil, or theophylline	Low-dose ICS + LTRA, theophylline, or zileuton	Medium-dose ICS + LTRA, theophylline, or zileuton		
		Each step: patient education, environmental control, and management of comorbidities					
		Steps 2–4: Consider subcutaneous allergen immunotherapy for patients who have persistent, allergic asthma					
All ages	Quick-relief medication	<ul style="list-style-type: none"> SABA as needed for symptoms; intensity of treatment depends on severity of symptoms For children ages 0–4 years with viral respiratory symptoms: SABA every 4–6 hours up to 24 hours (longer with physician consult); consider short course of systemic OCS if exacerbation is severe or patient has history of previous severe exacerbations For children ages 5–11 years and patients ages ≥12 years: up to 3 treatments at 20-minute intervals as needed; short course of systemic OCS may be needed 					
		Caution: In children ages 0–4 years, frequent use of SABA may indicate the need to step up treatment (see EPR-3 for recommendations on initiating daily long-term control therapy); for children ages 5–11 years and patients ages ≥12 years, use of SABA >2 days/week for symptom relief (not prevention of EIB) generally indicates inadequate control and need to step up treatments					

EIB, exercise-induced bronchospasm; ICS, inhaled corticosteroid; LABA, long-acting β_2 -adrenergic agonist; LTRA, leukotriene receptor antagonist; OCS, oral corticosteroid; PRN, as needed; SABA, short-acting β_2 -adrenergic agonist.

Adapted from: National Heart, Lung, and Blood Institute (NHLBI).²

Asthma management: Preferred and alternative Tx

The recommended stepwise interventions include both preferred therapies (evidence-based) and alternative treatments (listed alphabetically in **FIGURE 3** because there is insufficient evidence to rank them). The additional steps and age categories support the goal of using the least possible medication needed to maintain good control and minimize the potential for adverse events.

In initiating treatment, select the step that corresponds to the level of severity in the bottom row of **FIGURE 1**;

to adjust medications, determine the patient’s level of asthma control and follow the corresponding guidance in the bottom row of **FIGURE 2**.

Inhaled corticosteroids remain the bedrock of therapy

ICS, the most potent and consistently effective long-term controller therapy, remain the foundation of therapy for patients of all ages who have persistent asthma. (Evidence: A).

Several of the age-based recommendations follow, with a focus on preferred treatments:

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Spirometry testing, which is underused in family practice, often leads to adjustments in asthma therapy

Children 0 to 4 years of age

- The guidelines recommend low-dose ICS at Step 2 (**Evidence: A**) and medium-dose ICS at Step 3 (**Evidence: D**), as inhaled corticosteroids have been shown to reduce impairment and risk in this age group.⁹⁻¹⁶ The potential risk is generally limited to a small reduction in growth velocity during the first year of treatment, and offset by the benefits of therapy.^{15,16}

- Add a long-acting β_2 -adrenergic agonist (LABA) or montelukast to medium-dose ICS therapy at Step 4 rather than increasing the ICS dose (**Evidence: D**) to avoid the risk of side effects associated with high-dose ICS. Montelukast has demonstrated efficacy in children 2 to 5 years of age with persistent asthma.¹⁷

- Recommendations for preferred therapy at Steps 5 (high-dose ICS + LABA or montelukast) and 6 (Step 5 therapy + OCS) are based on expert panel judgment (**Evidence: D**). When severe persistent asthma warrants Step 6 therapy, start with a 2-week course of the lowest possible dose of OCS to confirm reversibility.

- In this age group, a therapeutic trial with close monitoring is recommended for patients whose asthma is not well controlled. If there is no response in 4 to 6 weeks, consider alternative therapies or diagnoses (**Evidence: D**).

Children 5 to 11 years of age

- For Step 3 therapy, the guidelines recommend either low-dose ICS plus a LABA, leukotriene receptor antagonist (LTRA), or theophylline; *or* medium-dose ICS (**Evidence: B**). Treatment decisions at Step 3 depend on whether impairment or risk is the chief concern, as well as on safety considerations.

The EPR-3 suggests that children with poor pulmonary function on >2 days a week may respond best to a LABA/low-dose ICS combination (based on studies of adolescents and adults).^{18,19} One study in children demonstrated benefits in the impairment domain with the addition of LTRA to ICS therapy.²⁰ In children with

greater levels of impairment, increasing the ICS to a medium dose has been shown to improve symptoms and pulmonary function.²¹

Reductions in exacerbations have not been observed with the addition of a LABA or LTRA to low-dose ICS therapy in children. Improvement has been found with a 4-fold increase in the dose of ICS in adolescents and adults,²² but high doses of ICS increase the risk of systemic effects.²³

- For Steps 4 and 5, ICS (medium dose for Step 5 and high dose for Step 6) plus a LABA is preferred, based on studies of patients ≥ 12 years of age (**Evidence: B**). Step 6 builds on Step 5, adding an OCS to the LABA/ICS combination (**Evidence: D**).

- If theophylline is prescribed—a viable option if cost and adherence to inhaled medications are key concerns—serum levels must be closely monitored because of the risk of toxicity.

- Closely monitor and be prepared to identify and respond to anaphylaxis in a child at Step 2, 3, or 4 who is receiving allergen immunotherapy.

Adolescents ≥ 12 years of age and adults

- There are 2 preferred Step 3 treatments: Low-dose ICS plus a LABA, *or* medium-dose ICS. The combination therapy has shown greater improvement in impairment^{24,25} and risk^{24,26} compared with the higher dose of ICS.

- Preferred treatments at Steps 4, 5, and 6 are the same as those for children ages 5 to 11 years, with one exception: Subcutaneous anti-IgE therapy (omalizumab) may be added to the regimen at Steps 5 and 6 for adolescents and adults with severe persistent allergic asthma to reduce the risk of exacerbations.²⁷

Weigh the benefits and risks of therapy

Safety is a key consideration for all asthma patients. Carefully weigh the benefits and risks of therapy, including the rare

but potential risk of life-threatening or fatal exacerbations with daily LABA therapy²⁸ and systemic effects with higher doses of ICS.²³ Patients who begin receiving oral corticosteroids require close monitoring, regardless of age.

Regular reassessment and monitoring are critical

Schedule visits at 2- to 6-week intervals for those who are starting therapy or require a step up to achieve or regain asthma control. After control is achieved, reassess at least every 1 to 6 months. Measures of asthma control are the same as those used to assess severity, with the addition of validated multidimensional questionnaires (eg, Asthma Control Test [ACT])²⁹ to gauge impairment.

JJ's physician scheduled a follow-up visit in 4 weeks, at which time he did a reassessment based on a physical exam and symptom recall. Finding JJ's asthma to be well controlled, the physician asked the boy's mother to bring him back to the office in 2 months, or earlier if symptoms recurred.

Does your patient require a step down or step up?

A step down is recommended for patients whose asthma is well controlled for 3 months or more. Reduce the dose of ICS gradually, about 25% to 50% every 3 months, because deterioration in asthma control is highly variable. Review adherence and medication administration technique with patients whose asthma is not well controlled, and consider a step up in treatment. If an alternative treatment is used but does not result in an adequate response, it should be discontinued and the preferred treatment used before stepping up. Refer patients to an asthma specialist if their asthma does not respond to these adjustments.

Partner with patients for optimal care

The EPR-3 recommends the integration of patient education into all aspects of

asthma care. To forge an active partnership, identify and address concerns about the condition and its treatment and involve the patient and family in developing treatment goals and making treatment decisions. If the patient is old enough, encourage self-monitoring and management.

The EPR-3 recommends that physicians give every patient a written asthma action plan that addresses individual symptoms and/or PEF measurements and includes instructions for self-management. Daily PEF monitoring can be useful in identifying early changes in the disease state and evaluating response to changes in therapy. It is ideal for those who have moderate to severe persistent asthma, difficulty recognizing signs of exacerbations, or a history of severe exacerbations. ■

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If a step down is in order, reduce ICS dosing gradually, at a rate of about 25% to 50% every 3 months

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FAST TRACK

For a list of asthma education resources, see Table W1 online at www.jfponline.com

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TABLE W1**Asthma education resources****Allergy & Asthma Network Mothers of Asthmatics**

2751 Prosperity Avenue, Suite 150
 Fairfax, VA 22030
www.breatherville.org
 (800) 878-4403 or (703) 641-9595

American Academy of Allergy, Asthma, and Immunology

555 East Wells Street, Suite 1100
 Milwaukee, WI 53202-3823
www.aaaai.org
 (414) 272-6071

American Association For Respiratory Care

9125 North MacArthur Boulevard, Suite 100
 Irving, TX 75063
www.aarc.org
 (972) 243-2272

American College of Allergy, Asthma, and Immunology

85 West Algonquin Road, Suite 550
 Arlington Heights, IL 60005
www.acaai.org
 (800) 842-7777 or (847) 427-1200

American Lung Association

61 Broadway
 New York, NY 10006
www.lungusa.org
 (800) 586-4872

Association of Asthma Educators

1215 Anthony Avenue
 Columbia, SC 29201
www.asthmaeducators.org
 (888) 988-7747

Asthma and Allergy Foundation of America

1233 20th Street, NW, Suite 402
 Washington, DC 20036
www.aafa.org
 (800) 727-8462

Centers for Disease Control and Prevention

1600 Clifton Road
 Atlanta, GA 30333
www.cdc.gov
 (800) 311-3435

Food Allergy & Anaphylaxis Network

11781 Lee Jackson Highway, Suite 160
 Fairfax, VA 22033
www.foodallergy.org
 (800) 929-4040

National Heart, Lung, and Blood Institute Information Center

P.O. Box 30105
 Bethesda, MD 20824-0105
www.nhlbi.nih.gov
 (301) 592-8573

National Jewish Medical and Research Center (Lung Line)

1400 Jackson Street
 Denver, CO 80206
www.njc.org
 (800) 222-LUNG

US Environmental Protection Agency

National Center for Environmental Publications
 P.O. Box 42419
 Cincinnati, OH 45242-0419
www.airnow.gov
 (800) 490-9198