CHAPTER

2

Asthma: An Overview

OUTLINE

OBJECTIVES

1. Describe the burden of asthma.
2. Enumerate the risk factors for asthma.
3. Describe the classification of asthma.
4. Discuss the medications employed in the management of stable and exacerbated asthma.
5. List the therapeutic interventions for the management of asthma.
6. Identify the characteristics of asthma-COPD overlap syndrome (ACOS).

KEY TERMS

ACOS
action plan
allergens
asthma control
controlled
ETS
FENO
GINA
intermittent
long-term medications
partly controlled
PEF
phenotypes
quick-relief medications
severe persistent
uncontrolled
variable airflow limitation

Introduction

Asthma is a not a new disease. Its characteristics were described even in ancient times. Yet this chronic disease remains a challenge to the modern clinician. Medical science is exploring new molecular pathways to treatment, and new **phenotypes** have been added to the medical lexicon. Regardless of the advances in medical therapies for asthma, the patient's health outcomes and health-related quality of life (HRQoL) are largely determined by how effectively the disease is managed.

Patients' education about symptoms and how to monitor them is a key component of management. An action plan should be individualized for each patient. Long-term medications need to be taken regularly. Risk factors, such as exposure to pollen or to a noxious chemical in the workplace, should be explored, identified, and mitigated.

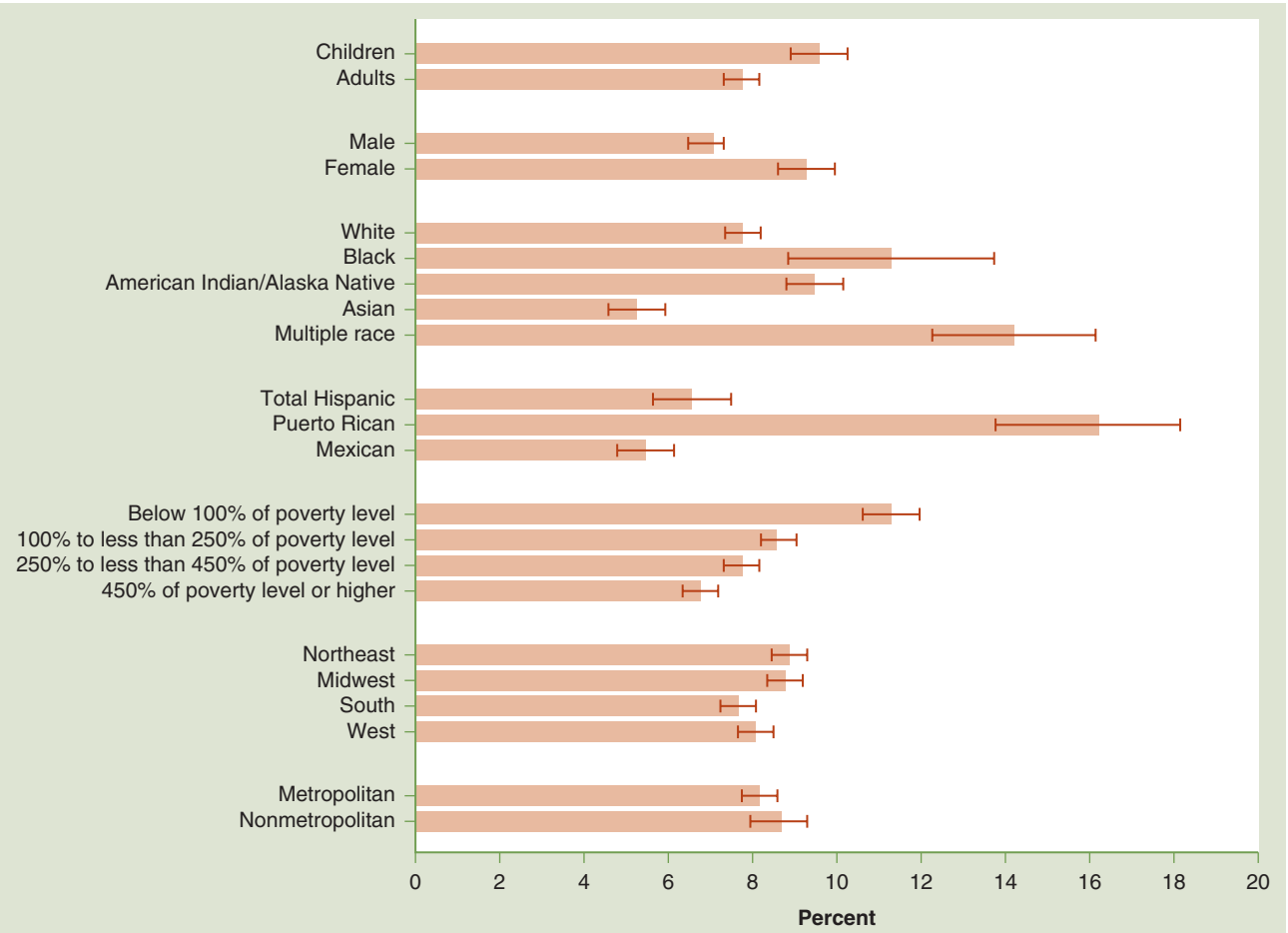
This chapter offers a synopsis of current knowledge on asthma and its management. It assumes a good understanding of pulmonary function, pharmacology, and pathophysiology.

Epidemiology

According to the Global Initiative for Asthma (**GINA**), "Asthma is a heterogeneous disease, usually characterized by chronic airway inflammation." Additionally, asthma results in **variable airflow limitation** and is accompanied by symptoms of chest tightness, dyspnea, wheeze, and cough.[1]

Estimates suggest that the global burden of asthma may total 300 million cases.[2] In the United States, the prevalence of asthma has increased across all demographic groups. According to the Centers for Disease Control and Prevention (CDC), since 2001, children have a higher prevalence of asthma than adults.[3]

The prevalence of asthma among adults age 18 years and older in the United States is currently 20.3 million. Currently 6.2 million children (i.e., younger than 18 years) in the United States have been diagnosed with asthma.[4] Unfortunately, childhood hospitalization and deaths due to asthma occur more often in African-American and Puerto Rican populations than among other races and ethnicities.[5] **Figure 2-1** shows asthma prevalence between 2008 and 2010.



I 95% confidence interval.
Crude (unadjusted) percentages are presented. The categories "Puerto Rican" and "Mexican" are subcategories of "Hispanic."

FIGURE 2-1 Average annual asthma prevalence 2008–2010.
Data from CDC. 2012. National Surveillance of Asthma: United States, 2001–2010. http://www.cdc.gov/nchs/data/series/sr_03/sr03_035.pdf.

According to a compilation of pooled data from the period 2008–2013, annual average individual cost accrued in the care for asthma in the United States totaled $3,266. Additionally, expenses incurred for asthma medications amounted to 56% of total medical costs for asthma. The total cost burden of asthma was $81.9 billion. Mortality and absenteeism accounted for 39% of this total.[6]

The most common childhood chronic illness is asthma. The CDC reports that the number of reported school day absences totaled 13.8 million in 2013. Asthma also accounts for 14.2 million lost workdays for the adult population.[7]

Risk Factors

Risk factors that stimulate the development of asthma are host-specific and are usually genetic. Risk factors that result in symptoms are usually environmental.[8] Reflecting the clear disparities in the prevalence of asthma for different races and ethnicities (see Figure 2-1), the Asian population has the lowest prevalence. In addition, prevalence rates for asthma are directly correlated with poverty levels.

Specific risk factors for asthma include pollution, low birth weight, viral infections, exposure to tobacco smoke, and diet. A particularly strong risk factor for asthma is atopy. Atopic factors are commonly associated with childhood asthma.[9]

Studies have attempted to isolate risk factors for childhood asthma that can be mitigated and thereby prevent the need for hospitalization. One study revealed that the combination of a viral infection and sensitization with exposure to the sensitizing allergen correlated strongly with hospital admission. Consequently, efforts should be targeted toward reducing exposure to **allergens** among sensitized children as well as implementing appropriate measures for the prophylaxis and treatment of viral infections.[10]

Among patients with asthma, overall control of exposure to triggers is not practicable. However, obvious measures, such as smoking cessation and reducing exposure to environmental tobacco smoke (**ETS**), as well as avoidance of known occupational and dietary allergens, can be helpful. The overall therapeutic strategy is to use medications to achieve optimal control of asthma and thereby reduce the effects of exposure to allergens.[8(p.155)]

Clinical Considerations

Asthma has traditionally been classified by severity, degree of airflow limitation, variability in clinical features, and symptoms (**Table 2-1**).

Determining the severity of asthma is useful in an initial assessment of the patient. However, the current recommendation is that the primary focus of therapy should be on the control of asthma.[11] **Asthma control** refers to the mitigation of symptoms and determining the step-wise level of treatment required to achieve this[9(p.779)] (**Table 2-2**).

Patients with asthma are divided into three age groups: children 0–4 years, children 5–11, and children 12–18 years and adults. Asthma causes are variably distributed among these groups. Well-recognized causes include allergens, pollution, food and drug additives, emotions, exercise, occupation, and viruses.[9]

Asthma is commonly diagnosed by symptoms and pulmonary function testing. Of note, during clinical assessment, wheezes are not always present. **Box 2-1** illustrates the useful indicators for diagnosing asthma.

Note that the absence of a wheeze does not exclude asthma; indeed, cough variant asthma is characterized by a nonproductive cough without wheezes. The measurement of pulmonary function should be correlated with the patient's history and symptoms. Additional diagnostic tests include skin tests to detect allergens and blood tests to quantify immunoglobulin E (IgE) or eosinophilia.[12] In order to diagnose asthma and quantify the degree of flow impairment, it is recommended that

TABLE 2-1
Classification of Asthma Severity by Clinical Features Before Treatment

Classification	Clinical Features
Intermittent	Symptoms less than once a week Brief exacerbation Nocturnal symptoms not more than twice a month FEV_1 or PEF $\geq$ 80% predicted value PEF or FEV_1 variability $<$ 20%
Mild persistent	Symptoms more than once a week but less than once a day Exacerbations may affect activity and sleep Nocturnal symptoms more than twice a month FEV_1 or PEF $\geq$ 80% of predicted value PEF or FEV_1 variably $<$ 20–30%
Moderate persistent	Symptoms daily Exacerbations may affect activity and sleep Nocturnal symptoms more than once a week Daily use of inhaled short-acting $beta_2$agonist FEV_1 or PEF 60–80% of predicted value PEF or FEV_1 variability $>$ 30%
Severe persistent	Symptoms daily Frequent exacerbations Frequent nocturnal asthma symptoms Limitation of physical activities FEV_1 or PEF $\leq$ 60% of predicted value PEF or FEV_1 variability $>$ 30%

Note the importance of monitoring FEV_1 or PEF to provide objective criteria in classifying asthma severity.

FEV_1, forced expiratory volume in 1 second; PEF, peak expiratory flow.

Bateman, E. D., S. S. Hurd, P. J. Barnes et al. 2008. "Global Strategy for Asthma Management and Prevention: GINA Executive Summary." *European Respiratory Journal* 31(1): 143–178.

TABLE 2-2
Levels of Asthma Control

Characteristic	Controlled	Partly Controlled (present in any week)	Uncontrolled
Daytime symptoms	None (twice or less per week)	More than twice a week	Three or more features of partly controlled asthma present in any week
Limitations of activities	None (twice or less per week)	Any	Three or more features of partly controlled asthma present in any week
Nocturnal symptoms/ awakening	None	Any	Three or more features of partly controlled asthma present in any week
Need for reliever/rescue treatment	None (twice or less per week)	More than twice a week	Three or more features of partly controlled asthma present in any week
PEF or FEV_1	Normal	<80% of predicted value or personal best	Three or more features of partly controlled asthma present in any week
Exacerbations	None	One or more per year	One in any week

FEV_1, forced expiratory volume in 1 second; PEF, peak expiratory flow.

Bateman, E. D., S. S. Hurd, P. J. Barnes et al. 2008. "Global Strategy for Asthma Management and Prevention: GINA Executive Summary." *European Respiratory Journal* 31(1): 143–178.

BOX 2-1 Key Indicators Suggesting a Diagnosis of Asthma

Consider a diagnosis of asthma and performing spirometry if any of these indicators is present. They are not diagnostic by themselves, but the presence of multiple key indicators increases the probability of a diagnosis of asthma.

- Wheezing (lack of wheezing does not exclude asthma)
- History of any of the following:
  - Cough, worse particularly at night
  - Recurrent wheeze
  - Recurrent difficulty in breathing
  - Recurrent chest tightness
- Symptoms occur or worsen in the presence of
  - Exercise
  - Viral infection
  - Animals with fur or hair
  - House-dust mites
  - Mold
  - Smoke (tobacco or wood)
  - Pollen
  - Changes in weather
  - Strong emotional expression
  - Airborne chemicals or dusts
  - Menstrual cycles
- Symptoms occur or worsen at night, awakening the patient.

Modified from National Asthma Education and Prevention Program. 2007. Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma. Full Report. NIH Publication No. 07-4051. 1–417.

spirometry be performed before and after bronchodilator therapy. Spirometry can be performed on children as young as 5 years of age.[13(p.43)]

Evidence of flow impairment with reversibility is commonly seen with asthma. However, because the effects of asthma are variable, obstruction may not be apparent on the spirogram when the patient is asymptomatic. Additionally, a significant bronchodilator effect may not be achievable if the patient's asthma is not optimally controlled.[14]

The measurement of exhaled nitric oxide (FENO) has been found to be useful in diagnosing and assessing control of asthma. The **FENO** level can be useful in assessing whether the patient's asthma is in remission or to gauge the response to adjustments in inhaled corticosteroids (ICS).[15]

Therapeutics

Interventions employed in the treatment and management of asthma are multifaceted. They encompass self-management education, **action plan**, smoking cessation counseling, mitigation of risk factors, pulmonary rehabilitation, and medications.

Medications

Medications for asthma can be divided into control or long-term medications and quick-relief or short-term medications. The **long-term medications** include corticosteroids, cromolyn sodium and nedocromil (not shown in table), immunomodulators, leukotriene receptor antagonists (LTRAs), long-acting beta$_2$-agonists (LABAs), and methylxanthines (**Table 2-3**). Short-term or **quick-relief medications** include anticholinergics, short-acting beta$_2$-agonists (SABAs), and systemic corticosteroids (not shown in table) (**Table 2-4**).[13]

Guidelines for the treatment of asthma advise that once the disease is controlled for a period of 3 to 6 months, the ICS dosage should be decreased in order to minimize side effects. This strategy can be employed in several ways.[9,16] **Figures 2-2, 2-3,** and **2-4** illustrate therapeutic paths for stepping up and stepping down therapy for children 0–4 years of age, children 5–11 years of age, and youths > 12 years of age and adults.

Self-Management Training

Asthma is a chronic disease, and thus the patient must be instructed on how to manage it. Self-management training involves not only education on pathophysiology and symptoms of the disease but also inculcating behavioral traits that will optimize the patient's self-efficacy in performing the tasks necessary to maximize the HRQoL. Modifying patient behaviors and self-management training to improve disease self-management are

TABLE 2-3
Long-Term Controller Medications

Medication	Dose Strength	Adult Medium Daily Dose
Corticosteroids		
Metered dose inhalers (pMDI or DPI)		
Beclomethasone dipropionate (QVAR)	40 or 80 µg/puff	> 240–480 µg
Budesonide (Pulmicort)	90, 180, or 200 µg/puff	> 600–1200 µg
Fluticasone propionate (Flovent)	44, 110, or 220 µg/puff	> 264–440 µg
Mometasone (Asmanex)	200 µg/puff	400 µg
Ciclesonide (Alvesco)	80 or 160 µg/puff	Starting dose in steroid-naïve patients is 160 µg bid
Tablets		
Prednisone	1, 2.5, 5, 10, 20, 25, and 50 mg	40–60 mg/day for 3–10 days for control in exacerbation
Prednisolone	5 mg	40–60 mg/day for 3–10 days for control in exacerbation
Methylprednisolone	2, 4, 8, 16, 24, and 32 mg	7.5–60 mg/day or qod as needed for control
Long-Acting Beta$_2$-Agonists		
Dry powder inhalers		
Salmeterol (Serevent)	50 µg/puff	50 µg bid
Formoterol (Foradil)	12 µg/puff	12 µg bid
Methylxanthines (Oral)		
Theophylline (Slo-Bid, Theo-24, Theo-Dur, Uniphyl)	Varies, depending on formulation	
Leukotriene Modifiers (Oral)		
Montelukast (Singulair)	10-mg tablets	10 mg qd
Combination Products		
Advair DPI or MDI (fluticasone/salmeterol)	100/50, 250/50, 500/50 µg DPI 45/21, 115/21, 230/21 µg HFA MDI	250/50 µg bid
Symbicort (budesonide/formoterol)	80/4.5, 160/4.5 µg	160/4.5 µg bid
Immunomodulators		
Omalizumab	Based on IgE level and body weight	

bid, twice a day; DPI, dry powder inhaler; HFA, hydrofluoroalkane; pMDI, pressurized metered dose inhaler; qd, daily; qid, four times a day; qod, every other day.
Hess, D. 2016. *Respiratory Care: Principles and Practice,* 3rd ed. Burlington, MA: Jones & Bartlett Learning.

TABLE 2-4
Quick-Relief Medications

Medication	Dose	Frequency
Short-Acting Beta$_2$-Agonists		
Pressurized metered dose inhalers		
Racemic albuterol (Ventolin HFA, Proventil HFA, Pro-Air HFA)	90 µg/puff	prn; q4h–q6h
Levalbuterol (Xopenex HFA)	45 µg/puff	prn; q6h
Nebulization		
Racemic albuterol (Ventolin, Proventil, generic)	2.5 mg (0.5% solution)	prn; q4h–q6h
Levalbuterol (Xopenex)	0.31 mg and 0.63 mg	q6h–q8h
Metaproterenol (Alupent)	5% solution	prn; q4h–q6h
Oral tablets		
Albuterol (Repetabs, Volmax)	2 and 4 mg	TID
Metaproterenol	10 and 20 mg	prn; q4h–q6h
Syrup		
Albuterol	2 mg/5 mL	TID-QID
Metaproterenol	10 mg/5 mL	prn; q4h–q6h
Subcutaneous injection		
Terbutaline	1 mg/mL injection	prn; q4h–q6h
Anticholinergics		
Pressurized metered dose inhalers		
Ipratropium bromide (Atrovent)	18 µg/puff	bid–qid
Nebulization		
Ipratropium bromide (Atrovent)	500-µg solution	bid–qid

bid, twice a day; HFA, hydrofluoroalkane; prn, as needed; qid, four times a day; q4h, every 4 hours; q6h, every 6 hours.
Hess, D. 2016. *Respiratory Care: Principles and Practice,* 3rd ed. Burlington, MA: Jones & Bartlett Learning.

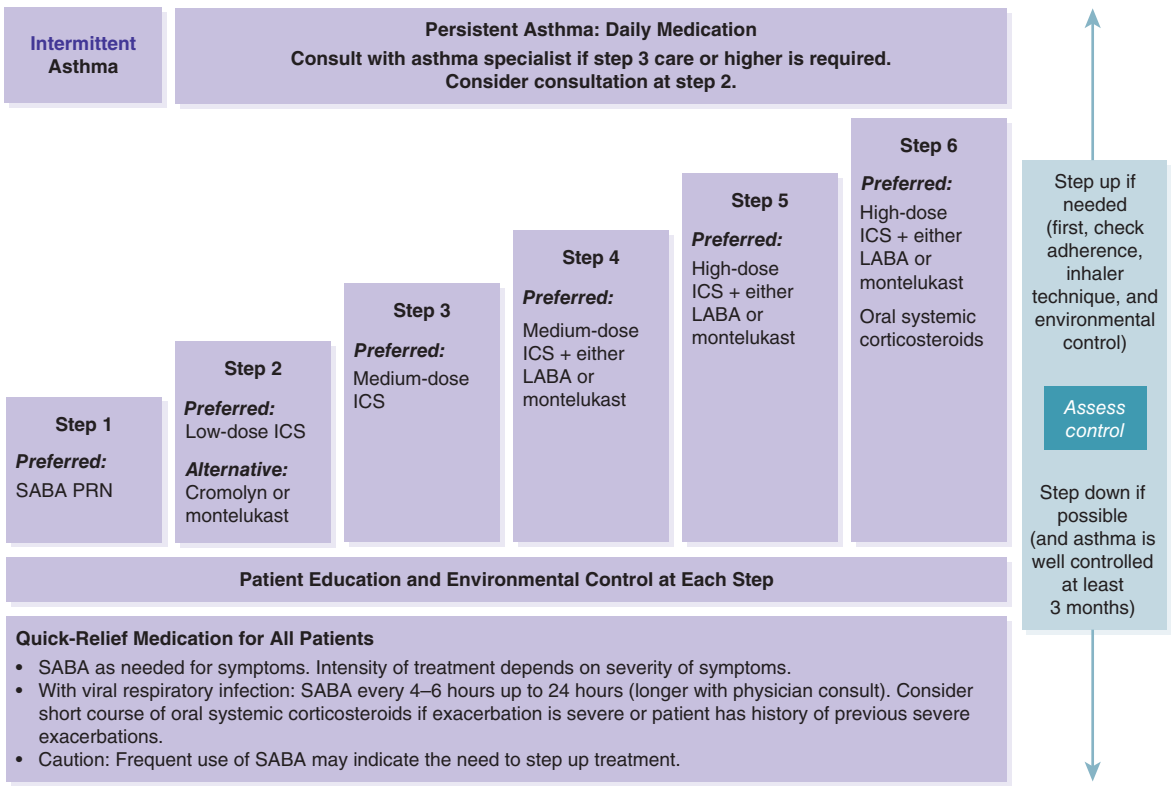


FIGURE 2-2 Stepwise approach for managing asthma in children 0–4 years of age.
Modified from National Asthma Education Program, National Heart, Lung and Blood Institute. 2007. Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma. Full Report 2007. Bethesda, MD: National Institutes of Health. NIH Publication 08-4051.

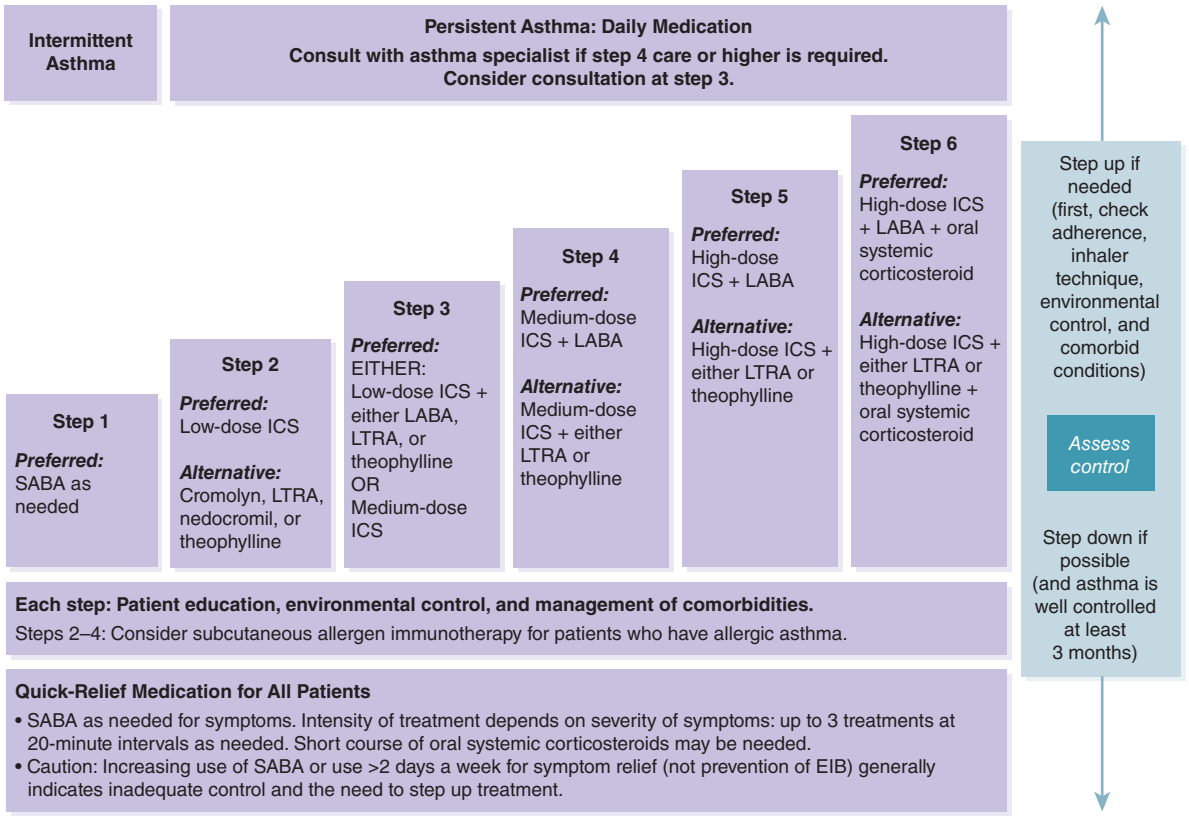


FIGURE 2-3 Stepwise approach for managing asthma in children 5–11 years of age.

Modified from National Asthma Education Program, National Heart, Lung and Blood Institute. 2007. Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma. Full Report 2007. Bethesda, MD: National Institutes of Health. NIH Publication 08-4051.

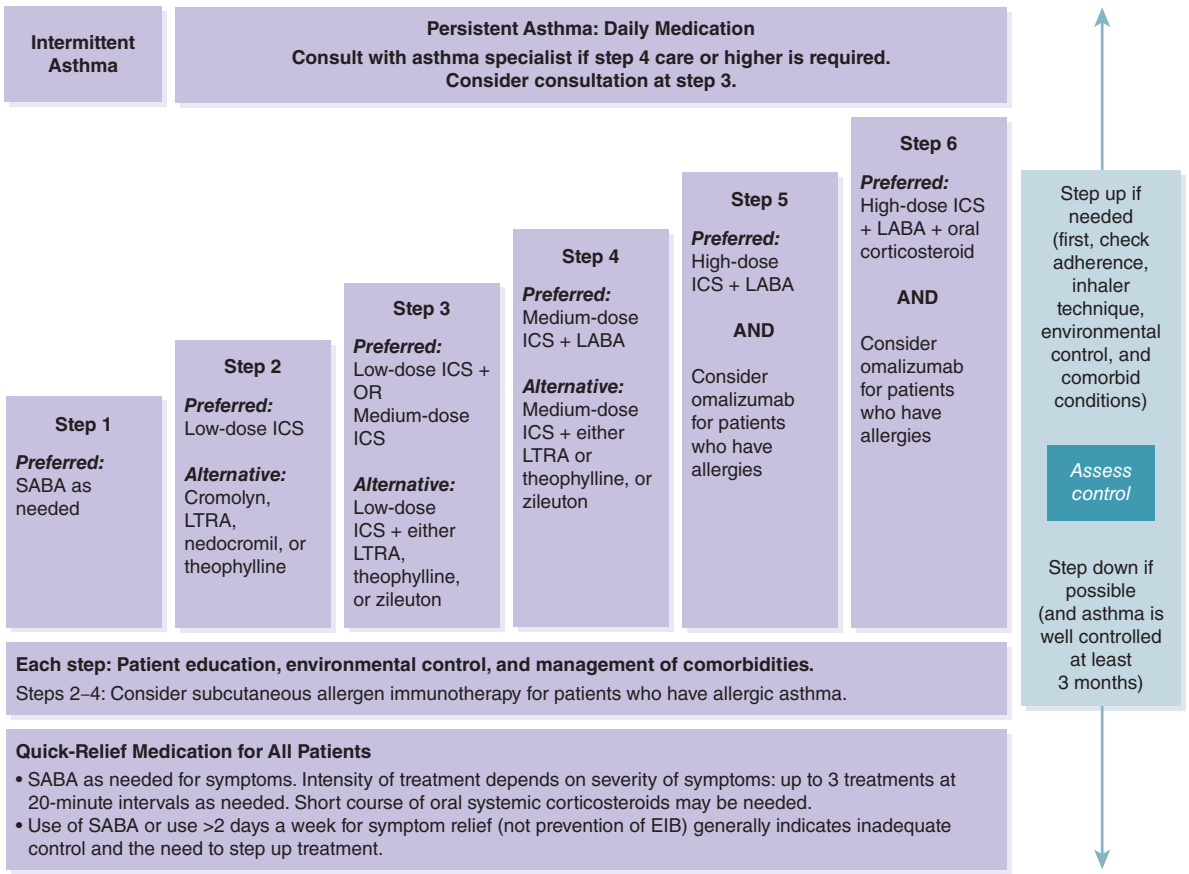


FIGURE 2-4 Stepwise approach for managing asthma in youths > 12 years of age and adults.

Modified from National Asthma Education Program, National Heart, Lung and Blood Institute. Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma. Full Report 2007. Bethesda, MD: National Institutes of Health; 2007. NIH Publication 08-4051.

BOX 2-2 Educational Recommendations of the National Asthma Education and Prevention Program (NAEPP)

- Teach basic facts about asthma
- Teach the necessary medication skills (techniques, delivery devices, and dosing regimens)
- Teach self-monitoring skills: symptom-based, peak flow monitoring
- Teach relevant environmental control/avoidance strategies
- Provide a written asthma exacerbation treatment plan

Modified from National Asthma Education Program, National Heart, Lung, and Blood Institute. 2007. Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma. Bethesda, MD: National Institutes of Health. NIH Publication 07-4051.

addressed in later chapters. **Box 2-2** illustrates the National Asthma Education and Prevention Program recommendations for patient education.

Reduction of Risk Factor Exposure

The many risk factors for asthma include indoor and outdoor allergens, indoor and outdoor air pollutants, occupational exposures, food and food additives, drugs, and obesity.

Indoor and Outdoor Allergens

Indoor allergens include cockroach antigen, dust mites, animal dander, and mold or fungi. Practical measures have been proved to reduce the impact of indoor allergens. For example, decreasing indoor relative humidity by dehumidifiers and air conditioning can decrease the propagation of dust mites. Additionally, thorough and regular vacuuming can reduce the presence of mites on flooring and carpeting.[17]

The Asthma and Allergy Foundation of America recommends the following practical measures for reducing indoor allergen exposure: vacuuming once or twice per week, preventing pet dander by not having pets with fur or feathers, keeping pets out of bedrooms, replacing carpeting, reducing mold exposure by reducing moisture, and controlling cockroaches.[18]

Exposure to common outdoor allergens, such as seasonal pollens and molds, can be reduced by keeping windows shut and using air conditioning. If warranted, fields and woody areas should be avoided if allergy testing has indicated sensitivity to allergens in these environments.[19]

Indoor and Outdoor Air Pollutants

An important indoor air pollutant is tobacco smoke. Exposure to environmental tobacco smoke should be minimized by restricting smoking. Other pollutants include carbon monoxide and nitrogen dioxide, which are produced from unvented or malfunctioning gas appliances and wood stoves; organic chemicals, such as aerosol sprays and cleaning agents; and formaldehyde, which is found in pressed wood products. Practical measures to minimize exposure to these pollutants include using appliances properly, using household chemicals judiciously and storing them properly, good housekeeping, and ensuring adequate ventilation.[20]

Reduction of exposure to outdoor air pollutants is complicated and includes policy and scientific interventions to reduce the incidence of particulate matter and other pollutants in the atmosphere. Local governments can be of great assistance by regularly issuing ozone and smog alerts. People should not venture outside if outdoor alerts are active. Window and doors should be shut to prevent intrusion of outside air into the home.[21]

Occupational Exposures

As part of the initial assessment for asthma in an adult patient, a thorough job history should be obtained so that occupational exposure can be explored as a possible asthma cause.[22] In many countries occupational asthma is the most common respiratory disorder related to the workplace.[23]

Three primary strategies can be employed to reduce the incidence of occupational asthma. As the primary strategy, prevention is key and is achieved by optimizing the air quality of the workplace. Compliance with the Occupational Safety and Health Act (OSHA) guidelines is important. Second, occupational asthma should be detected early by using surveillance tactics. Finally, exposure can be reduced by replacing or substituting irritants and by using personal protective equipment.[24]

Food, Food Additives, and Drugs

Known allergens in food and food additives as well as offending medications should be avoided. When in doubt about a particular food, the patient should carefully read the food label for any possible additives or chemicals that he or she is allergic to. The most common allergenic foods include fish, shellfish, tree nuts, peanuts, soy, wheat, eggs, and milk.[25]

Common medication triggers include penicillin, sulfonamides, anticonvulsants, aspirin and other nonsteroidal anti-inflammatory drugs (NSAIDs), and chemotherapy drugs. Following the diagnosis of a drug allergy, the patient should inform healthcare providers so that these medications are not unwittingly prescribed. Additionally, a medical alert bracelet or necklace is helpful.[26]

Obesity

An association between obesity and asthma is increasingly recognized. Estimates reveal that roughly 38% of adults with asthma in the United States are obese. Studies have documented that weight reduction

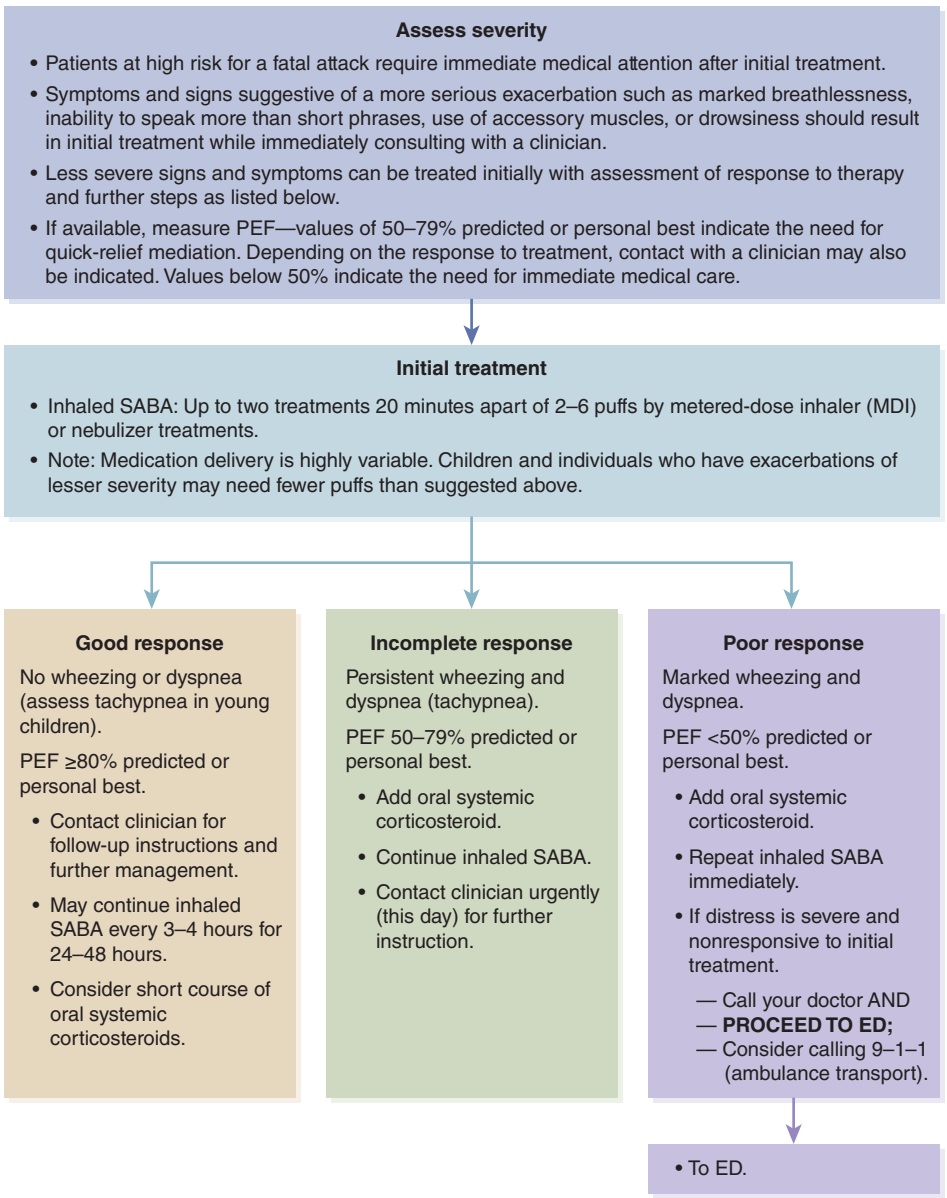
achieved nutritionally or surgically resulted in improved outcomes in lung function.[27] The existing literature suggests that more research is needed to clarify the links between obesity and asthma, including phenotypes, and variability of results achieved through weight reduction.

Pulmonary Rehabilitation

The components and outcomes of a robust pulmonary rehabilitation program are well described in Chapter 1 on chronic obstructive pulmonary disease (COPD). Research has revealed that exercise capacity and HRQoL are significantly improved in active patients with asthma.[28] However, a systematic review has revealed that lung function in children with asthma is minimally improved by exercise training, but with appropriate medication it can help to prevent exercise-induced bronchoconstriction and improve overall fitness in such patients.[29]

Management of an Exacerbation

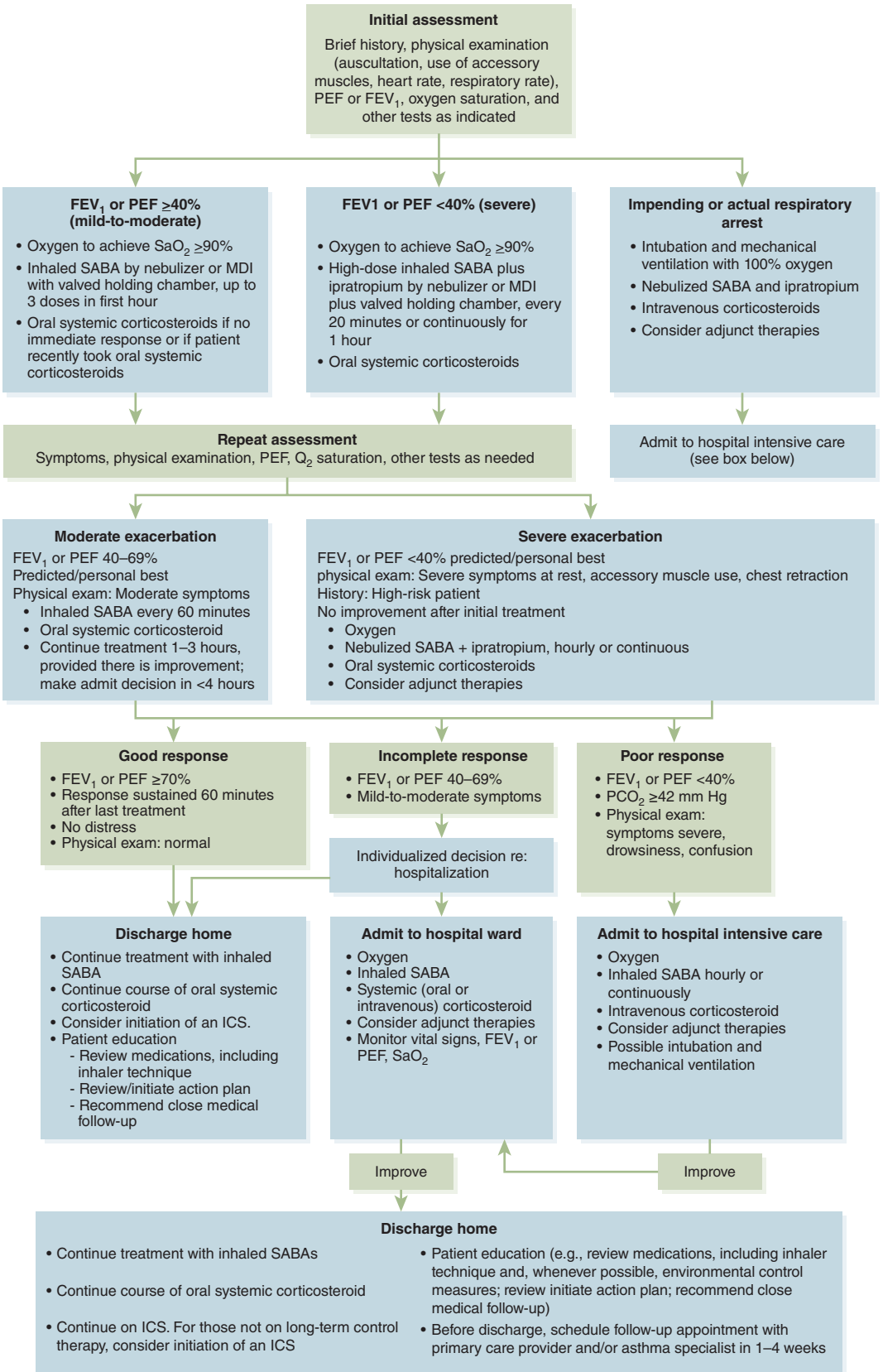
Asthma exacerbations can be categorized as mild, moderate, severe, or life-threatening. Patient education can be invaluable in detection and management of an exacerbation. Using an action plan and knowing how to monitor signs and symptoms can lead patients to seek earlier treatment and possibly avoid an emergency department visit.[30] **Figure 2-5** and **Figure 2-6** illustrate



Key: ED, Emergency department; MDI, metered-dose inhaler; PEF, peak expiratory flow; SABA, short-acting beta$_2$ agonist (quick-relief inhaler)

FIGURE 2-5 Management of asthma exacerbations: home treatment.

Modified from National Asthma Education and Prevention Program. 2007. Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma. Full Report 2007. NIH Publication No. 07–4051, 1–417.



Key: FEV_1, Forced expiratory volume in 1 second; ICS, Inhaled corticosteroid; MDI, metered-dose inhaler; PCO_2, partial pressure carbon dioxide; PEF, peak expiratory flow; SABA, short-acting $beta_2$ agonist; SaO_2, oxygen saturation

FIGURE 2-6 Management of asthma exacerbations: emergency department and hospital-based care.

Modified from National Asthma Education and Prevention Program. 2007. Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma. Full Report. NIH Publication No. 07–4051, 1–417.

treatment of an exacerbation in the home as well as in hospital settings.

An exacerbation results in an increase in symptoms such as dyspnea, coughing, and wheezing. The strategy for management of an exacerbation is to alleviate the accompanying bronchoconstriction and hypoxemia and to prevent a recurrence.[8(p.160)] Caregivers must be vigilant during the treatment of the patient and care must be delivered in a timely manner. Vital signs and symptoms should be monitored closely for response to the treatment interventions. If tolerated, serial measurements of lung function such as peak expiratory flow (**PEF**) should be performed.[31]

A good response to treatment can result in discharge to the home setting. A less than optimal response can result in hospital admission. A severe exacerbation that is poorly responsive or refractory to treatment can result in intubation, mechanical ventilation, and admission to the intensive care unit.

Asthma-COPD Overlap Syndrome

Patients with asthma-COPD overlap syndrome (**ACOS**) present with characteristic features of both asthma and COPD. These patients will exhibit an enhanced response to ICS relative to that in patients with COPD alone, as well as bronchial and systemic eosinophilic inflammation, and more reversible airflow limitation than with COPD.[32]

According to a 2017 study, patients with ACOS were more symptomatic than their COPD or asthma counterparts and had more frequent exacerbations. Additionally, they were more likely to be on a COPD-only treatment plan. Further research is needed to improve outcomes in these patients.[33]

Key Points

- Asthma is characterized by chronic airway inflammation.
- For treatment purposes, patients with asthma are divided into three age groups: children 0–4 years, children 5–11, and children 12–18 years old and adults.
- Emphasis in treatment strategy has shifted from severity to control, and asthma is classified as controlled, partly controlled, and uncontrolled.
- Asthma is characterized by reversible airflow impairment.
- Reduced airflow may not be evident on a spirogram if the patient is asymptomatic.
- Asthma medications are classified as either long-term or quick-relief.
- Reduction of exposure to all allergens is impractical; optimal control of the patient's asthma depends on minimizing the effects of allergen exposure.
- Assessment of the patient with asthma must include a thorough job history to identify possible occupational exposures leading to an asthma phenotype.

Case Study

A 30-year-old white woman has been admitted to the hospital because of an asthma exacerbation. She was diagnosed with adult-onset asthma 2 years ago. During the past 2 months she visited the emergency department twice for exacerbations that were successfully treated and did not require hospital admission. She is classified as having moderate persistent asthma. She is a restaurant worker and is currently uninsured.

As a pulmonary disease navigator, you have been consulted to assess and educate the patient on asthma management. From a chart review, you ascertain that the patient has been on an ICS/LABA medication regimen and has a SABA inhaler for use as needed for symptom relief. The patient states that she has been following up with a public health clinic. From your assessment you have discovered that the patient has not been taking her LABA medication because she does not think it is effective. Additionally, you discover that she has not been monitoring her symptoms or checking her PEF. There is obviously a problem with the patient's adherence to her treatment regimen. This clinical scenario serves as an introduction to the use of self-management training skills, to be addressed later in the text.

Question:

What steps should you take to improve the patient's adherence to her treatment regimen?

Testing Your Knowledge

Choose one answer for each of the following questions.

1. Asthma is characterized by:
   a. Fixed airflow impairment that is always present
   b. Reversible flow impairment that is always present
   c. Wheezing that is always present
   d. Variable flow impairment
2. Some of the characteristics of moderate persistent asthma include:
   a. Daily symptoms and nocturnal symptoms more than once per week
   b. Daily symptoms and limitation of activities
   c. Frequent nocturnal symptoms and limitation of activities
   d. Symptoms less than once per week and brief exacerbations

3. Patients with ACOS are different from patients with only asthma and only COPD. This difference is characterized by:
   a. Decreased response to ICS as compared to that in patients with only COPD
   b. Frequent nonproductive cough
   c. More symptoms and more frequent exacerbations than in patients with only COPD or asthma
   d. More fixed airflow limitation than in patients with only COPD
4. An incomplete response to home treatment of an exacerbation is signified by:
   a. Marked wheezing and dyspnea
   b. PEF ≥ 80% of predicted value
   c. Persistent wheezing without dyspnea
   d. PEF 50–79% of predicted value
5. A patient's health outcomes and HRQoL are largely determined by:
   a. Insurance plan with medication benefits
   b. New treatments based on molecular pathways
   c. The patient's ability to manage the asthma
   d. Reducing exposure to allergens

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