Assessment and Management of Asthma Exacerbation in Urgent Care: Part 1

Urgent message: Asthma is increasing in prevalence and so, too, presentations of asthma in ambulatory settings. Urgent care providers have an important role to play in identifying and treating acute asthma exacerbations, including providing a written asthma action plan at discharge to improve long-term outcome.

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Patients often seek assistance in urgent care centers for acute presentations of asthma. This provides unique opportunities for short- and long-term management in the urgent care setting. Identification of relevant history, adequate treatment, and appropriate follow-up are essential, and are areas where the urgent care provider plays an important role. Protocols can be helpful in short-term management of the asthmatic patient presenting to an urgent care center. A written asthma action plan at discharge may help to improve long-term outcomes. In the first of a two-part series, we review the epidemiology and pathophysiology of asthma, and provide guidance on key aspects of medical history-taking and examination of the patient who presents for urgent care with symptoms suggestive of asthma. Part 2, in a subsequent issue, will review both short and long-term management of asthma through the use of pharmacotherapy, protocols for treatment, and a written asthma action plan at discharge.

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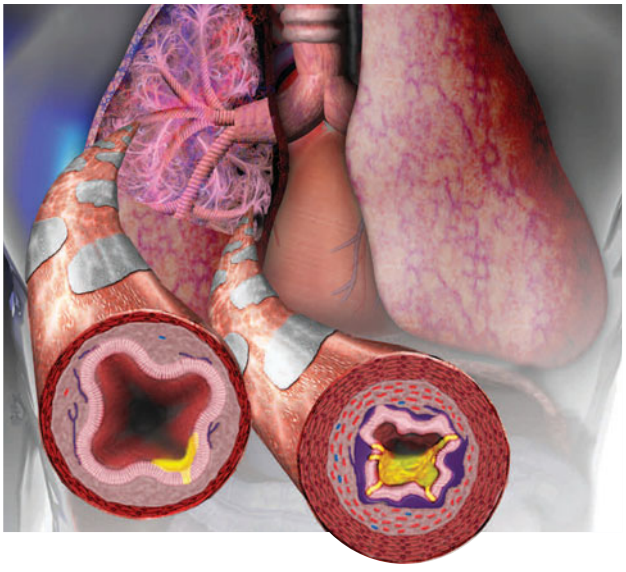

Introduction

Asthma is a multifactorial chronic disorder of the air-

Table 1. Key Indicators for Considering a Diagnosis of Asthma *

History
- Cough, worse at night
- Recurrent wheeze
- Recurrent difficulty in breathing
- Recurrent chest tightness

Review of symptoms
- Symptoms occur or worsen
  - Exercise
  - Viral infections
  - Animals with fur or hair
  - House-dust mites
  - Mold
  - Smoke
  - Pollen
  - Changes in weather
  - Strong emotional expression
  - Airborne chemical or dusts
  - Menstrual cycles
  - At night, awakening the patient

Physical exam
- Wheezing

*Adapted from the National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report [EPR-3].Consider a diagnosis of asthma and either performing or referring for spirometry if any of these key indicators are present

ways, characterized by variable and recurring symptoms, airflow obstruction, bronchial hyper-responsiveness, and an underlying chronic airway inflammation.[1-3] Inflammation is a central feature of asthma, and continues to be the foundation for assessment of asthma severity and control of the disease. The prevalence of asthma increased dramatically in the last decade,[4] and ambulatory care use for asthma has also continued to increase during this period.[2,5] These statistics suggest that urgent care facilities will continue to play a vital role in the short and long-term management of asthma patients.

It is essential that urgent care providers understand the underlying pathogenesis of asthma, and inquire about the risk factors associated with asthma exacerbations. The medical history and subsequent focused examination will provide the foundation for effective short-term management of asthma in the urgent care setting, and proper discharge planning in order to facilitate better long-term management of the disease.

Epidemiology

Asthma data are reported as prevalence (percentage of current population) because there are no national mechanisms in place to measure incidence (rate at which new cases of asthma occur in a population).[3] Approximately 34 million Americans (24 million adults and 10 million children) have a diagnosis of asthma.[3,6-8] Approximately 12 million (35%) have an asthma exacerbation (a worsening in asthma symptoms that requires a change in the intensity of treatment to prevent further deterioration in clinical status) over a 1-year period.[2,3] The prevalence of asthma is higher in non-Hispanic African Americans and individuals with lower socioeconomic status.[2-4] The prevalence of asthma increased approximately 12.3% between 2001 and 2009, with an estimated $50.1 billion spent on asthma-related costs in the United States in 2010.[4,9] A percentage of these costs were generated by increased use of ambulatory care settings by patients who had an acute asthma exacerbation. Of note, the rates of emergency department (ED) visits, hospitalizations, and mortality for asthma have either held steady or, more importantly, declined over the last decade.[3] These patterns suggest that an increasing number of patients with acute asthma exacerbations may present to urgent care centers for treatment and short-term management. In addition, if the pattern of decreased ED visits and hospitalizations is to continue, it is imperative for urgent care providers to provide appropriate and adequate discharge instructions for patients with the goal of preventing future asthma exacerbations. Understanding the pathogenesis is a fundamental building block to this end.

Pathophysiology

Central to the pathogenesis of asthma is presence of underlying airway inflammation.[1,3] Airway inflammation is the result of many cell types, whose interactions ultimately result in epithelial cell injury and subsequent airflow limitation. Airflow limitation results in airway hyperresponsiveness and/or airway obstruction, both of which result in clinical symptoms of cough, wheeze, and shortness of breath. These clinical symptoms present in a variety of severity patterns that reflect different aspects of the disease, such as intermittent versus persistent asthma, and well versus poorly controlled asthma. Understanding the fundamentals of asthma pathogenesis is a key factor in understanding the rationale behind both short-term and long-term management. Short-term management for asthma exacerbation is directed at controlling inflammation and airflow limitation, using drugs to reduce inflammation and relax the airway musculature in hopes of reversing air-

Table 2. Risk Factors for Death From Asthma*

Asthma history
- Previous severe exacerbation requiring intubation or intensive care unit admission for asthma
- Two or more hospitalizations for asthma in the past year
- Three or more emergency department (ED) visits for asthma in the past year
- Hospitalization or ED visit for asthma in the past month
- Using >2 canisters of a short-acting beta$_2$-agonist per month
- Using >2 canisters of a short-acting beta$_2$-agonist per month
- Sensitivity to Alternaria

Social history
- Low socioeconomic status
- Inner city residence
- Illicit drug use
- Major psychosocial problems

Comorbidities
- Cardiovascular disease
- Other chronic lung disease
- Chronic psychiatric disease

Other
- Lack of a written asthma plan

*Adapted from the National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report [EPR-3].

Table 3. Differential Diagnosis of Asthma in Infants, Children, and Adults*

Infants and Children
- Upper airway disease
  - Allergic Rhinitis and Sinusitis
- Obstructions involving large airways
  - Foreign body in trachea or bronchus
  - Vocal cord dysfunction
  - Vascular rings or laryngeal webs
  - Laryngotracheomalacia
  - Tracheal stenosis
  - Bronchostenosis
  - Enlarged lymph nodes
  - Tumor
- Obstructions involving small airways
  - Bronchiolitis
  - Cystic Fibrosis
  - Bronchopulmonary dysplasia
  - Heart disease
- Other
  - Recurrent cough not due to asthma
  - Aspiration (swallowing defect or reflux disease)

Adults
- Chronic obstructive pulmonary disease
- Congestive heart failure
- Pulmonary embolism
- Pulmonary disease (i.e. fibrosis, eosinophilia)
- Tumor
- Vocal cord dysfunction
- Drugs, including pharmaceuticals (i.e. angiotensin converting enzyme inhibitors)

*Adapted from the National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report [EPR-3].

flow obstruction. While short-term management can, to a large extent, reverse some of these processes, reversibility of airflow limitation may be incomplete in some patients with asthma. Long-term management is directed at prevention, through avoidance of triggers, and using drugs that help to reduce airway inflammation, airway hyper-responsiveness, and airflow obstruction. Understanding the rationale behind short and long-term management will lead more efficient assessment and management of patients presenting to an urgent care center with suspected asthma exacerbation.

Medical History and Exam

Patients may present to an urgent care center without a known diagnosis of asthma. While it may not be practical to *diagnose* asthma in the urgent care setting, an urgent care provider can at least *suspect the diagnosis* and provide appropriate follow-up care for a patient. A patient's medical history is essential in establishing whether a diagnosis of asthma is a consideration. Although short-term management of a patient in respiratory distress may be similar in different diseases, establishing a specific diagnosis of "asthma exacerbation" is particularly important in patients without a known diagnosis for proper short-term and long-term management. The provider trying to establish a diagnosis of asthma should determine that episodic symptoms of airflow obstruction are present and that airflow obstruction is at least partially reversible. Alternative diagnoses should be excluded.[1]

Table 1 highlights key indicators that have been suggested by the National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3 (EPR-3) for considering a diagnosis of asthma. Although these indicators are not by themselves diagnostic, multiple key indicators increase the likelihood of a diagnosis of asthma.[1] In the initial history and review of symptoms, an urgent care provider should attempt to identify precipitating factors (e.g., exposure at home, work, daycare, or school to inhalant allergens, or irritants such as tobacco smoke, or

Table 4. Components and Classification of Asthma Severity*

Components of Severity		Age Group	Classification of Severity			
				Persistent		
			Intermittent	Mild	Moderate	Severe
Impairment Normal FEV_1/FVC: 8-19 years: 85% 20-39 years: 80% 40-59 years: 75% 60-80 years: 70%	Symptoms	0-4 5-11 ≥12	≤2 days/week	>2 days/week but not daily	Daily	Throughout the day
	Nighttime awakenings	0-4	0	1-2 times a month	3-4 times a month	>1 time a week
		5-11 ≥12	≤2 times per month	3-4 times a month	>1 time a week, but not nightly	Often, 7 times a week
	Short-acting $beta_2$-agonist use for control (not prevention)	0-4 5-11	≤2 days/week	>2 days/week but not daily	Daily	Several times per day
		≥12		>2 days/week but not >1 time per day		
	Interference with normal activity	0-4 5-11 ≥12	None	Minor limitation	Some limitation	Extremely limited
	Lung Function	0-4	N/A	N/A	N/A	N/A
		5-11	• Normal FEV_1 between exacerbations • FEV_1 >80% predicted • FEV_1/FVC > 85%	• FEV_1 = 80% predicted • FEV_1/FVC >80%	• FEV_1 = 60-80% predicted • FEV_1/FVC = 75-80%	• FEV_1 <60% predicted • FEV_1/FVC <75%
		≥12	• Normal FEV_1 between exacerbations • FEV_1 >80% predicted • FEV_1/FVC normal	• FEV_1 ≥80% predicted • FEV_1/FVC normal	• FEV_1 >60 but <80% predicted • FEV_1/FVC reduced 5%	• FEV_1 <60% predicted • FEV_1/FVC reduced 5%
Risk	Exacerbations requiring oral systemic corticosteroids	0-4	0-1/year	≥2 exacerbations in 6 months requiring oral steroids, or ≥4 wheezing episodes per year lasting >1 day AND risk factors for persistent asthma		
		5-11 ≥12		≥2 exacerbations requiring oral steroids in 1 year		

*Adapted from the National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report [EPR-3].

viral respiratory infections) and comorbidities that may aggravate asthma (e.g., sinusitis, rhinitis, gastroesophageal reflux disorder, obstructive sleep apnea).

The physical exam should focus on the upper respiratory tract, chest, and skin. Physical findings that increase the probability of asthma include[1]:

- *Hyperexpansion of the thorax,* especially in children; use of accessory muscles; appearance of hunched shoulders; and chest deformity
- *Sounds of wheezing during normal breathing, or a prolonged phase of forced exhalation* (typical of airflow obstruction). Wheezing may only be heard during forced exhalation.
- *Increased nasal secretion, mucosal swelling, and/or nasal polyps*
- *Atopic dermatitis/eczema* or any other manifestation of an allergic skin condition.

Note that wheezing is not a reliable indicator of airway limitation; however, it is the *only* physical exam finding that has been suggested as a key indicator for likelihood of a diagnosis of asthma. Although hyperexpansion of the thorax, nasal findings (i.e. nasal polyps), and skin findings (i.e. eczema) are often associated with asthma, they have not been suggested as key indicators by the EPR-3.

Once a diagnosis of asthma is suspected, the provider should consider risk factors associated with worse outcomes (**Table 2**), which may become important when considering discharge and follow-up.

Laboratory testing is essential in assessing the severity of a patient's presentation. The EPR-3 recommends that office-based physicians who care for asthma patients have access to spirometry. For diagnostic purposes, spirometry is generally recommended over measurements with a peak flow meter because there is wide variability even in the published predicted peak expiratory flow (PEF) reference values. Spirometry, which meas-

Table 5. Components and Classification of Asthma Control*

Components of Control		Age Group	Classification of Control		
			Well Controlled	Not Well Controlled	Poorly Controlled
Impairment	Symptoms	0-4	≤2 days/week	>2 days/week	Throughout the day
		5-11	≤2 days/week but not more than once on each day	>2 days/week or multiple times on ≤2 days/week	
		≥12	>2days/week	>2 days/week	
	Nighttime awakenings	0-4	≤1 time a month	>1 time a month	>1 time a month
		5-11		≥2 times a month	≥2 time a week
		≥12	≤2 times a month	1-3 times per week	≥4 time a week
	Short-acting $beta_2$-agonist use for control (not prevention)	0-4	≤2 days/week	>2 days/week but not daily	Several times per day
		5-11		>2 days/week	
		≥12			
	Interference with normal activity	0-4	None	Some limitation	Extremely limited
		5-11			
		≥12			
	Lung Function	0-4	N/A	N/A	N/A
		5-11	• FEV_1 or peak flow >80% predicted or personal best • FEV_1/FVC >80%	• FEV_1 or peak flow 60-80% predicted or personal best • FEV_1/FVC 75-80%	• FEV_1 or peak flow <60% predicted or personal best • FEV_1/FVC <75%
		≥12	• FEV_1 or peak flow >80% predicted or personal best	• FEV_1 or peak flow 60-80% predicted or personal best	• FEV_1 or peak flow <60% predicted or personal best
	Validated questionnaires: • ATAQ[a] • ACQ[a] • ACT[a]	0-4	N/A	N/A	N/A
		5-11			
		≥12	• 0 • ≤0.75[b] • ≥20	• 1-2 • ≥1.5[b] • 16-19	• 3-4 • N/A • ≤15
Risk	Exacerbations requiring oral systemic corticosteroids	0-4	0-1/year	2-3 times per year	>3 times per year
		5-11		≥2 exacerbations requiring oral steroids in 1 year	
		≥12			
	Reduction or progressive loss of lung function	0-4	N/A		
		5-11	Evaluation requires long term follow-up care		
		≥12			
	Treatment-related adverse effects	0-4	Consider treatment-related effects in the overall assessment of risk. Patients with worrisome treatment-related side effects may be at higher risk of poor control (i.e. non-compliance).		
		5-11			
		≥12			

*Adapted from the National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report [EPR-3].
a. Asthma Control Questionnaire (Juniper et al. 1999)[11]; Asthma Therapy Assessment Questionnaire (Vollmer et al. 1999)[12]; Asthma Control Test (Nathan et al. 2004)[13]
b. ACQ values of 0.76-1.4 are intermediate regarding well controlled asthma. Another validated questionnaire might be more useful

ures the rate at which the lung changes volume during forced breathing maneuvers, should be performed using equipment and techniques that meet standards developed by the American Thoracic Society. Basic spirometry can be performed in the urgent care setting with relative ease and inexpensive equipment (CPT code 94010 for normal spirometry and both CPT codes 94010 and 94060 for abnormal spirometry with the addition of a pre versus post bronchodilator spirometry test).

Normal spirometry implies a forced vital capacity (FVC) and forced expiratory volume in 1 second (FEV_1) of 80% to 120% predicted, and an absolute FEV_1/FVC ratio >0.7. The normal ranges for spirometry values vary depending on a patient's height, weight, age, sex, and racial or ethnic background. Contraindications to spirometry include vomiting, nausea, vertigo, hemoptysis, pneumothorax, recent abdominal surgery, recent eye surgery, recent myocardial infarction or unstable angina, and thoracic aneurysms.[10] If a diagnosis of asthma is not already documented, and cannot be established with spirometry in the urgent care setting, PEFs can act as surrogate data. Any abnormal results should be documented by the provider and the patient should be referred back to either a primary care provider or a

specialist with a "suspected diagnosis" of asthma exacerbation.

A differential diagnosis should be established (**Table 3**), with additional laboratory testing in to rule out other possible etiologies. Once a suspected diagnosis of asthma exacerbation has been established, information obtained from the diagnostic evaluation should be used to characterize a patient's asthma severity and control in order to guide decisions for therapy (**Tables 4 and 5**).[11-13] For clinical management, the emphasis should be on assessing asthma severity for initiating therapy and assessing control for monitoring and adjusting therapy.[1] Asthma severity is defined by the EPR-3 as the intrinsic intensity of the disease process,[1] or the difficulty in controlling asthma with the patient's current treatment.[3] Severity is most easily measured in a patient not receiving long-term-control therapy,[1] and should be evaluated after exclusion of modifiable factors such as poor adherence, smoking, and comorbidities. Severity largely reflects the required level of treatment and the activity of the underlying disease state during initial treatment.[3] During a patient's initial presentation, if he or she is not currently taking long-term control medication, asthma severity is assessed to guide clinical decisions on the appropriate medication and other therapeutic interventions.[1] Asthma control is defined by the EPR-3 as the degree to which the manifestations of asthma (symptoms, functional impairments, and risks of untoward events) are

"If a diagnosis of asthma is not already documented, and cannot be established with spirometry in the urgent care setting, PEFs can act as surrogate data."

TABLE 6. Classifying Severity of Asthma Exacerbations and Control in the Urgent Care Setting*

Mild	Dyspnea only with activity, or tachypnea in young children	PEF ≥70% predicted or personal best	• SABA as needed should provide prompt relief • Possible short course of oral systemic corticosteroids
Moderate	Dyspnea interferes with or limits usual activity	PEF 40% to 69% of predicted or personal best	• Scheduled inhaled SABA use should provide relief • Oral systemic corticosteroids Symptoms may persist for 1-2 days after treatment is begun
Severe	Dyspnea at rest; interferes with conversation	PEF <40% of predicted or personal best	• Scheduled inhaled SABA use should provide relief • Oral systemic corticosteroids Symptoms may persist for >3 days after treatment is begun • Adjunctive therapies might be helpful • May require admission
Life-threatening	Too dyspneic to speak; perspiring	PEF <25% predicted or personal best	• Minimal or no relief from inhaled SABA • Intravenous corticosteroids • Adjunctive therapies might be helpful • Requires admission

*Adapted from the National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report [EPR-3].

SABA = Short-acting beta$_2$-agonist; FEV = forced expiratory volume; PEF = peak expiratory flow

minimized and the goals of therapy are met.[1] Asthma control not only encompasses a patient's current clinical state, but also considers future risk. If a patient has a documented established diagnosis, the emphasis for clinical management should be on assessment of asthma severity and control. The level of asthma control will guide decisions to either maintain or adjust therapy.[1] Asthma severity and control should be based on both the patient's impairment over the last 2 to 4 weeks and the most severe impairment or risk category. In patients aged 5 years and older, spirometry or peak flow measurements should also be used to assess asthma control. **Table 6** outlines an example of how asthma severity and control might be assessed in the urgent care setting based on the EPR-3 guidelines.

Conclusion

The increase in prevalence of asthma with increasing presentations to ambulatory care settings presents unique opportunities in short and long-term management for the urgent care provider. An appreciation of the fundamental pathogenesis of airway inflammation in asthma and the variable, interactive expressions of airway hyperesponsiveness and airway obstruction will give an urgent care provider a better understanding of the opportunities to control the disease. Suspecting a diagnosis of "asthma exacerbation" is particularly important in the patient without a known diagnosis for proper short-term and long-term management. Knowledge of key indicators for a diagnosis of asthma on history and examination is important in further evaluating risk factors for worse outcomes in patients with asthma. Part 2 of this topic, in a subsequent issue, will review both the short- and long-term management of the disease in the urgent care setting. ■

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