

Asthma Management for the Otolaryngologist

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KEYWORDS

• Asthma • Cough • Pulmonary function testing • Unified airway

KEY POINTS

- Asthma is an reversible, obstructive, inflammatory disease of the lower airways that is characterized by cough, wheezing, and shortness of breath.
- Patients with asthma may present with cough alone, often occurring at night.
- Patients presenting with nighttime cough should always have asthma considered as part of the differential diagnosis.
- Owing to system-wide inflammatory effects, otolaryngologists should consider the potential presence of asthma in all patients presenting with allergic rhinitis or chronic rhinosinusitis.
- Asthma can be classified on the basis of severity and chronicity of symptoms, and treated to optimize the patient's level of symptom control.

INTRODUCTION

Asthma is a common inflammatory condition of the lower respiratory system.¹ It is found in all age groups, from infants to older adults, and presents a major disease burden that affects approximately 300 million persons worldwide.² Patients with asthma report a cluster of 3 primary symptoms, including cough, wheezing, and shortness of breath (dyspnea). For many patients, their only symptoms may be a dry cough, often occurring at night, and frequently severe enough to wake them from sleep. Because these symptoms overlap with other common conditions, the diagnosis of asthma is sometimes elusive, and patients with asthma often are misclassified, with unsuccessful treatment and no resolution of their symptoms.

Asthma is a type of obstructive lung disease. With obstruction, patients are able to inspire at relatively normal levels, but have difficulty exhaling fully owing to both narrowing of the lower airways and loss of elasticity of the bronchioles. As a result, air becomes trapped in the lungs, which limits the amount of air exchange and can ultimately decrease oxygenation. In asthma, as opposed to chronic obstructive

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pulmonary disease, the airway obstruction is at least partially reversible, and the use of a bronchodilating agent such as albuterol will improve expiration and relieve symptoms.

It is important for otolaryngologists to recognize that asthma represents only 1 focused aspect of a broader spectrum of inflammatory respiratory symptoms and that many patients seeking care for conditions such as allergic rhinitis and chronic rhinosinusitis also have concurrent asthma. The concept of the “unified airway” has become well-accepted over the past several decades, and has allowed otolaryngologists to better understand and appreciate the comorbidity of upper and lower airway inflammation among patients with common sinonasal complaints.³ Recognition of these inflammatory comorbidities prompted the World Health Organization in 2002 to state: “When considering a diagnosis of rhinitis or asthma, an evaluation of both the upper and lower airways should be made.”⁴

This article focuses on the management of asthma for otolaryngologists. Because otolaryngologists commonly encounter patients with unified airway diseases such as asthma, many of whom may have undiagnosed disease, it is important for these physicians to recognize the symptoms of asthma, understand the basic elements of diagnosis, and appreciate common approaches to the management of symptoms and control of the underlying disease in these patients.

PATHOPHYSIOLOGY OF ASTHMA

The pathophysiology of asthma involves a variety of complex and interactive processes that result in acute and chronic airway inflammation. The majority of patients with asthma have inflammation that is primarily driven by T-helper 2 cells, with activation of cellular and humoral mediators including mast cells, eosinophils and lymphocytes, as well as numerous interleukins (IL-4, IL-5, and IL-13), chemokines, and other cytokines.^{1,5} In many individuals, this process begins in early childhood, resulting in chronic and progressive inflammatory changes in the lower airway. In others, asthma presents in adults, with little prior history of inflammatory or atopic disease in childhood.

Tissue changes occur in patients with asthma, and are generally progressive with time. Much of this inflammation can be subacute, but with exposure to various triggering stimuli can be unmasked, allowing the acute expression of symptoms among affected patients.⁶ A variety of intrinsic and extrinsic factors can be involved in both the pathogenesis and expression of asthma, including underlying atopy, sensitization, and exposure to allergic antigens, exposure to tobacco smoke, infectious exacerbations, and contact with nonspecific irritants. These inflammatory influences provoke characteristic changes in the respiratory tract, including epithelial shedding, goblet cell hyperplasia, hypertrophy of submucosal mucus glands, subepithelial fibrosis with collagen deposition, smooth muscle hypertrophy, and vascular leakage. These changes are expressed through the cardinal symptoms of cough, wheezing, and dyspnea.⁷

The changes in the lungs that occur over time worsen as the disease progresses, and although initially they can be reversed with treatment, they will become irreversible with chronicity. These changes are described broadly as “remodeling,” representing structural changes in the bronchioles that cause decrease function and increased patient symptoms. These pathophysiologic changes can be described in 3 phases: acute inflammatory, chronic inflammatory, and irreversible (remodeling).

Acute inflammatory changes

- Epithelial cell edema
- Muscle constriction

- Vascular leakage
 - Mucus hypersecretion
- Chronic inflammatory changes

- Loss of epithelial cells
 - Exposure of nerve endings
 - Loss of cilia
 - Increased goblet cells
 - Submucosal fibrosis
 - Increased muscle mass
- Irreversible (remodeling) changes
- Dense deposition of collagen
 - Marked increase in muscle mass
 - Loss of epithelial cells
 - Loss of elasticity

As these progressive changes occur, there is narrowing of the lumen of the airway, which causes increased wheezing, decreased airway diameter for respiration, and increased frequency of mucus plugging and airway obstruction. Because of these changes, air trapping in the lungs becomes common and the patient experiences increasing difficulty in expiration. It is these contributors to airway narrowing that are primary drivers to the symptoms that patients experience during asthmatic episodes and exacerbations.⁸

PRESENTATION

Although many patients will seek treatment for asthma when they are experiencing wheezing or shortness of breath (dyspnea), there are a number of individuals with chronic cough who may have asthma that has not been recognized or diagnosed. Many patients with asthma only recognize acute exacerbations as characterizing an episode of asthma, yet ignore the mild wheezing and nighttime cough that become accepted as normal. It is important for otolaryngologists to consider asthma among all patients presenting to their offices with cough, especially nighttime cough that awakens them from sleep.

Asthma symptoms may be present persistently, but are often episodic. They can occur throughout the year or may have a predilection to occur seasonally. Asthma symptoms may be exacerbated with a concurrent viral upper or lower respiratory infection, and can be worse with exposure to both allergens and nonallergic triggers. Cough again may be the sole symptom of asthma in some patients, so a careful differential and diagnostic approach must be used by treating otolaryngologists to accurately assess this symptom and its causes.

DIAGNOSIS

As with most inflammatory diseases, a careful history is important in assisting with the diagnostic process. Patients with asthma often have a family history of asthma or atopic disease, because there is some genetic predisposition to the development of asthma. Adult patients may have experienced asthma in childhood, only to outgrow its symptoms before the development of adult disease. In addition, many patients with asthma will have a prior history of allergic rhinitis or allergic eczema, with asthma symptoms presenting only later in childhood or in adulthood. In fact, the presence of allergic rhinitis seems to predispose individuals to the development of asthma later in life.⁹

Patients with asthma will often present with cough, which is usually described as dry and nonproductive. It can occur throughout the day, but a nighttime cough is frequently characteristic of asthma. The presence of cough is nonspecific, and should prompt the otolaryngologist to consider not only a diagnosis of asthma, but other triggering conditions such as laryngopharyngeal reflux disease. A more specific but less common symptom at presentation is that of wheezing, which is representative of worsening bronchospasm among patients with asthma. As the disease worsens, patients will complain of difficult breathing and chest tightness, both of which are symptoms of more severe asthma.

The history should also include an assessment of any triggers or antecedent events that may have caused the symptoms to occur. These should include both allergic and nonallergic triggers, as well as a prior history of allergic or atopic diseases. In addition, inquiry should be made about prior treatments, both medical and adjuvant, that might have been used to alleviate the patient's symptoms.

The physical examination in a patient with asthma may be essentially normal, even in patients with more severe disease. Because of the variability in symptom expression, patients may be relatively free of findings at an office visit. Common signs that may be present include a dry cough, end-expiratory wheezes on chest auscultation, or even chest retractions with severe exacerbation. In patients having respiratory distress owing to asthma, patients will display accessory muscle use for breathing, tachypnea, and even cyanosis. Patients expressing these severe signs will need emergency treatment in a critical care setting.

The primary diagnostic procedure that is used for the assessment of patients with asthma is pulmonary function testing. Although many pulmonary function test measures exist, the most appropriate and useful in assessment of asthma is spirometry, with measurements made both before and after the use of a short-acting β -2 agonist as a bronchodilator. In spirometry, the patient is asked to take a full inhalation and then to maximally and rapidly exhale into a measurement device. Three measurements are generally recorded. The patient then inhales the short-acting bronchodilator, and after 10 minutes repeats the test.

The major indices that are used to assess airflow during spirometry are:

- Forced expiratory volume in 1 second (FEV_1), and
- Forced vital capacity (FVC).

These findings are compared with benchmarks that are normalized for the specific demographic reference group for the patient and then assessed. In patients with obstructive lung diseases such as asthma, the FEV_1 is reduced, generally to less than 80% of the predicted value, the FVC is maintained near normal levels, and the FEV_1/FVC ratio is reduced. In patients with asthma, which is a reversible obstructive airway disease, the FEV_1 will improve after the administration of a β -2 agonist, with an improvement of 12% or more generally considered diagnostic of asthma among patients with obstruction.

In some patients who have subclinical or intermittent asthma, pulmonary function testing may be nondiagnostic when performed as described. In those patients, it can be useful to challenge their airways to see if they will respond to inhalation of a triggering agent. This procedure can help to assess the presence of airway inflammation that may be otherwise missed. In bronchial provocation, an agent such as methacholine or histamine can be administered by inhalational challenge to see if testing can elicit a decline in FEV_1 . In patients with subclinical inflammation, a decrease in FEV_1 of 20% or more with progressive challenge indicates the presence of asthma and can be diagnostic in the absence of routine testing.

Other indicators that can be measured during spirometry are the peak expiratory flow rate and forced expiratory flow rate between the 25% percentile and the 75% percentile of the FVC. The peak expiratory flow rate is more of an expression of airflow in the large airways, and may underrepresent the importance of disease in the small airways most affected by asthma. It is therefore a late indicator of change. In contrast, the forced expiratory flow rate between the 25% percentile and the 75% percentile of the FVC is an assessment of very small airways, and may be overly sensitive to change, making it a less useful clinical indicator than the FEV_1 .

Other tests can be useful in the diagnosis of asthma, but are used less frequently. One of the more common measures is exhaled nitric oxide testing, which assesses the presence of nitric oxide as a proxy for airway inflammation, and can be useful in both diagnosing the presence of asthma and in assessing the response to treatment. In some patients, chest radiographs can be useful, as can serum measurements of specific or total immunoglobulin E. Skin testing for inhalant allergy can also be useful in assessing the presence of allergic triggers that may be important in symptom expression and exacerbation.

CONTROL

The ultimate goal for the management of the patient with asthma is the establishment of control. Because asthma is a chronic inflammatory disease, current therapeutic methods do not consider the objective of management to be the establishment of cure, but rather the ability to provide the patient with freedom for symptoms and a normal quality of life. Although theoretically the goal of therapy would be to eliminate all underlying inflammation and to prevent the progression of disease, the facility of current diagnostic testing does not permit a sufficiently adequate assessment to allow this evaluation.

Two concepts are important in facilitating the management of patients with asthma: severity and control. Severity is the intrinsic intensity of the disease process, which allows both initial establishment of therapy and the adjustment of therapy over time. Control is the degree to which the manifestations of asthma, such as symptoms, functional impairments, and risks of untoward events, are minimized and optimal patient quality of life is achieved.¹ The goal of therapy can be seen to maintain complete control of symptoms over time with the lowest dose of medications necessary and with the fewest side effects. Specifically, these goals are to:

- Gain and maintain control of asthma symptoms;
- Maintain normal activity levels, including exercise;
- Prevent asthma exacerbations;
- Avoid adverse effects from asthma medications; and
- Prevent asthma mortality.¹⁰

Levels of asthma control are generally assessed using a variety of clinical indicators, including:

- Daytime symptoms;
- Limitations of activities;
- Nocturnal symptoms/awakenings;
- Need for reliever or rescue treatment; and
- Exacerbations.¹⁰

When asthma is under complete control, the patient should be experiencing none of these clinical findings. They should be free of all symptoms, day and night, and

not need to use any medications for acute relief of symptoms. Asthma can be considered partially controlled with the patient experiencing some of these clinical findings, but when patients are frequently symptomatic and require frequent medication use for acute symptom treatment, their asthma would be considered uncontrolled.

Although patients may be assessed clinically by simply inquiring about each of the specific indicators noted, there are validated measures of asthma control that can be used for both clinical and research indications. Two of these measures include the Asthma Control Test (available: <http://www.asthmacontrol.com>) and the Asthma Control Questionnaire (available: <http://www.qoltech.co.uk/acq.html>).

MANAGEMENT

Because the current strategic initiative is to assist the patient to achieve asthma control, the goal is to use patient-based indicators of function to guide therapy as opposed to relying on assessment of pulmonary function by spirometry. Control is a dynamic indicator and reflects the patient's level of function better than a static assessment of severity of lung function impairment alone. The establishment and maintenance of control requires an active partnership between the patient, the patient's family, and the physician, and involves the use of both educational interventions and appropriate medications to achieve success.

Because asthma exacerbations can be triggered by environmental exposures to both allergic and nonallergic factors, understanding these triggers and avoiding them as possible is an important strategy. Although it would seem to be wise to avoid allergenic exposures, there is no compelling evidence that avoidance strategies are effective in reducing the clinical burden of disease. In contrast, the avoidance of tobacco exposure does decrease symptomatic expression and improve control among patients with asthma.

There is also evidence that treating allergic rhinitis with medications and immunotherapy can be beneficial in reducing asthma symptoms and improving control.¹¹ Although the benefits reported vary in different trials, both antihistamines and intranasal corticosteroid sprays can be useful in assisting with asthma symptoms in appropriate individuals. Rhinitis medications, however, seem to be less effective than allergen-specific immunotherapy in influencing asthma control over the long term. The use of both subcutaneous and sublingual immunotherapy have been shown to improve asthma symptoms and asthma control, with improvement in outcomes and reduction in asthma exacerbations.

The mainstay of treatment for asthma involves the use of pharmacotherapy to both decrease patient symptoms and to induce long-term control. Medications for the treatment of asthma can be considered in 2 broad categories based on the indications for their use: rescue medications and controller medications. Because the goal of asthma therapy is to achieve control, the strategy of therapy is to treat patients with controller medications and decrease or eliminate the need for them to use rescue medications.

Rescue medications are used by patients to rapidly reverse the symptoms of obstruction, and should be used infrequently for acute need. The most commonly used rescue medication is albuterol, which is a rapidly acting β -2 agonist that functions as a bronchodilator in reducing bronchoconstriction, relaxing smooth muscle, and encouraging improved respiration. Medications such as albuterol are important agents in the treatment of asthma, but do not exert antiinflammatory effects on the airway. As a result, although bronchodilators can improve short-term symptoms,

ongoing inflammation will occur, leading to worsening physiologic changes in the lungs and eventually to remodeling. In addition, short-acting bronchodilators have decreasing benefit with repeated use, likely owing to tolerance at the receptor level of central adaptation. These effects can lead to acute failure of response and can be life threatening with frequent use. As such, albuterol and similar medications are best used infrequently and only until control can be achieved with more appropriate agents.

The primary controller medications that are used for the treatment of asthma are inhaled corticosteroids (ICSs). ICSs represent a broad class of medications with anti-inflammatory and immunosuppressive effects, and are considered first-line treatments for the control of asthma. They are the most effective long-term medications for achieving and maintaining asthma control, and newer agents are generally well-tolerated without significant adverse effects. ICSs are not only useful in reducing patient symptoms and in improving disease control, but have been shown to improve pulmonary function with persistent use. They have been shown to reduce asthma morbidity and have been associated with significant decrease in asthma-related mortality.¹²

The most significant adverse effects noted with ICSs are related to hypothalamic-pituitary axis suppression, similar to those seen with systemic corticosteroid medications, but less severe. There seems to be a dose-dependent effect that can be assessed, yet significant consequences are uncommon. Although transient growth suppression in children has been reported with high-dose ICSs, there is not any convincing evidence that there is a sustained effect on adult height. Common side effects also include oral candidiasis and mild to moderate dysphonia, which can be improved by the use of spacers to decrease application of medication to the laryngopharyngeal mucosa.

Another commonly used controller class that is applied in the treatment of asthma is the combination ICS/long-acting β -2 agonist medications. Long-acting β -2 agonists such as salmeterol can be useful in reducing bronchoconstriction, but should not be used alone for the treatment of asthma owing to an increased incidence of asthma-related deaths. When combined with an ICS, these medications can provide excellent asthma control and allow lower doses of ICSs to be prescribed to achieve control. These combination agents are frequently used and have been shown to be safe in the treatment of asthma in adolescents and adults.

Alternate medications can be used for the treatment of asthma in select circumstances. Leukotriene-modifying agents such as montelukast have been shown to improve asthma both alone and in combination with other controller medications. The effect of these medications is inferior in asthma control to ICSs, but they may have specific benefit in aspirin-exacerbated respiratory disease. In addition, they have been shown to be useful in exercise-induced bronchoconstriction. Anticholinergic agents such as ipratropium can also be useful in patients with severe airway obstruction and in patients currently on treatment with β -blockers.

Less frequently used in current practice are older oral bronchodilators such as theophylline and mast cell-inhibiting medications such as cromolyn sodium. Newer monoclonal antibody medications that have select immunomodulatory functions, such as omalizumab, have specific uses in select patients and can reduce the need for systemic steroids in patients with severe disease.

As with the use of all medications, specific patient characteristics and adherence must be assessed in prescribing treatments and in evaluating the response to therapy. As patients achieve control, medications can be adjusted to reduce administered doses and to eliminate the use of multiple medications.

In patients with demonstrated allergic sensitivities, there is substantial evidence that the use of allergen-specific immunotherapy can both facilitate asthma control and improve pulmonary function among atopic patients with asthma. Several studies have shown significant benefit, as reported in a 2010 Cochrane review, which noted improvement in asthma symptoms, reduced pharmacotherapy use, and decreased bronchial hyperresponsiveness.¹³ Similar efficacy seems to be present with sublingual immunotherapy as well.¹⁴ Allergen-specific immunotherapy has benefit in the management of patients with asthma and can be considered as an appropriate method in their treatment.

Initiating Therapy

When initiating therapy for asthma, it can be useful to classify the severity and chronicity of the patient's symptoms as a guide to the types and doses of medications to be used. Asthma can be classified into 2 time courses based on the frequency and persistence of symptoms (**Table 1**):

Intermittent

- Symptoms occurring 2 days a week or less;
- Nighttime awakenings 2 days a month or less;
- Use of short-term β -2 agonist 2 days a week or less; and
- No interference with normal activity.

Persistent

- Symptoms occurring more than 2 days a week;
- Nighttime awakenings 3 days a month or more;
- Use of short-term β -2 agonist more than 2 days a week; and
- Some degree of limitations in normal activity.¹

The 2007 National Heart, Lung, and Blood Institute guidelines further subclassify persistent asthma into 3 levels of severity, based again on the frequency of symptoms and use of rescue medication:

Mild persistent asthma

- Symptoms occurring more than 2 days a week, but not daily;
- Nighttime awakenings 3 or 4 times a month;
- Use of short-term β -2 agonist more than twice a week, but not more than once daily; and
- Minor limitations in normal activity.

Moderate persistent asthma

- Symptoms occurring daily;
- Nighttime awakenings at least once a week, but not nightly;
- Daily use of short-term β -2 agonist; and
- Some clinically significant limitations in normal activity.

Severe persistent asthma

- Symptoms occurring through each day;
- Nighttime awakenings several times weekly;
- Use of short-term β -2 agonist several times daily; and
- Severe limitations in normal activities.

Based on this assessment of severity, therapy can be initiated using guidelines published by the National Heart, Lung, and Blood Institute (**Fig. 1**). For intermittent asthma, short-acting β -2 agonists can be used on an as-needed basis, and can generally control these uncommon symptoms. For persistent asthma, the types and doses of medications used can be determined based on the step care algorithm. In general, therapy

Table 1
Classification of asthma severity

Components of Severity		Classification of Asthma Severity (≥12 Years of Age)			
		Intermittent	Persistent		
			Mild	Moderate	Severe
Impairment	Symptoms	≤2 d/wk	>2 d/wk but not daily	Daily	Throughout the day
Normal	FEV ₁ /FVC:				
8–19 y	85% Nighttime awakenings	<2×/mo	3–4×/mo	>1×/wk but not nightly	Often 7×/wk
20–39 y	80% Short-acting beta ₂ -agonist use for symptom control (not prevention of EIB)	≤2 d/wk	>2 d/wk but not daily, and not more than 1× on any day	Daily	Several times per day
40–59 y	75% Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
60–80 y	70% Lung function	• Normal FEV₁ between exacerbations • FEV₁ >80% of predicted • FEV₁/FVC normal	• FEV₁ >80% of predicted • FEV₁/FVC normal	• FEV₁ >60% but <80% of predicted • FEV₁/FVC reduced 5%	• FEV₁ <60% predicted • FEV₁/FVC reduced >5%
Risk	Exacerbations requiring oral systemic corticosteroids	0–1/y ^a	≥2/y ^a		
Recommended step for initiating treatment		Step 1 ^c	Step 2 ^c	Step 3 ^{b,c}	Step 4 or 5 ^{b,c}

Abbreviations: EIB, exercise-induced bronchoconstriction; FEV₁, forced expiratory volume in 1 second; FVC, forced vital capacity.

^a Consider severity and interval since last exacerbation. Frequency and severity may fluctuate over time for patients in any severity category. Relative annual risk of exacerbations may be related to FEV₁.

^b And consider a short course of oral systemic corticosteroids.

^c In 2–6 weeks, evaluate level of asthma control that is achieved and adjust therapy accordingly.

From National Asthma Education and Prevention Program (NAEPP). Guidelines for the Diagnosis and Management of Asthma (EPR-3). Bethesda (MD): National Heart, Lung, and Blood Institute (NHLBI); 2007. Available at: <https://www.nhlbi.nih.gov/files/docs/guidelines/asthsumm.pdf>. Accessed August 10, 2017.

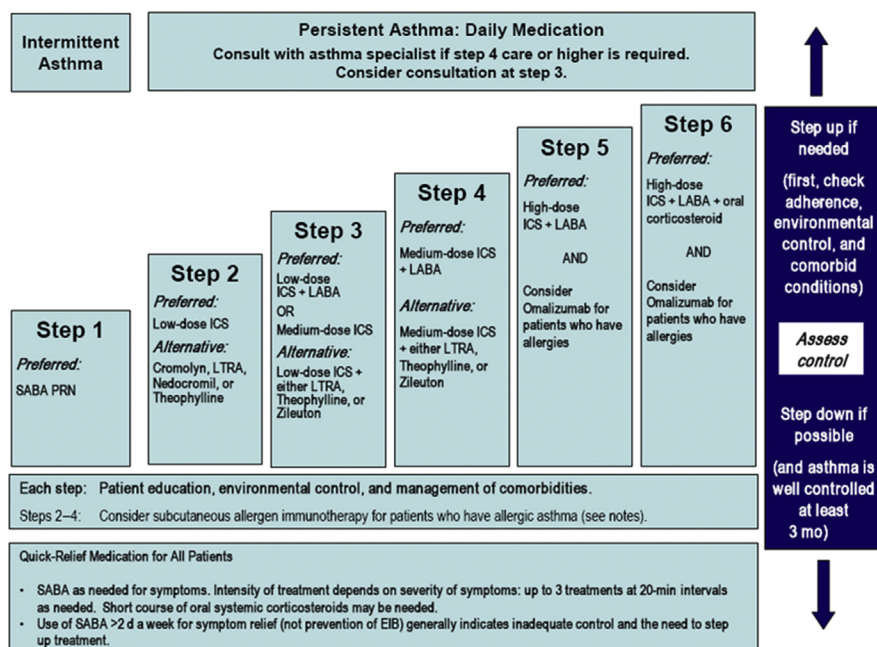


Fig. 1. Stepwise approach to managing asthma based on control. ICS, inhaled corticosteroids; LABA, long-acting β -agonists; LTRA, leukotriene receptor antagonist; SABA, short-acting β . (From National Asthma Education and Prevention Program (NAEPP). Guidelines for the Diagnosis and Management of Asthma (EPR-3). Bethesda (MD): National Heart, Lung, and Blood Institute (NHLBI); 2007. Available at: <https://www.nhlbi.nih.gov/files/docs/guidelines/asthsumm.pdf>. Accessed August 10, 2017.)

can be initiated for moderate persistent asthma in step 3, with a medium-dose ICS or a combination agent of an ICS/long-acting β -2 agonist. Patients with mild persistent asthma may be treated with a low-dose ICS alone at step 2, and patients with severe persistent asthma should be treated at step 4 or higher, with higher doses and combinations of therapeutic agents. In cases of severe persistent asthma, it is wise to have the patient managed by a clinician who specializes in the treatment of patients with asthma.

Once the patient has initiated asthma therapy, the efficacy of that treatment must be assessed periodically to optimize outcome. Whereas patients with severe symptoms should be observed closely and followed on a weekly basis until improved, others can be managed at 4-week intervals, with adjustments in therapeutic intensity based on an assessment of control (Table 2). The goal is to facilitate the patient's asthma to being well-controlled, with no limitation in activities and with infrequent symptoms and use of rescue medications. The value of the step care approach to treatment is that by using the National Heart, Lung, and Blood Institute algorithm the clinician can step up or step down therapy by changes in dosing of medications or by adding or removing complementary medications. The clinician should continue to manage patients with the objective of achieving excellent control at the lowest dose and number of medications necessary. Modifications in treatment level can also be made if symptoms worsen owing to factors such as seasonal allergen exposures or concurrent respiratory infections.

Table 2
Components of asthma control

Components of Control		Classification of Asthma Control (≥12 Years of Age)		
		Well Controlled	Not Well Controlled	Very Poorly Controlled
Impairment	Symptoms	≤2 d/wk	>2 d/wk	Throughout the day
	Nighttime awakenings	≤2×/mo	1–3×/wk	≥4×/wk
	Interference with normal activity	None	Some limitation	Extremely limited
	Short-acting beta-agonist use for symptom control (not prevention of EIB)	≤2 d/wk	>2 d/wk	Several times per day
	FEV ₁ or peak flow	>80% predicted/personal best	60%–80% predicted/personal best	<60% predicted/personal best
	<i>Validated Questionnaires</i>			
	ATAQ	0	1–2	3–4
Risk	ACQ	≤0.75	≥1.5	N/A
	ACT	≥20	16–19	≤15
	Exacerbations requiring oral systemic corticosteroids	0–1/y	≥2/y	
	Progressive loss of lung function	Consider severity and interval since last exacerbation		
	Treatment-related adverse effects	Evaluation requires long-term follow-up care		
Recommended action for treatment		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.		
		• Maintain current step • Regular follow-ups every 1–6 mo to maintain control • Consider step down if well-controlled for at least 3 mo	• Step up 1 step and Reevaluate in 2–6 wk • For side effects, consider alternative treatment options.	• Consider short course of oral systemic corticosteroids • Step up 1–2 steps, and Reevaluate in 2 wk • For side effects, consider alternative treatment options

Abbreviations: ACQ, Asthma Control Questionnaire; ATAQ, Asthma Therapy Assessment Questionnaire; EIB, exercise-induced bronchoconstriction; FEV₁, forced expiratory volume in 1 second; N/A, not applicable.

From National Asthma Education and Prevention Program (NAEPP). Guidelines for the Diagnosis and Management of Asthma (EPR-3). Bethesda (MD): National Heart, Lung, and Blood Institute (NHLBI); 2007. Available at: <https://www.nhlbi.nih.gov/files/docs/guidelines/asthsumm.pdf>. Accessed August 10, 2017.

SUMMARY

Asthma is a chronic inflammatory disease that will frequently be encountered by otolaryngologists as they manage their patients with upper respiratory diseases. Symptoms such as cough should alert otolaryngologists to consider more broadly the potential role of asthma in the differential diagnosis. It is critical for otolaryngologists to appreciate that patients with allergic rhinitis and chronic rhinosinusitis will often have asthma, and that many of them may not be diagnosed at the time of presentation. Appropriate diagnosis of the patient with asthma, as well as effective treatment for its symptoms, will improve patient function and enhance quality of life.

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