

## **Allergy/Immunology Cases**

### **TWO, TWO YEAR OLDS**

- 1) A 2 year old female is brought to clinic with skin rash all over since 4 months of age. There are no individual lesions, but diffuse thickening with excoriated areas and some honey-crusting.
- 2) A 2 year old male presents with a history of wheezing.

### **TWO TEENAGERS**

- 1) 14 year old female with high risk asthma, moderate persistent, presents to the emergency room with loud wheezing:

What does high risk mean? What does moderate persistent mean?

- 2) 15 year old male presents with urticaria after a summer football practice:

**Use these questions to get started on the cases. We will discuss them at the lecture.**

What other questions might you ask about history?

What diagnoses/differential might you consider?

Does family history matter here?

What might you expect on physical exam?

What testing might be done?

What allergies could play a role?

What might you prescribe?

What advice should you give the parents?



## Introduction

More than 22 million Americans have asthma, and it is one of the most common chronic diseases of childhood, affecting an estimated 6 million children. The burden of asthma affects the patients, their families, and society in terms of lost work and school, lessened quality of life, and avoidable emergency department (ED) visits, hospitalizations, and deaths. Improved scientific understanding of asthma has led to significant improvements in asthma care, and the National Asthma Education and Prevention Program (NAEPP) has been dedicated to translating these research findings into clinical practice through publication and dissemination of clinical practice guidelines. The first NAEPP guidelines were published in 1991, and updates were made in 1997, 2002, and now with the current report. Important gains have been made in reducing morbidity and mortality rates due to asthma; however, challenges remain. The NAEPP hopes that the “Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma—Full Report 2007” (EPR—3: Full Report 2007) will support the efforts of those who already incorporate best practices and

will help enlist even greater numbers of primary care clinicians, asthma specialists, health care systems and providers, and communities to join together in making quality asthma care available to all people who have asthma. The goal, simply stated, is to help people with asthma control their asthma so that they can be active all day and sleep well at night.

This EPR—3: Summary Report 2007 presents the key recommendations from the EPR—3: Full Report 2007 (See [www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm](http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm)). Detailed recommendations, the levels of scientific evidence upon which they are based, citations from the published scientific literature, discussion of the Expert Panel’s rationale for the recommendations, and description of methods used to develop the report are included in that resource document. Because EPR—3: Full Report 2007 is an update of previous NAEPP guidelines, highlights of major changes in the update are presented below, and figure 1 presents a summary of recommended key clinical activities.

**FIGURE 3–1. SUGGESTED ITEMS FOR MEDICAL HISTORY\***

A detailed medical history of the new patient who is known or thought to have asthma should address the following items:

**1. Symptoms**

Cough  
Wheezing  
Shortness of breath  
Chest tightness  
Sputum production

**2. Pattern of symptoms**

Perennial, seasonal, or both  
Continual, episodic, or both  
Onset, duration, frequency (number of days or nights, per week or month)  
Diurnal variations, especially nocturnal and on awakening in early morning

**3. Precipitating and/or aggravating factors**

Viral respiratory infections  
Environmental allergens, indoor (e.g., mold, house-dust mite, cockroach, animal dander or secretory products) and outdoor (e.g., pollen)  
Characteristics of home including age, location, cooling and heating system, wood-burning stove, humidifier, carpeting over concrete, presence of molds or mildew, characteristics of rooms where patient spends time (e.g., bedroom and living room with attention to bedding, floor covering, stuffed furniture)  
Smoking (patient and others in home or daycare)  
Exercise  
Occupational chemicals or allergens  
Environmental change (e.g., moving to new home; going on vacation; and/or alterations in workplace, work processes, or materials used)  
Irritants (e.g., tobacco smoke, strong odors, air pollutants, occupational chemicals, dusts and particulates, vapors, gases, and aerosols)  
Emotions (e.g., fear, anger, frustration, hard crying or laughing)  
Stress (e.g., fear, anger, frustration)  
Drugs (e.g., aspirin; and other nonsteroidal anti-inflammatory drugs, beta-blockers including eye drops, others)  
Food, food additives, and preservatives (e.g., sulfites)  
Changes in weather, exposure to cold air  
Endocrine factors (e.g., menses, pregnancy, thyroid disease)  
Comorbid conditions (e.g. sinusitis, rhinitis, GERD)

**4. Development of disease and treatment**

Age of onset and diagnosis  
History of early-life injury to airways (e.g., bronchopulmonary dysplasia, pneumonia, parental smoking)  
Progression of disease (better or worse)  
Present management and response, including plans for managing exacerbations  
Frequency of using SABA  
Need for oral corticosteroids and frequency of use

**5. Family history**

History of asthma, allergy, sinusitis, rhinitis, eczema, or nasal polyps in close relatives

**6. Social history**

Daycare, workplace, and school characteristics that may interfere with adherence  
Social factors that interfere with adherence, such as substance abuse  
Social support/social networks  
Level of education completed  
Employment

**7. History of exacerbations**

Usual prodromal signs and symptoms  
Rapidly of onset  
Duration  
Frequency  
Severity (need for urgent care, hospitalization, ICU admission)  
Life-threatening exacerbations (e.g., intubation, intensive care unit admission)  
Number and severity of exacerbations in the past year.  
Usual patterns and management (what works?)

**8. Impact of asthma on patient and family**

Episodes of unscheduled care (ED, urgent care, hospitalization)  
Number of days missed from school/work  
Limitation of activity, especially sports and strenuous work  
History of nocturnal awakening  
Effect on growth, development, behavior, school or work performance, and lifestyle  
Impact on family routines, activities, or dynamics  
Economic impact

**9. Assessment of patient's and family's perceptions of disease**

Patient's, parents', and spouse's or partner's knowledge of asthma and belief in the chronicity of asthma and in the efficacy of treatment  
Patient's perception and beliefs regarding use and long-term effects of medications  
Ability of patient and parents, spouse, or partner to cope with disease  
Level of family support and patient's and parents', spouse's, or partner's capacity to recognize severity of an exacerbation  
Economic resources  
Sociocultural beliefs

\*This list does not represent a standardized assessment or diagnostic instrument. The validity and reliability of this list have not been assessed.

## **PREDICTIVE INDEX for ASTHMA/PERSISTENT WHEEZE**

For children under 3 years of age with >3 episodes of wheezing over the previous year:

### **1 MAJOR**

Atopic dermatitis

Parental asthma

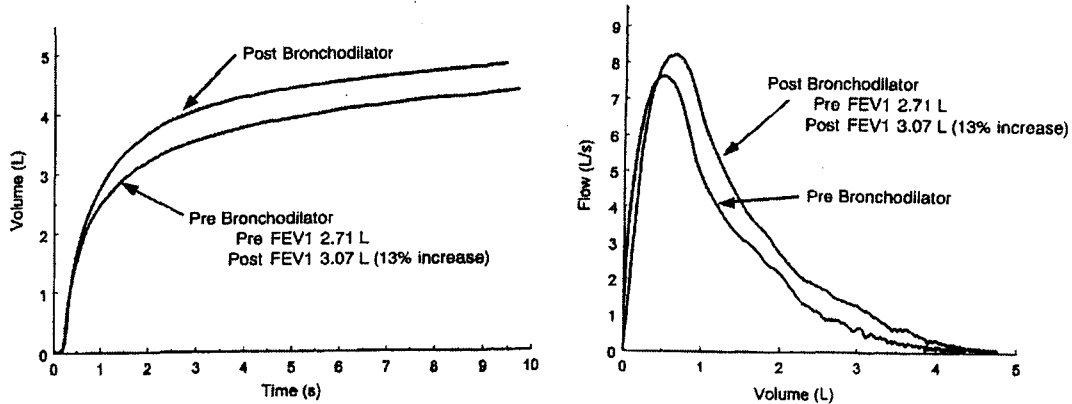
### **2 MINOR CRITERIA**

Peripheral eosinophilia

Wheezing apart from URI

Allergic rhinitis

**FIGURE 3-3a. SAMPLE SPIROMETRY VOLUME TIME AND FLOW VOLUME CURVES**



Key: FEV<sub>1</sub>, forced expiratory volume in 1 second

**FIGURE 3-3b. REPORT OF SPIROMETRY FINDINGS PRE- AND POSTBRONCHODILATOR**

Prebronchodilator				Postbronchodilator			
<b>Study:</b> bronch	<b>ID:</b> Height:	<b>Test date:</b> 8/7/06	<b>Time:</b> 9:38 a.m.	<b>Study:</b> bronch	<b>ID:</b> Height:	<b>Test date:</b> 8/7/06	<b>Time:</b> 9:58 a.m.
<b>Age:</b> 59	175 cm	<b>Sex:</b> M	<b>System:</b> 7 20 17	<b>Age:</b> 59	175 cm	<b>Sex:</b> M	<b>System:</b> 7 20 17
<b>Trial</b>	<b>FVC</b>	<b>FEV<sub>1</sub></b>	<b>FEV<sub>1</sub>/FVC (%)</b>	<b>Trial</b>	<b>FVC</b>	<b>FEV<sub>1</sub></b>	<b>FEV<sub>1</sub>/FVC (%)</b>
1	4.34	2.68	61.8%	1	4.73	2.94	62.2%
2	4.44	2.62	58.9%	2	4.76	3.07	64.5%
3	4.55	2.71	59.6%	3	4.78	3.04	63.5%
<b>Best Values</b>	4.56	2.71	59.4%	<b>Best Values</b>	4.78	3.07	64.3%
<b>Predicted Values*</b>	4.23	3.40	80.5%	<b>Reference Values</b>	4.56	2.71	
<b>Percent Predicted</b>	107.8%	79.7%	73.8%	<b>Difference (L)</b>	0.22	0.36	
				<b>Difference (%)</b>	4.8%	13.4%	
<b>Interpretations:</b> FEV <sub>1</sub> and FEV <sub>1</sub> /FVC are below normal range. The reduced rate at which air is exhaled indicates obstruction to airflow. *Predicted values from Knudson et al. (1983)				<b>Interpretations:</b> Significant increases in FEV <sub>1</sub> , with bronchodilator (≥12% increase after bronchodilator indicates a significant change).			

Key: FEV<sub>1</sub>, forced expiratory volume in 1 second; FVC, forced vital capacity

**FIGURE 3-4a. CLASSIFYING ASTHMA SEVERITY IN CHILDREN 0-4 YEARS OF AGE**

- **Classifying severity in children who are not currently taking long-term control medication.**

Components of Severity		Classification of Asthma Severity (Children 0-4 years of age)			
		Intermittent	Mild	Persistent	
Impairment	Symptoms	≤2 days/week	>2 days/week but not daily	Daily	Throughout the day
	Nighttime awakenings	0	1-2x/month	3-4x/month	>1x/week
	Short-acting beta <sub>2</sub> -agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week but not daily	Daily	Several times per day
	Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
Risk	Exacerbations requiring oral systemic corticosteroids	0-1/year	≥2 exacerbations in 6 months requiring oral steroids, or ≥4 wheezing episodes/1 year lasting >1 day AND risk factors for persistent asthma		
		← Consider severity and interval since last exacerbation. Frequency and severity may fluctuate over time. →			
		Exacerbations of any severity may occur in patients in any severity category			

- Level of severity is determined by both impairment and risk. Assess impairment domain by caregiver's recall of previous 2-4 weeks. Assign severity to the most severe category in which any feature occurs.
- At present, there are inadequate data to correspond frequencies of exacerbations with different levels of asthma severity. For treatment purposes, patients who had ≥2 exacerbations requiring oral corticosteroids in the past 6 months, or ≥4 wheezing episodes in the past year, and who have risk factors for persistent asthma may be considered the same as patients who have persistent asthma, even in the absence of impairment levels consistent with persistent asthma.
- **Classifying severity in patients after asthma becomes well controlled, by lowest level of treatment required to maintain control.\***

Lowest level of treatment required to maintain control (See figure 4-1a for treatment steps.)	Classification of Asthma Severity			
	Intermittent	Mild	Persistent	
	Step 1	Step 2	Moderate	Severe
			Step 3 or 4	Step 5 or 6

Key: EIB, exercise-induced bronchospasm

\*Notes:

- For population-based evaluations, clinical research, or characterization of a patient's overall asthma severity after control is achieved. For clinical management, the focus is on monitoring the level of control (See figure 3-5a.), not the level of severity, once treatment is established.
- See figure 3-5a for definition of asthma control.

**FIGURE 3–4b. CLASSIFYING ASTHMA SEVERITY IN CHILDREN 5–11 YEARS OF AGE**

■ **Classifying severity in children who are not currently taking long-term control medication.**

Components of Severity		Classification of Asthma Severity (Children 5–11 years of age)			
		Intermittent	Mild	Moderate	Severe
Impairment	Symptoms	≤2 days/week	>2 days/week but not daily	Daily	Throughout the day
	Nighttime awakenings	≤2x/month	3–4x/month	>1x/week but not nightly	Often 7x/week
	Short-acting beta <sub>2</sub> -agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week but not daily	Daily	Several times per day
	Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
	Lung function	• Normal FEV <sub>1</sub> between exacerbations • FEV <sub>1</sub> >80% predicted • FEV <sub>1</sub> /FVC >85%	• FEV <sub>1</sub> = >80% predicted • FEV <sub>1</sub> /FVC >80%	• FEV <sub>1</sub> = 60–80% predicted • FEV <sub>1</sub> /FVC = 75–80%	• FEV <sub>1</sub> <60% predicted • FEV <sub>1</sub> /FVC <75%
Risk	Exacerbations requiring oral systemic corticosteroids	0–1/year (see note) → 2 in 1 year (see note) → ← 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 FEV <sub>1</sub>			

- Level of severity is determined by both impairment and risk. Assess impairment domain by patient's/caregiver's recall of the previous 2–4 weeks and spirometry. Assign severity to the most severe category in which any feature occurs.
- At present, there are inadequate data to correspond frequencies of exacerbations with different levels of asthma severity. In general, more frequent and intense exacerbations (e.g., requiring urgent, unscheduled care, hospitalization, or ICU admission) indicate greater underlying disease severity. For treatment purposes, patients who had ≥2 exacerbations requiring oral systemic corticosteroids 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.
- Classifying severity in patients after asthma becomes well controlled, by lowest level of treatment required to maintain control.\*

Lowest level of treatment required to maintain control (See figure 4–1b for treatment steps.)	Classification of Asthma Severity			
	Intermittent	Mild	Moderate	Severe
	Step 1	Step 2	Step 3 or 4	Step 5 or 6

Key: EIB, exercise-induced bronchospasm; FEV<sub>1</sub>, forced expiratory volume in second; FVC, forced vital capacity; ICU, intensive care unit

\*Notes:

- For population-based evaluations, clinical research, or characterization of a patient's overall asthma severity after control is achieved. For clinical management, the focus is on monitoring the level of control (See figure 3–5b.), not the level of severity, once treatment is established.
- See figure 3–5b for definition of asthma control.

**FIGURE 3–4c. CLASSIFYING ASTHMA SEVERITY IN YOUTHS ≥12 YEARS OF AGE AND ADULTS**

■ **Classifying severity for patients who are not currently taking long-term control medications.**

Components of Severity		Classification of Asthma Severity (Youths ≥12 years of age and adults)			
		Intermittent	Mild	Persistent	
Impairment	Symptoms	≤2 days/week	>2 days/week but not daily	Daily	Throughout the day
	Nighttime awakenings	≤2x/month	3–4x/month	>1x/week but not nightly	Often 7x/week
	Short-acting beta <sub>2</sub> -agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week but not >1x/day	Daily	Several times per day
	Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
Normal FEV <sub>1</sub> /FVC: 8–19 yr 85% 20–39 yr 80% 40–59 yr 75% 60–80 yr 70%	Lung function	<ul style="list-style-type: none"> <li>• Normal FEV<sub>1</sub> between exacerbations</li> <li>• FEV<sub>1</sub> &gt;80% predicted</li> <li>• FEV<sub>1</sub>/FVC normal</li> </ul>	<ul style="list-style-type: none"> <li>• FEV<sub>1</sub> ≥80% predicted</li> <li>• FEV<sub>1</sub>/FVC normal</li> </ul>	<ul style="list-style-type: none"> <li>• FEV<sub>1</sub> &gt;60% but &lt;80% predicted</li> <li>• FEV<sub>1</sub>/FVC reduced 5%</li> </ul>	<ul style="list-style-type: none"> <li>• FEV<sub>1</sub> &lt;60% predicted</li> <li>• FEV<sub>1</sub>/FVC reduced &gt;5%</li> </ul>
	Risk	Exacerbations requiring oral systemic corticosteroids	0–1/year (see note)	≥2/year (see note) →	
		← 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 FEV <sub>1</sub>			

- Level of severity is determined by assessment of both impairment and risk. Assess impairment domain by patient's/caregiver's recall of previous 2–4 weeks and spirometry. Assign severity to the most severe category in which any feature occurs.
- At present, there are inadequate data to correspond frequencies of exacerbations with different levels of asthma severity. In general, more frequent and intense exacerbations (e.g., requiring urgent, unscheduled care, hospitalization, or ICU admission) indicate greater underlying disease severity. For treatment purposes, patients who had ≥2 exacerbations requiring oral systemic corticosteroids 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.

■ **Classifying severity in patients after asthma becomes well controlled, by lowest level of treatment required to maintain control.\***

Lowest level of treatment required to maintain control (See figure 4–5 for treatment steps.)	Classification of Asthma Severity			
	Intermittent	Persistent		
		Mild	Moderate	Severe
	Step 1	Step 2	Step 3 or 4	Step 5 or 6

Key: EIB, exercise-induced bronchospasm; FEV<sub>1</sub>, forced expiratory volume in 1 second; FVC, forced vital capacity; ICU, intensive care unit

\*Notes:

- For population-based evaluations, clinical research, or characterization of a patient's overall asthma severity after control is achieved. For clinical management, the focus is on monitoring the level of control (See figure 3–5c.), not the level of severity, once treatment is established.
- See figure 3–5c for definition of asthma control.



**FIGURE 3-5a. ASSESSING ASTHMA CONTROL IN CHILDREN 0-4 YEARS OF AGE**

Components of Control		Classification of Asthma Control (Children 0-4 years of age)		
		Well Controlled	Not Well Controlled	Very Poorly Controlled
<b>Impairment</b>	Symptoms	≤2 days/week	>2 days/week	Throughout the day
	Nighttime awakenings	≤1x/month	>1x/month	>1x/week
	Interference with normal activity	None	Some limitation	Extremely limited
	Short-acting beta <sub>2</sub> -agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week	Several times per day
<b>Risk</b>	Exacerbations requiring oral systemic corticosteroids	0-1/year	2-3/year	>3/year
	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.		

Key: EIB, exercise-induced bronchospasm; ICU, intensive care unit

**Notes:**

- The level of control is based on the most severe impairment or risk category. Assess impairment domain by caregiver's recall of previous 2-4 weeks. Symptom assessment for longer periods should reflect a global assessment, such as inquiring whether the patient's asthma is better or worse since the last visit.
- At present, there are inadequate data to correspond frequencies of exacerbations with different levels of asthma control. In general, more frequent and intense exacerbations (e.g., requiring urgent, unscheduled care, hospitalization, or ICU admission) indicate poorer disease control. For treatment purposes, patients who had ≥2 exacerbations requiring oral systemic corticosteroids in the past year may be considered the same as patients who have not-well-controlled asthma, even in the absence of impairment levels consistent with persistent asthma.

**FIGURE 3–5b. ASSESSING ASTHMA CONTROL IN CHILDREN 5–11 YEARS OF AGE**

Components of Control		Classification of Asthma Control (Children 5–11 years of age)		
		Well Controlled	Not Well Controlled	Very Poorly Controlled
<b>Impairment</b>	Symptoms	≤2 days/week but not more than once on each day	>2 days/week or multiple times on ≤2 days/week	Throughout the day
	Nighttime awakenings	≤1x/month	≥2x/month	≥2x/week
	Interference with normal activity	None	Some limitation	Extremely limited
	Short-acting beta <sub>2</sub> -agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week	Several times per day
	Lung function			
	▪ FEV <sub>1</sub> or peak flow	>80% predicted/ personal best	60–80% predicted/ personal best	<60% predicted/ personal best
	▪ FEV <sub>1</sub> /FVC	>80%	75–80%	<75%
	Exacerbations requiring oral systemic corticosteroids	0–1/year	≥2/year (see note)	
		Consider severity and interval since last exacerbation		
<b>Risk</b>	Reduction in lung growth	Evaluation requires long-term followup.		
	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.		

Key: EIB, exercise-induced bronchospasm; FEV<sub>1</sub>, forced expiratory volume in 1 second; FVC, forced vital capacity; ICU, intensive care unit

**Notes:**

- The level of control is based on the most severe impairment or risk category. Assess impairment domain by patient’s/caregiver’s recall of previous 2–4 weeks and by spirometry/or peak flow measures. Symptom assessment for longer periods should reflect a global assessment, such as inquiring whether the patient’s asthma is better or worse since the last visit.
- At present, there are inadequate data to correspond frequencies of exacerbations with different levels of asthma control. In general, more frequent and intense exacerbations (e.g., requiring urgent, unscheduled care, hospitalization, or ICU admission) indicate poorer disease control. For treatment purposes, patients who had ≥2 exacerbations requiring oral systemic corticosteroids in the past year may be considered the same as patients who have not-well-controlled asthma, even in the absence of impairment levels consistent with not-well-controlled asthma.

**FIGURE 3–5c. ASSESSING ASTHMA CONTROL IN YOUTHS ≥12 YEARS OF AGE AND ADULTS**

Components of Control		Classification of Asthma Control (Youths ≥12 years of age and adults)		
		Well-Controlled	Not Well-Controlled	Very Poorly Controlled
<b>Impairment</b>	Symptoms	≤2 days/week	>2 days/week	Throughout the day
	Nighttime awakening	≤2x/month	1–3x/week	≥4x/week
	Interference with normal activity	None	Some limitation	Extremely limited
	Short-acting beta <sub>2</sub> -agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week	Several times per day
	FEV <sub>1</sub> or peak flow	>80% predicted/ personal best	60–80% predicted/ personal best	<60% predicted/ personal best
	Validated Questionnaires			
	ATAQ ACQ ACT	0 ≤0.75* ≥20	1–2 ≥1.5 16–19	3–4 N/A ≤15
<b>Risk</b>	Exacerbations	0–1/year	≥2/year (see note) Consider severity and interval since last exacerbation	
	Progressive loss of lung function	Evaluation requires long-term followup care		
	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.		

\*ACQ values of 0.76–1.4 are indeterminate regarding well-controlled asthma.

Key: EIB, exercise-induced bronchospasm; FEV<sub>1</sub>, forced expiratory volume in 1 second. See figure 3–8 for full name and source of ATAQ, ACQ, ACT.

**Notes:**

- The level of control is based on the most severe impairment or risk category. Assess impairment domain by patient’s recall of previous 2–4 weeks and by spirometry/or peak flow measures. Symptom assessment for longer periods should reflect a global assessment, such as inquiring whether the patient’s asthma is better or worse since the last visit.
- At present, there are inadequate data to correspond frequencies of exacerbations with different levels of asthma control. In general, more frequent and intense exacerbations (e.g., requiring urgent, unscheduled care, hospitalization, or ICU admission) indicate poorer disease control. For treatment purposes, patients who had ≥2 exacerbations requiring oral systemic corticosteroids in the past year may be considered the same as patients who have not-well-controlled asthma, even in the absence of impairment levels consistent with not-well-controlled asthma.

**FIGURE 3–6. SAMPLE QUESTIONS FOR ASSESSING AND MONITORING ASTHMA CONTROL****Monitoring Asthma Control****Ask the patient:**

- Has your asthma awakened you at night or early morning?
- Have you needed more quick-relief bronchodilator medication (inhaled short-acting beta<sub>2</sub>-agonist) than usual?
- Have you needed any urgent medical care for your asthma, such as unscheduled visits to your doctor, an urgent care clinic, or the emergency department?
- Are you participating in your usual and desired activities?
- If you are measuring your peak flow, has it been below your personal best?

**Actions to consider:**

- Assess whether the medications are being taken as prescribed.
- Assess whether the medications are being inhaled with correct technique.
- Assess lung function with spirometry and compare to previous measurement.
- Adjust medications, as needed; either step up if control is inadequate or step down if control is maximized, to achieve the best control with the lowest dose of medication.

Source: Adapted and reprinted from "Global Initiative for Asthma: Pocket Guide for Asthma Management and Prevention." NIH Publication No. 96-3659B. Bethesda, MD: Department of Health and Human Services, National Institutes of Health, National Heart, Lung, and Blood Institute. 1995