Clinical Practice Guideline: Asthma

INTRODUCTION
A critical aspect of the diagnosis and management of asthma is the precise and periodic measurement of lung function – both before and after bronchodilator therapy – to determine both the severity and the effectiveness of therapeutic interventions. When establishing the diagnosis of asthma: • Evaluate medical history, including smoking, drug and alcohol use, physician examinations and supportive diagnostic lung function testing • Establish that episodic symptoms of airflow obstruction or airway hyperresponsiveness are present and objectively demonstrate that obstruction is at least partially reversible with spirometry • Exclude the presence of any alternative diagnoses, particularly Chronic Obstructive Pulmonary Disease (COPD) or vocal cord obstruction in adults and aspiration, cardiac failure, inhaled foreign body, and structural abnormality or cystic fibrosis in children • Evaluate medication requirements – short-acting bronchodilators used more than twice per week should prompt daily inhaled corticosteroid administration for persistent asthma, even if mild severity
ASSESSMENT
Measures of assessment and monitoring should include: • *Spirometry*: to be conducted at least once a year before and after inhaled bronchodilator therapy. Significant reversibility is indicated by an increase of >12 percent and 200 ml in FEV1. Spirometry to demonstrate obstruction and assess reversibility, including in children 5 years of age or older. Reversibility is determined either by an increase in FEV1 of ≥12% from baseline or by an increase of ≥10% of predicted FEV1 after inhalation of a short-acting bronchodilator. • *Peak flow*: symptomatic patients with normal spirometry should: – Have a daily assessment of peak flow monitoring upon rising and before bedtime. – Maintain an accurate log of daily measurements to help detect subtle changes in lung function that may otherwise go unnoticed by the patient or the provider. Functions of assessment and monitoring are closely linked to the concepts of severity, control and responsiveness to treatment. • *Severity*: the intrinsic intensity of the disease process. Severity is most easily and directly measured in a patient who is not currently receiving long-term control treatment. • *Control*: the degree to which the manifestations of asthma (symptoms, functional impairments and risks of untoward events) are minimized and the goals of therapy are met. • *Responsiveness*: the ease with which control is achieved by therapy.

CONTRIBUTING FACTORS

Assess at the initial evaluation and additional visits based on the following seasonal variations:

- Smoking and secondhand smoke. If the member smokes, address the value and available resources to aid in smoking cessation.
- Possible environmental inhalant allergens, indoor irritants, pet dander and air pollution.
- Viral Respiratory Infection component to induction of Reactive Airways Disease.
- All the modifiable risk factors: sedentary lifestyle, obesity, stress, smoking, drug use.
- Other factors: acute/chronic rhinitis rhino-sinusitis, gastro-esophageal reflux, drugs (ASA/NSAIDS, sulfites, beta adrenergic blockers in sensitive patients).
- Workplace exposures.

TRIGGERS

Identify triggers of asthma symptoms such as:

- Smoking and second hand smoke
- Air pollution
- Things that the member is allergic to: pet dander, dust mites, cockroaches, mold or pollen
- For exercise-induced asthma, advise members on the proper use of inhaler use before they exercise
- Dry, cold air
- Infection
- Some medicines, such as aspirin

PHARMACOTHERAPY

Maintain optimal outcomes:

- Control chronic and nocturnal symptoms
- Maintain normal activity levels, including exercise
- Maintain near normal pulmonary function
- Prevent acute episodes of asthma exacerbation
- Avoid adverse effects of asthma medications
- In addition to allergen avoidance, enhance pharmacotherapy for environmental allergy-based seasonal asthma (e.g., daily antihistamines and nasal steroid sprays to avoid asthma induction, daily inhaled corticosteroids during season even if not needed outside of season, etc.)
- Annual influenza and pneumococcal vaccinations as appropriate

Pharmacotherapy based on individual's needs:

- *Rescue medication*
  - Short-acting Beta2 Adrenergic Agonist bronchodilator
  - Primary medication only for infrequent symptoms or pre-exposure prophylaxis
- *First-line controller medication*
  - Inhaled corticosteroids
  - To be added for ALL persistent disease, no matter how mild
- *Second-line controller medication*
  - Long-acting Beta2 Adrenergic Agonist bronchodilators
  - To be added for asthmatics inadequately controlled on steroids
- *Third-line medications*

- Other anti-inflammatory inhalers
- Only added for asthmatics inadequately controlled on first and second step therapy

- *Fourth-line medications*
  - Methylxanthines
  - Available, but rarely required

PATIENT EDUCATION (ACTION PLAN)

All patients with asthma should have a written Asthma Action Plan that incorporates all aspects of their asthma care. This care plan should be re-evaluated at least annually and more often if necessary to help control the patient's changing condition. A team approach, which includes the patient, the PCP, a certified asthma educator and a pulmonary specialist, when appropriate, is the ideal delivery model for the effective and efficient treatment of asthma. Toward this end, the patient must understand his or her Asthma Action Plan, which includes:

- Short- and long-term goals
- Written environmental control recommendations
- Lifestyle changes including sick day interventions
- Self-monitoring of peak flows with use of a recording system (monthly calendar charting seasonal variations in asthma symptoms)
- Basic facts about asthma (provide written material for patient reference)
- Appropriate role of asthma medications:
  - Explain use of controller vs. reliever medications
  - Provide Asthma Action Plan for medication use
  - Provide use instructions for metered dose inhaler (MDI) (observe use and critique technique) and the use of spacer devices

An example of an asthma action plan is attached to this Clinical Practice Guideline.

MONITORING AND REPORTING

Establish therapeutic goals (normal activity without restriction, rare symptoms) and provide instructions for monitoring and reporting. Practice use of peak flow meter as a monitoring tool and instruct patient to record missed school/work days, altered activity and symptom changes.

FOLLOW-UP

Follow-up should include:

- Routine office exams seasonally or every one to six months (if stable), with increased frequency in acute cases or if patient's routine "stable" status changes
- Assess attainment of patient goals and concerns
- Adjust treatment plans as often as necessary for optimal control; add inhaled corticosteroids for all persistent (rescue meds > twice per week) asthma, no matter how mild the severity
- Update the Asthma Action Plan and self-management plan at least annually and more often as indicated for changes in status
- Re-assess patient's peak flow and inhaler technique
- Smoking cessation program referral for smokers

MEASUREMENT OF COMPLIANCE

The following Medical Record Review measurements will be used to assess compliance with this guideline:

**** Appropriate Diagnosis/Assessment****

1 - History & Physical completed- (must include documented vitals, and cardiopulmonary exam)

2 - Spirometry & peak flow measures used to confirm diagnosis in members ≥ 5 years of age

3 - Severity of asthma assessed and episodic signs/symptoms identified

****Patient Education/Risk Factor Assessment****

4 - Evidence of an Asthma Management Plan developed with member/parent (must include documentation of understanding and that plan was provided).

5 - Co-Morbid conditions assessed and discussed

6 - Educated member/parent on recognizing triggers and reducing exposure to environmental risk factors

7- Educated member/parent on taking prescribed medications correctly

****Appropriate Medications/Adherence****

8 - Prescribed appropriate long-term medications

9 - Evaluated response to medication and control of asthma assessed

REFERENCES:

Expert Panel Report 3 (EPR3): Guidelines for the Diagnosis and Management of Asthma; http://www.nhlbi.nih.gov/health-pro/guidelines/current/asthma-guidelines/full-report.htm

Components of Severity		Classification of Asthma Severity (Children 0–4 years of age)			
			Persistent		
		Intermittent	Mild	Moderate	Severe
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 $beta_2$-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			

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

Components of Control		Classification of Asthma Control (Children 0–4 years of age)		
		Well Controlled	**Not Well Controlled**	**Very Poorly Controlled**
Impairment	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 $beta_2$-agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week	Several times per day
Risk	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.		

Components of Severity		Classification of Asthma Severity (Children 5–11 years of age)			
		Intermittent	Persistent		
			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 $beta_2$-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_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%
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_1			

Components of Control		Classification of Asthma Control (Children 5–11 years of age)		
		Well Controlled	**Not Well Controlled**	**Very Poorly Controlled**
Impairment	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 $beta_2$-agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week	Several times per day
	Lung function ▪ FEV_1 or peak flow ▪ FEV_1/FVC	 >80% predicted/ personal best >80%	 60–80% predicted/ personal best 75–80%	 <60% predicted/ personal best <75%
Risk	**Exacerbations requiring oral systemic corticosteroids**	**0–1/year**	**≥2/year (see note)**	
		Consider severity and interval since last exacerbation		
	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.		

Components of Severity		Classification of Asthma Severity (Youths ≥12 years of age and adults)			
			Persistent		
		Intermittent	Mild	Moderate	Severe
Impairment **Normal FEV_1/FVC:** **8–19 yr 85%** **20 –39 yr 80%** **40 –59 yr 75%** **60 –80 yr 70%**	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 $beta_2$-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
	Lung function	• 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	0–1/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_1			

Components of Control		Classification of Asthma Control (Youths ≥12 years of age and adults)		
		Well-Controlled	**Not Well-Controlled**	**Very Poorly Controlled**
Impairment	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 $beta_2$-agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week	Several times per day
	FEV_1 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
Risk	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.		

Figure 1. Summary of recommended key clinical activities for the diagnosis and management of asthma

Clinical issue	Key clinical activities	Action steps
DIAGNOSIS		
	Establish asthma diagnosis	• Use medical history and physical examination to determine the symptoms of recurrent episodes of airflow obstruction are present. • Use spirometry in all patients ≥5 years of age to determine that airway obstruction is at least partially reversible. • Consider alternative causes of airway obstruction.
Managing asthma long-term	**Goal of asthma therapy is asthma control:** • Reduce impairment (prevent chronic symptoms, require infrequent use of short acting beta2-agonist (SABA), maintain (near) normal lung function and normal activity levels. • Reduce risk (prevent exacerbations, minimize need for emergency care or hospitalization, prevent loss of lung function, or for children, prevent reduced lung growth, have minimal or no adverse effects of therapy).	
FOUR COMPONENTS OF CARE		
Assessment and monitoring	Assess asthma severity to initiate therapy	• Use severity classification chart, assessing both domains of impairment and risk, to determine initial treatment. • Use asthma control chart, assessing both domains of impairment and risk, to determine if therapy should be maintained or adjusted (step up if necessary, step down if possible.
	Assess asthma control to monitor and adjust therapy	• Use multiple measures of impairment and risk: different measures assess different manifestations of asthma, they may not correlate with each other and they may respond differently to therapy. Obtain lung function measures by spirometry at least every 1-2 years, more frequently for not well-controlled asthma. • Asthma is highly variable over time: periodic monitoring is essential. Consider scheduling patients at 2-6 week intervals while gaining control; at 1-6 month intervals, depending on step of care required or duration of control; to monitor if sufficient control is maintained; at three-month intervals if a step down in therapy is anticipated.
	Schedule follow-up care	• Assess asthma control, medical technique, written asthma action plan, patient adherence and concerns at every visit.

Education	Provide self-management education Tailor education to literacy level of patient; appreciate the potential role of a patient's cultural beliefs and practices in asthma management Develop a written asthma action plan in partnership with the patient Integrate education into all points of care where health professionals interact with patients	Teach and reinforce: • Self-monitoring to assess level of asthma control and signs of worsening asthma (either symptom or peak flow monitoring shows similar benefits for most patients). Peak flow monitoring may be helpful for patients who have difficulty perceiving symptoms, a history of severe exacerbations, or moderate or severe asthma. • Using written asthma action plan (review differences between long-term control and quick relief medication). • Taking medication correctly (inhaler technique and use of devices). • Agree on treatment goals and address patient concerns. • Provide instructions for daily management: – Long term control medication, if applicable, and environmental control measures. • Managing worsening asthma: – How to adjust medication and know when to seek medical care. • Involve all members of the health care team in providing/reinforcing education, including physicians, nurses, pharmacists, respiratory therapists and asthma educators. • Encourage education at all points of care: clinics, emergency departments, hospitals, pharmacies, schools and other community settings and the patient's home. • Use a variety of educational strategies and methods.
Control environmental factors and comorbid conditions	Recommend measures to control exposures to allergens and pollutants or irritants that make asthma worse	• Determine exposures, history of symptoms in presence of exposures and sensitivities. • Advise patient on ways to reduce exposure to those allergens and pollutants or irritants to which the patient is sensitive. Multi-faceted approaches are beneficial; single steps alone are generally ineffective. Advise all patients and pregnant women to avoid exposure to tobacco smoke. • Consider allergen immunotherapy, by specifically trained personnel, for patients who have persistent asthma and when there is clear evidence of a relationship between symptoms and exposure to an allergen to which the

	Treat comorbid conditions	patient is sensitive. • Consider especially: allergic bronchopulmonary aspergillosis; gastroesophageal reflux, obesity, obstructive sleep apnea, rhinitis and sinusitis and stress or depression. Recognition and treatment of conditions may improve asthma control. • Consider inactivated influenza vaccine for all patients over 6 months of age.
Medications	Select medication and delivery devices to meet patient's needs and circumstances	• Use stepwise approach to identify appropriate treatment options. • Inhaled corticosteroids (ICSs) are the most effective long-term control therapy. When choosing among treatment options, consider domain of relevance to the patient (impairment, risk or both), patient's history of response to the medication and patient's willingness and ability to use the medication.
Clinical issue	**Key clinical activities**	**Action steps**
STEPWISE APPROACH		
General principles for all age groups	Incorporate four components of care	• Include medications, patient education, environmental control measures and management of comorbidities at each step. Monitor asthma control regularly.
	Initiate therapy based on asthma severity	• For patients not taking long term control therapy, select treatment step based on severity. Patients who have persistent asthma require daily long term control medication.
	Adjust therapy based on asthma control	• Once therapy is initiated, monitor the level of asthma control and adjust therapy accordingly, step up if necessary and step down if possible to identify the minimum amount of medication required to maintain asthma control. • Refer to an asthma specialist for consultation or co-management if there are difficulties achieving or maintaining control; step 4 care or higher is required (step 3 care or higher for children 0-4 years of age); immunotherapy or omalizumab is considered; additional testing is indicated or if the patient required 2 bursts of oral systemic corticosteroids in the past year or a hospitalization.

For age-specific principles using the Stepwise approach, refer to the National Heart, Lung and Blood Institute's Expert Panel Report 3 (2007) at http://www.nhlbi.nih.gov/guidelines/asthma/index.htm. Guidance is also available on treating patients with respect to pregnancy, surgery and management in home or emergency care settings.