MOUNT CARMEL Health Partners

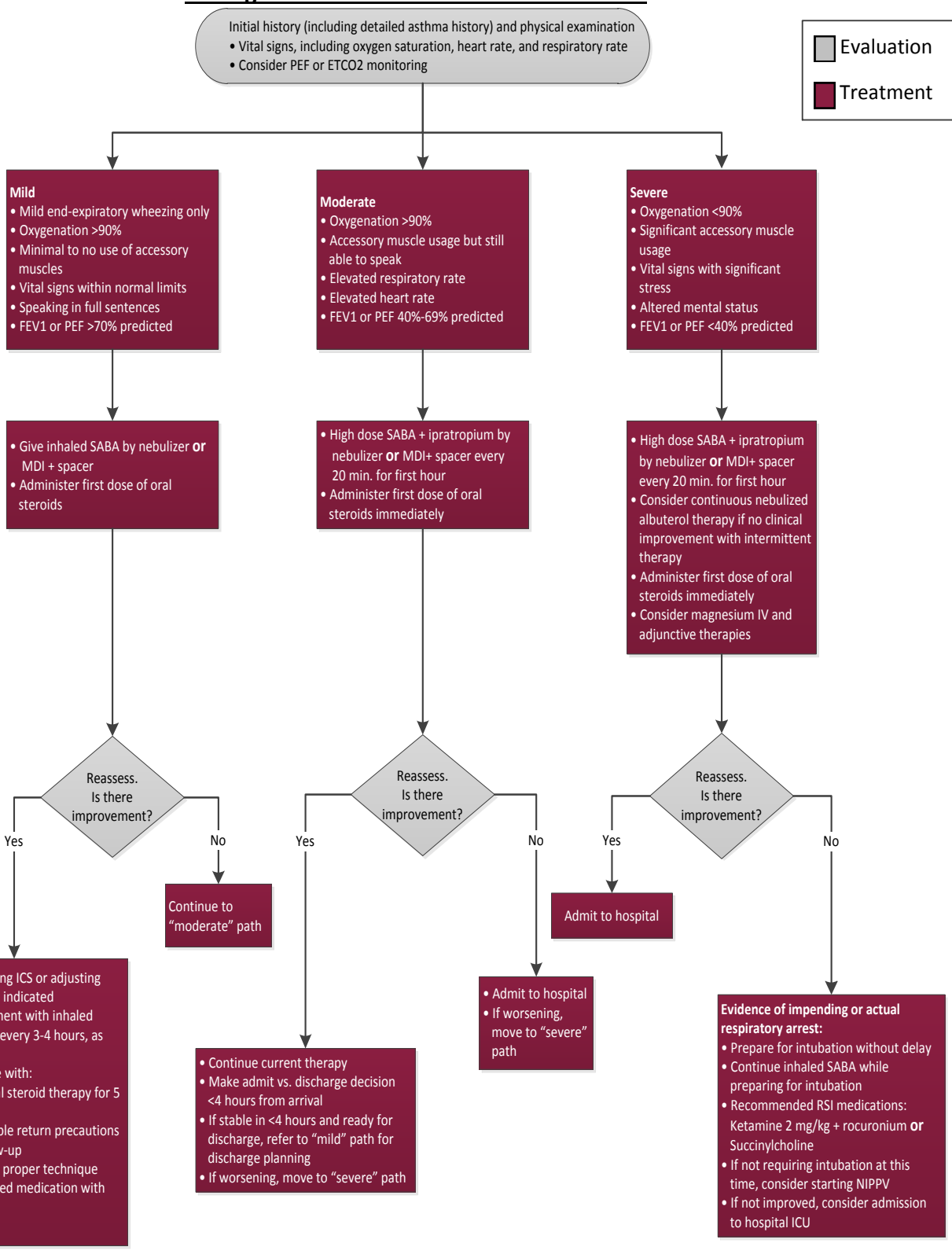
Asthma Clinical Guideline

Definition: Asthma is a common chronic disorder of the airways that is complex and characterized by variable and recurring symptoms, reversible airflow obstruction, bronchial hyper-responsiveness, and an underlying inflammation. The interaction of these features of asthma determines the clinical manifestations and severity of asthma and the response to treatment.

Quick Guide to Asthma

Spirometry is recommended to establish the diagnosis of asthma. A stepwise approach to pharmacologic treatment to achieve and maintain control of asthma should take into account the safety of treatment, potential for adverse effects, and the cost of treatment required to achieve control.

Management of Acute Asthma Exacerbation



Abbreviations: $ETCO_2$, end-tidal carbon dioxide; ICS, inhaled corticosteroids; IV, intravenous; MDI, metered-dose inhaler; NIPPV, noninvasive positive-pressure ventilation; PEF, peak expiratory flow; RSI, rapid sequence intubation; SABA, short-acting beta agonist; FEV1, forced expiratory volume in 1 second.

Diagnosis

Confirmation of the diagnosis of asthma is based upon two key elements:

1. The history or presence of respiratory symptoms consistent with asthma.
2. The demonstration of variable expiratory airflow obstruction.

Alternative diagnoses must be excluded.

Pulmonary Function Testing

Pulmonary function tests are critical tools for the diagnosis of asthma. Measurement of lung function can confirm the diagnosis by quantifying the severity, reversibility, and variability of airflow limitation.

Spirometry is the recommended test to establish a diagnosis of asthma. It measures:

- FEV1 -- forced expiratory volume in one second
- FVC -- forced vital capacity is the volume of air differential between full inspiration and maximal expiration
- FEF -- forced expiratory flow between 25% and 75% of the vital capacity
- FEV6 -- forced expiratory volume in six seconds

The results of spirometry can be used to:

- Distinguish normal from abnormal lung function
- Categorize abnormalities into obstructive or restrictive patterns
- Assess the reversibility of the obstructive abnormality if the testing is repeated after administration of a bronchodilator

The National Asthma Education and Prevention Program recommends that spirometry before and after administration of a bronchodilator be performed on all adolescents and adults being considered for the diagnosis of asthma.

History

There are key indicators that heighten the probability of asthma:

- Episodic symptoms -- these symptoms typically come and go, over minutes not seconds, and resolve spontaneously when the triggering stimulus is removed or in response to anti-asthmatic medications
- Characteristic triggers -- respiratory symptoms that are triggered by exercise, cold air, and exposure to allergens (dust, mold, furred animals, cockroaches, and pollens)
- Strong family history of asthma
- History of asthmatic symptoms as a child
- Exercise-triggered symptoms develop 5 to 15 minutes after a brief period of exertion or about 15 minutes into prolonged exercise and resolve with rest over approximately 30 to 60 minutes

Triad of Symptoms

- Wheezing
- Cough (typically worse at night)
- Shortness of breath or difficulty breathing

Physical Examination

Evaluate for:

- Widespread, high-pitched musical wheezes
- Hyper-expansion of the thorax
- Increased nasal secretions, mucosal swelling and/or nasal polyps
- Atopic dermatitis/eczema or other manifestation of an allergic skin condition

Triggers

- Occupational exposure, e.g., paint fumes, wood dust
- Irritants: tobacco smoke, air pollution, strong odors
- Inhalant allergens: dust mites, animal allergens, cockroach allergens, mold, mildew, pollens, grass
- Medications: non-selective beta-blockers, aspirin, NSAIDs
- Respiratory infections
- Dietary sulfites

Future Evaluations

Asthma assessments at each office visit should include the following:

- Patient history
- Physical examination
- Pulmonary function (spirometry, peak flow meter)
- Exacerbations
- Frequency of short-acting beta2-agonist use
- Nighttime awakenings
- Irritant exposures
- Consider Asthma Control Test or equivalent
- Comorbid conditions
  - -- sinusitis/rhinitis
  - -- gastroesophageal reflux disease
  - -- obesity (BMI greater than or equal to 30)
  - -- depression
  - -- allergic bronchopulmonary asbergillosis

Chest radiography is recommended for patients with severe asthma and for patients with any of the following:

- Fever
- Chronic purulent sputum production
- Localized wheezing
- Hemoptysis
- Weight loss
- Clubbing
- Inspiratory crackles
- Significant hypoxemia
- Airflow obstruction that does not resolve with bronchodilators
- Diffuse arthralgia
- Vasculitic rash

Categories of Asthma Severity

There are three elements used to determine the severity of asthma in adolescents over the age of 12 and adults:

1. Current level of lung function (FEV1/FVC values).
2. Reported symptoms over the previous two to four weeks.
3. Number of exacerbations requiring oral glucocorticoids per year.

Management

The goal of asthma management is to reduce functional impairment and risk.

"Impairment" refers to the intensity and frequency of asthma symptoms and the degree to which the patient is limited by these symptoms. The goal is to:

- Prevent frequent or troublesome symptoms
- Maintain activities indicative of normal daily living
- Minimize the need (less than or equal to 2 times per weeks) of inhaled short-acting beta agonists (SABAs) to relieve symptoms
- Lessen nighttime awakenings (less than 2 nights per month)
- Optimize lung function
- Reduce risk
- Prevent recurrent exacerbations and the need for emergency department or hospital care
- Prevent reduced lung maturation in children
- Prevent the loss of lung function in adults
- Optimize pharmacology with minimal or no adverse side effects

Ongoing Monitoring

Routine follow-up after establishing the diagnosis of asthma should be scheduled within one month of the initial evaluation. Subsequent visits should be scheduled every one to six months depending upon the severity of the asthma. Follow-up visits are recommended within two weeks of an emergency room visit or inpatient admission.

Patient Education

- Teach patient how to manage and control asthma signs/symptoms.
- Provide medication instructions.
- Reinforce the importance of compliance.
- Demonstrate proper inhaler usage.
- Instruct patient on spacer/holding chamber usage.
- Discuss self-monitoring skills and the avoidance of triggers.

Vaccinations

- Influenza vaccination: the live attenuated vaccine (nasal spray) is not recommended for people with asthma; the inactivated vaccine (flu shot) should be given.
- Pneumococcal vaccination: recommended for all adults with asthma. For persons ages 65 and older, a one-time revaccination is recommended if previously vaccinated five or more years earlier and less than age 65 at the time of primary vaccination.

Indicators for Referral

- The patient has required hospitalization or more than 2 bouts of oral corticosteroids in a year
- A diagnosis of asthma is uncertain
- The patient has asthma that is difficult to control
- Patient suffers frequent or continuous exacerbations
- The adult or pediatric patient older than age 5 requires Step 4 care or higher or a child under age 5 requires Step 3 care or higher

Consult a pulmonologist, asthma specialist, or allergist depending upon the patient's condition.

Inhaled Steroids

Category	Generic Name (Brand Name)	Concentration (mcg/puff)
Short-Acting Beta Agonists	albuterol (ProAir®, Proventil®, Ventolin®)	90
	levalbuterol (Xopenex®)	45
Short-Acting Anticholinergic	ipratropium (Atrovent®)	17
Combined Short-Acting Beta Agonist and Short-Acting Anticholinergic	ipratropium/Albuterol (Combivent®)	20/100
Inhaled Corticosteroids	beclomethasone (Qvar®)	40, 80
	budesonide (Pulmicort®)	90, 180
	fluticasone propionate (Flovent®)	44, 110, 220
	fluticasone furoate (Arnuity Ellipta®)	100, 200
	mometasone (Asmanex®)	100, 200
Combination Long-Acting Beta Agonist and Inhaled Corticosteroid	budesonide/formoterol (Symbicort®)	80/4.5 160/4.5
	fluticasone/salmeterol (Advair®)	Advair HFA 45/21 115/21 230/21 Advair Diskus 100/50 250/50 500/50
	fluticasone/vilanterol (Breo Ellipta®)	100/25 200/25
	mometasone/formoterol (Dulera®)	100/5 200/5
Long-Acting Anticholinergic	tiotropium (Spiriva Respimat® ONLY)	1.25, 2.5

Black Box Warning--Asthma-Related Death: fluticasone/sameterol (Advair®), fluticasone/vilanterol (Breo Elipta®), budesonide/formoterol (Symbicort®), mometasone/formoterol (Dulera®)

Long-acting beta-2 adrenergic agonists (LABA) increase the risk of asthma-related death. Data from a large placebo-controlled U.S. study showed an increase in asthma-related deaths in patients receiving salmeterol plus a usual asthma treatment, with results considered to be a LABA class effect. There is inadequate data to determine if concurrent inhaled corticosteroids or other long-term asthma control treatments mitigate an increased risk of asthma-related death from LABA. LABA use may increase the risk of asthma-related hospitalization in pediatric and adolescent patients. Use only for asthma patients not controlled on long-term asthma control treatment such as an inhaled corticosteroid or whose disease severity requires treatment with both corticosteroid and LABA. Once asthma control is achieved and maintained, assess the patient at regular intervals and initiate a step down treatment (such as discontinue corticosteroid/LABA combination) if possible without loss of asthma control. Maintain the patient on a long-term asthma control treatment such as inhaled corticosteroid; do not use corticosteroid/LABA combination if asthma is adequately controlled on low-or medium-dose inhaled corticosteroids.

Red-Yellow-Green Asthma Tool

The **Red-Yellow-Green Asthma Tool** is a guide to assist patients or family members in managing their own asthma. It allows them to know when following up with their physician. The plan is based on "zones" of asthma that are defined by symptoms and peak expiratory flow rate.

Green Zone means "Good"

The green zone is associated with asthma that is under control.

- Peak expiratory flow rate between 80% to 100% of the patient's personal best measurement.
- No symptoms
- Able to perform usual daily activities
- Continue taking medication as prescribed

The goal is to be in the green zone every day.

Yellow "Caution" Zone

- Peak expiratory flow rate between 50% to 80% of the patient's personal best measurement.
- Patient may be asymptomatic or have mild to moderate symptoms that may prevent usual activities:
  - coughing
  - waking at night
  - wheezing,
  - chest tightness,
  - tachypnea/shortness of breath
- Eliminate triggers
- Stop strenuous exercise

Rescue medicine should be used.

Medications may need to be increased and warrant a discussion with medical care provider if patient is in the yellow zone most days.

Red "Alert" Zone

Peak expiratory flow rate less than 50% of the patient's personal best measurement.

- Very short of breath
- Usual activities severely limited
- Difficulty walking and talking due to shortness of breath
- Respiratory effort increased. Accessory respiratory muscle use, retractions, tachypnea.
- Acrocyanosis or central cyanosis

Rescue medicine should be used.

Call your physician right away.

Immediate medical evaluation is necessary.

Classifying Asthma Severity in Children 0 to 4 Years of Age

Symptoms	Intermittent Asthma	Persistent Asthma		
		Mild	Moderate	Severe
Daytime symptoms	Less than or equal to 2 days/week	Greater than 2 days/week	Daily	Throughout the day
Nocturnal awakenings	None	1 to 2 times/month	3 to 4 times/month	More than 1 time/week
Short-acting beta agonists	Less than or equal to 2 days/week	Greater than 2 days/week	Daily	Several times/day
Interference with daily activities	None	Minor	Some	Extreme
Exacerbations requiring oral glucocorticoids	0 to 1/year	Greater than or equal to 2 exacerbations in 6 months requiring oral systemic glucocorticoids or greater than 4 wheezing episodes/year lasting more than 1 day AND risk factors for persistent asthma		

Classifying Asthma Severity in Children 5 to 11 Years of Age

Symptoms	Intermittent Asthma	Persistent Asthma		
		Mild	Moderate	Severe
Daytime symptoms	Less than or equal to 2 days/week	Greater than 2 days/week	Daily	Throughout the day
Nocturnal awakenings	Less than or equal to 2 days/month	3 to 4 times/month	Less than 1 time/week but not nightly	Often 7 times/week
Short-acting beta agonists	Less than or equal to 2 days/week	Greater than 2 days/week	Daily	Several times/day
Interference with daily activities	None	Minor	Some	Extreme
FEV1	Normal between exacerbations	Greater than or equal to 80%	Between 60-80%	Less than 60%
FEV1/FVC Ratio	Greater than 80%	Greater than 80%	Between 75-80%	Less than 75%
Exacerbations requiring oral glucocorticoids	0 to 1 /year	Greater than or equal to 2/year	Greater than or equal to 2/year	Greater than or equal to 2/year

Classifying Asthma Severity in Patients 12 Years of Age and Older

Symptoms	Intermittent Asthma	Persistent Asthma		
		Mild	Moderate	Severe
Daytime symptoms	Less than or equal to 2 days/week	Greater than 2 days/week	Daily	Throughout the day
Nocturnal awakenings	Less than or equal to 2 days/month	3 to 4 times/month	Less than 1 time/week	Nightly
Short-acting beta agonists	Less than 2 days/week	Greater than 2 days/week	Daily	Several times/day
Interference with daily activities	None	Minor	Some	Extreme
FEV1	Normal	Normal	Between 60-80%	Less than 60%
FEV1/FVC Ratio	Normal	Normal	Below normal	Below normal
Exacerbations requiring oral glucocorticoids	Less than or equal to 1/year	1 to 2/year	Greater than or equal to 2/year	Greater than 2/year

Table 1: Stepwise approach for managing asthma in children up to age 4

INTERMITTENT ASTHMA	PERSISTENT ASTHMA (Daily Medication) **Consult with asthma specialist if Step 3 care or higher is required.** **Consider consultation at Step 2**				
				Step 5	Step 6
			Step 4	**Preferred:** *High-dose ICS + either LABA or montelukast*	**Preferred:** *High-dose ICS + either LABA or montelukast* **Alternative:** *Oral systemic corticosteroids*
		Step 3	**Preferred:** *Medium-dose ICS + either LABA or montelukast*		
	Step 2	**Preferred:** *Medium-dose ICS*			
Step 1	**Preferred:** *Low-dose ICS* **Alternative:** *cromolyn or montelukast*				
Preferred: *SABA prn*					

Assess control: check adherence, inhaler technique, and environmental control.

Step up if needed and step down if possible (if well-controlled at least three months).

Each Step: Patient/parent education and environmental control

KEY (alphabetical order)

- ICS = inhaled corticosteroid
- LABA = inhaled long-acting beta$_2$-agonist
- SABA = inhaled short-acting beta$_2$-agonist

QUICK RELIEF MEDICATION (all patients)

- SABA as needed for symptoms; intensity of treatment depends on severity of symptoms.
- With viral respiratory infection: SABA every 4 to 6 hours up to 24 hours (longer with physician consult).
- Frequent use of SABA may indicate the need to step up treatment.

NOTES

- This approach is meant to assist, not replace, the clinical decision making required to meet individual patient needs.
- If an alternative treatment is used and the response is inadequate, discontinue it and use the preferred treatment before stepping up.
- If a clear benefit is not observed within 4 to 6 weeks and the patient/family medication technique and adherence are satisfactory, consider adjusting the therapy or alternative diagnosis.
- Studies on children up to age 4 are limited. Step 2 preferred therapy is based on Evidence A. All other recommendations are based on expert opinion and extrapolation from studies in older children.

Source: Adapted from the National Asthma Education and Prevention Program. *Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma, Full Report 2007.*

Table 2: Stepwise approach for managing asthma in children ages 5 to 11

INTERMITTENT ASTHMA	PERSISTENT ASTHMA (Daily Medication) **Consult with asthma specialist if Step 4 care or higher is required.** **Consider consultation at Step 3.**				
Step 1 **Preferred:** *SABA prn*	**Step 2** **Preferred:** *Low-dose ICS* **Alternative:** *cromolyn, LTRA, nedocromil or theophylline*	**Step 3** **Preferred:** *Either low-dose ICS + (either LABA, LTRA or theophylline)* *or* *medium-dose ICS*	**Step 4** **Preferred:** *Medium-dose ICS + LABA* **Alternative:** *Medium-dose ICS + either LTRA or theophylline*	**Step 5** **Preferred:** *High-dose ICS + LABA* **Alternative:** *High-dose ICS + either LTRA or theophylline*	**Step 6** **Preferred:** *High-dose ICS + LABA + oral systemic corticosteroid* **Alternative:** *High-dose ICS + either LTRA or theophylline + oral systemic corticosteroid*

Assess control: check adherence, inhaler technique, environmental control, and comorbid conditions.

Step up if needed and step down if possible (if well-controlled at least three months).

Each Step: Patient/parent education, environmental control, and management of comorbidities.

Steps 2 through 4: Consider subcutaneous allergen immunotherapy for patients who have allergic asthma (see notes).

KEY (alphabetical order)

- ICS = inhaled corticosteroid
- LABA = inhaled long-acting beta$_2$-agonist
- LTRA = leukotriene receptor agonist
- SABA = inhaled short-acting beta$_2$-agonist

QUICK RELIEF MEDICATION (all patients)

- SABA as needed for symptoms; intensity of treatment depends on severity of symptoms; up to three treatments at 20-minute intervals as needed.
- Use of SABA more than two days a week for symptom relief–not prevention of EIB–generally indicates inadequate control and the need to step up treatment.

NOTES

- This approach is meant to assist, not replace, the clinical decision making required to meet individual patient needs.
- If an alternative treatment is used and the response is inadequate, discontinue it and use the preferred treatment before stepping up.
- Theophylline is a less desirable alternative due to the need to monitor serum concentration levels.
- Step 1 and Step 2 medications are based on Evidence A. Step 3 ICS + adjunctive therapy and ICS are based on Evidence B for efficacy of each treatment and extrapolation from comparator trials in older children and adults (comparator trials are not available for this age group); Steps 4 through 6 are based on expert opinion and extrapolation from studies in older children and adults.
- Immunotherapy for Steps 2 through 4 is based on Evidence B for house-dust mites, animal dander and pollens; evidence is weak or lacking for molds and cockroaches. Evidence is strongest for immunotherapy with single allergens. The role of allergy in asthma is greater in children than in adults. Clinicians who administer immunotherapy should be prepared and equipped to identify and treat anaphylaxis should it occur.

Source: Adapted from the National Asthma Education and Prevention Program. *Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma, Full Report 2007.*

Table 3: Stepwise approach for managing asthma in patients ages 12 and older.

INTERMITTENT ASTHMA	PERSISTENT ASTHMA (Daily Medication) **Consult with asthma specialist if Step 4 care or higher is required.** **Consider consultation at Step 3.**				
					Step 6 **Preferred:** *High-dose ICS + LABA + oral systemic corticosteroid* **Alternative:** *High-dose ICS + either LTRA or theophylline + oral systemic corticosteroid* **Consider:** *Omalizumab for patients who have allergies*
				Step 5 **Preferred:** *High-dose ICS + LABA* **Alternative:** *High-dose ICS + either LTRA or theophylline* **Consider:** *Omalizumab for patients who have allergies*	
			Step 4 **Preferred:** *Medium-dose ICS + LABA* **Alternative:** *Medium-dose ICS + either LTRA or theophylline*		
		Step 3 **Preferred:** *Either Low-dose ICS + LABA or medium-dose ICS* **Alternative:** *Low-dose ICS + either LTRA, theophylline, or zileuton*			
	Step 2 **Preferred:** *Low-dose ICS* **Alternative:** *Cromolyn, LTRA, nedocromil or theophylline*				
Step 1 **Preferred:** *SABA prn*					

Assess control: check adherence, inhaler technique, environmental control, and comorbid conditions.

Step up if needed and step down if possible (if well-controlled at least three months).

Each Step: Patient/parent education, environmental control, and management of comorbidities.

Steps 2 through 4: Consider subcutaneous allergen immunotherapy for patients who have allergic asthma (see notes).

KEY (alphabetical order)

- EIB = exercise-induced bronchospasm
- ICS = inhaled corticosteroid
- LABA = inhaled long-acting beta$_2$-agonist
- LTRA = leukotriene receptor agonist
- SABA = inhaled short-acting beta$_2$-agonist

QUICK RELIEF MEDICATION (all patients)

- SABA as needed for symptoms; intensity of treatment depends on severity of symptoms; up to three treatments at 20-minute intervals as needed.
- Use of SABA more than two days a week for symptom relief–not prevention of EIB–generally indicates inadequate control and the need to step up treatment.

NOTES

- This approach is meant to assist, not replace, the clinical decision making required to meet individual patient needs.
- If an alternative treatment is used and the response is inadequate, discontinue it and use the preferred treatment before stepping up.
- Zileuton is a less desirable alternative drug due to limited studies as adjunctive therapy and the need to monitor liver function. Theophylline requires monitoring of serum concentration levels.
- In Step 6, before oral systemic corticosteroids are introduced, a trial of high-dose ICS + LABA + either (LTRA, theophylline) or zileuton may be considered, although this approach has not been studied in clinical trials.
- Steps 1 through 3 preferred therapies are based on Evidence A; Step 3 alternative therapy is based on Evidence A for LTRA, Evidence B for theophylline, and Evidence D for zileuton. Step 4 preferred therapy is based on Evidence B and alternative therapy is based on Evidence B for LTRA and theophylline and Evidence D for zileuton. Step 5 preferred therapy is based on Evidence B. Step 6 preferred therapy is based on (EPR-2 1997) and Evidence B of omalizumab.
- Immunotherapy for Steps 2 through 4 is based on Evidence B for house-dust mites, animal dander and pollens; evidence is weak or lacking for molds and cockroaches. Evidence is strongest for immunotherapy with single allergens. The role of allergy in asthma is greater in children than in adults. Clinicians who administer immunotherapy should be prepared and equipped to identify and treat anaphylaxis should it occur.

Source: Adapted from the National Asthma Education and Prevention Program. *Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma, Full Report 2007.*

ICD-10 Reference Guide for Asthma

When using ICD-10-CM, it is not be necessary to code for the difference between extrinsic or intrinsic asthma. Asthma is found in section J45 of ICD-10-CM, and requires documentation of mild, medium, and severe asthma. Further documentation is required to assign the correct code between the differences of intermittent and persistent. The greater specificity of ICD-10-CM goes to another level of detail: uncomplicated, (acute) exacerbation, and status asthmaticus.

ICD-10	Description	HCC
J45	**Asthma**	**226**
	J45.0 • Predominantly allergic asthma • Allergic: - Bronchitis NOS - Rhinitis with asthma • Atopic asthma • Extrinsic allergic asthma • Hay fever with asthma	226
	J45.2 Mild intermittent asthma **J45.20** Uncomplicated **J45.21** With (acute) exacerbation **J45.22** With status asthmaticus	226
	J45.3 Mild persistent asthma **J45.30** Uncomplicated **J45.31** With (acute) exacerbation **J45.32** With status asthmaticus	226
	J45.4 Moderate persistent asthma **J45.40** Uncomplicated **J45.41** With (acute) exacerbation **J45.42** With status asthmaticus	226
	J45.5 Severe persistent asthma **J45.50** Uncomplicated **J45.51** With (acute) exacerbation **J45.52** With status asthmaticus	226
	J45.9 Other and unspecified asthma **J45.90** Unspecified • Asthmatic bronchitis NOS • Childhood asthma NOS • Late onset asthma J45.901 Unspecified asthma with (acute) exacerbation J45.902 Unspecified asthma with status asthmaticus	226

NOS: Not otherwise specified

Use additional code, where applicable, to identify:
- exposure to environmental tobacco smoke (Z58.83)
- exposure to tobacco smoke in the perinatal period (P96.6)
- occupational exposure to environmental tobacco smoke (Z57.31)
- history of tobacco use (Z86.43)
- tobacco use (Z72.0)
- tobacco dependence (F17.x)

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References

1. Asthma Definition. Retrieved from: medical.dictionary.thefreedictionary.com/asthma
2. UptoDate. An Overview of Asthma Management. 2016. Retrieved from: uptodate.com
3. UptoDate. Diagnosis of Asthma in Adolescents and Adults. 2017. Retrieved from: uptodate.com
4. Asthma, A Presentation on Athma Mangement and Prevention. Retrieved from www.cdc.com