

An Update of the Asthma Guidelines

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Sources

- ▶ The information for the guidelines comes from
 - Asthma Guidelines from the National Heart, Lung and Blood Institute (NHLBI) 2007
 - Guidelines from the Global Initiative for Asthma (GINA) 2018.
- ▶ Over past 2 years, a group of Pediatricians with Pediatric Pulmonology and Adult Pulmonology oversight and the help of asthma educators have been working on an update of the guidelines.

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Reviewing Asthma Guidelines

- ▶ Clinic visit for asthma
- ▶ Diagnosis of asthma
- ▶ The differential diagnosis
- ▶ Diagnostics
- ▶ Classification
- ▶ Asthma Control Assessment
- ▶ Review Step Wise management
- ▶ Asthma follow up

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Definition

- ▶ “Asthma is a **heterogeneous** disease, usually characterized by **chronic airway inflammation**. It is defined by **respiratory symptoms** such as wheeze, shortness of breath, chest tightness and cough that **vary over time** and in intensity, together with variable **flow limitation**.” GINA 2018

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Clinic visit for asthma

- ▶ History
- ▶ Physical Exam
- ▶ Diagnostics
- ▶ Diagnosis

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History

- ▶ Which symptoms are present?
 - Cough
 - Wheezing
 - Dyspnea
- ▶ How often do the symptoms occur and how well are they controlled?
 - Daytime
 - Nighttime
 - Exertion
- ▶ How often does the patient need rescue medications?

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History

- ▶ Asthma exacerbations
 - Symptoms
 - Were steroids required?
 - Did the Patient need to go to the ER?
 - Was the patient hospitalized?
 - Has the patient ever been in the ICU or needed intubation?

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Physical Exam

- ▶ Growth
 - Decreasing growth velocity can be a side effect of both inhaled and oral steroids.
- ▶ Weight
 - Increasing weight and BMI can be a side effect of frequent oral steroid use.
- ▶ Skin
 - Eczema
- ▶ HEENT
 - Thrush in the oropharynx can be a side effect of ICS
 - Nasal exam looking for signs of allergic rhinitis.

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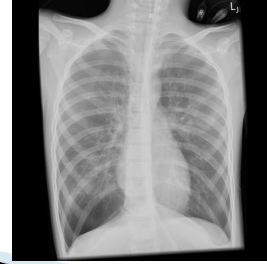
Physical Exam

- ▶ Respiratory
 - Oxygen saturations
 - Work of breathing
 - Auscultation
 - Expiratory time with and without forced expiration
 - Crackles?
 - Wheeze?

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Diagnostics

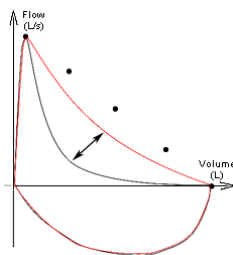
- ▶ Chest Xray
 - Findings supportive of asthma include bronchial wall thickening, hyperinflation



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Diagnostics

- ▶ Spirometry: obstruction with reversibility



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Patients less the 5 years

INITIAL ASSESSMENT

Symptoms	Medical History
<ul style="list-style-type: none"> • Recurrent wheezing • Coughing • Recurrent Respiratory Tract Infections 	<ul style="list-style-type: none"> • Allergic rhinitis • Premature Birth • Family history (1st degree relative) of asthma or allergy • Atopy present in the majority of children with asthma who are over 3 years old

• Allergen specific sensitization is one of the most important risk factors for the development of asthma

Risk factors that may exacerbate symptoms	Red flags
<ul style="list-style-type: none"> • Allergen exposure/sensitization • Environmental Tobacco/Marijuana Smoke • Irritants (woodsmoke, airborne chemicals, strong smells) 	<ul style="list-style-type: none"> • Reactive airway disease • Nocturnal symptoms • History of steroid use • ED visits • Hospitalization

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Patients less than 5 years of age.

DIAGNOSTICS

Features suggesting a diagnosis of asthma in children 5 years and younger	
Feature	Characteristics suggesting asthma
Cough	Recurrent or persistent non-productive cough that may be worse at night accompanied by some wheezing and breathing difficulties. Cough occurring with exercise, laughing, crying or exposure to tobacco smoke in the absence of an apparent respiratory infection
Wheezing	Recurrent wheezing, including during sleep or with triggers such as activity, laughing, crying or exposure to tobacco smoke or air pollution
Difficult or heavy breathing or shortness of breath	Occurring with exercise, laughing, or crying
Reduced activity	Not running, playing or laughing at the same intensity as other children; tires earlier during walks (wants to be carried)
Past or family history	Other allergic disease (atopic dermatitis or allergic rhinitis) Asthma in first-degree relatives
Therapeutic trial with low dose inhaled corticosteroid and as-needed short-acting beta ₂ -agonist, SABA*	Clinical improvement during 2-3 months of controller treatment and worsening when treatment stopped

* Due to the variable nature of asthma in young children, a therapeutic trial may need to be repeated in order to be certain of the diagnosis. GINA page 103

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Differential Diagnosis

Differential diagnosis

- Upper respiratory tract infections (e.g. RSV and Rhinovirus) are associated with recurrent wheezing throughout childhood*
- Recurrent viral respiratory tract infections
- GERD
- Foreign body aspiration
- Tracheomalacia
- Tuberculosis
- Bronchopulmonary dysplasia
- Cystic fibrosis
- Primary ciliary dyskinesia
- Vascular ring
- Congenital heart disease
- Immune deficiency

* Global Strategy for Asthma Management and Prevention (GINA) page 100

Key indications for referral of a child 5 years or younger for further diagnostic investigations

- Any of the following features suggest an alternative diagnosis and indicate the need for further investigations:
- Failure to thrive
 - Neonatal or very early onset symptoms (especially if associated with failure to thrive)
 - Vomiting associated with respiratory symptoms
 - Continuous wheezing
 - Failure to respond to asthma controller medications
 - No association of symptoms with typical triggers, such as viral respiratory tract infections
 - Focal lung or cardiovascular signs, or finger clubbing
 - Hypoxemia outside context of viral illness

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Testing

Testing:

- Pulse Oximetry
- CXR to R/O structural abnormalities (congenital lobar emphysema, vascular rings), chronic infections such as TB, an inhaled foreign body

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Patients 6 to 11 years of age

INITIAL ASSESSMENT

Symptoms	Medical History	Comorbidities
<ul style="list-style-type: none"> • Recurrent wheezing • Coughing • Chest tightness • Expiratory airflow limitations • Dyspnea 	<ul style="list-style-type: none"> • Pneumonia • Atopic dermatitis (eczema) • Allergies • Premature Birth • Recurrent bronchitis • Allergic rhinitis • Family history of asthma or allergy 	<ul style="list-style-type: none"> • Rhinitis • Sinusitis • GERD • Obesity • OSA • Depression and anxiety

Risk factors that may exacerbate symptoms

- Exercise
- Recurrent Respiratory Tract Infections
- Allergen exposure/sensitization
- Changes in weather
- Environmental Tobacco/Marijuana Smoke
- Irritants (woodsmoke, airborne chemicals, strong smells)
- Stress
- Menstrual cycles
- Nocturnal symptoms
- Strong emotional expressions

Red flags

- History of steroid use
- ED visits
- Hospitalization

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Patients greater than 12 yo

INITIAL ASSESSMENT

Symptoms	Medical History	Comorbidities
<ul style="list-style-type: none"> • Recurrent wheezing • Coughing • Chest tightness • Expiratory airflow limitations • Dyspnea 	<ul style="list-style-type: none"> • Pneumonia • Atopic dermatitis (eczema) • Allergies • Premature Birth • Recurrent bronchitis • Allergic rhinitis • Family history of asthma or allergy 	<ul style="list-style-type: none"> • Rhinitis • Sinusitis • GERD • Obesity • OSA • Depression and anxiety
Risk factors that may exacerbate symptoms		Red flags
<ul style="list-style-type: none"> • Exercise • Recurrent Respiratory Tract Infections • Allergen exposure/sensitization • Changes in weather • Environmental Tobacco Smoke • Tobacco or marijuana use • Irritants (woodsmoke, airborne chemicals, strong smells) 		<ul style="list-style-type: none"> • Stress • Menstrual cycles • Nocturnal symptoms • Strong emotional expressions • History of steroid use • ED visits • Hospitalization

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Differential 6-12 yo

Differential diagnosis	Features that decrease probability that respiratory symptoms are due to asthma
<ul style="list-style-type: none"> • Chronic upper airway cough syndrome • Inhaled foreign body • Bronchiectasis • Primary ciliary dyskinesia • Congenital heart disease • Cystic fibrosis • Vocal cord dysfunction • Tuberculosis 	<ul style="list-style-type: none"> • Chronic sputum production • Dyspnea associated with dizziness, light headedness or peripheral tingling • Chest pain • Exercise-induced dyspnea with noisy inspiration

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Differential >12 yo.

Differential diagnosis	Patients 40+ years
<ul style="list-style-type: none"> • Chronic upper airway cough syndrome • Bronchiectasis • Primary ciliary dyskinesia • Cystic fibrosis • Vocal cord dysfunction • Tuberculosis 	<ul style="list-style-type: none"> • COPD • Bronchiectasis • Cardiac Failure • Interstitial/Diffuse Lung Disease
Features that decrease probability that respiratory symptoms are due to asthma	
<ul style="list-style-type: none"> • Chronic sputum production • Dyspnea associated with dizziness, light headedness or peripheral tingling • Chest pain • Exercise-induced dyspnea with noisy inspiration 	

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Diagnostics > 6 years old.

DIAGNOSTICS

Spirometry	Recommended Additional Testing
<ul style="list-style-type: none"> • Performed at diagnosis or start of treatment, after 3-6 months of controller treatment to assess the patient's personal best FEV₁, every 1-2 years, more frequently in at risk patients. • Lung function does not correlate strongly with asthma symptoms in adults and children; a low FEV₁ is a strong independent predictor of risk of exacerbations, even after adjustment for symptom frequency. 	<ul style="list-style-type: none"> • Pulse Oximetry • CXR • Consider allergy testing

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General Points

- ▶ Asthma symptoms can be a great mimicker of other disorders to important to keep in mind the differential especially in atypical presentations.
- ▶ Asthma classification is used to help assess the severity of asthma and to help choose maintenance medications.
- ▶ For patients already on treatment, classification can be used as a way to assess overall control.

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Symptom Control Assessment.

Symptom Control Assessment		Level of Asthma Symptom Control			
In the past 4 weeks, has the patient had:	Yes	No	Well controlled	Partly controlled	Uncontrolled
Daytime asthma symptoms for more than a few minutes, more than twice a week?			None of these	1-2 of these	3 or more
Any activity limitation due to asthma? (Runs/plays less than other children, tires easily during walking/playing?) Missed work or school due to asthma?					
Reliever medication needed* more than twice a week?					
Any night waking or night coughing due to asthma?					
Have you been to a quick care or ED for your asthma since your last visit?					
Have you been prescribed an oral corticosteroid (OCS) for your asthma since your last visit?					

* Excludes reliever taken before exercise

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Classification < 5 yo

SEVERITY CLASSIFICATION

Components of Severity	Persistent			
	Intermittent	Mild	Moderate	Severe
Daytime symptoms	≤2 days/week	>2 days/week but not daily	Daily	Throughout the day
Nighttime awakenings	None	1-2/month	3-4/month	>1x/week
SABA ¹ use for symptom control ²	≤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	n/a	n/a	n/a	n/a
Risk	Exacerbations requiring oral corticosteroids	0-1/yr	>2 exacerbations in 6 months requiring oral corticosteroids or ≥4 wheezing episodes/year lasting ≥1 day AND risk factors for persistent asthma ³	

* Level of severity is determined by both impairment and risk. Assess impairment domain by patient/caregiver's recall of the previous 2-4 weeks and symptoms (if ≥5yrs of age). Severity may be assigned to the most severe category in which any feature occurs.

¹ At present, there are inadequate data to compare frequency 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 3yrs of age 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.

² Short acting inhaled beta₂-agonists.

³ Does not include SABA for prevention of exercise-induced bronchospasm.

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Classification 6 -12 yo

SEVERITY CLASSIFICATION

Components of Severity	Persistent			
	Intermittent	Mild	Moderate	Severe
Daytime symptoms	≤2 days/week	>2 days/week but not daily	Daily	Throughout the day
Nighttime awakenings	<2/month	3-4/month	>1x/week	7x/week
SABA ¹ use for symptom control ²	≤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% FEV ₁ /FVC>80%	FEV ₁ >60-80% FEV ₁ /FVC>75-80%	FEV ₁ <60% FEV ₁ /FVC<75%
Risk	Exacerbations requiring oral corticosteroids	0-1/yr	>2 exacerbations in 1 year requiring oral corticosteroids ³	

* Level of severity is determined by both impairment and risk. Assess impairment domain by patient/caregiver's recall of the previous 2-4 weeks and symptoms (if ≥5yrs of age). Severity may be assigned to the most severe category in which any feature occurs.

¹ At present, there are inadequate data to compare frequency 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 6yrs of age 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.

² Short acting inhaled beta₂-agonists.

³ Does not include SABA for prevention of exercise induced bronchospasm.

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Assessment of Risk

- ▶ Frequency of Oral steroids for exacerbations
 - 0 -1 courses of steroids is consistent with intermittent classification
 - The need for 2 or more courses in a calendar year is a factor of increase risk and need for inhaled corticosteroids
- ▶ Frequent Short acting beta agonist use.
 - If using greater than 200 inhalations per month (greater than 1 canister) there is an increased risk of mortality.
- ▶ Need for Acute Care for Severe Exacerbations.
 - 1 or more ER visits or hospitalizations in the past year
 - Any history of ICU care and/or need for intubation but especially in the past 5 years.
- ▶ Evidence of Flow Limitation on Spirometry
 - Low FEV1 especially if less than 60% increases chance exacerbation

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Other Risk Factors

- ▶ Smoking
 - Passive Exposure increases risk
- ▶ Poor Compliance
 - Not adhering to the prescribed plan
 - Poor technique with medications
- ▶ Psychological problems that may impede treatment
- ▶ Socioeconomic barriers to treatment

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Risk

- ▶ There is not a direct correlation between the number of exacerbations and the classification of asthma.
- ▶ However, the more frequent the exacerbations especially if they are severe, the increase in disease severity.
- ▶ This concept also applies to the number of risk factors for asthma exacerbations. The more risk factors, the more likely the patient will have more severe disease.

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Classification > 12 yo

Components of Severity		SEVERITY CLASSIFICATION		
		Intermittent	Mild	Persistent
Impairment	Daytime symptoms	≤2 days/week	>2 days/week but not daily	Daily
	Nighttime awakenings	≤2/month	3-4/month	>1/week
	SABA use for symptom control ¹	≤2 days/week	>2 days/week but not daily	Daily
	Interference with normal activity	None	Minor limitation	Some limitation
Risk	Lung function	Normal FEV ₁ , between exacerbations FEV ₁ > 80% predicted FEV ₁ /FVC Normal	FEV ₁ > 80% FEV ₁ /FVC Normal	FEV ₁ > 60-80% FEV ₁ /FVC > 70-75%
	Exacerbations requiring oral corticosteroids	0-1/yr	≥2 exacerbations in 1 year requiring oral corticosteroids ¹	

* Level of severity is determined by both impairment and risk. Assess impairment derive by patient/physician's recall of the previous 2-4 weeks and spirometry (if >12yo of age). Severity may be assigned to the most severe category in which any feature occurs.
¹ If present, there are recognizable signs or symptoms (frequency of exacerbations with different levels of airway severity, frequency, nocturnal and/or severe exacerbations (e.g., requiring urgent, unscheduled care, hospitalization, or ICU admission) indicate greater underlying disease severity. For treatment purposes, patients >12yo of age who had ≥2 exacerbations requiring oral or systemic corticosteroids in the past year may be considered to have persistent asthma, even in the absence of treatment levels consistent with persistent asthma.
² Short acting inhaled beta₂ agonists.
³ Does not include SABA for prevention of exercise-induced bronchospasm.

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Spirometry

- ▶ In patients older than 6 years of age, spirometry is introduced into the classification of asthma.
- ▶ Lung function does not correlate strongly with asthma symptoms in children and adults.
- ▶ Patients can have frequent asthma symptoms on questioning but still have normal spirometry at the time of the clinic visit.
 - In those instances, symptom control is the most important aspect of asthma classification and not spirometry.
- ▶ However, a low FEV1 is a strong independent risk factor irrespective of symptom items of future exacerbations.
 - If a patient has few asthma symptoms but a low FEV1, it should cause a provider to take pause as to whether or not a patient really has good control.

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Asthma classification based on amount therapy needed for control

- ▶ Step 1 patients do well with SABA only .
 - Classification is intermittent
- ▶ Patients who need low dose inhaled steroids (Step 2)
 - Classification is Mild Persistent.
- ▶ Patients who need moderate dosing of inhaled steroids (Step 3,4)
 - Classification is Moderate Persistent
- ▶ Patients who need high dose inhaled steroids (Step 4, 5)
 - Classification is Severe Persistent dosing.

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Step wise management of Asthma

- ▶ With the initial presentation of asthma, a decision is made as to their classification.
- ▶ Once Classification is made, the amount of controller, as in which step, is determined.
- ▶ Intermittent Step 1
 - These patients have rare symptoms and no risk and usually do well with short acting beta agonists.
- ▶ Mild Persistent needs Step 2 .
 - Step 2 is low dose inhaled steroids.

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Step wise management of Asthma

- ▶ Moderate Persistent is step 3 or Step 4 controller
 - Step 3 is medium dose of inhaled steroids.
 - Step 4 is medium dose of inhaled steroids plus a long acting beta agonists but may need to consider high dose inhaled steroid.
- ▶ Severe Persistent is step 4 or Step 5
 - Step 4 can be high dose inhaled steroid
 - Step 5 is high dose inhaled steroids and a Long acting beta agonist.

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Asthma Management 0 to 5

STEPWISE APPROACH TO MANAGEMENT 0-5 YEARS

	Step 1	Step 2	Step 3	Step 4	KEY
Preferred Controller		Daily low dose ICS	Refer to an Asthma Specialist Double low dose ICS	Refer to an Asthma Specialist Continue controller and refer for specialist assessment	SABA – short-acting beta ₂ agonist LABA – long-acting beta ₂ agonist LTRA – leukotriene receptor antagonist ICS – inhaled corticosteroid
Other Controller Options		LTRA	Low dose ICS + LTRA	Add LTRA include ICS frequency	
Reliever	As-needed SABA (all children)				
Severity Classification	Intermittent	Mild Persistent	Moderate Persistent	Severe Persistent	

*Asthma severity is assessed retrospectively from the level of treatment required to control symptoms and exacerbations. It can be assessed once the patient has been on controller treatment for several months and, if appropriate, treatment stepdown has been attempted to find the patient's minimum effective level of treatment. Asthma severity is not a static feature and may change over months or years.

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Management 6 to 12 yo

STEPWISE APPROACH TO MANAGEMENT 6-11 YEARS

	Step 1	Step 2	Step 3	Step 4	Step 5
Preferred Controller		Low dose ICS	Consider Consult with an Asthma Specialist Medium dose ICS	Refer to an Asthma Specialist Medium/high ICS + LABA	Refer to an Asthma Specialist Add-on treatment: anti-IGF, High ICS + LABA
Other Controller Options		LTRA	LTRA	Low dose ICS +	High dose ICS
Reliever	As needed short-acting beta ₂ agonist (SABA)				
Severity Classification	Intermittent	Mild Persistent	Moderate Persistent	Moderate to Severe Persistent	Severe Persistent

KEY	
SABA – short-acting beta ₂ agonist	LTRA – leukotriene receptor antagonist
LABA – long-acting beta ₂ agonist	ICS – inhaled corticosteroid

*Asthma severity is assessed retrospectively from the level of treatment required to control symptoms and exacerbations. It can be assessed once the patient has been on controller treatment for several months and, if appropriate, treatment stepdown has been attempted to find the patient's minimum effective level of treatment. Asthma severity is not a static feature and may change over months or years.

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Management 12 years and older

STEPWISE APPROACH TO MANAGEMENT ≥12 YEARS

	Step 1	Step 2	Step 3	Step 4	Step 5
Preferred Controller		Low dose ICS	Consider Consult with an Asthma Specialist Medium dose ICS/LABA	Refer to an Asthma Specialist Medium/high ICS/LABA	Refer to an Asthma Specialist Refer for add-on treatment: LAMA*, anti-IGF, anti-IL5
Other Controller Options		LTRA	Med/high dose ICS Low dose ICS + LTRA	Add LAMA* High dose ICS + LTRA	Add low dose CCS
Reliever	As needed short-acting beta ₂ agonist (SABA)				
Severity Classification	Intermittent	Mild Persistent	Moderate Persistent	Moderate to Severe Persistent	Severe Persistent

KEY	
SABA – short-acting beta ₂ agonist	ICS – inhaled corticosteroid
LABA – long-acting beta ₂ agonist	CCS – oral corticosteroid
LAMA – long-acting muscarinic antagonist	SMI – soft mist inhaler
LTRA – leukotriene receptor antagonist	

*Spiriva (tiotropium bromide respimat SMI) by mist inhaler is an add-on treatment for patients with a history of exacerbations.
**Asthma severity is assessed retrospectively from the level of treatment required to control symptoms and exacerbations. It can be assessed once the patient has been on controller treatment for several months and, if appropriate, treatment stepdown has been attempted to find the patient's minimum effective level of treatment. Asthma severity is not a static feature and may change over months or years.

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Dosing 0 to 5 years old.

LOW DAILY DOSES OF INHALED CORTICOSTEROIDS

Brand name	Corticosteroid	
	Corticosteroid	Low daily dose
Flovent	Fluticasone propionate (HFA)	44 mcg 2 puffs twice daily
Pulmicort	Budesonide (nebulized)	0.5 mg once daily
QVAR	Beclomethasone dipropionate (HFA)	40 mcg 2 puffs twice daily

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Dosing for 6 to 12 years old.

DAILY DOSES OF INHALED CORTICOSTEROIDS

Brand name	Corticosteroid	Low	Medium	High
Asmanex Twisthaler*	Mometasone furoate (DPI)	110 mcg 1 puff once daily	220 mcg 1 puff once daily	220 mcg 2 puffs once daily
Arnuity Ellipta	Fluticasone furoate (DPI)	100 mcg 1 puff once daily	200 mcg 1 puff once daily	200 mcg 1 puff twice daily
Flovent	Fluticasone propionate (DPI)	50 mcg 1 puff twice daily	100 mcg 1 puff twice daily	250 mcg 1 puff twice daily
Flovent	Fluticasone propionate (HFA)	44 mcg 2 puffs twice daily	110 mcg 2 puffs twice daily	220 mcg 2 puffs twice daily
Pulmicort	Budesonide (DPI)	90 mcg 1 puff twice daily	180 mcg 1 puff twice daily	180 mcg 2 puffs twice daily
Pulmicort	Budesonide (respules)	0.25 mg twice daily or 0.5 mg once daily	0.5 mg twice daily	1 mg twice daily
QVAR	Beclomethasone dipropionate (HFA)	40 mcg 2 puffs twice daily	80 mcg 2 puffs twice daily	80 mcg 4 puffs twice daily

* Please consider development stages when prescribing for pediatric patients. Consider use of aerodilator with medium mask through age 10.

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Dosing 12 years or older

DAILY DOSES OF INHALED CORTICOSTEROIDS

Brand name	Corticosteroid	Low	Medium	High
Asmanex Twisthaler	Mometasone furoate (DPI)	110 mcg or 220 mcg 1 puff once daily	220 mcg or 440 mcg 1 puff once daily	440 mcg 2 puffs once daily
Asmanex	Mometasone furoate (HFA)	90 mcg 2 puffs once daily	200 mcg 2 puffs once daily	200 mcg 2 puffs twice daily
Arnuity Ellipta	Fluticasone furoate (DPI)	100 mcg 1 puff once daily	200 mcg 1 puff once daily	200 mcg 1 puff twice daily
Flovent Diskus	Fluticasone propionate (DPI)	50 mcg 1 puff twice daily	100 mcg 2 puffs twice daily	250 mcg or 500 mcg 1 puff twice daily
Flovent	Fluticasone propionate (HFA)	44 mcg 2 puffs twice daily	110 mcg 2 puffs twice daily	220 mcg 2 puffs twice daily
Pulmicort Flexhaler	Budesonide (DPI)	90 mcg 1 puff twice daily	180 mcg 1 puff twice daily	180 mcg 2 puffs twice daily
QVAR	Beclomethasone dipropionate (HFA) or RediHaler (DPI)	40 mcg 2 puffs twice daily	80 mcg 2 puffs twice daily	80 mcg 4 puffs twice daily

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Nebulizer Treatment with Mask

1. Hold the mask to the face so both the nose and mouth are covered. The mask may be secured to the head with an elastic band.
2. Turn the compressor on to start the mist. The head should be held upright. This correctly positions the nebulizer and opens the airway.
3. Assure deep breathing throughout the treatment.
4. Occasionally tapping the side of the nebulizer helps the solution to drop to where it can be misted.
5. Continue the treatment until the onset of inconsistent nebulization, i.e. sputtering.



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Spacer with Mask

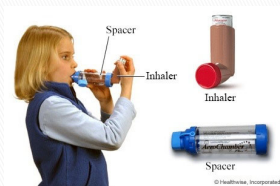
- Shake the MDI four to five times
- Insert the mouthpiece of the MDI into the spacer.
- Place the mask gently over the patient's mouth and nose. Be certain that there is a good seal.
- Press down on the MDI canister to release the medicine into the spacer.
- Keep the mask on for six breaths.
- Wait one minute before repeating steps 2 through 5 for the second puff.



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Spacer with Mouth Piece.

- ▶ Shake the MDI four to five times
- ▶ Place the mouthpiece of the MDI into the spacer.
- ▶ Place the spacer mouthpiece in your mouth. Exhale completely
- ▶ Press down on the MDI canister to release the medicine into the spacer.
- ▶ Breathe in slowly and deeply. If you hear a whistle, your child is breathing in too fast.
- ▶ Remove the MDI and spacer.
- ▶ Hold your breath for ten seconds, then breath out slowly.
- ▶ Wait one minute before repeating steps 2 through 6 for the second puff.



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Dry Powder Inhaler

- ▶ Exhale to get as much air as possible
- ▶ Trigger DPI
- ▶ Rapid and forcible inhalation
- ▶ Hold breath for 10 seconds
- ▶ If too slow, not all the dose gets emitted and particles are deposited in the mouth



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Thoughts on Delivery

- ▶ Our practice
 - Choose technique that is easiest for family and child to use day in and day out.
 - For Nebulizer need to wear mask which for some toddlers can be very difficult.
 - Use tidal volume technique up to 10 to 12 years old.
 - Switch to full inhalation technique around 9 to 12
 - Dry powdered inhaler 13 years and older.
 - Recommend inhaler with spacer at any age.
 - Always need to review technique.

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Medication Dosing

- ▶ Recommend that providers use medications that they feel comfortable using.
- ▶ It is important to understand the optimal ways to deliver the medications
- ▶ If providers need to increase medications to moderate persistent dosing especially with poor control consider consult with an asthma specialist.

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General Management

MANAGEMENT

Assess symptom control over last 4 weeks- System Control Assessment Tobacco treatment referral for parents/caregivers if patient exposed to environmental tobacco smoke Influenza vaccine Allergen avoidance Pneumococcal vaccine	Set goals for managing asthma and medications Assess and treat comorbidities Self-management education • Written asthma action plan • Inhaler education with teach back* • Assess adherence Annual visits
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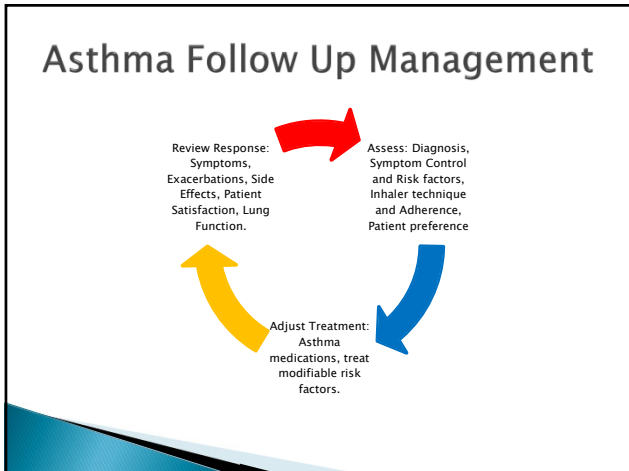
* Inhaler competence in asthma: Common errors, barriers to use and recommended solutions." Respiratory Medicine, October 23, 2012
<https://www.sciencedirect.com/science/article/pii/S0954611112003587>

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Follow Up

- ▶ After Initial Diagnosis
 - Closer follow up with revisit in 1 to 3 months.
- ▶ Routine Follow up anywhere 1 to 6 months.
 - If doing well and stable OK to space to 6 months.
 - If making a change either up or down in the amount of therapy 3 months.
- ▶ After acute exacerbation
 - Follow up in 1 to 4 weeks.

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Evaluation patient with Poor Response to treatment.

- ▶ Confirm that the diagnosis is correct.
- ▶ Co-morbidities
 - Obesity
 - Gastroesophageal Reflux
 - Obstructive Sleep Apnea
 - Psychiatric diagnoses.
- ▶ Compliance
 - Actually taking the medication.
 - Using a spacer correctly. Using dry powdered inhaler correctly.
- ▶ Environmental Exposure
 - Cigarette smoke
 - Allergen exposure
- ▶ Consider stepping up therapy depending on the answers to the above issues.

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Stepping Down in therapy

- ▶ Guidelines state that should consider if doing well at 3 months
 - This recommendation may be short for many patients.
 - Exercise caution on decreasing therapy going into the winter.
 - Have they been able to tolerate respiratory infection with a break through?
 - What are the patient's risk factors?
- ▶ Step down therapy
 - Reverse directions of the steps.
 - Discontinuing Long acting Beta agonists is considered a step
 - Reassess in 3 months.

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Example #1

- ▶ John is a 6 year old with Mild Persistent Asthma on Flovent 44
 - He has no cough during the day or night time.
 - He has no problems with exertion when well.
 - He does not need SABA when well
 - He has had 2 asthma exacerbations in the past 3 months
 - One exacerbation required an ER visits with steroids
 - Second exacerbation was managed by the PCP with a course of steroids and a nebulizer treatment in the office.

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Example #1

- ▶ Based on his symptoms profile and his need for SABA, John is doing well.
- ▶ His risk profile is significant in that he has had 2 courses of steroids and 1 ER visit in the past 3 months.
- ▶ For this reason, his classification should be increased from Mild Persistent to Moderate Persistent. His therapy should be increased from Step 2 to Step 3.
- ▶ His inhaled steroids should be increased from low dose to medium dose inhaled steroids.

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Example #2

- ▶ Lisa is an 8 year old who has just been diagnosed with asthma.
- ▶ She has a daily cough and cough a few nights a month.
- ▶ She has not needed a course of prednisone and has not needed to go to the ER.
- ▶ Spirometry is normal with an FEV1 of 95%.

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Example #2

- ▶ Lisa has regular symptoms of asthma
- ▶ At this time, she has no risk factors with no recent course of steroids.
- ▶ Her spirometry is normal in clinic.
- ▶ Her classification is mostly based on symptoms and would be Moderate Persistent and thus would Step 3 therapy which is medium dose of inhaled steroids.
- ▶ A Short Acting Beta agonists with exercise would be recommended in this case.

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Example #3

- ▶ Jennifer is a 14 year old with a history of asthma on Flovent 110
- ▶ When well she has no symptoms during the day. She does have a cough several nights a week.
- ▶ She does cough when she plays basketball but 2 puffs of SABA before she plays seems to work.
- ▶ She has not needed a course of steroids or needed to go to the ER for her asthma recently.
- ▶ Her spirometry in clinic is normal. FEV1 is 90%

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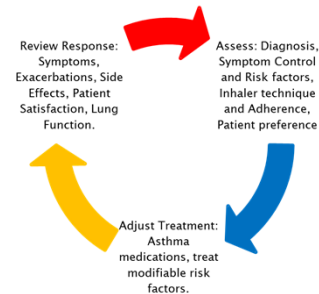
Example #3

- ▶ Jennifer is doing well with no symptoms during the day but does have symptoms several nights a week. She does have symptoms with exercise and uses SABA before. This use of SABA is not considered a risk factor.
- ▶ Her spirometry is normal
- ▶ She has no risk factors at this time.
- ▶ In this case classification is done based on the amount of medication that is needed for control. Flovent 110 is a medium dose so her classification is Moderate Persistent and she is on Step 3 therapy
- ▶ She is only partially controlled with coughing at night so would recommend increasing to step 4 therapy and adding a long acting beta agonist.

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Summary

- ▶ With each visit the process is the same.



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