

## Classification and Management of Asthma

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AARC Approved 1 Hour Live CRCE

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## Learning Objectives

- 1) Describe asthma
- 2) Classify asthma based upon severity
- 3) Suggest treatment options based upon classification.

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## Asthma – What is it?

- “Asthma is a chronic (long-term) lung disease that inflames and narrows the airways. Asthma causes recurring periods of wheezing, chest tightness, shortness of breath, and coughing. The coughing often occurs at night or early in the morning.
- Asthma affects people of all ages, but it most often starts during childhood. In the United States, more than 25 million people are known to have asthma. About 7 million of these people are children.”
- <https://www.nhlbi.nih.gov/health-topics/asthma>

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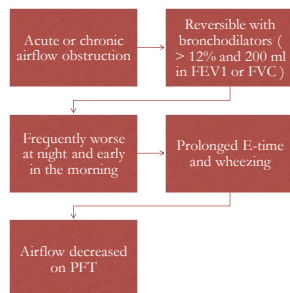
## Causes

The exact cause of asthma isn't known.

- An inherited tendency to develop allergies, called atopy
- Parents who have asthma
- Certain respiratory infections during childhood
- Contact with some airborne allergens or exposure to some viral infections in infancy or in early childhood when the immune system is developing

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## Typical Findings



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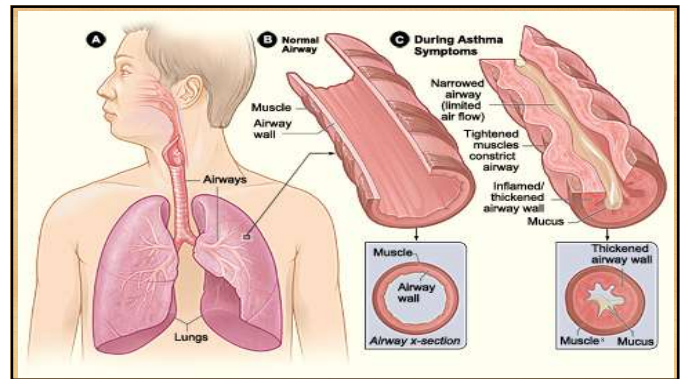
## Typical Findings

- Inflammatory cell infiltration
  - Eosinophils
  - Neutrophils
  - Lymphocytes
- Goblet cell hyperplasia
  - Thick mucus
  - Plugging

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### Typical Findings

- Airway edema
- Mast cell activation
- Bronchial smooth muscle hypertrophy
- Remodeling of the basement membrane
- May be normal between exacerbations



### Keep in Mind

- Signs & symptoms vary widely patient to patient
- Signs & symptoms can vary with the same patient over time

### Classification of Severity - Impairment

- Symptoms
- Nighttime Awakenings
- SABA use
- Activity Interference
- Lung function
  - FEV1
  - FEV1% (FEV1/FVC)

### Classification of Severity - Impairment

- Lung function
  - FEV1
  - FEV1% (FEV1/FVC)

Components of Severity	Intermittent		
	Age 0-4 years	Age 5-11 years	Age ≥12 years
Symptoms	≤2 days/week		
Nighttime awakenings	0	≤2x/month	
SABA use for symptom control (not to prevent EEPs)	≤2 days/week		
Interference with normal activity	None		
Lung function	Normal FEV <sub>1</sub> , Spirometry, exhalations		
	Not applicable	>80%	>80%
	Not applicable	>80%	Normal <sup>†</sup>
Risk	Asthma exacerbations requiring oral systemic corticosteroids <sup>‡</sup>		
	0-1/year		

Components of Severity	Intermittent			Persistent		
	Aggs 0-4 years	Aggs 5-11 years	Aggs >12 years	Aggs 0-4 years	Aggs 5-11 years	Aggs >12 years
Symptoms	≤2 days/week			≥2 days/week but not daily		
Nighttime awakenings	0	≤2x/month	1-2x/month	3-6x/month		
SABA use for symptom control (not to prevent EBP)	≤2 days/week			≥2 days/week but not daily		
SABA use for symptom control (not to prevent EBP)	≤2 days/week			≥2 days/week but not more than once on any day		
Interference with normal activity	None			Minor limitation		
Lung Function	Normal FEV <sub>1</sub> between exacerbations			Normal FEV <sub>1</sub> between exacerbations		
→ FEV <sub>1</sub> (% predicted)	Not applicable	>80%	>80%	Not applicable	>80%	>80%
→ FEV <sub>1</sub> /VC*	Not applicable	>85%	Normal†	>80%	>80%	Normal†
Asthma exacerbations requiring oral systemic corticosteroids	0-1/year			≥2 exacerbations in 6 months, or wheezing or wheezing risk factor AND risk factors for persistent asthma		
				Generally more frequent and intense events indicate greater severity		

Components of Severity	Intermittent			Mild Persistent			Moderate Persistent	
	Aggs 0-4 years	Aggs 5-11 years	Aggs >12 years	Aggs 0-4 years	Aggs 5-11 years	Aggs >12 years	Aggs 0-4 years	Aggs >12 years
Symptoms	≤2 days/week			≥2 days/week out not daily			Daily	
Nighttime awakenings	0	≤2x/month	1-2x/month	3-4x/month			3-4x/month	
SABA use for symptom control (not to prevent EBP)	≤2 days/week			≥2 days/week but not daily			≥2 days/week but not daily and not more than once on any day	
SABA use for symptom control (not to prevent EBP)	≤2 days/week			≥2 days/week but not daily			Daily	
Interference with normal activity	None			Minor limitation			Some limitation	
Lung Function	Normal FEV <sub>1</sub> between exacerbations			Normal FEV <sub>1</sub> between exacerbations			Normal FEV <sub>1</sub> between exacerbations	
→ FEV <sub>1</sub> (% predicted)	Not applicable	>80%	>80%	Not applicable	>80%	>80%	Not applicable	60-80%
→ FEV <sub>1</sub> /VC*	Not applicable	>85%	Normal†	>80%	>80%	Normal†	75-80%	Reduced †
Asthma exacerbations requiring oral systemic corticosteroids	0-1/year			≥2 exacerbations in 6 months, or wheezing or wheezing risk factor AND risk factors for persistent asthma			Generally more frequent and intense events indicate greater severity	
							Generally more frequent and intense events indicate greater severity	

Components of Severity	Intermittent			Mild Persistent			Moderate Persistent		Severe Persistent	
	Aggs 0-4 years	Aggs 5-11 years	Aggs >12 years	Aggs 0-4 years	Aggs 5-11 years	Aggs >12 years	Aggs 0-4 years	Aggs 5-11 years	Aggs 0-4 years	Aggs >12 years
Symptoms	≤2 days/week			≥2 days/week but not daily			Daily		Throughout the day	
Nighttime awakenings	0	≤2x/month	1-2x/month	3-4x/month			3-4x/month		Often 7x/week	
SABA use for symptom control (not to prevent EBP)	≤2 days/week			≥2 days/week but not daily			Daily		Several times per day	
SABA use for symptom control (not to prevent EBP)	≤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			Normal FEV <sub>1</sub> between exacerbations			Normal FEV <sub>1</sub> between exacerbations		Normal FEV <sub>1</sub> between exacerbations	
→ FEV <sub>1</sub> (% predicted)	Not applicable	>80%	>80%	Not applicable	>80%	>80%	Not applicable	60-80%	60-80%	<80%
→ FEV <sub>1</sub> /VC*	Not applicable	>85%	Normal†	>80%	>80%	Normal†	75-80%	Reduced †	<75%	Reduced †
Asthma exacerbations requiring oral systemic corticosteroids	0-1/year			≥2 exacerbations in 6 months, or wheezing or wheezing risk factor AND risk factors for persistent asthma			Generally more frequent and intense events indicate greater severity		Generally more frequent and intense events indicate greater severity	

Components of Severity	Intermittent			Mild Persistent			Moderate Persistent		Severe Persistent	
	Aggs 0-4 years	Aggs 5-11 years	Aggs >12 years	Aggs 0-4 years	Aggs 5-11 years	Aggs >12 years	Aggs 0-4 years	Aggs >12 years	Aggs 0-4 years	Aggs >12 years
Symptoms	≤2 days/week			≥2 days/week out not daily			Daily		Throughout the day	
Nighttime awakenings	0	≤2x/month	1-2x/month	3-4x/month			3-4x/month		Often 7x/week	
SABA use for symptom control (not to prevent EBP)	≤2 days/week			≥2 days/week but not daily			Daily		Several times per day	
SABA use for symptom control (not to prevent EBP)	≤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			Normal FEV <sub>1</sub> between exacerbations			Normal FEV <sub>1</sub> between exacerbations		Normal FEV <sub>1</sub> between exacerbations	
→ FEV <sub>1</sub> (% predicted)	Not applicable	>80%	>80%	Not applicable	>80%	>80%	Not applicable	60-80%	60-80%	<80%
→ FEV <sub>1</sub> /VC*	Not applicable	>85%	Normal†	>80%	>80%	Normal†	75-80%	Reduced †	<75%	Reduced †
Asthma exacerbations requiring oral systemic corticosteroids	0-1/year			≥2 exacerbations in 6 months, or wheezing or wheezing risk factor AND risk factors for persistent asthma			Generally more frequent and intense events indicate greater severity		Generally more frequent and intense events indicate greater severity	

## Stepwise Approach

- Step up if needed
- Maintain the therapy
- Step down if possible

	STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6
	At each step: Patient education, environmental control, and management of comorbidities					
	Intermittent Asthma			Persistent Asthma: Daily Medication		
	SABA as needed			Consult with asthma specialist if step 3 care or higher is required. Consider consultation at step 2.		
Preferred Treatment†	SABA as needed			low-dose ICS*	medium-dose ICS*	high-dose ICS* + either LABA* or montelukast
Alternative Treatment†	SABA as needed			low-dose ICS*	medium-dose ICS*	high-dose ICS* + either LABA* or montelukast
Quick-Relief Medication	SABA as needed			low-dose ICS*	medium-dose ICS*	high-dose ICS* + either LABA* or montelukast
	If clear benefit is not observed in 4-6 weeks, and medication technique and adherence are satisfactory, consider adjusting therapy or alternate diagnosis.					
	SABA as needed for symptoms; intensity of treatment depends on severity of symptoms.					
	With viral respiratory symptoms: SABA every 4-6 hours up to 24 hours (longer with physician consult). Consider short course of oral systemic corticosteroids if asthma exacerbation is severe or patient has history of severe exacerbations.					
	Caution: Frequent use of SABA may indicate the need to step up treatment.					

	STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6
<b>At each step:</b> Patient education, environmental control, and management of comorbidities						
Preferred Treatment <sup>1</sup>	<b>Intermittent Asthma</b>	<b>Persistent Asthma: Daily Medication</b>				
	SABA <sup>2</sup> as needed	low-dose ICS <sup>3</sup>	low-dose ICS <sup>3</sup> + either LABA <sup>4</sup> , LTRA <sup>4</sup> , or theophylline <sup>5</sup> OR medium-dose ICS	medium-dose ICS <sup>3</sup> + LABA <sup>4</sup>	high-dose ICS <sup>3</sup> + LABA <sup>4</sup>	high-dose ICS <sup>3</sup> + LABA <sup>4</sup> + oral corticosteroids
Alternative Treatment <sup>1</sup>		chromolyn, LTRA <sup>4</sup> , or theophylline <sup>5</sup>	medium-dose ICS	high-dose ICS <sup>3</sup> + either LTRA <sup>4</sup> or theophylline <sup>5</sup>	high-dose ICS <sup>3</sup> + either LTRA <sup>4</sup> or theophylline <sup>5</sup>	high-dose ICS <sup>3</sup> + LABA <sup>4</sup> + oral corticosteroids
Quick-Relief Medication	<ul style="list-style-type: none"> <li>SABA<sup>2</sup> as needed for symptoms. The intensity of treatment depends on severity of symptoms: up to 3 treatments every 20 minutes as needed. Short course of oral systemic corticosteroids may be needed.</li> <li>Caution: Increasing use of SABA or use &gt;2 days/week for symptom relief (not to prevent EBP) generally indicates inadequate control and the need to step-up treatment.</li> </ul>					

	STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6
<b>At each step:</b> Patient education, environmental control, and management of comorbidities						
Preferred Treatment <sup>1</sup>	<b>Intermittent Asthma</b>	<b>Persistent Asthma: Daily Medication</b>				
	SABA <sup>2</sup> as needed	low-dose ICS <sup>3</sup>	low-dose ICS <sup>3</sup> + LABA <sup>4</sup> OR medium-dose ICS <sup>3</sup>	medium-dose ICS <sup>3</sup> + LABA <sup>4</sup>	high-dose ICS <sup>3</sup> + LABA <sup>4</sup>	high-dose ICS <sup>3</sup> + LABA <sup>4</sup> + oral corticosteroids <sup>6</sup>
Alternative Treatment <sup>1</sup>		chromolyn, LTRA <sup>4</sup> , or theophylline <sup>5</sup>	low-dose ICS <sup>3</sup> + either LTRA <sup>4</sup> or theophylline <sup>5</sup>	medium-dose ICS <sup>3</sup> + either LTRA <sup>4</sup> or theophylline <sup>5</sup> or olodaterol <sup>7</sup>	high-dose ICS <sup>3</sup> + either LTRA <sup>4</sup> or theophylline <sup>5</sup> or olodaterol <sup>7</sup>	high-dose ICS <sup>3</sup> + LABA <sup>4</sup> + oral corticosteroids <sup>6</sup> AND consider omalizumab for patients who have allergies <sup>8</sup>
Quick-Relief Medication	<ul style="list-style-type: none"> <li>SABA<sup>2</sup> as needed for symptoms. The intensity of treatment depends on severity of symptoms: up to 3 treatments every 20 minutes as needed. Short course of oral systemic corticosteroids may be needed.</li> <li>Caution: Use of SABA &gt;2 days/week for symptom relief (not to prevent EBP) generally indicates inadequate control and the need to step-up treatment.</li> </ul>					

Components of Control	Well Controlled		
	Age 0-4 years	Age 5-11 years	Age ≥12 years
Symptoms	<2 days/week	<2 days/week but not more than once on each day	<2 days/week
Nighttime awakenings	<1x/month	<2x/month	<2x/month
Interference with normal activity	None		
SABA <sup>2</sup> use for symptom control (not to prevent EBP)	<2 days/week		
Lung Function	<ul style="list-style-type: none"> <li>FEV<sub>1</sub> (% predicted) or peak flow (% personal best)</li> <li>FEV<sub>1</sub>/FVC<sup>3</sup></li> </ul>		
Validated questionnaires <sup>4</sup>	<ul style="list-style-type: none"> <li>AACQ<sup>5</sup></li> <li>ACQ<sup>6</sup></li> <li>ACT<sup>7</sup></li> </ul>		
Asthma exacerbations requiring oral systemic corticosteroids <sup>8</sup>	0-1/year		
Reduction in lung growth/Progressive loss of lung function	Not applicable	Evaluation requires long-term follow-up care	Not applicable
Treatment-related adverse effects	The level of intensity observed		
<b>Recommended Action for Treatment</b>	Maintain current step. Regular follow-up every 1-6 months. Consider step down if well controlled for at least 3 months.		

Components of Control	Well Controlled			Not Well Controlled		
	Age 0-4 years	Age 5-11 years	Age ≥12 years	Age 0-4 years	Age 5-11 years	Age ≥12 years
Symptoms	<2 days/week	<2 days/week but not more than once on each day	<2 days/week	>2 days/week	>2 days/week or multiple times on <2 days/week	>2 days/week
Nighttime awakenings	<1x/month	<2x/month	<2x/month	>1x/month	>2x/month	1-3x/week
Interference with normal activity	None			Some limitation		
SABA <sup>2</sup> use for symptom control (not to prevent EBP)	<2 days/week			>2 days/week		
Lung Function	<ul style="list-style-type: none"> <li>FEV<sub>1</sub> (% predicted) or peak flow (% personal best)</li> <li>FEV<sub>1</sub>/FVC<sup>3</sup></li> </ul>			<ul style="list-style-type: none"> <li>FEV<sub>1</sub> (% predicted) or peak flow (% personal best)</li> <li>FEV<sub>1</sub>/FVC<sup>3</sup></li> </ul>		
Validated questionnaires <sup>4</sup>	<ul style="list-style-type: none"> <li>AACQ<sup>5</sup></li> <li>ACQ<sup>6</sup></li> <li>ACT<sup>7</sup></li> </ul>			<ul style="list-style-type: none"> <li>AACQ<sup>5</sup></li> <li>ACQ<sup>6</sup></li> <li>ACT<sup>7</sup></li> </ul>		
Asthma exacerbations requiring oral systemic corticosteroids <sup>8</sup>	0-1/year			2-3/year		
Reduction in lung growth/Progressive loss of lung function	Not applicable	Evaluation requires long-term follow-up care	Not applicable	Not applicable	Evaluation requires long-term follow-up care	Evaluation requires long-term follow-up care
Treatment-related adverse effects	The level of intensity observed			The level of intensity observed or greater in severity from none to very troublesome		
<b>Recommended Action for Treatment</b>	Maintain current step. Regular follow-up every 1-6 months. Consider step down if well controlled for at least 3 months.			Step up 1 step. Step up at least 1 step. Reevaluate in 2-6 weeks to achieve control. For children 0-4 years, if no clear benefit observed in 4-6 weeks, consider adjusting therapy or alternative diagnosis. Review reference to medication, inhaler technique, and appropriate use and avoid overuse for not well controlled.		

Components of Control	Well Controlled			Not Well Controlled			Very Poorly Controlled		
	Age 0-4 years	Age 5-11 years	Age ≥12 years	Age 0-4 years	Age 5-11 years	Age ≥12 years	Age 0-4 years	Age 5-11 years	Age ≥12 years
Symptoms	<2 days/week	<2 days/week but not more than once on each day	<2 days/week	>2 days/week	>2 days/week or multiple times on <2 days/week	>2 days/week	Throughout the day	Throughout the day	Throughout the day
Nighttime awakenings	<1x/month	<2x/month	<2x/month	>1x/month	>2x/month	1-3x/week	>1x/week	>2x/week	>4x/week
Interference with normal activity	None			Some limitation			Extremely limited		
SABA <sup>2</sup> use for symptom control (not to prevent EBP)	<2 days/week			>2 days/week			Several times per day		
Lung Function	<ul style="list-style-type: none"> <li>FEV<sub>1</sub> (% predicted) or peak flow (% personal best)</li> <li>FEV<sub>1</sub>/FVC<sup>3</sup></li> </ul>			<ul style="list-style-type: none"> <li>FEV<sub>1</sub> (% predicted) or peak flow (% personal best)</li> <li>FEV<sub>1</sub>/FVC<sup>3</sup></li> </ul>			<ul style="list-style-type: none"> <li>FEV<sub>1</sub> (% predicted) or peak flow (% personal best)</li> <li>FEV<sub>1</sub>/FVC<sup>3</sup></li> </ul>		
Validated questionnaires <sup>4</sup>	<ul style="list-style-type: none"> <li>AACQ<sup>5</sup></li> <li>ACQ<sup>6</sup></li> <li>ACT<sup>7</sup></li> </ul>			<ul style="list-style-type: none"> <li>AACQ<sup>5</sup></li> <li>ACQ<sup>6</sup></li> <li>ACT<sup>7</sup></li> </ul>			<ul style="list-style-type: none"> <li>AACQ<sup>5</sup></li> <li>ACQ<sup>6</sup></li> <li>ACT<sup>7</sup></li> </ul>		
Asthma exacerbations requiring oral systemic corticosteroids <sup>8</sup>	0-1/year			2-3/year			>2/year		
Reduction in lung growth/Progressive loss of lung function	Not applicable	Evaluation requires long-term follow-up care	Not applicable	Not applicable	Evaluation requires long-term follow-up care	Not applicable	Not applicable	Evaluation requires long-term follow-up care	Evaluation requires long-term follow-up care
Treatment-related adverse effects	The level of intensity observed			The level of intensity observed or greater in severity from none to very troublesome and/or worrisome			The level of intensity observed or greater in severity from none to very troublesome and/or worrisome		
<b>Recommended Action for Treatment</b>	Maintain current step. Regular follow-up every 1-6 months. Consider step down if well controlled for at least 3 months.			Step up 1 step. Step up at least 1 step. Reevaluate in 2-6 weeks to achieve control.			Step up 1 step. Step up at least 2 steps. Reevaluate in 2 weeks to achieve EBP.		

Daily Dose	0-4 years of age		
	Low	Medium	High
<b>Medication</b>			
<b>Beclomethasone MDI<sup>1</sup></b>	N/A	N/A	N/A
40 mcg/puff			
<b>Budesonide DPI<sup>2</sup></b>	N/A	N/A	N/A
90 mcg/inhalation			
<b>Budesonide Nebules</b>	0.25-0.5 mg	>0.5-1.0 mg	>1.0 mg
0.25 mg	1-2 nebs/day		
0.5 mg	1 nebs/day	2 nebs/day	3 nebs/day
1.0 mg	1 nebs/day	2 nebs/day	2 nebs/day
<b>Ciclesonide MDI<sup>3</sup></b>	N/A	N/A	N/A
80 mcg/puff			
<b>Flunisolide MDI<sup>4</sup></b>	N/A	N/A	N/A
80 mcg/puff			

Daily Dose	0-4 years of age			5-11 years of age		
	Low	Medium	High	Low	Medium	High
<b>MEDICATION</b>						
<b>Beclomethasone MDI</b>	N/A	N/A	N/A	80-160 mcg	>160-320 mcg	>320 mcg
40 mcg/puff				1-2 puffs 2x/day	3-4 puffs 2x/day	
80 mcg/puff				1 puff 2x/day	2 puffs 2x/day	>3 puffs 2x/day
<b>Budesonide DPI</b>	N/A	N/A	N/A	180-360 mcg	>360-720 mcg	>720 mcg
90 mcg/inhalation				1-2 inh's 2x/day	3-4 inh's 2x/day	
180 mcg/inhalation					2 inh's 2x/day	>3 inh's 2x/day
<b>Budesonide Nebules</b>	0.25-0.5 mg	>0.5-1.0 mg	>1.0 mg	0.5 mg	1.0 mg	2.0 mg
0.25 mg	1-2 nebs/day			1 neb 2x/day		
0.5 mg	1 neb/day	2 nebs/day	3 nebs/day	1 neb/day	1 neb 2x/day	
1.0 mg	1 neb/day	2 nebs/day		1 neb/day	1 neb 2x/day	
<b>Ciclesonide MDI</b>	N/A	N/A	N/A	80-160 mcg	>160-320 mcg	>320 mcg
80 mcg/puff				1 puff am	2 puffs pm	>3 puffs 2x/day
160 mcg/puff				1 puff/day	1 puff 2x/day	>2 puffs 2x/day
<b>Flunisolide MDI</b>	N/A	N/A	N/A	160 mcg	320-480 mcg	>480 mcg
80 mcg/puff				1 puff 2x/day	2-3 puffs 2x/day	>4 puffs 2x/day

Daily Dose	0-4 years of age			5-11 years of age			>12 years of age		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
<b>MEDICATION</b>									
<b>Beclomethasone MDI</b>	N/A	N/A	N/A	80-160 mcg	>160-320 mcg	>320 mcg	80-240 mcg	>240-480 mcg	>480 mcg
40 mcg/puff				1-2 puffs 2x/day	3-4 puffs 2x/day		1-3 puffs 2x/day	4-6 puffs 2x/day	
80 mcg/puff				1 puff 2x/day	2 puffs 2x/day	>3 puffs 2x/day	1 puff am, 2 puffs pm	2-3 puffs 2x/day	>4 puffs 2x/day
<b>Budesonide DPI</b>	N/A	N/A	N/A	180-360 mcg	>360-720 mcg	>720 mcg	180-540 mcg	>540-1080 mcg	>1080 mcg
90 mcg/inhalation				1-2 inh's 2x/day	3-4 inh's 2x/day		1-3 inh's 2x/day		
180 mcg/inhalation					2 inh's 2x/day	>3 inh's 2x/day	1 inh' am, 2 inh's pm	2-3 inh's 2x/day	>4 inh's 2x/day
<b>Budesonide Nebules</b>	0.25-0.5 mg	>0.5-1.0 mg	>1.0 mg	0.5 mg	1.0 mg	2.0 mg	N/A	N/A	N/A
0.25 mg	1-2 nebs/day			1 neb 2x/day					
0.5 mg	1 neb/day	2 nebs/day	3 nebs/day	1 neb/day	1 neb 2x/day				
1.0 mg	1 neb/day	2 nebs/day		1 neb/day	1 neb 2x/day				
<b>Ciclesonide MDI</b>	N/A	N/A	N/A	80-160 mcg	>160-320 mcg	>320 mcg	160-320 mcg	>320-640 mcg	>640 mcg
80 mcg/puff				1 puff am	2 puffs pm	>3 puffs 2x/day	1-2 puffs 2x/day	3-4 puffs 2x/day	
160 mcg/puff				1 puff/day	1 puff 2x/day	>2 puffs 2x/day		2 puffs 2x/day	>3 puffs 2x/day
<b>Flunisolide MDI</b>	N/A	N/A	N/A	160 mcg	320-480 mcg	>480 mcg	320 mcg	>320-640 mcg	>640 mcg
80 mcg/puff				1 puff 2x/day	2-3 puffs 2x/day	>4 puffs 2x/day	2 puffs 2x/day	3-4 puffs 2x/day	>5 puffs 2x/day

Daily Dose	0-4 years of age		
	Low	Medium	High
<b>MEDICATION</b>			
<b>Fluticasone MDI</b>	176 mcg	>176-352 mcg	>352 mcg
44 mcg/puff	2 puffs 2x/day	3-4 puffs 2x/day	
110 mcg/puff		1 puff 2x/day	>2 puffs 2x/day
220 mcg/puff			
<b>Fluticasone DPI</b>	N/A	N/A	N/A
50 mcg/inhalation			
100 mcg/inhalation			
250 mcg/inhalation			
<b>Mometasone DPI</b>	N/A	N/A	N/A
110 mcg/inhalation			
220 mcg/inhalation			

Daily Dose	0-4 years of age			5-11 years of age		
	Low	Medium	High	Low	Medium	High
<b>MEDICATION</b>						
<b>Fluticasone MDI</b>	176 mcg	>176-352 mcg	>352 mcg	88-176 mcg	>176-352 mcg	>352 mcg
44 mcg/puff	2 puffs 2x/day	3-4 puffs 2x/day		1-2 puffs 2x/day	3-4 puffs 2x/day	
110 mcg/puff		1 puff 2x/day	>2 puffs 2x/day		1 puff 2x/day	>2 puffs 2x/day
220 mcg/puff						
<b>Fluticasone DPI</b>	N/A	N/A	N/A	100-200 mcg	>200-400 mcg	>400 mcg
50 mcg/inhalation				1-2 inh's 2x/day	3-4 inh's 2x/day	
100 mcg/inhalation				1 inh' 2x/day	2 inh's 2x/day	>2 inh's 2x/day
250 mcg/inhalation					1 inh' 2x/day	
<b>Mometasone DPI</b>	N/A	N/A	N/A	110 mcg	220-440 mcg	>440 mcg
110 mcg/inhalation				1 inh'/day	1-2 inh's 2x/day	>3 inh's 2x/day
220 mcg/inhalation					1-2 inh's/day	>3 inh's divided in 2 doses

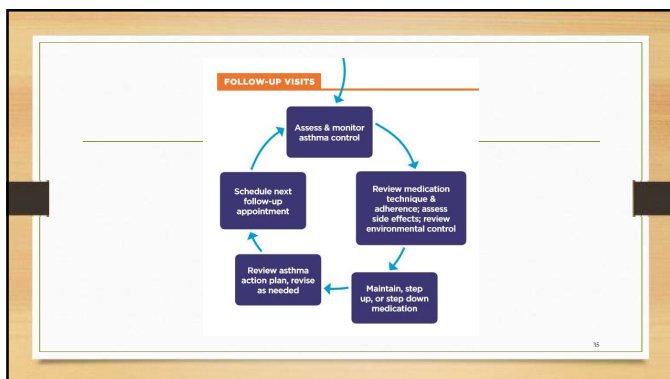
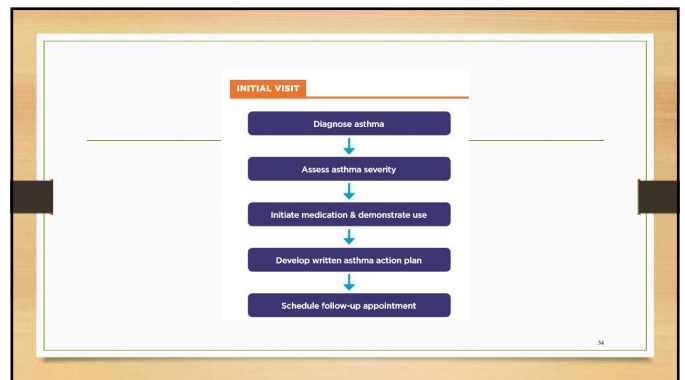
Daily Dose	0-4 years of age			5-11 years of age			>12 years of age		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
<b>MEDICATION</b>									
<b>Fluticasone MDI</b>	176 mcg	>176-352 mcg	>352 mcg	88-176 mcg	>176-352 mcg	>352 mcg	88-264 mcg	>264-440 mcg	>440 mcg
44 mcg/puff	2 puffs 2x/day	3-4 puffs 2x/day		1-2 puffs 2x/day	3-4 puffs 2x/day		1-3 puffs 2x/day		
110 mcg/puff		1 puff 2x/day	>2 puffs 2x/day		1 puff 2x/day	>2 puffs 2x/day		2 puffs 2x/day	3 puffs 2x/day
220 mcg/puff								1 puffs 2x/day	>2 puffs 2x/day
<b>Fluticasone DPI</b>	N/A	N/A	N/A	100-200 mcg	>200-400 mcg	>400 mcg	100-300 mcg	>300-600 mcg	>600 mcg
50 mcg/inhalation				1-2 inh's 2x/day	3-4 inh's 2x/day		1-3 inh's 2x/day		
100 mcg/inhalation				1 inh' 2x/day	2 inh's 2x/day	>2 inh's 2x/day	2 inh's 2x/day	>3 inh's 2x/day	
250 mcg/inhalation					1 inh' 2x/day		1 inh' 2x/day	>2 inh's 2x/day	
<b>Mometasone DPI</b>	N/A	N/A	N/A	110 mcg	220-440 mcg	>440 mcg	110-220 mcg	>220-440 mcg	>440 mcg
110 mcg/inhalation				1 inh'/day	1-2 inh's 2x/day	>3 inh's 2x/day	1-2 inh's pm	3-4 inh's pm or 2 inh's 2x/day	>3 inh's 2x/day
220 mcg/inhalation					1-2 inh's/day	>3 inh's divided in 2 doses	1 inh' pm	1 inh' 2x/day or 2 inh's pm 2x	>3 inh's divided in 2 doses

Medication	0-4 years of age			5-11 years of age			>12 years of age		
	Combining Medication (inhaled corticosteroid + long-acting beta <sub>2</sub> -agonist)								
<b>Fluticasone/Salmeterol</b> – DPI <sup>†</sup> 100 mcg/50 mcg, 250 mcg/50 mcg, or 500 mcg/50 mcg	N/A <sup>†</sup>			1 inhalation 2x/day; dose depends on level of severity or control			1 inhalation 2x/day; dose depends on level of severity or control		
<b>Budesonide/Formoterol</b> – MDI <sup>†</sup> 45 mcg/21 mcg, 115 mcg/21 mcg, or 230 mcg/21 mcg	N/A <sup>†</sup>			2 puffs 2x/day; dose depends on level of severity or control			2 puffs 2x/day; dose depends on level of severity or control		
<b>Mometasone/Formoterol</b> – MDI <sup>†</sup> 100 mcg/5 mcg	N/A <sup>†</sup>			N/A <sup>†</sup>			2 inhalations 2x/day; dose depends on severity of asthma		

Medication	0-4 years of age	5-11 years of age	≥12 years of age
<b>Leukotriene Modifiers</b>			
<b>Leukotriene Receptor Antagonists (LTRAs)</b>			
Montelukast – 4 mg or 5 mg chewable tablet, 4 mg granule packets, 10 mg tablet	4 mg every night at bedtime (1-5 years of age)	5 mg every night at bedtime (6-14 years of age)	10 mg every night at bedtime
Zafirlukast – 10 mg or 20 mg tablet <i>Take at least 1 hour before or 2 hours after a meal. Monitor liver function.</i>	N/A*	10 mg 2x/day (7-11 years of age)	40 mg daily (20 mg tablet 2x/day)
<b>5-Lipoxygenase Inhibitor</b>			
Zileuton – 600 mg tablet <i>Monitor liver function.</i>	N/A*	N/A*	2,400 mg daily (give 1 tablet 4x/day)

Medication	0-4 years of age	5-11 years of age	≥12 years of age
<b>Immunomodulators</b>			
<b>Omalizumab (Anti IgE)</b> – Subcutaneous injection, 150 mg/1.2 mL, following reconstitution with 1.4 mL sterile water for injection <i>Monitor subjects after injections; be prepared to treat anaphylaxis that may occur.</i>	N/A*	N/A*	150-375 mg subcutaneous every 2-4 weeks, depending on body weight and pretreatment serum IgE level
<b>Crystallins</b>			
<b>Cremonin</b> – Nebulizer: 20 mg/ampule	1 ampule 4x/day, N/A* <2 years of age	1 ampule 4x/day	1 ampule 4x/day
<b>Methylxanthines</b>			
<b>Theophylline</b> – Liquids, sustained-release tablets, and capsules <i>Monitor serum concentration levels.</i>	Starting dose 10 mg/kg/day; usual maximum: • <1 year of age: 0.5 (age in weeks) + 5 = mg/kg/day • ≥1 year of age: 16 mg/kg/day	Starting dose 10 mg/kg/day; usual maximum: 16 mg/kg/day	Starting dose 10 mg/kg/day up to 300 mg maximum; usual maximum: 800 mg/day

<b>Inhaled Long-Acting Beta<sub>2</sub>-Agonists (LABAs)</b> – used in conjunction with ICS* for long-term control. LABA is NOT to be used as monotherapy.			
<b>Salmeterol</b> – DPI† 50 mcg/bliater	N/A*	1 bliater every 12 hours	1 bliater every 12 hours
<b>Formoterol</b> – DPI† 12 mcg/single-use capsule	N/A*	1 capsule every 12 hours	1 capsule every 12 hours
<b>Oral Systemic Corticosteroids</b>			
<b>Methylprednisolone</b> – 2, 4, 8, 16, 32 mg tablets	• 0.25-2 mg/kg daily in single dose in a.m. or every other day as needed for control • Short course "burst": 1-2 mg/kg/day, max 60 mg/d for 3-10 days	• 0.25-2 mg/kg daily in single dose in a.m. or every other day as needed for control • Short course "burst": 1-2 mg/kg/day, max 60 mg/d for 3-10 days	• 75-60 mg daily in single dose in a.m. or every other day as needed for control • Short course "burst": to achieve control, 40-60 mg/day as single or 2 divided doses for 3-10 days
<b>Prednisolone</b> – 5 mg tablets; 5 mg/5 cc, 15 mg/5 cc			
<b>Prednisone</b> – 1, 2.5, 5, 10, 20, 50 mg tablets; 5 mg/cc, 5 mg/5 cc			



- ### To Do List - Diagnosis
- Establish asthma diagnosis
    - History
    - 5 years old or older get spirometry – check reversibility
    - Consider other causes
      - Not everything that wheezes is asthma



## To Do List – Control Freak

- Reduce Impairment
  - Prevent chronic symptoms
  - Infrequent use of SABA
  - Maintain near normal lung function and activities

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## To Do List – Reduce Risk

- Reduce Risk
  - Prevent Exacerbations
  - Minimize ER visits & hospitalizations.
  - Prevent loss of lung function. Prevent reduced lung growth in children.
  - Minimize adverse effects of therapy.

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## To Do List – Assess & Monitor

- Initial Visit
  - Diagnose
  - Classify
  - Meds
  - Education
  - Written action plan
  - Next visit

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## To Do List – Assess & Monitor

- Follow-up Visit – Assess at each visit
  - Control
  - Review Meds
  - Proper medication technique
  - Written action plan
  - Adherence
  - Concerns
  - Environment

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## To Do List – Assess & Monitor

- Follow-up Visit – Assess at each visit
  - Should therapy be adjusted?
    - Step up if needed
    - Step down if possible
    - Maintain (3 month rule)
  - Every 1-2 years check spirometry.
    - More frequently if asthma is not well controlled

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## To Do List – Assess & Monitor

- Schedule Follow-up Visit
  - Every 2-6 weeks while gaining control
  - Every 1-6 months to monitor control
  - Every 3 months if step down is anticipated

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### To Do List – Use of Meds

- Select medication and delivery devices that meet patient's needs and circumstances.
- Review medications, technique, and adherence at each follow-up visit

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### To Do List – Patient Education

- Teach patients how to manage their asthma
- Peak flow meter
- Asthma diary
- Develop a written asthma action plan (see sample)
- Integrate education into all points of care involving interactions with patients

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### To Do List – Environmental Control

- Recommend ways to control exposures
  - Allergens
  - Irritants
  - Pollutants
- Treat comorbidities
- Prevent EIB
- Maintain control through pregnancy

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### To Do List – Home Care

- Home Care
  - Early signs & symptoms
  - Measure PEF
  - Adjust meds
  - Monitor response
  - Know when to seek help

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### To Do List – Emergency Care

- Assess severity
  - Lung function
  - Physical Exam
  - Signs & symptoms
- Treat
  - Hypoxemia & Airflow obstruction
  - Reduce airway inflammation

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### To Do List – Discharge

- Discharge with meds and patient education
  - SABA, oral systemic corticosteroids, consider ICS
  - Refer to follow-up care
  - Asthma discharge plan
  - Review inhaler technique and environmental control

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## Certified Asthma Educator

- National Asthma Education Certification Board
- Cost \$350
- **Eligibility** - There are two kinds of eligibility. A candidate must fulfill ONE of the requirements.
  - 1. Licensed or credentialed health care professionals OR
  - 2. Individuals providing professional direct patient asthma education and counseling with a minimum of 1,000 hours experience in these activities.
- <https://www.naecb.com>

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## Practice Questions

- An asthma exacerbation is considered severe if peak flow measurement are \_\_\_ of predicted or personal best.
  - a) <80%
  - b) <70%
  - c) <60%
  - d) <50%

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## Practice Questions

- The most common symptom of asthma is:
  - a) shortness of breath
  - b) wheezing
  - c) cough
  - d) chest tightness

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## Practice Questions

- 9 year old, uses his inhaler 5 times per week before gym class, wakes up at night 2 times per week with difficulty breathing. Classify his asthma:
  - a) Intermittent
  - b) Persistent Mild
  - c) Persistent Moderate
  - d) Persistent Severe

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## Practice Questions

- 9 year old, uses his inhaler 5 times per week before gym class, wakes up at night 2 times per week with difficulty breathing. Classify his asthma:
  - a) Well Controlled
  - b) Not Well Controlled
  - c) Poorly Controlled
  - d) Very Poorly Controlled

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## Practice Questions

- 22 year old, no activity limitations, FEV1% > 80%, no nighttime awakenings, uses inhaler once a day.
  - a) Well Controlled
  - b) Not Well Controlled
  - c) Poorly Controlled
  - d) Very Poorly Controlled

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## Practice Questions

- Pregnant patients should:
  - a) Keep taking controller meds
  - b) Stop taking controller meds due to maternal side effects
  - c) Stop taking controller meds due to risk of birth defects
  - d) Stop taking controller meds due to fetal asphyxia

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## Practice Questions

- 11 year old has an FEV1 of 72% and FEV1% of 83%. Classify his asthma:
  - a) Intermittent
  - b) Persistent Mild
  - c) Persistent Moderate
  - d) Persistent Severe

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## Practice Questions

- 11 year old has an FEV1 of 72% and FEV1% of 83%. Suggest therapy:
  - a) Fluticasone MDI 50 mcg - 4 puffs/day
  - b) Fluticasone DPI 100 mcg - 1 puff/day
  - c) Budesonide Nebules 0.25 mg 4x/daily
  - d) Budesonide Nebules 1.0 mg 1x/daily

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## Practice Questions

- 48 year old female has an Asthma Control Test (ACT) score of 15. Classify her asthma control:
  - a) Well Controlled
  - b) Not Well Controlled
  - c) Poorly Controlled
  - d) Very Poorly Controlled

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## Practice Questions

- 16 year old male is having SOB while playing basketball. What do you suggest?
  - a) Switch to baseball, there is less running
  - b) SABA use 15-20 minutes before the game
  - c) SABA use throughout the game
  - d) Quit playing sports

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## Review

- Diagnose & Symptoms of Asthma
- Classification of Impairment
  - Symptoms
  - Nighttime awakenings
  - SABA Use
  - Activities
  - Lung Function

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## Review

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- Risk
- Control
  - Included asthma questionnaire
- To do list
  - Initial visit
  - Follow-up visit

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## Review

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AE-C

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