

Wheezes, Sneezes & Triggers Too!

Asthma Education Program

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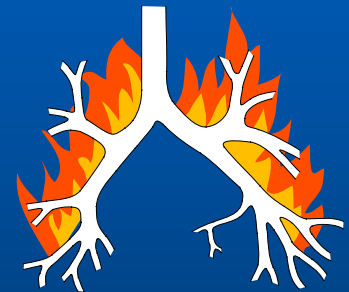


Pediatric Pulmonary Division Chief
Baystate Children's Hospital

What Is Asthma?

Asthma is a chronic inflammatory disease of the airways

- Inflammation leads to:
 - ✓ Hyperresponsive “twitchy” airways
 - ✓ Airway obstruction – usually reversible
 - ✓ Symptoms – cough, wheeze, shortness of breath



Most children do not “grow out of it” – disease may go through a silent period in young adulthood

Facts & Figures

- 17 million Americans suffer from asthma
- 5 million children
- 5,000 deaths per year
- Most common chronic illness in childhood
- Number one chronic illness causing school absence
- On average, a child with asthma will miss **one full week of school each year** due to the disease

Asthma In Springfield

- Springfield, Massachusetts, the twelfth worst U.S. city in which to live for those with asthma (AAFA,2010),
- Out of 32 public elementary schools in Springfield, 26 report that over 15% of children have an asthma diagnosis and 11 report a rate in excess of 20% (EOHHS, 2010).

Asthma In Springfield

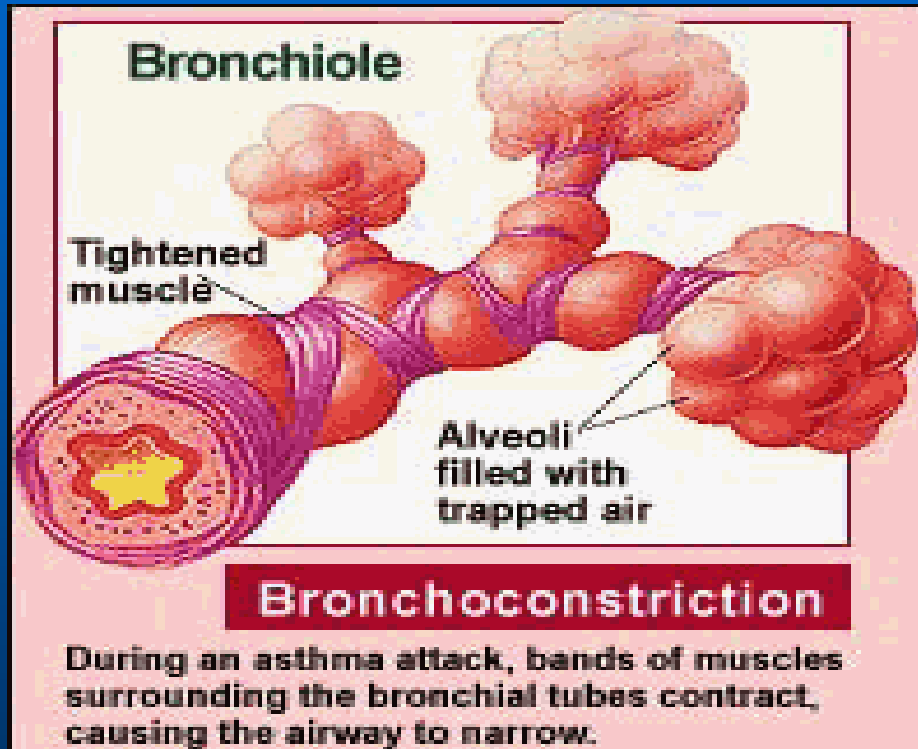
- 20% of school children have asthma
- 45% of children living below the poverty level have asthma
- Large disparity Hispanic children have 6 times and Black children 2.5 times higher than state wide asthma rate
- Asthma Hospitalizations 260/100,000 in our area (state rate is 140)

What Happens During An Asthma Attack?

- Airways swell on the inside and constrict from the outside. This blocks the flow of air.
- Thick mucus plugs the smaller airways.
- Breathing becomes a struggle.
- Whistling or wheezing sounds may start.
- Chest feels tight.
- Coughing may occur.



Common Symptoms of Asthma



- Recurrent wheezing.
- Recurrent shortness of breath.
- A cough that lasts for more than a week.
- Recurrent feeling of tightness in the chest.

- Not all people with asthma wheeze.
- For some, coughing – especially during the night or after exercise-may be the main symptom.

“Triggers”

- People with asthma have very sensitive airways. Everyday things that cause little or no trouble for most people can leave people with asthma gasping for breath. These are called ***asthma triggers***.
- *There are two basic types of asthma triggers*
 - ***allergic triggers (allergens)***
 - ***non-allergic triggers.***

Allergic triggers

- Indoor and outdoor molds
- Animal dander
 - Flakes from the skin, hair, or feathers of any warm-blooded pet, including dogs, cats, birds, rodents, and horses
- Dust mite particles
 - Microscopic insects present in house dust
- Cockroach particles
- Plant pollens



Non-allergic triggers “irritants”

- Respiratory infections
 - The common cold, the flu, or a sinus infection
- Tobacco smoke, wood smoke, room deodorizers, household cleaning products, perfumes and cosmetics, outdoor air pollution
- Cold air or sudden changes in air temperature
- Exercise
- Emotions
- Gastroesophageal reflux (heartburn)



Trigger Control

Management

Reduce Exposure

The first and most important step in controlling allergen induced asthma is to reduce exposure to relevant indoor and outdoor allergens.

Examples:

- ❖ Remove or restrict pets
- ❖ Reduce exposure to dust mites
- ❖ Avoid all types of smoke
- ❖ Treat reflux
- ❖ Annual flu vaccine
- ❖ Avoid exposure to triggers





The dust-free bedroom

- NO pile carpeting (hardwood or linoleum), cleaned by damp mopping, not vacuuming
- No heavy curtains or drapes
- No stuffed animals in the bed
- Mite proof dust covers on mattress and pillow (no feather pillows, please)
- Wash bedding in hot (130°) water
- Forced air vents filtered or closed off

The dust-free bedroom - 2

- If carpet cannot be removed – treat with tannic acid or other mite killing agent
- Vacuum using HEPA filter
- Keep humidity below 50% (helps avoid mold growth too!)
- Use wipeable furniture – wood, plastic, vinyl or leather
- Use face mask when cleaning

Classifying Asthma Severity Impairment

Components of Severity		Classification of Asthma Severity			
		Intermittent	Persistent		
			Mild	Moderate	Severe
Impairment Normal FEV ₁ /FVC: 8–19 y 85% 20–39 y 80% 40–59 y 75% 60–80 y 70%	Symptoms	≤2 d/wk	>2 d/wk but not daily	Daily	Throughout the day
	Nighttime awakening	0 ≤2x/mo ≤2x/mo	1–2x/mo 3–4x/mo 3–4x/mo	3–4x/mo >1x/wk but not nightly >1x/wk but not nightly	>1x/wk Often 7x/wk Often 7x/wk
	Short-acting β₂-agonist use for symptom control (not prevention of EIB*)	≤2 d/wk	>2 d/wk, but not daily >2 d/wk, but not daily >2 d/wk, but not >1x/d	Daily	Several times per day
	Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
	Lung function	<ul style="list-style-type: none"> ■ Normal FEV₁ between exacerbations ■ FEV₁[†] >80% of predicted ■ FEV₁/FVC[‡] >85% ■ Normal FEV₁ between exacerbations ■ FEV₁ >80% of predicted ■ FEV₁/FVC normal 	<ul style="list-style-type: none"> ■ FEV₁ ≥80% of predicted ■ FEV₁/FVC >80% ■ FEV₁ >80% of predicted ■ FEV₁/FVC normal 	<ul style="list-style-type: none"> ■ FEV₁ =60%–80% of predicted ■ FEV₁/FVC=75%–80% ■ FEV₁ >60% but <80% of predicted ■ FEV₁/FVC reduced 5% 	<ul style="list-style-type: none"> ■ FEV₁ <60% of predicted ■ FEV₁/FVC <75% ■ FEV₁ <60% of predicted ■ FEV₁/FVC reduced >5%

*EIB=exercise-induced bronchoconstriction; †FEV₁=forced expiratory volume in 1 second;
 ‡FVC=forced vital capacity.

Adapted from NAEP, NHLBI, NIH. *Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma*. August 2007.

- Recommended across age groups
- Children ≤4 y
- Children 5–11 y
- Persons ≥12 y

Asthma Control Test™ (ACT) for Patients 12 Years and Older

1. In the past 4 weeks, how much of the time did your asthma keep you from getting as much done at work, school or at home? Score

All of
the time

1

Most of
the time

2

Some of
the time

3

A little of
the time

4

None of
the time

5

2. During the past 4 weeks, how often have you had shortness of breath?

More than
once a day

1

Once
a day

2

3 to 6 times
a week

3

Once or twice
a week

4

Not at all

5

3. During the past 4 weeks, how often did your asthma symptoms (wheezing, coughing, shortness of breath, chest tightness or pain) wake you up at night, or earlier than usual in the morning?

4 or more
nights a week

1

2 or 3 nights
a week

2

Once
a week

3

Once
or twice

4

Not at all

5

4. During the past 4 weeks, how often have you used your rescue inhaler or nebulizer medication (such as albuterol)?

3 or more
times per day

1

1 or 2 times
per day

2

2 or 3 times
per week

3

Once a week
or less

4

Not at all

5

5. How would you rate your asthma control during the past 4 weeks?

Not controlled
at all

1

Poorly
controlled

2

Somewhat
controlled

3

Well
controlled

4

Completely
controlled

5

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Patient Total Score

Medications



Asthma drugs are divided into *controller medications* and *reliever medications*.

Controller medications: those that should be used regularly to keep asthma under control.

Reliever medications: those that should be added if a patient's peak flow readings begin to drop or symptoms begin to increase.

Medications

■ Relievers

- Short-Acting Inhaled Beta₂-Agonists: albuterol (Ventolin, Proventil, etc.), Pirbuterol (Maxair), Xopenex
- Anticholinergics (Atrovent)
- Systemic Corticosteroids (prednisone, medrol)

Reliever Medications

Inhaled Short-Acting Beta₂-Agonists

- ***How do they work?***
 - These medications should be used on an as needed basis.
 - Relax the muscles around the airways making it easier to breathe.
 - Begin to work within 5 minutes and last for 4 to 6 hours.
- ***Examples: (neb, MDI, DPI)***
 - Albuterol, Proventil®, Ventolin®, Maxair®, Alupent®
- ***More than one inhaler per month indicates inadequate control***
- **Xopenex – levalbuterol HCl**

Reliever Medications

Over-the-Counter Short-Acting Beta₂-Agonists

- ***Examples:***
 - Epinephrine (Primatene Mist or AsthmaNefrin)
 - Ephedrine/guaifensin (Bronkaid caps, Primatene tabs)

- ***How do they work?***
 - Relax the muscles around the airways making it easier to breathe.
 - Not specific for airways therefore increased adverse effects.
 - Very short acting – rebound effect.

- ***Patients should not use these!***

Medications

■ Controllers

- Inhaled Corticosteroids (6 kinds available)
- Cromolyn Sodium (Intal) – not available anymore
- Nedocromil Sodium (Tilade)
- Long Acting Beta2-Agonist (Serevent, Foradil)
- Combination therapy (Advair, Symbicort)
- Leukotriene modifiers (Singulair, Accolate)
- Theophylline

Controller Medications

Mast Cell Stabilizers & Corticosteroids

- ***How do they work?***
 - Prevent and reduce airway inflammation.
 - Make airways less sensitive to triggers.
 - Reduce the need for short-acting reliever medications, but daily use is required.

- ***Examples.***
 - **Inhaled Mast Cell stabilizers (non-steroidal)**
 - Intal®, and Tilade®.
 - **Inhaled Steroids – highest potency**
 - Aerobid®, Azmacort®, Flovent®, Pulmicort® (Respules) Q-var®, Alvesco®

Inhaled Corticosteroids

- Safe to use, but small risk for adverse events at recommended dosages
 - Reduce potential for adverse events by:
 - Using spacer and rinsing mouth
 - Using lowest dose possible
 - Use in combination with long-acting beta2-agonists
 - Monitor growth in children
- Patients unclear about benefits, often do not use if they feel good.

Controller Medications

Long-Acting Bronchodilators (DO NOT REPLACE ANTI - INFLAMMATORY)

■ *How do they work?*

- Relax muscles around airways making it easier to breathe.
- Reverse or prevent airway narrowing.
- Effects last 10 to 12 hours.
- Reduce the need for short-acting bronchodilators (“relievers”).

■ *Examples.*

- Inhaled: Salmeterol (Serevent®), Formoterol (Foradil®) – these are NEVER used alone without an inhaled steroid
- Oral tablets or liquids are NOT recommended.

Controller Medications

Combination Products

- Advair[®]: Salmeterol and Fluticasone
 - DPI one puff twice daily or MDI two puffs twice daily
 - 3 strengths
- Symbicort[®]: Formoterol and Budesonide
 - Metered dose inhaler – 2 puffs twice a day
 - 2 dose strengths

Controller Medications

Oral Leukotriene Inhibitors

- *How do they work?*
 - Prevent and reduce airway inflammation.
 - Prevent constriction of airway muscles.
 - Reduce edema and mucous secretion
 - Reduce the need for short-acting bronchodilators (“relievers”).
 - **Not as strong as inhaled steroids**
- *Examples:*
 - Accolate®, Singulair®, and Zyflo®.
 - Taken by mouth in tablet form.

Xolair[®]

- Humanized anti-IgE monoclonal antibody
- Binds to circulating and bound IgE
- Prevents “allergic” asthma
- Lowers need for inhaled or oral steroids
- **Injection** every 2 – 4 weeks, currently last line therapy, only for ages 12 and over
- Costly
- Recent question about heart effects

Medication Delivery Devices

- Metered-dose inhaler (MDI)
- Spacer/holding chamber (age 4 and over)
- Spacer/holding chamber and face mask (age 3 to 5)
- Dry powder inhaler (DPI)
 - less coordination but need inspiratory flow (not for younger than 4 years old)
- Nebulizer (preferred age 2 or less)

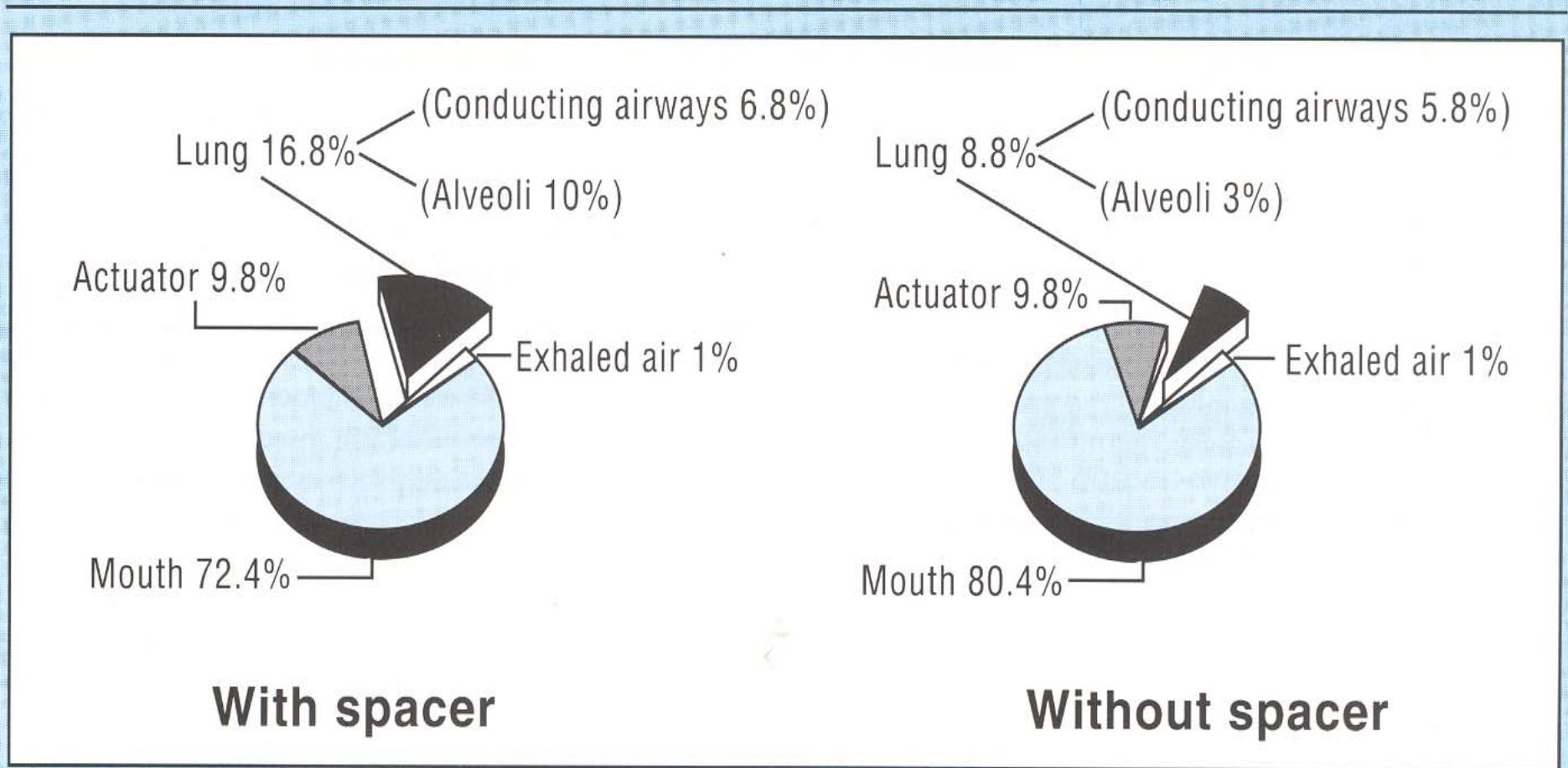
How (not to) Use an Inhaler

1. Prime the inhaler (for a new or infrequently used inhaler).
2. Take off the cap and shake the inhaler.
3. Tilt your head back slightly.
4. Breathe out all the way.
5. Hold your inhaler 1 to 2 inches in front of your mouth (about the width of 2 fingers) or put the inhaler in your mouth.
6. As you start breathing in slowly through your mouth, press down on the inhaler one time.
7. Keep breathing in slowly, as deeply as you can.
8. Hold your breath as you count slowly to 10, if you can.
9. Wait about 1 minute between puffs.



Spacers improve efficiency

Figure 3
Drug Deposition in Patients Using a Spacer and in Patients Not Using a Spacer



How to Use an Inhaler with a Spacer

Insert inhaler into spacer and shake the inhaler and spacer.

Breathe out all the way.

Put the mouthpiece in mouth and close lips around it. Do not block opening with tongue

Press down on the inhaler one time.

Breathe in slowly through mouth.

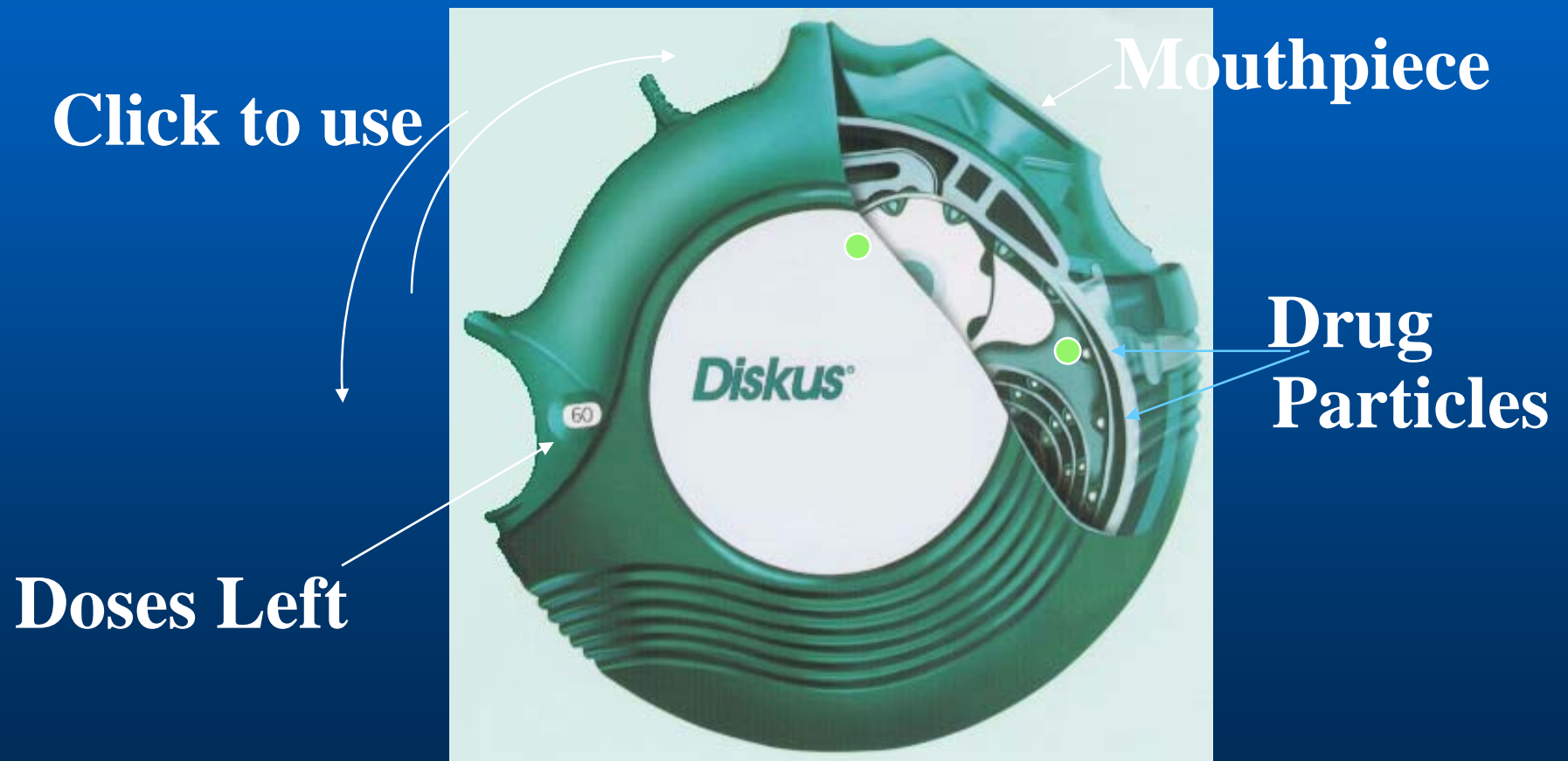
Keep breathing in slowly and deeply.

Hold breath to 10, if possible.

Wait at least 1 minute between puffs.



Diskus Inhalers (Advair, Serevent)



Pulmicort Flexhaler

Inhale here



Dose counter

Drug Storage

Twist and click

Air enters here

Asmanex[®]
Twisthaler[®] 220 mcg
(mometasone furoate inhalation powder)



Foradil Aerolizer



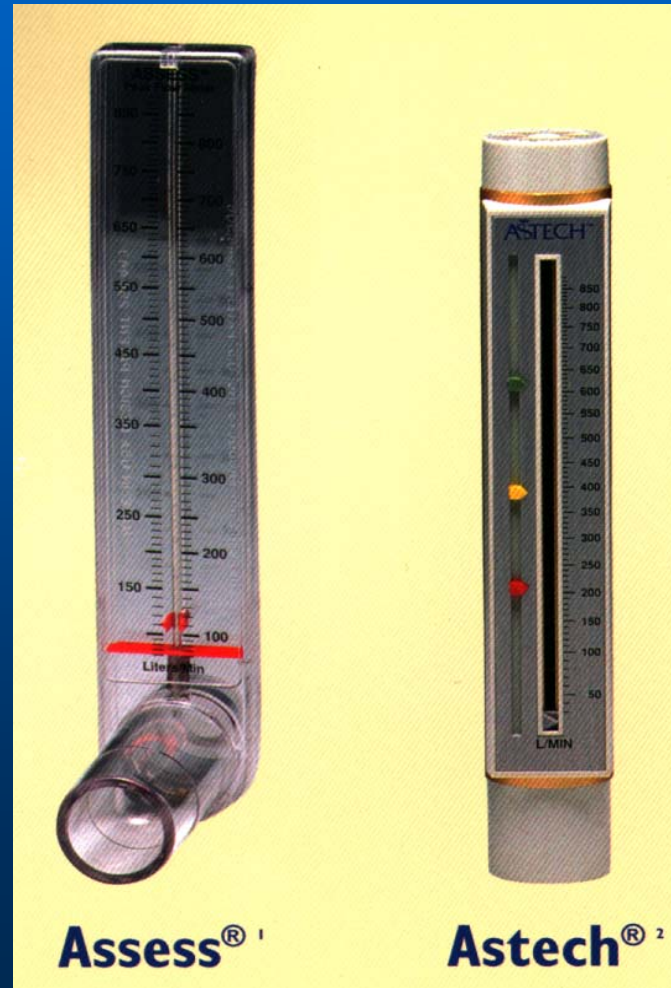
Pulmicort Respules™ (budesonide inhalation suspension): Packaging



Peak Flow Meters

- This meter measures how fast air is expelled (breathe out) from lungs.
- Peak flow meters warn of upcoming asthma attack even before symptoms occur.
- Can predict exacerbation: when s/s appear, airways already 50-80% obstructed.
- Affected by age, height, weight, gender, race
- People with asthma cannot always feel the early changes taking place in their airways.
- Not as sensitive as office pulmonary function testing

Peak Flow Meters



Use of trade names does not reflect endorsement of these product

Zone System for Patients

Green Zone: All Clear

Minimal (Ideally No) Symptoms

PEF: 80-100%, <20% Variability

Consider Stepdown in Therapy

Yellow Zone: Caution

Asthma Symptoms

PEF: 50-80%, 20-30% Variability from baseline

No Symptoms: Temporary Addition of Bronchodilator

Frequently symptomatic: Consider Burst of Oral Steroid and Stepup in Daily Therapy

Red Zone: Medical Alert

Symptoms at Rest, Severe

PEF: <50%

Add Bronchodilator Immediately

Seek Urgent Medical Care if No Response to Treatment

Asthma Action Plan

- This management plan, specially written for each person, is now a regular part of asthma care and includes an action plan for medications to take for an acute attack.
- A personalized plan for the patient, family, school, etc.
- **Green Zone** – no symptoms, no use of reliever medication – continue controllers daily.
- **Yellow Zone** – may or may not have symptoms. Treat as if symptoms present – take one dose of quick relief medication – recheck peak flow in 15 – 30 minutes. FREQUENT yellow zone is treated like frequent symptoms.
- **Red Zone** – medical emergency – take quick relief medications 3 times in an hour OR go immediately to doctor or emergency department. DON'T IGNORE!

Signs to Seek Emergency Care

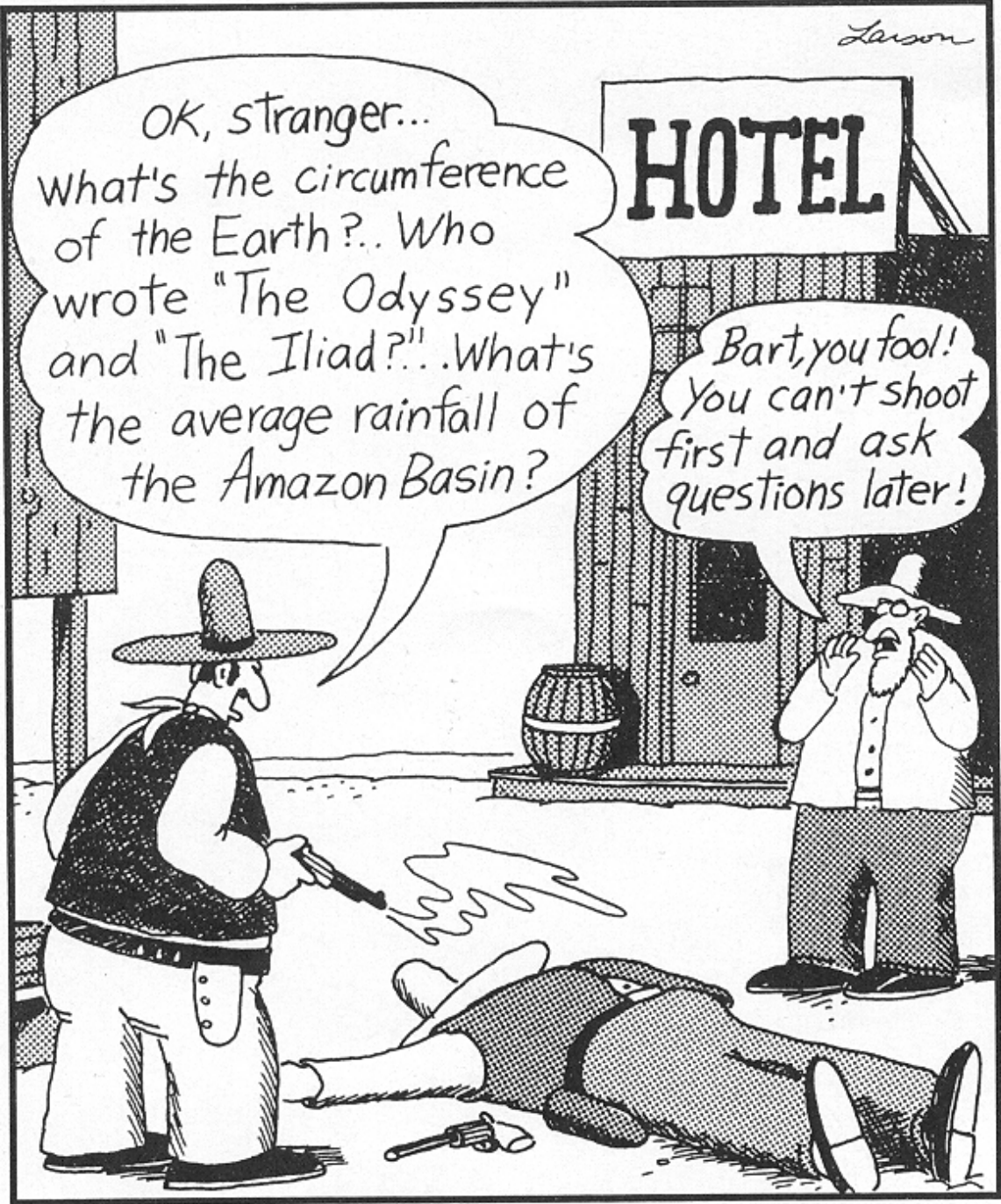
1. Wheeze, cough, or shortness of breath gets worse, even after the medicine has been given time to work.
Most inhaled bronchodilator medications produce an effect within 5 to 10 minutes.
2. Chest and neck are pulled or sucked in with each breath.
3. Person is visibly struggling to breathe.
4. Person has trouble walking or talking, stops playing and cannot start again.
5. Peak flow rate gets lower, or does not improve after treatment with bronchodilators, or drops to 50 percent or less.
6. Lips or fingernails are gray or blue. If this happens,
**GO TO THE DOCTOR OR EMERGENCY ROOM
RIGHT AWAY!**

Larson

HOTEL

OK, stranger...
What's the circumference
of the Earth?.. Who
wrote "The Odyssey"
and "The Iliad?!"..What's
the average rainfall of
the Amazon Basin?

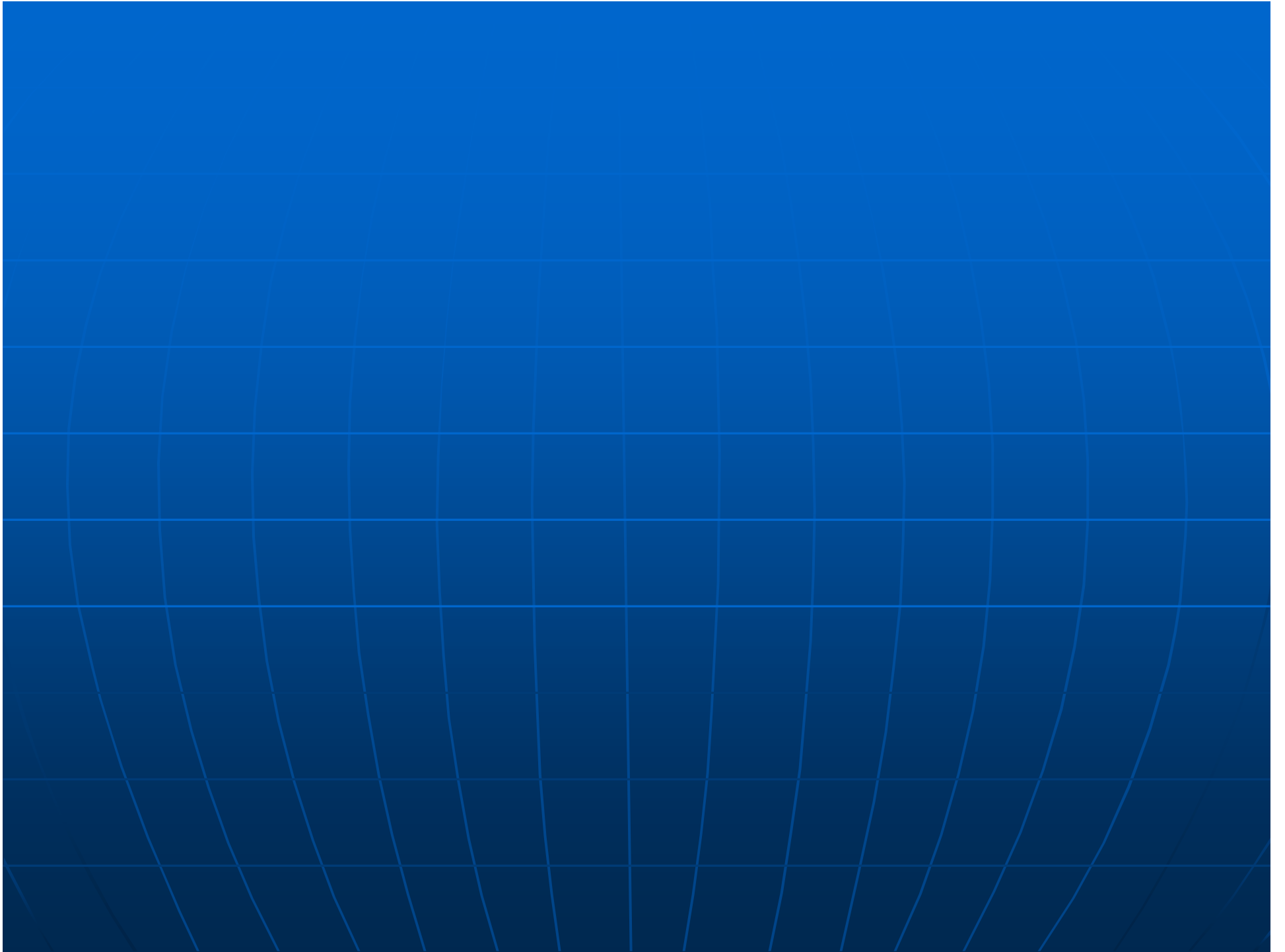
Bart, you fool!
You can't shoot
first and ask
questions later!



Thank you!

Robert Kaslovsky, MD
Baystate Children's Hospital





Classifying Asthma Severity

Risk

Components of Severity		Classification of Asthma Severity		
		Intermittent	Persistent	
			Mild	Moderate
Risk	Exacerbations requiring oral systemic corticosteroids	0–1/year	≥2 exacerbations in 6 months requiring oral steroids, or ≥4 wheezing episodes/1 year lasting >1 day AND risk factors for persistent asthma	
		Consider severity and interval since last exacerbation. ←Frequency and severity may fluctuate over time.→ Exacerbations of any severity may occur in patients in any severity category.		
		0–1/year	≥2/year	
		Consider severity and interval since last exacerbation. ←Frequency and severity may fluctuate over time for patients in any severity category. Relative annual risk of exacerbations may be related to FEV ₁ .		
		0–1/year	≥2/year	
		Consider severity and interval since last exacerbation. ←Frequency and severity may fluctuate over time for patients in any severity category. Relative annual risk of exacerbations may be related to FEV ₁ .		

Adapted from NAEP, NHLBI, NIH. *Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma*. August 2007.

- Recommended across age groups
- Children ≤4 y
- Children 5–11 y
- Persons ≥12 y

2007 National Institutes of Health (NIH) Asthma Guidelines Redefine How to Manage Asthma

Initial Assessment

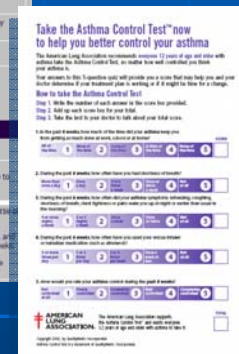
ASSESS SEVERITY using criteria from the NIH guidelines

Components of Severity		Classification of Asthma Severity ≥12 years of age			
		Intermittent	Mild Persistent	Moderate Persistent	Severe Persistent
Impairment	Symptoms	≤2 days/week	>2 days/week but not daily	Daily	Throughout the day
	Nighttime awakenings	≤2/month	3-4x/month	>1x/week but not nightly	Often 7x/week
	Short-acting beta ₂ -agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week but not >1x/day	Daily	Several times per day
	Normal FEV ₁ /FVC:	None	Minor limitation	Some limitation	Extremely limited
Risk	Exacerbations (consider frequency and severity)	0-2/year	3-2/year	3-2/year	>3/year
	Frequency and severity may fluctuate over time for patients in any severity category. Relative annual risk of exacerbations may be related to FEV ₁ .				
Recommended Step for Initiating Treatment		Step 1	Step 2	Step 3	Step 4 or 5
(See figure 4-5 for treatment steps)		In 2-6 weeks, evaluate level of asthma control that is achieved and adjust therapy accordingly.			

Follow-up Assessments

ASSESS CONTROL using criteria from the NIH guidelines and a validated tool, such as the Asthma Control Test™

Components of Control		Classification of Asthma Control (≥12 years of age)		
		Well Controlled	Not Well Controlled	Very Poorly Controlled
Impairment	Symptoms	≤2 days/week	>2 days/week	Throughout the day
	Nighttime awakenings	≤2/month	1-3/week	≥4/week
	Interference with normal activity	None	Some limitation	Extremely limited
	Short-acting beta ₂ -agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week	Several times per day
Risk	FEV ₁ or peak flow	>80% predicted/ personal best	60-80% predicted/ personal best	<60% predicted/ personal best
	Validated questionnaires	ATAQ ACT AQZ	0-25 20 18-19	1-2 21-3 16-19
Recommended Action for Treatment	Exacerbations	0-1 per year	2-3 per year	>3 per year
	Progressive loss of lung function	Evaluation requires long-term follow-up care		
Treatment-related adverse effects		Medication side effects can vary in intensity from none to very troublesome and worrisome. The level of intensity does not correlate to specific levels of control but should be considered in the overall assessment of risk.		
Recommended Action for Treatment (see figure 4-5 for treatment steps)		• Maintain current step. • Consider step down if well controlled for at least 3 months.	• Step up 1 step and reevaluate in 2-6 weeks. • For side effects, consider alternative treatment options.	• Consider short course systemic corticosteroids. • Step up 1-2 steps, and reevaluate in 2 weeks. • For side effects, consider alternative treatment options.



SELECT ASTHMA THERAPY

2007 NIH steps of asthma therapy

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, Nedocromil, LTRA, or Theophylline	Step 3 Preferred: Low-Dose ICS + LABA OR Medium-Dose ICS Alternative: Low-dose ICS + either LTRA, Theophylline, or Zileuton	Step 4 Preferred: Medium-Dose ICS + LABA Alternative: Medium-dose ICS + either LTRA, Theophylline, or Zileuton	Step 5 Preferred: High-dose ICS + LABA AND Consider Omalizumab for patients who have allergies	Step 6 Preferred: High-dose ICS + LABA + oral corticosteroid AND Consider Omalizumab for patients who have allergies

Asthma Control Test is a trademark of QualityMetric Incorporated.

NIH, National Heart, Lung and Blood Institute. *Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma (EPR-3 2007).*

NIH Item No. 08-4051. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm>. Accessed September 10, 2007.