

Asthma Education and Treatment based on National Guidelines

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Introduction

- Asthma is a chronic inflammatory disease. Its clinical hallmarks include
 - Partially or completely reversible airway obstruction
 - Bronchial hyperresponsiveness (BHR)
- Multiple inflammatory and immune-modulated mechanisms contribute to asthma
- Persistent inflammation may result in cellular damage and worsening lung function
- Targeting acute and chronic inflammation is essential to successful asthma management

Learning Objectives

- The participant will better understand how to educate the patient (and/or parent) using the **National Asthma Education and Prevention Program (NAEPP)** or **National Heart, Lung and Blood Institute (NHLBI)** Guidelines.
- The participant will be able to manage the changes in asthma severity with appropriate adjustments in therapy.
- The participant will know when specialist referral should be considered in taking care of the more severe asthma patients.

Asthma

- Usually associated with airflow obstruction of variable severity.
- Airflow obstruction is **usually** reversible, either spontaneously, or with treatment
- The inflammation associated with asthma causes an increase in the baseline bronchial hyperresponsiveness to a variety of stimuli
- Clinical Diagnosis

Asthma Remains a Serious Health Risk in the United States

Every day in America approximately ...

78,000 people miss school or work due to asthma

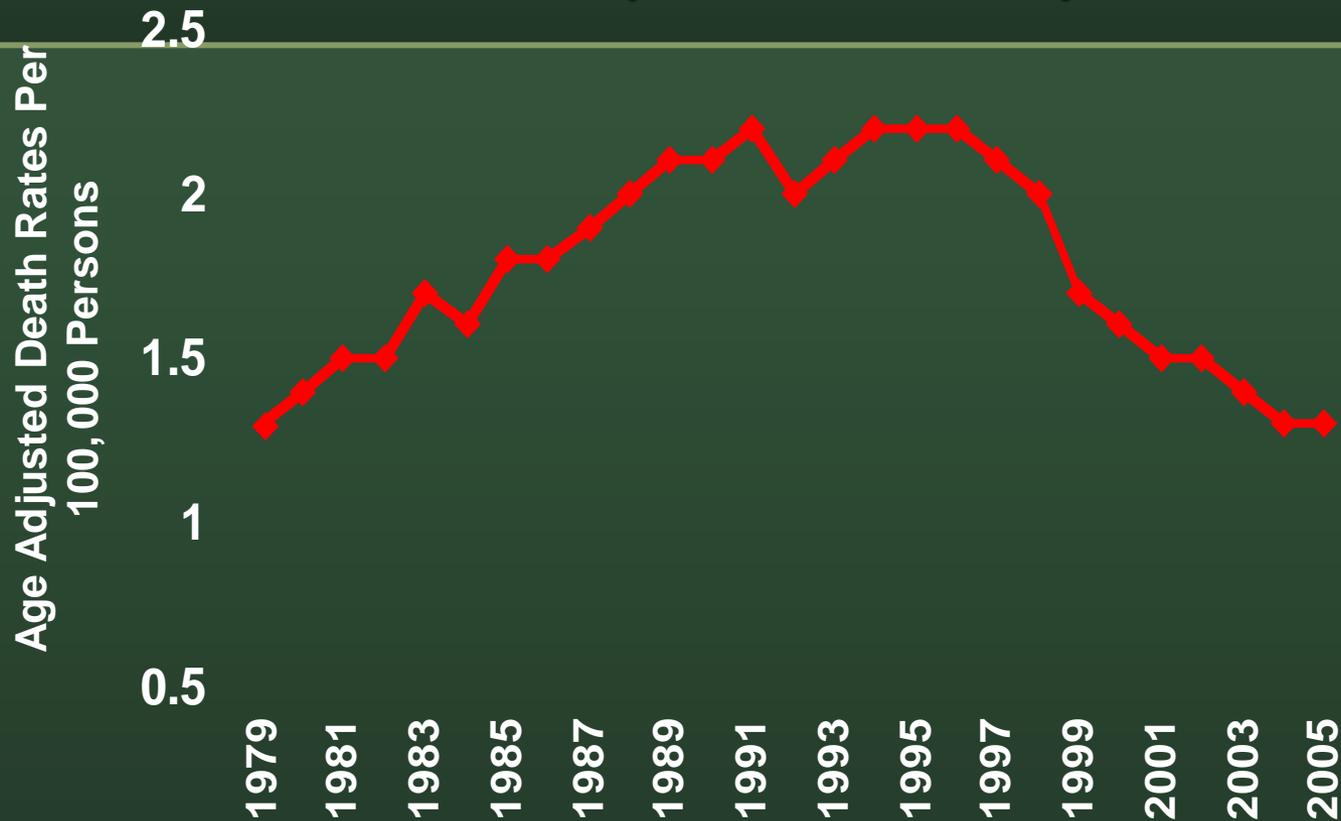
35,000 people have an asthma attack

4600 people visit the emergency room due to asthma

1200 people are admitted to the hospital due to asthma

10 people **die** from asthma

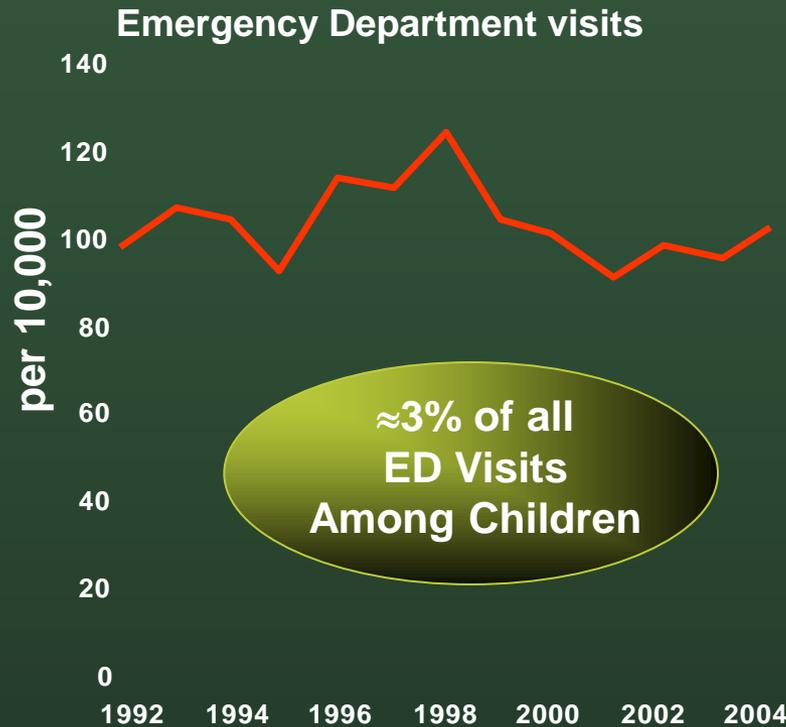
Asthma Death Rate* In US, 1979-2005 (2013 rate 1.1)



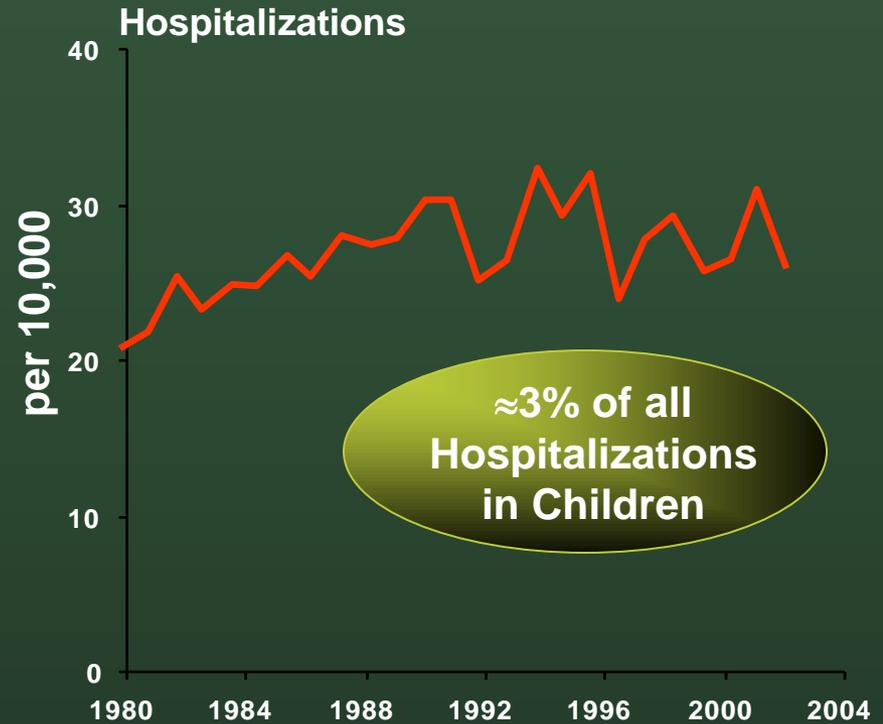
*1979-1998 rates reflect the International Classification of Disease, 9th Revision Code 493. 1999-2005 rates reflect the ICD 10th Revision Codes. Asthma age-adjusted death rates based on the 2000 standard population.

1. American Lung Association Epidemiology & Statistics Unit Research And Scientific Affairs. *Trends in Asthma Morbidity and Mortality*. August 2007. Available at: www.lungusa.org. Accessed October 15, 2007.
2. Kung HC, Hoyert DL, Xu J, Murphy SL. Deaths: Preliminary data for 2005. Health E-Stats. Sept 2007.

Emergency Department Visits and Hospitalizations for Asthma Remain High Among Children 0-17 years



CDC/NCHS, National Hospital Ambulatory Medical Care Survey.



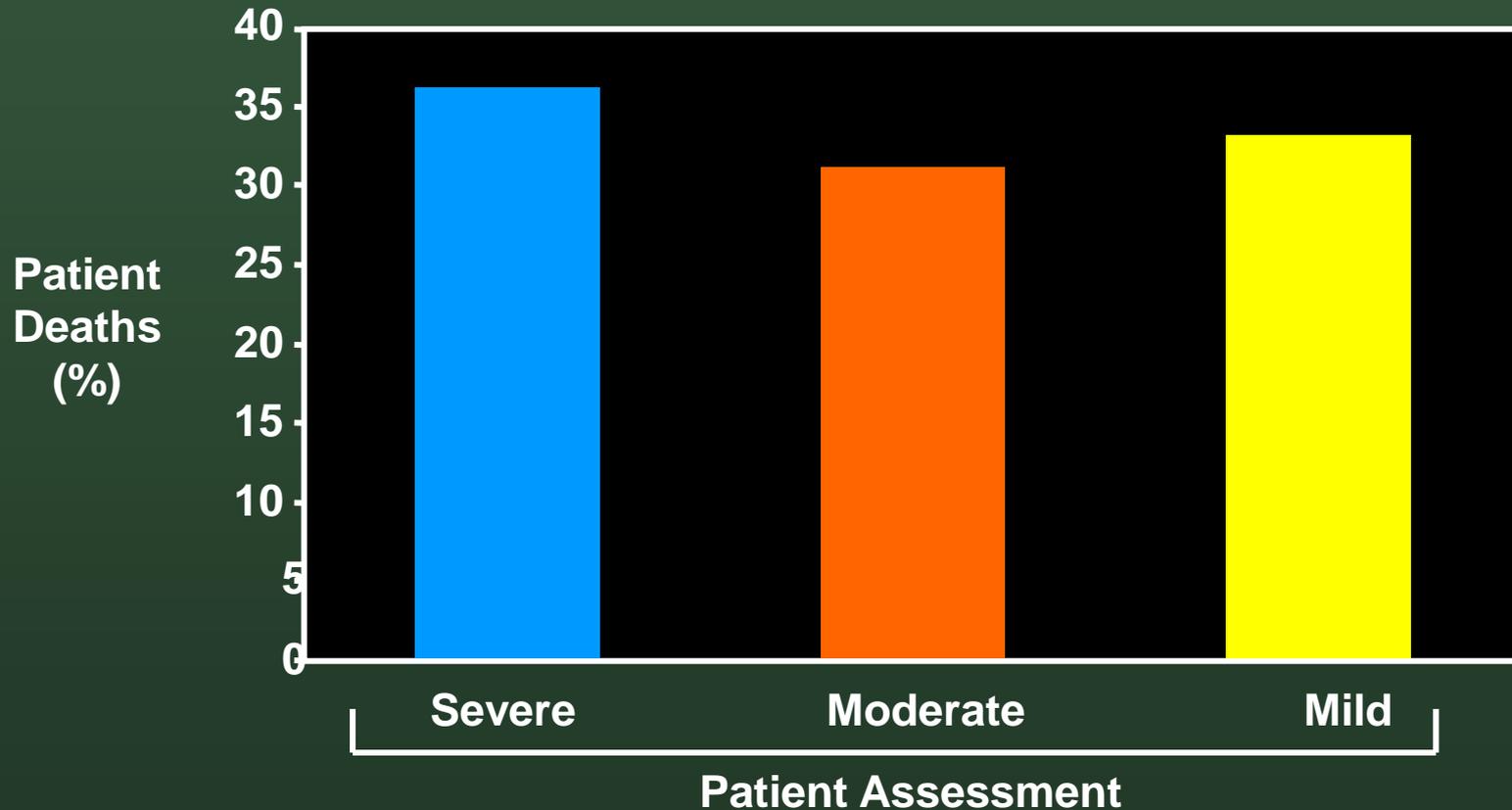
CDC/NCHS, National Hospital Discharge Survey.

Asthma ED visits represented about 3% of all ED visits among children 0-17 years of age in 2004
 Asthma hospitalizations represented about 3% of all hospitalizations among children 0-17 years of age in 2004

*Total population of children, includes children with and without an asthma diagnosis.

US Department of Health and Human Services. Centers for Disease Control and Prevention National Center for Health Statistics. Number 381, December 12, 2006.

Pediatric Asthma Deaths: Mild Patients Are Also at Risk

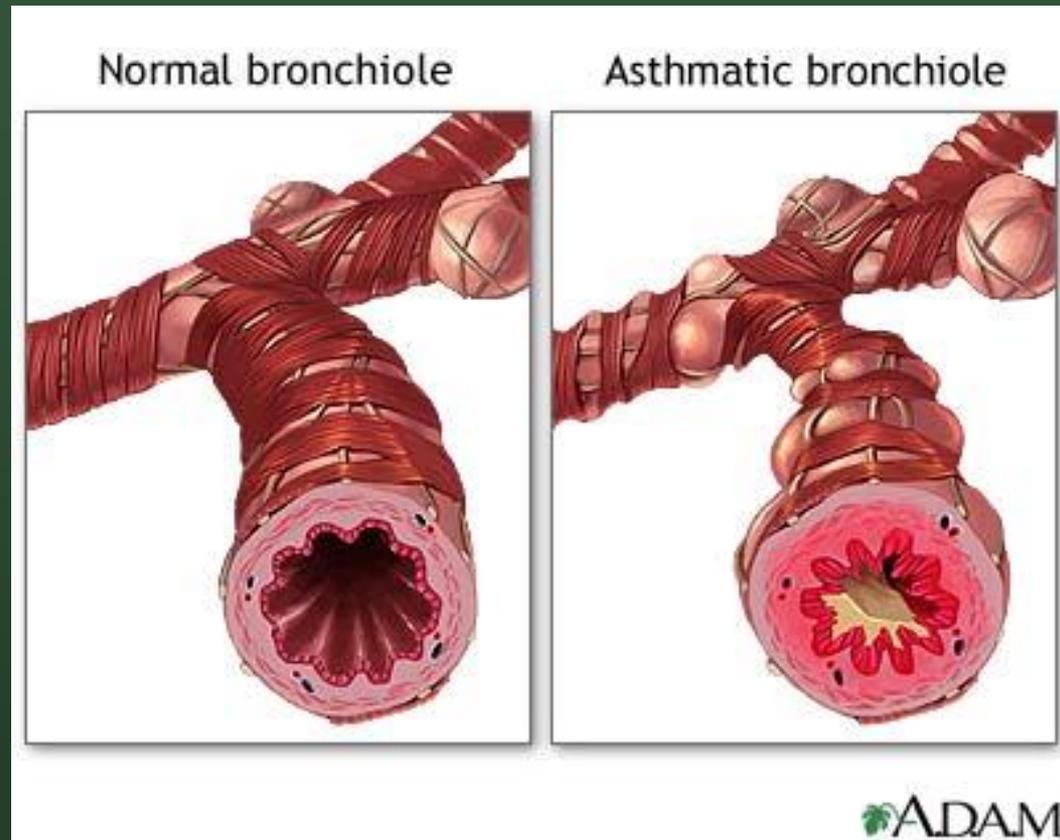


Findings from a cohort study reviewing all pediatric asthma-related deaths (n=51) in the Australian state of Victoria from 1986 to 1989.

Robertson et al. *Pediatr Pulmonol.* 1992;13:95-100.

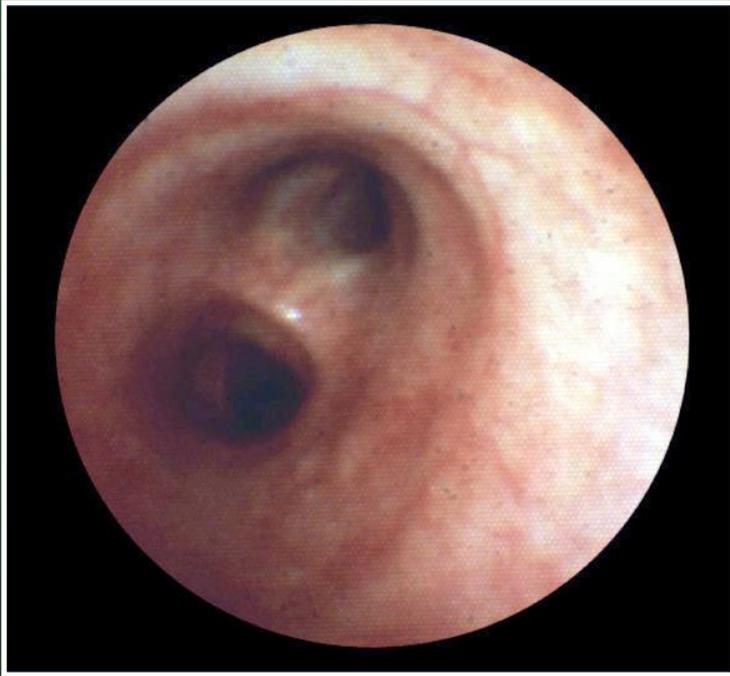
Basic Mechanisms of Asthma Pathophysiology

Complex Biphasic Mechanism



A.D.A.M., 2007

Bronchoconstriction



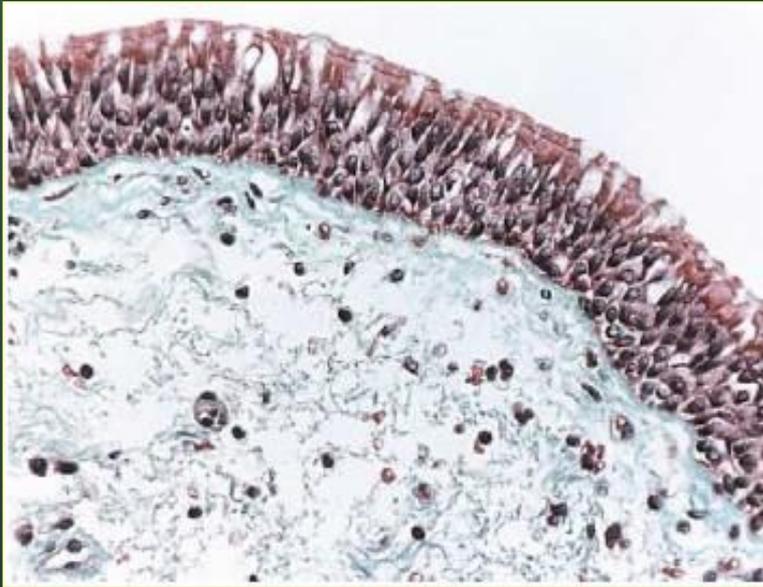
Before



10 Minutes After
Allergen Challenge

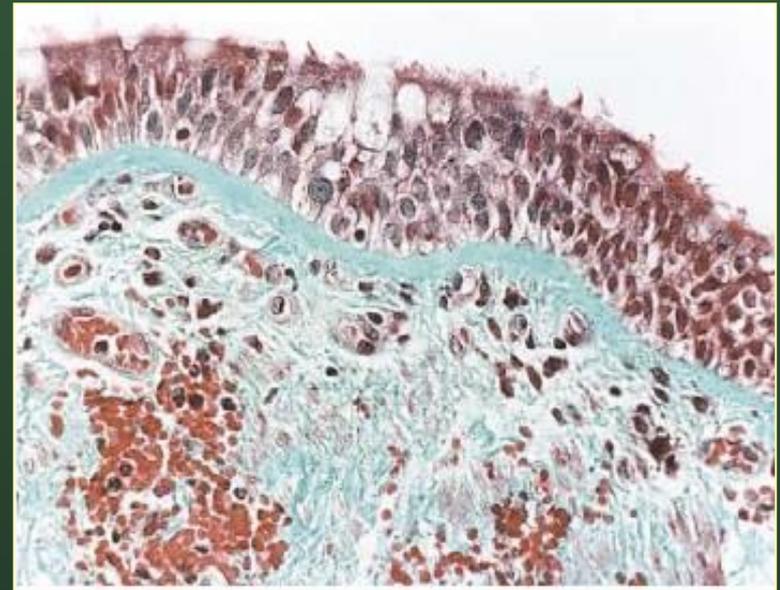
Asthma Is a Chronic Inflammatory Disease: Pathophysiologic Changes

Normal Architecture



**Bronchial Mucosa From a
Subject Without Asthma**

Disrupted Architecture



**Bronchial Mucosa From a
Subject With Mild Asthma**

Hematoxylin and eosin stain.

Photographs courtesy of Nizar N. Jarjour, MD, University of Wisconsin.

Multiple Mechanisms Contribute to Asthma: Inflammatory Mediators

- Mast Cells
- Macrophages
- Eosinophils
- T-Lymphocytes
- Epithelial Cells
- Platelets
- Neutrophils
- Myofibroblasts
- Basophils



Histamine
Lipid Mediators*
Peptides†
Cytokines‡
Growth Factors

Bronchoconstriction

Microvascular Leakage

Mucus Hypersecretion

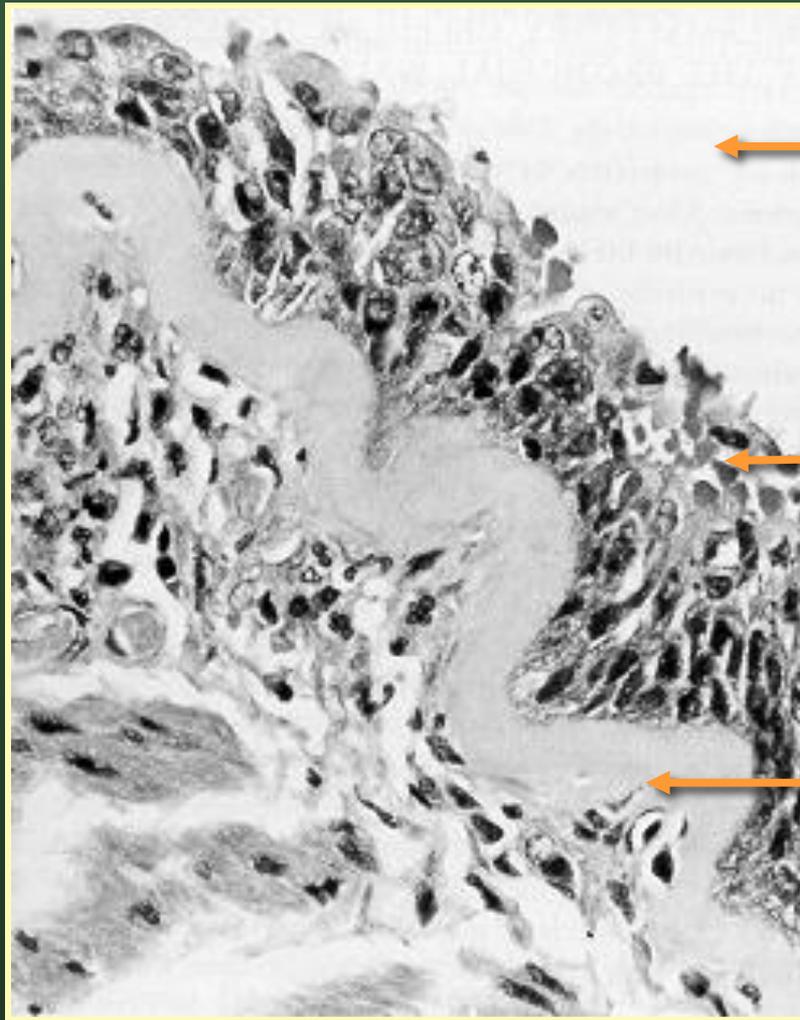
Airway
Hyperresponsiveness

*For example, prostaglandins and leukotrienes.

†For example, bradykinin and tachykinin.

‡For example, tumor necrosis factor (TNF).

Consequences of Persistent Asthma: Subepithelial Collagen Deposition



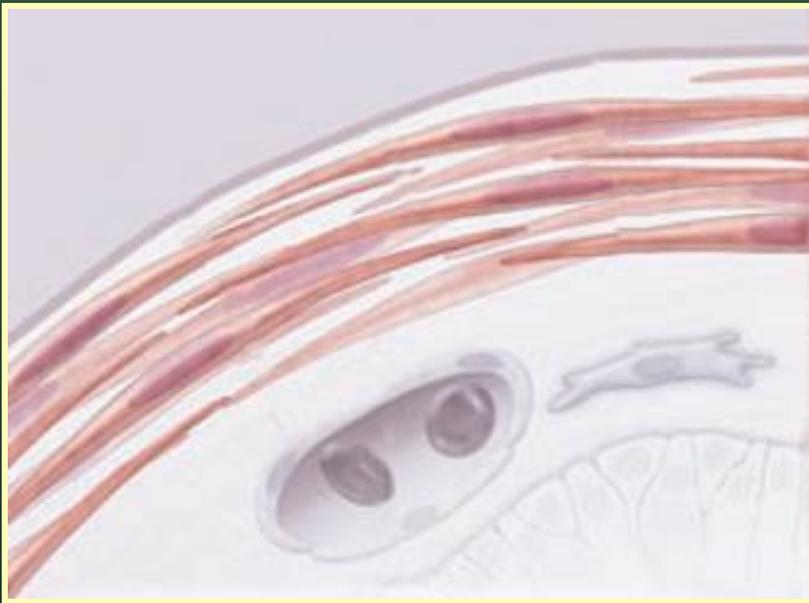
Lumen

Epithelium

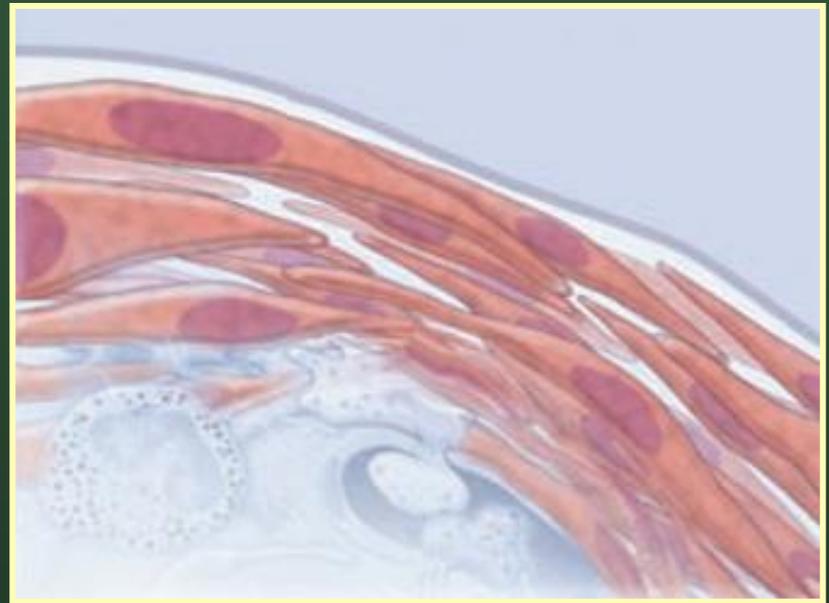
Subepithelial Collagen
Deposition

Consequences of Chronic Asthma: Smooth Muscle Hyperplasia

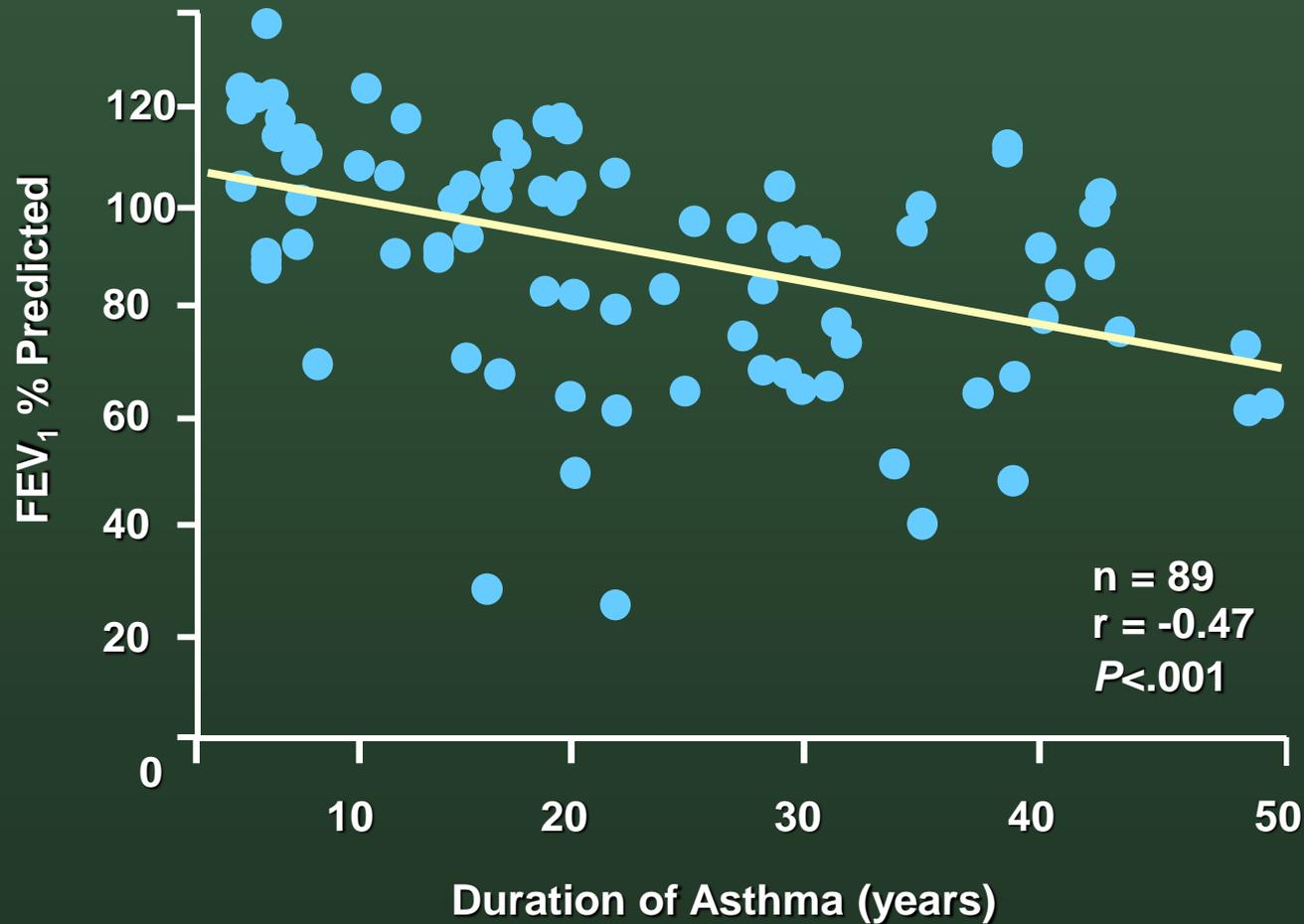
Normal Airway



Asthmatic Airway



Consequences of Chronic Asthma: Progressive Decline in FEV₁



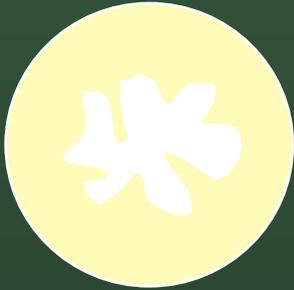
FEV₁ = forced expiratory volume in 1 second.

Adapted with permission from Brown PJ et al. *Thorax*. 1984;39:131-136.

Shifting Focus of Asthma Therapy

1970s

B-agonists



1990s

Steroids



2010s

Anti IgE/IL-5



Bronchospasm

Relieve Symptoms

Inflammation

Relieve Symptoms
Control
Exacerbations

Outcomes

Relieve symptoms,
Control exacerbations
Alter the Natural
History of Asthma

Overview of Asthma Medications

- **Daily: Long-Term Control**
 - Corticosteroids (inhaled and systemic)
 - Long-acting beta₂-agonists
 - Leukotriene modifiers
 - Anti-IgE therapy

Overview of Asthma Medications (continued)

- As-needed: Quick Relief
 - Short-acting beta₂-agonists
 - Anticholinergics

Inhaled Corticosteroids

- Most effective long-term-control therapy for persistent asthma
- Small risk for adverse events at recommended dosage
- Reduce potential for adverse events by:
 - Using spacer and rinsing mouth
 - Using lowest dose possible
 - Using in combination with long-acting beta₂-agonists
 - Monitoring growth in children

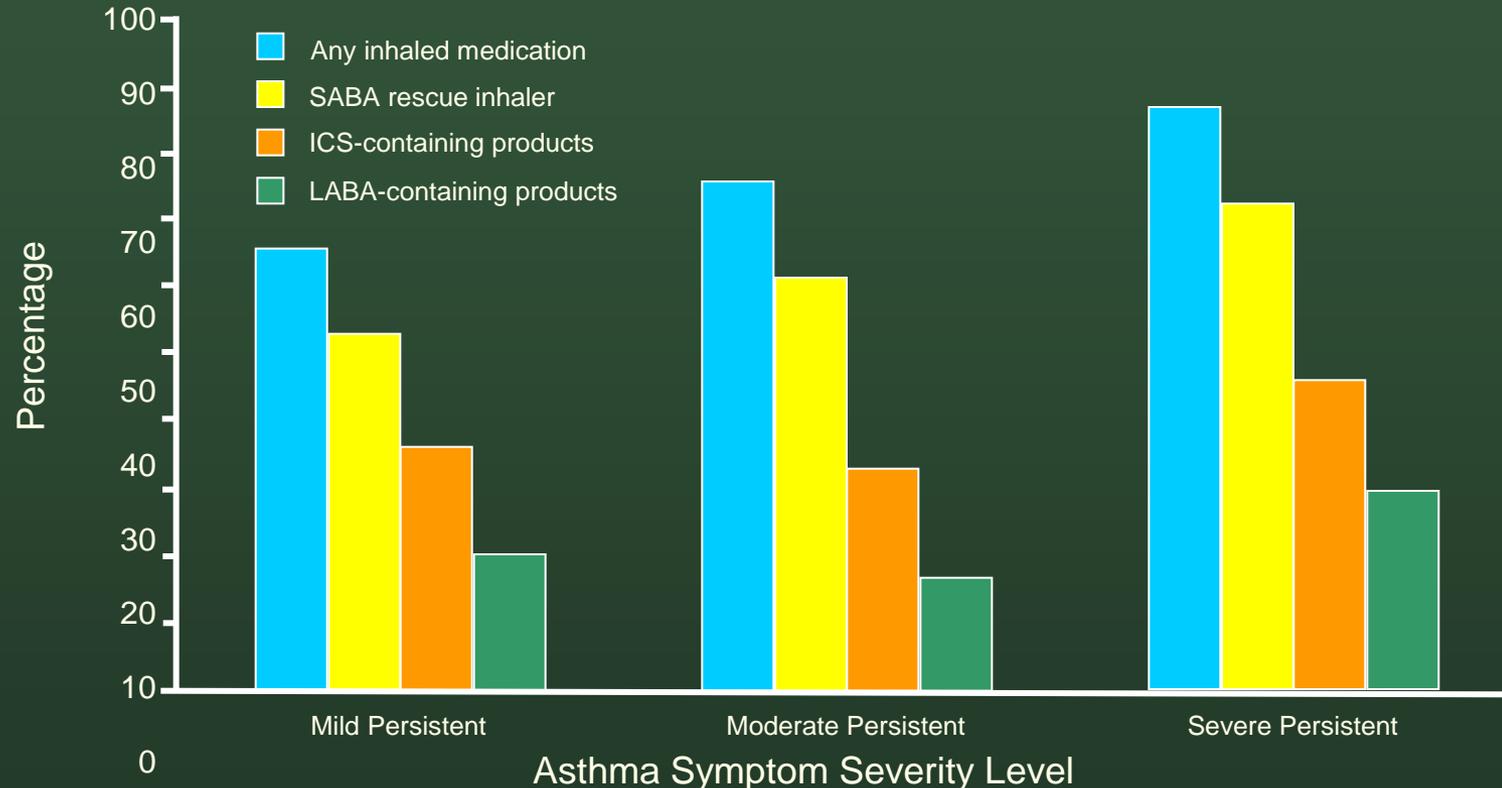
Inhaled Corticosteroids

(continued)

- Benefit of daily use:
 - Fewer symptoms
 - Fewer severe exacerbations
 - Reduced use of quick-relief medicine
 - Improved lung function
 - Reduced airway inflammation

Use of ICS-Containing Medications Remains Low Among Moderate and Severe Asthmatics

Percent With Current Asthma* Who Used Inhaled Medications in Preceding 3 Months, by Medication Type and Symptom Severity†



SABA = short-acting beta₂-agonist; ICS = inhaled corticosteroid; LABA = long-acting beta₂-agonist.

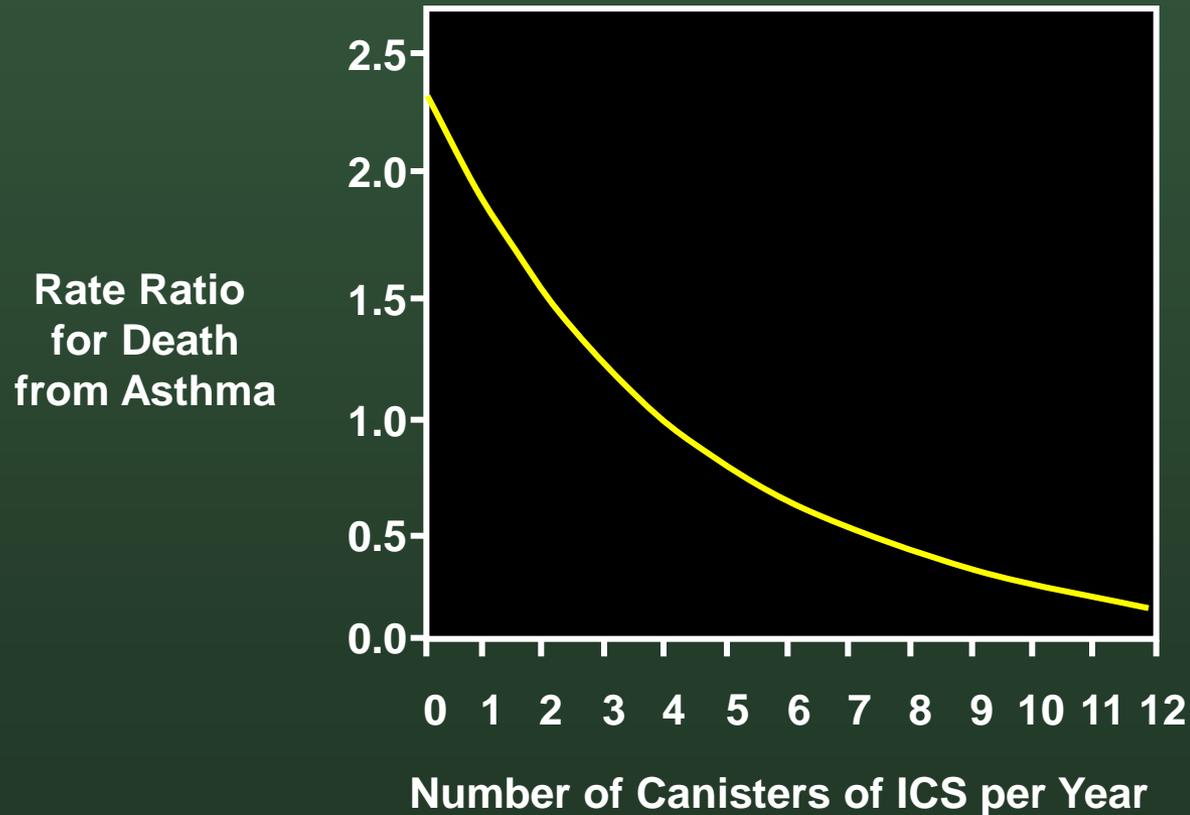
*Persons with current asthma were respondents who reported ever being told by a medical professional that they had asthma and who still had asthma.

†The frequency of symptoms and degree of activity limitation were used to classify those with current asthma into 4 symptom severity groups: mild intermittent, mild persistent, moderate persistent, and severe persistent (as defined by the NIH

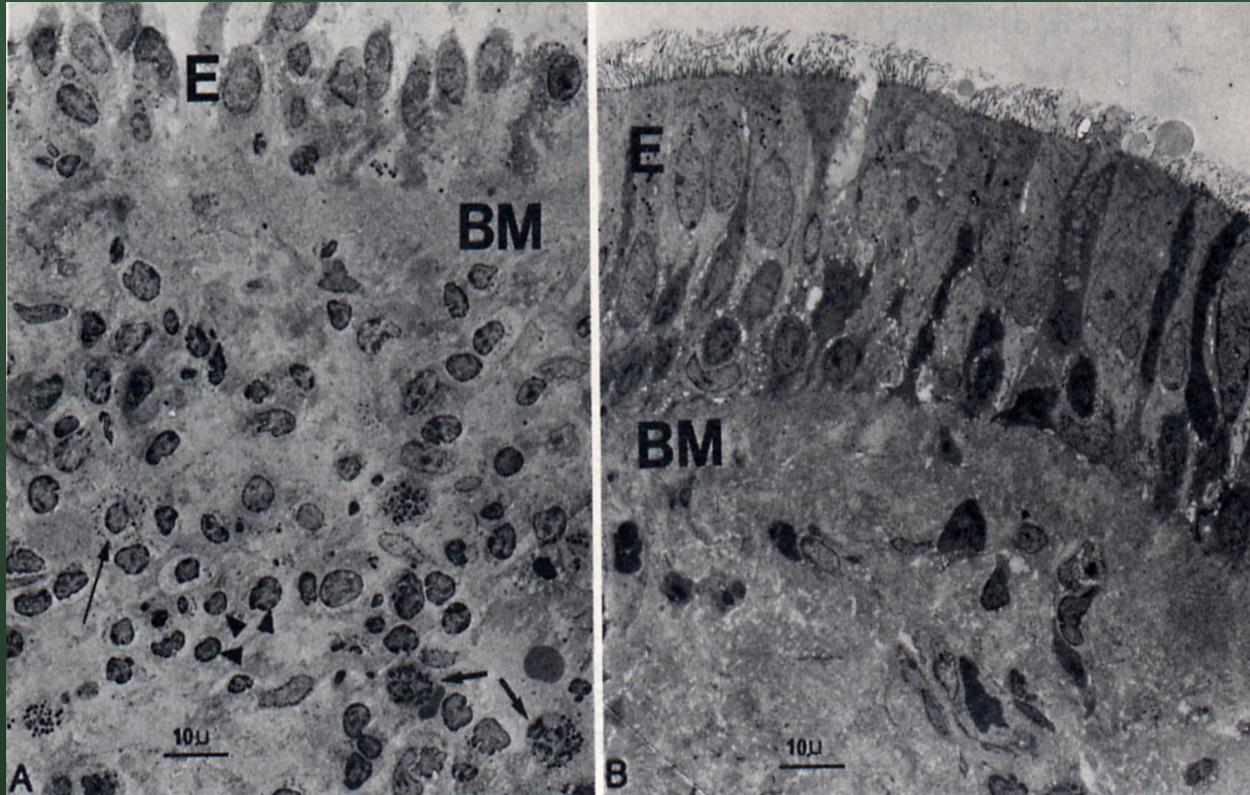
Guidelines for the Diagnosis and Management of Asthma).

Centers for Disease Control and Prevention. *MMWR Morb Mortal Wkly Rep.* 2006;55(33):919.

Low-dose ICS and the Prevention of Death from Asthma in Canada



Effects of Inhaled Corticosteroids on Inflammation



Pre- and post-3-month treatment with budesonide (BUD) 600 mcg b.i.d.

Laitinen LA, et al. *J Allergy Clin Immunol.* 1992;90:32-42.

Inhaled Corticosteroids and Linear Growth in Children

- Potential risks are well balanced by benefits.
- Growth rates in children are highly variable. Short-term evaluations may not be predictive of attaining final adult height.
- Poorly controlled asthma may delay growth.
- Children with asthma tend to have longer periods of reduced growth rates prior to puberty (males > females).

Long-Acting Beta₂-Agonists

- Not a substitute for anti-inflammatory therapy
 - Not appropriate for monotherapy
 - Beneficial when added to inhaled corticosteroids
 - Not for acute symptoms or exacerbations
-

Short-Acting Beta₂-Agonists

- Most effective medication for relief of acute bronchospasm
- More than one canister per month suggests inadequate asthma control
- Regularly scheduled use is not generally recommended
 - May lower effectiveness
 - May increase airway hyperresponsiveness

Using Too Much Albuterol May Signal a Lack of Asthma Control

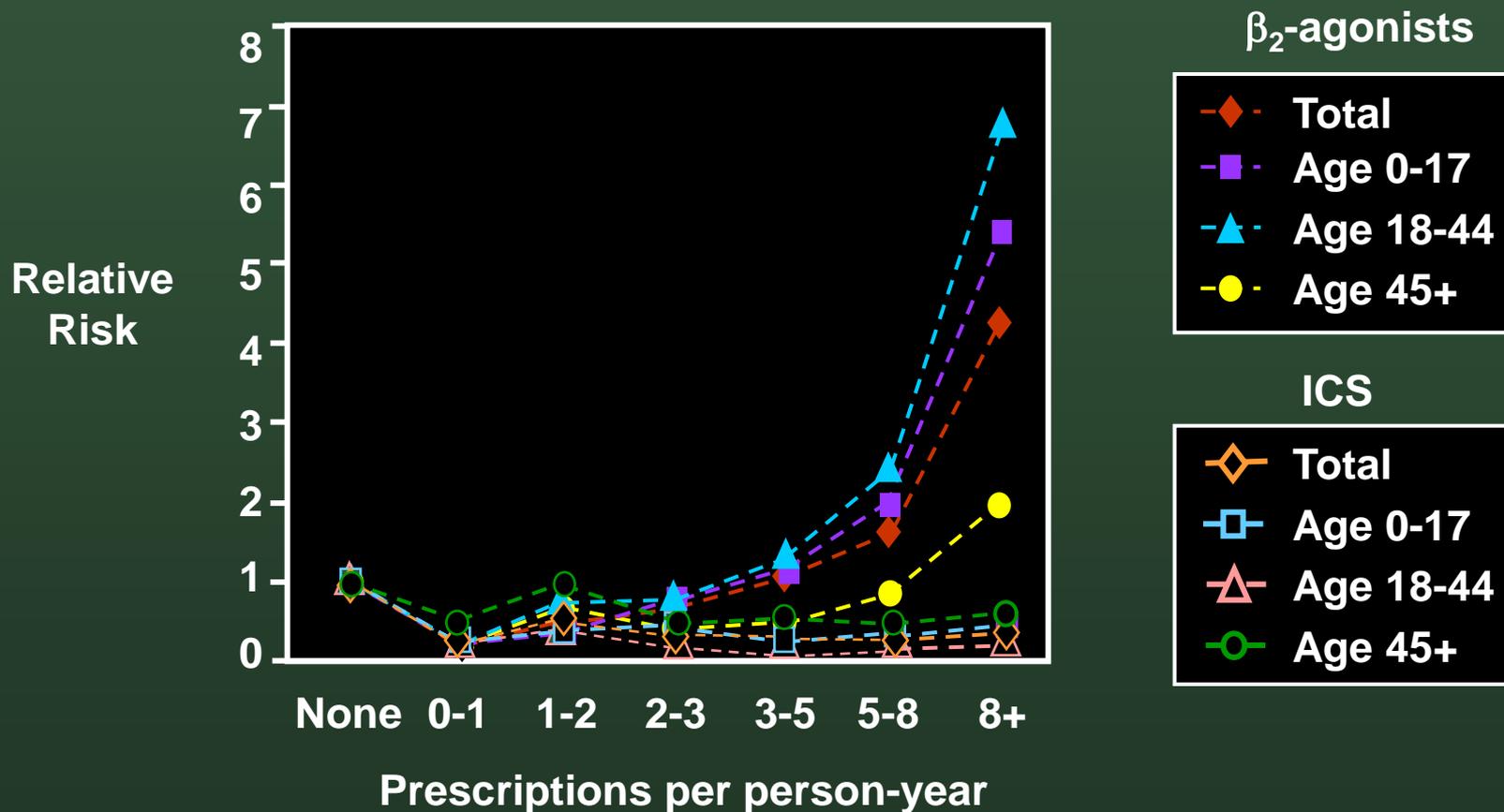
- Frequency of short-acting beta₂-agonist (SABA) use may be a useful barometer of lack of asthma control
- Excessive SABA use may be associated with an increased risk of exacerbation¹
- **How much albuterol are your patients using?**
 - Most albuterol inhalers have 200 puffs per canister, equaling 100 doses
 - One 200-puff canister may last a patient approximately 1 year when taking <2 doses a week on average*



*Calculations are for a canister containing 200 inhalations with patient using 2 inhalations per dose. Additional puffs may be required for priming of canister after 2 weeks of nonuse.

1. Schatz M et al. *J Allergy Clin Immunol.* 2006;117(5):995-1000.

Relative Risk of Hospitalization in the United States



Leukotriene Modifiers

■ Mechanisms

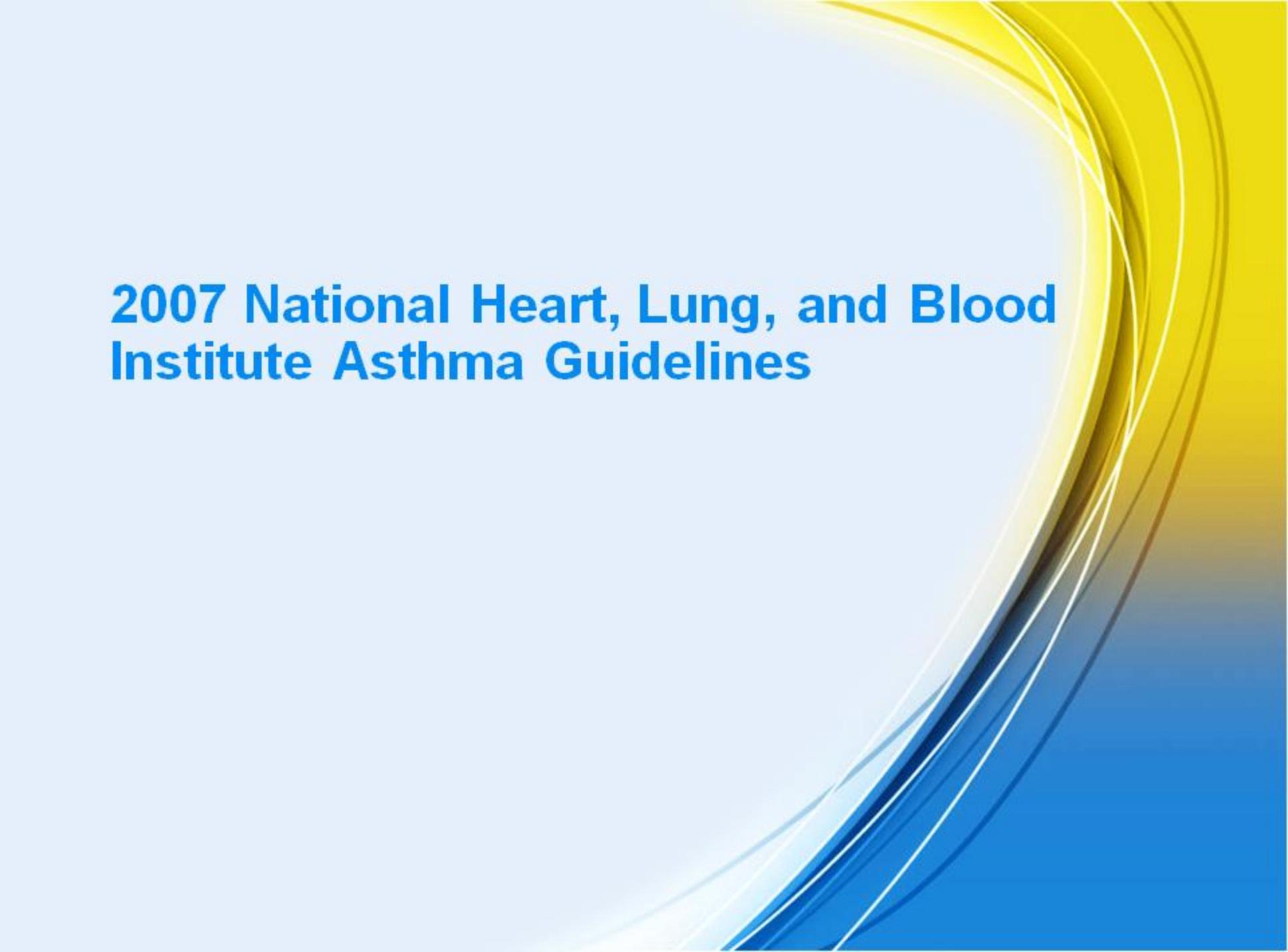
- 5-LO inhibitors (zileuton)
- Cysteinyl leukotriene receptor antagonists (montelukast)

■ Indications

- Long-term-control therapy in mild persistent asthma
 - Improve lung function
 - Reduce need for short-acting beta₂-agonists
 - Reduce exacerbations

Omalizumab

- Anti-IgE monoclonal antibody
- For moderate to severe allergic asthma
- Monthly to twice monthly injections
- Prevents symptoms before they start
- Reduces day time and night time symptoms
- May allow reduction in oral and inhaled corticosteroids

The background features a series of overlapping, curved lines in shades of yellow and blue, creating a dynamic, flowing effect. The lines are most prominent on the right side of the slide, curving from the top towards the bottom. The overall color palette is light and airy, with a gradient from white to light blue.

2007 National Heart, Lung, and Blood Institute Asthma Guidelines

Advantages and Limitations of Treatment Guidelines

- Advantages for patients and providers¹
 - Improve quality of patient care
 - Decrease unnecessary variation in care
 - Provide evidence-based recommendations for improving clinical decisions
 - Highlight gaps in knowledge
- Current limitations
 - Familiarity with guideline recommendations^{2,3}
 - Implementation of guidelines^{2,3}
 - Limited information as to whether management has changed in response to guidelines

Definitions: Severity, Control, and Responsiveness

- Assessment and monitoring of asthma are closely linked to the concepts of severity, control, and responsiveness

Severity

The intrinsic intensity of the disease process; most easily and directly measured in a patient who is not currently receiving long-term control treatment

Control

The degree to which the manifestations of asthma (symptoms, functional impairments, and risks of untoward events) are minimized and the goals of therapy are met

Responsiveness

The ease with which control is achieved by therapy

GOAL OF THERAPY: CONTROL OF ASTHMA

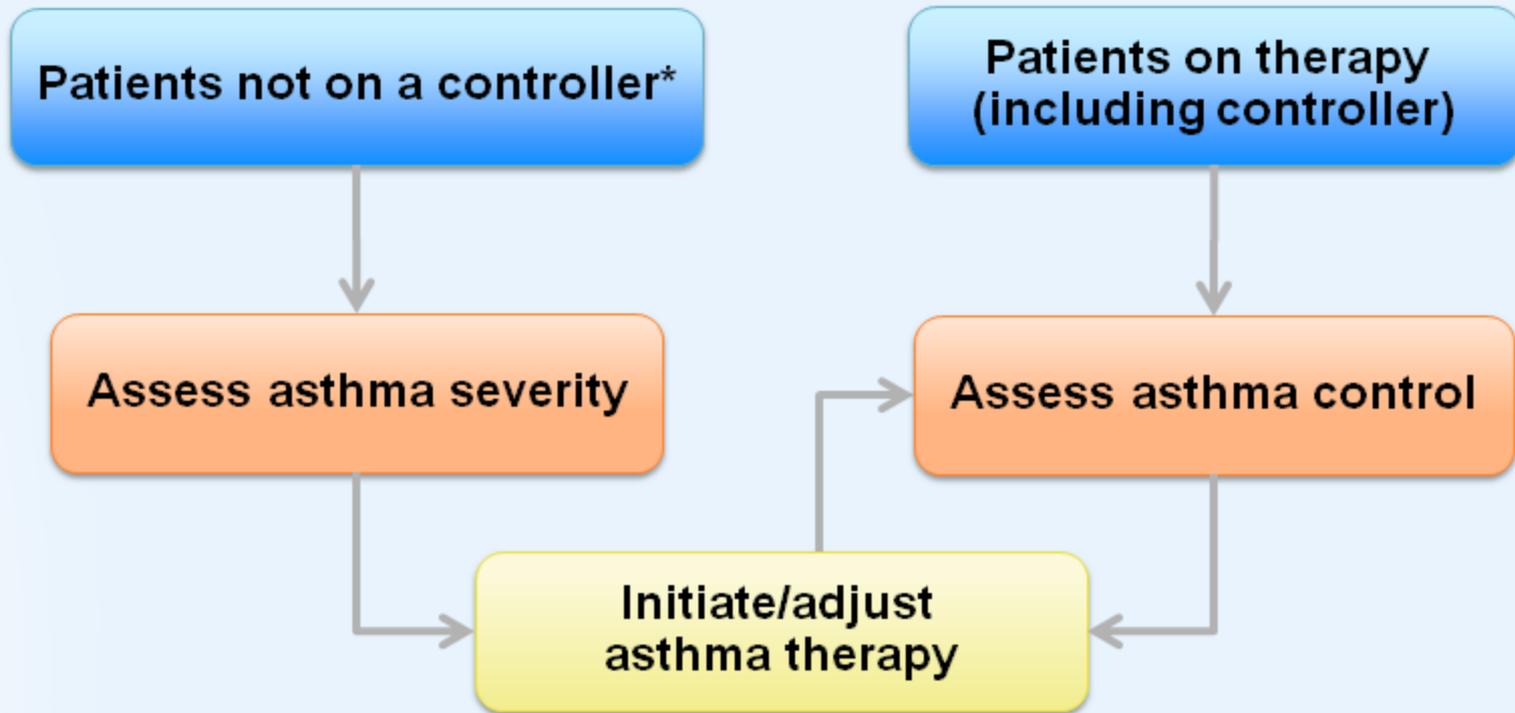
- Reduce Impairment:
 - Prevent chronic and troublesome symptoms (e.g., coughing or breathlessness in the daytime, in the night, or after exertion).
 - Require infrequent use (≤ 2 days a week) of inhaled SABA for quick relief of symptoms (not including prevention of exercise-induced bronchospasm [EIB]).
 - Maintain (near) normal pulmonary function.
 - Maintain normal activity levels (including exercise and other physical activity and attendance at school or work).
 - Meet patients and families expectations of and satisfaction with asthma care.

GOAL OF THERAPY: CONTROL OF ASTHMA

- Reduce Risk
 - Prevent recurrent exacerbations of asthma and minimize the need for ED visits or hospitalizations.
 - Prevent loss of lung function; for children, prevent reduced lung growth.
 - Provide optimal pharmacotherapy with minimal or no adverse effects of therapy.

**Many Adults and
Children With Asthma
Are Not Achieving the
NAEPP/NHLBI Goals
of Therapy**

NIH Recommendations Guide



*Long-term daily maintenance medication used to achieve and maintain asthma control (eg, inhaled corticosteroid).

Indicators of Poor Asthma Control

- Step up therapy if patient:
 - Awakens at night with symptoms
 - Has an urgent care visit
 - Has increased need for short-acting inhaled beta₂-agonists
 - Uses more than one canister of short-acting beta₂-agonist in 1 month

Indicators of Poor Asthma Control (continued)

- Before increasing medications, check:
 - Inhaler technique
 - Adherence to prescribed regimen
 - Environmental changes
 - Also consider alternative diagnoses

Classifying Asthma Severity and Initiating Treatment in Children 0 to 4 Years of Age

Components of Severity		Intermittent	Persistent		
			Mild	Moderate	Severe
Impairment	Symptoms	≤2 days/week	>2 days/week but not daily	Daily	Throughout the day
	Nighttime awakenings	0	1-2x/month	3-4x/month	>1x/week
	SABA use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week but not daily	Daily	Several times per day
	Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
Risk	Exacerbations requiring oral systemic corticosteroids	0-1/year	≥2 exacerbations in 6 months requiring oral systemic corticosteroids, or ≥4 wheezing episodes/1 year lasting >1 day AND risk factors for persistent asthma		
		<p style="text-align: center;">← Consider severity and interval since last exacerbation Frequency and severity may fluctuate over time →</p> <p style="text-align: center;">Exacerbations of any severity may occur in patients in any severity category</p>			
Recommended Step for Initiating Treatment		Step 1	Step 2	Step 3 and consider short course of oral systemic corticosteroids	
		In 2 to 6 weeks, depending on severity, evaluate level of asthma control that is achieved. If no clear benefit is observed in 4 to 6 weeks, consider adjusting therapy or alternative diagnoses			

Stepwise Approach for Managing Asthma in Children Aged 0 to 4 Years

Intermittent Asthma

Persistent Asthma: Daily Medication

Consult with asthma specialist if Step 3 care or higher is required.
Consider consultation at Step 2.

Step 1

Preferred:
SABA PRN

Step 2

Preferred:
Low-dose ICS (A)

Alternative:
Cromolyn (B)
or
Montelukast (A)

Step 3

Preferred:
Medium-dose ICS (D)

Step 4

Preferred:
Medium-dose ICS + either LABA (D)
or
Montelukast (D)

Step 5

Preferred:
High-dose ICS + either LABA (D)
or
Montelukast (D)

Step 6

Preferred:
High-dose ICS + either LABA or Montelukast and Oral Systemic Corticosteroids (D)

Step Up If Needed

(first, check adherence, inhaler technique, and environmental control)

Assess Control

Step Down If Possible

(and asthma is well controlled at least 3 months)

Patient Education and Environmental Control at Each Step

Quick-Relief Medication for All Patients

- SABA as needed for symptoms. Intensity of treatment depends on severity of symptoms
- With viral respiratory infection: SABA q 4-6 hours up to 24 hours (longer with physician consult). Consider short course of oral systemic corticosteroids if exacerbation is severe or patient has history of previous severe exacerbations
- Caution: Frequent use of SABA may indicate the need to step up treatment. See text for recommendations on initiating daily long-term-control therapy

Assessing Asthma Control and Adjusting Therapy in Children 0 to 4 Years of Age

Components of Control		Well Controlled	Not Well Controlled	Very Poorly Controlled
Impairment	Symptoms	≤2 days/week	>2 days/week	Throughout the day
	Nighttime awakenings	≤1x/month	>1x/month	>1x/week
	Interference with normal activity	None	Some limitation	Extremely limited
	SABA use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week	Several times per day
Risk	Exacerbations requiring oral systemic corticosteroids	0-1/year	2-3/year	>3/year
	Treatment-related adverse effects	Medication side effects can vary in intensity from none to very troublesome and worrisome. The level of intensity does not correlate to specific levels of control but should be considered in the overall assessment of risk.		
Recommended Action for Treatment		<ul style="list-style-type: none"> • Maintain current treatment • Regular follow-up every 1 to 6 months • Consider step down if well controlled for at least 3 months 	<ul style="list-style-type: none"> • Step up (1 step) and Reevaluate in 2 to 6 weeks • If no clear benefit in 4 to 6 weeks, consider alternative diagnoses or adjusting therapy • For side effects, consider alternative treatment options 	<ul style="list-style-type: none"> • Consider short course of oral systemic corticosteroids • Step up (1-2 steps) and Reevaluate in 2 weeks • If no clear benefit in 4 to 6 weeks, consider alternative diagnoses or adjusting therapy • For side effects, consider alternative treatment options

Classifying Asthma Severity and Initiating Treatment in Children 5 to 11 Years of Age

Components of Severity		Intermittent	Persistent		
			Mild	Moderate	Severe
Impairment	Symptoms	≤2 days/week	>2 days/week but not daily	Daily	Throughout the day
	Nighttime awakenings	≤2x/month	3-4x/month	>1x/week but not nightly	Often 7x/week
	SABA use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week but not daily	Daily	Several times per day
	Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
	Lung Function	<ul style="list-style-type: none"> • Normal FEV₁ between exacerbations • FEV₁ >80% predicted • FEV₁/FVC >85% 	<ul style="list-style-type: none"> • FEV₁ ≥80% predicted • FEV₁/FVC >80% 	<ul style="list-style-type: none"> • FEV₁ = 60%-80% predicted • FEV₁/FVC = 75%-80% 	<ul style="list-style-type: none"> • FEV₁ <60% predicted • FEV₁/FVC <75%
Risk	Exacerbations requiring oral systemic corticosteroids	0-1/year	≥2/year		
		<p>← Consider severity and interval since last exacerbation →</p> <p>Frequency and severity may fluctuate over time for patients in any severity category</p> <p>Relative annual risk of exacerbations may be related to FEV₁</p>			
Recommended Step for Initiating Treatment		Step 1	Step 2	Step 3, medium-dose ICS option	Step 3, medium-dose ICS option, or Step 4
		and consider short course of oral systemic corticosteroids			
In 2 to 6 weeks, evaluate level of asthma control that is achieved and adjust therapy accordingly					

Adapted from National Asthma Education and Prevention Program. *Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma* (EPR-3 2007). U.S. Department of Health and Human Services. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>. Accessed August 29, 2007.

Stepwise Approach for Managing Asthma in Children Aged 5 to 11 Years

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 (A)
Alternative:
Cromolyn (B),
LTRA (B),
Nedocromil (B),
or
Theophylline (B)

Step 3
Preferred:
EITHER
Low-dose ICS +
either LABA (B),
LTRA (B), or
Theophylline (B)
OR
Medium-dose
ICS (B)

Step 4
Preferred:
Medium-dose
ICS + LABA (B)
Alternative:
Medium-dose
ICS + either
LTRA (B)
or
Theophylline (B)

Step 5
Preferred:
High-dose ICS +
LABA (B)
Alternative:
High-dose ICS +
either LTRA (B)
or
Theophylline (B)

Step 6
Preferred:
High-dose ICS +
LABA +
Oral Systemic
Corticosteroid (D)
Alternative:
High-dose ICS +
either LTRA or
Theophylline
and
Oral Systemic
Corticosteroid (D)

Step Up If Needed

(first, check adherence, inhaler technique, environmental control, and comorbid conditionals)

Assess Control

Step Down If Possible

(and asthma is well-controlled at least 3 months)

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

Steps 2-4: Consider subcutaneous allergen immunotherapy for patients who have allergic asthma

Quick-Relief Medication for All Patients

- SABA as needed for symptoms. Intensity of treatment depends on severity of symptoms: up to 3 treatments at 20-minute intervals as needed. Short course of oral systemic corticosteroids may be needed
- Caution: Increasing of use of SABA or use >2 days a week for symptom relief (not prevention of EIB) indicates inadequate control and the need to step up treatment

Assessing Asthma Control and Adjusting Therapy in Children 5 to 11 Years of Age

Components of Control		Well Controlled	Not Well Controlled	Very Poorly Controlled
Impairment	Symptoms	≤2 days/week but not more than once on each day	>2 days/week or multiple times on ≤2 days/week	Throughout the day
	Nighttime awakenings	≤1x/month	≥2x/month	≥2x/week
	Interference with normal activity	None	Some limitation	Extremely limited
	SABA use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week	Several times per day
	Lung function • FEV ₁ or peak flow • FEV ₁ /FVC	>80% predicted/ personal best >80%	60%-80% predicted/ personal best 75%-80%	<60% predicted/ personal best <75%
Risk	Exacerbations requiring oral systemic corticosteroids	0-1/year	≥2/year	
		Consider severity and interval since last exacerbation		
	Reduction in lung growth	Evaluation requires long-term follow-up		
	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		<ul style="list-style-type: none"> • Maintain current step • Regular follow-up every 1 to 6 months • Consider step down if well controlled for at least 3 months 	<ul style="list-style-type: none"> • Step up at least 1 step and • Reevaluate in 2 to 6 weeks • For side effects, consider alternative treatment options 	<ul style="list-style-type: none"> • Consider short course of oral systemic corticosteroids • Step up 1 or 2 steps, and • Reevaluate in 2 weeks • For side effects, consider alternative treatment options

Adapted from National Asthma Education and Prevention Program. *Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma* (EPR-3 2007). U.S. Department of Health and Human Services. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>. Accessed August 29, 2007.

Classifying Asthma Severity and Initiating Treatment in Youths ≥ 12 Years of Age and Adults

Components of Severity		Intermittent	Persistent		
			Mild	Moderate	Severe
Impairment Normal FEV ₁ /FVC: 8-19 yr 85% 20-39 yr 80% 40-59 yr 75% 60-80 yr 70%	Symptoms	≤ 2 days/week	> 2 days/week but not daily	Daily	Throughout the day
	Nighttime awakenings	≤ 2 x/month	3-4x/month	> 1 x/week but not nightly	Often 7x/week
	SABA use for symptom control (not prevention of EIB)	≤ 2 days/week	> 2 days/week but not daily and not more than 1x on any day	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 $> 80\%$ predicted FEV₁/FVC normal 	<ul style="list-style-type: none"> FEV₁ $> 80\%$ predicted FEV₁/FVC normal 	<ul style="list-style-type: none"> FEV₁ $> 60\%$ but $< 80\%$ predicted FEV₁/FVC reduced 5% 	<ul style="list-style-type: none"> FEV₁ $< 60\%$ predicted FEV₁/FVC reduced $> 5\%$
Risk	Exacerbations requiring oral systemic corticosteroids	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			
Recommended Step for Initiating Treatment		Step 1	Step 2	Step 3	Step 4 or 5
		and consider short course of oral systemic corticosteroids In 2 to 6 weeks, evaluate level of asthma control that is achieved and adjust therapy accordingly			

EIB = exercise-induced bronchospasm; FEV₁ = forced expiratory volume in one second; FVC = forced vital capacity.

Adapted from National Asthma Education and Prevention Program. *Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma* (EPR-3 2007). U.S. Department of Health and Human Services. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>. Accessed August 29, 2007.

CASE

ASTHMA IN ADULTS ≥ 12

Classifying Asthma Severity

13 yo male with symptoms 3 days a week, no nighttime wakening, albuterol use 3 days a week, no limitation in activities, FEV1 85%, 2 episodes of asthma requiring OCS in the past year, has done well since last episode 4 months ago.

Classifying Asthma Severity and Initiating Treatment in Youths ≥ 12 Years of Age and Adults

Components of Severity		Intermittent	Persistent		
			Mild	Moderate	Severe
Impairment Normal FEV ₁ /FVC: 8-19 yr 85% 20-39 yr 80% 40-59 yr 75% 60-80 yr 70%	Symptoms	≤ 2 days/week	> 2 days/week but not daily	Daily	Throughout the day
	Nighttime awakenings	≤ 2 x/month	3-4x/month	> 1 x/week but not nightly	Often 7x/week
	SABA use for symptom control (not prevention of EIB)	≤ 2 days/week	> 2 days/week but not daily and not more than 1x on any day	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 $> 80\%$ predicted FEV₁/FVC normal 	<ul style="list-style-type: none"> FEV₁ $> 80\%$ predicted FEV₁/FVC normal 	<ul style="list-style-type: none"> FEV₁ $> 60\%$ but $< 80\%$ predicted FEV₁/FVC reduced 5% 	<ul style="list-style-type: none"> FEV₁ $< 60\%$ predicted FEV₁/FVC reduced $> 5\%$
Risk	Exacerbations requiring oral systemic corticosteroids	0-1/year	≥ 2 /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
		and consider short course of oral systemic corticosteroids			
In 2 to 6 weeks, evaluate level of asthma control that is achieved and adjust therapy accordingly					

EIB = exercise-induced bronchospasm; FEV₁ = forced expiratory volume in one second; FVC = forced vital capacity.

Adapted from National Asthma Education and Prevention Program. *Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma* (EPR-3 2007). U.S. Department of Health and Human Services. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>. Accessed August 29, 2007.

Stepwise Approach for Managing Asthma in Patients Aged ≥ 12 Years

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 (A)

Alternative:
Cromolyn (A),
LTRA (A),
Nedocromil (A),
or
Theophylline (B)

Step 3

Preferred:
Low-dose ICS +
LABA (A)
OR
Medium-dose ICS
(A)

Alternative:
Low-dose ICS +
either LTRA (A),
Theophylline (B),
or Zileuton (D)

Step 4

Preferred:
Medium-dose
ICS + LABA (B)

Alternative:
Medium-dose
ICS +
either
LTRA (B),
Theophylline (B),
or Zileuton (D)

Step 5

Preferred:
High-dose ICS +
LABA (B)

AND

Consider
Omalizumab
for Patients
Who Have
Allergies (B)

Step 6

Preferred:
High-dose ICS +
LABA + Oral
Corticosteroid

AND

Consider
Omalizumab for
Patients Who
Have Allergies

Step Up If Needed

(first, check adherence, environmental control, and comorbid conditions)

Assess Control

Step Down If Possible

(and asthma is well controlled at least 3 months)

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

Steps 2-4: Consider subcutaneous allergen immunotherapy for patients who have allergic asthma

Quick-Relief Medication for All Patients

- SABA as needed for symptoms. Intensity of treatment depends on severity of symptoms: up to 3 treatments at 20-minute intervals as needed. Short course of systemic oral corticosteroids may be needed
- Use of SABA >2 days a week for symptom relief (not prevention of EIB) generally indicates inadequate control and the need to step up treatment

ICS = inhaled corticosteroids; LABA = long-acting β_2 -agonist; LTRA = leukotriene receptor antagonist.

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Assessing Asthma Control and Adjusting Therapy in Youths ≥ 12 Years of Age and Adults

Components of Control		Well Controlled	Not Well Controlled	Very Poorly Controlled
Impairment	Symptoms	≤ 2 days/week	> 2 days/week	Throughout the day
	Nighttime awakenings	≤ 2 x/month	1-3x/week	≥ 4 x/week
	Interference with normal activity	None	Some limitation	Extremely limited
	SABA use for symptom control (not prevention of EIB)	≤ 2 days/week	> 2 days/week	Several times per day
	FEV ₁ or peak flow	$> 80\%$ predicted/ personal best	60%-80% predicted/ personal best	$< 60\%$ predicted/ personal best
	Validated questionnaires ATAQ ACQ ACT	0 ≤ 0.75 ≥ 20	1-2 ≥ 1.5 16-19	3-4 N/A ≤ 15
Risk	Exacerbations requiring oral systemic corticosteroids	0-1/year	≥ 2/year	
		Consider severity and interval since last exacerbation		
	Progressive loss of lung function	Evaluation requires long-term follow-up		
	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		<ul style="list-style-type: none"> Maintain current step Regular follow-ups every 1-6 months to maintain control Consider step down if well controlled for at least 3 months 	<ul style="list-style-type: none"> Step up 1 step and Reevaluate in 2 to 6 weeks For side effects, consider alternative treatment options 	<ul style="list-style-type: none"> Consider short course of oral systemic corticosteroids Step up 1-2 steps, and Reevaluate in 2 weeks For side effects, consider alternative treatment options



CASE

ASTHMA IN ADULTS ≥ 12

Assessing Asthma Control

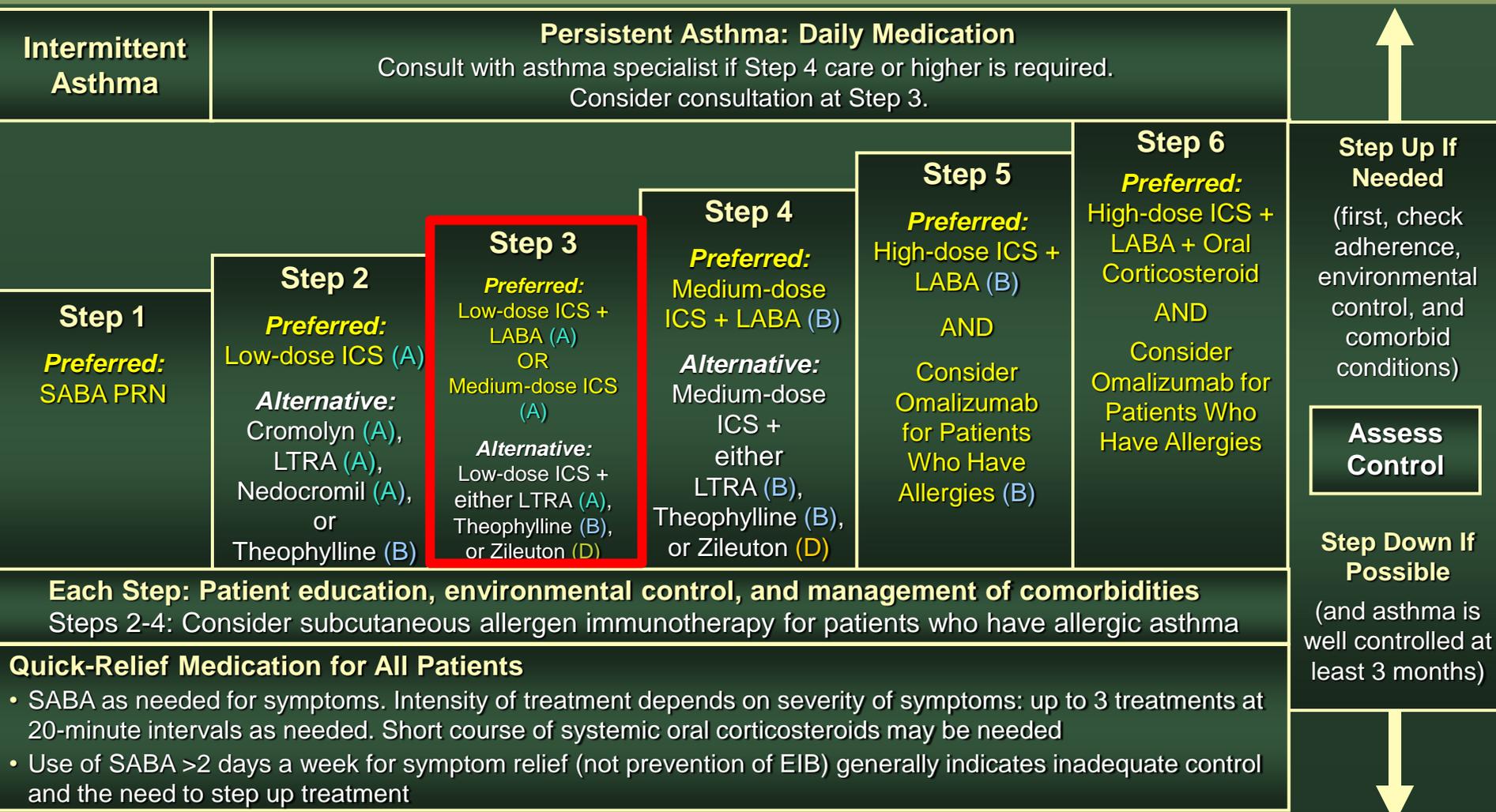
Symptoms 3 days a week, no interference with activities, albuterol use 3 times a week, FEV1 75%, needed OCS 1 month ago.

Assessing Asthma Control and Adjusting Therapy in Youths ≥ 12 Years of Age and Adults

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	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		<ul style="list-style-type: none"> Maintain current step Regular follow-ups every 1-6 months to maintain control Consider step down if well controlled for at least 3 months 	<ul style="list-style-type: none"> Step up 1 step and Reevaluate in 2 to 6 weeks For side effects, consider alternative treatment options 	<ul style="list-style-type: none"> Consider short course of oral systemic corticosteroids Step up 1-2 steps, and Reevaluate in 2 weeks For side effects, consider alternative treatment options



Stepwise Approach for Managing Asthma in Patients Aged ≥12 Years



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How best to decide which patients will benefit from allergist evaluation and co-management

- NHLBI Guidelines
 - Age 0-4 YO
 - Consult with asthma specialist at step 3
 - Consider at step 2
 - Age 5-11 YO
 - Consult with asthma specialist at step 4
 - Consider at step 3
 - Age \geq 12 YO
 - Consult with asthma specialist at step 4
 - Consider at step 3

How best to decide which patients will benefit from allergist evaluation and co-management (cont).

- If there is a significant component of other atopic disease that may be related.
 - Allergy evaluation may be helpful
 - Especially if there are other ancillary treatment options available.
- If there are complicating factors that may require further intervention.
- If the level of severity requires specialty referral for access (i.e. Xolair)

Learning Objectives

- The participant will better understand how to educate the patient (and/or parent) using the **National Asthma Education and Prevention Program (NAEPP)** or **National Heart, Lung and Blood Institute (NHLBI)** Guidelines.
- The participant will be able to manage the changes in asthma severity with appropriate adjustments in therapy.
- The participant will know when specialist referral should be considered in taking care of the more severe asthma patients.