

Asthma: Classification, Management, Prevention and New Treatments

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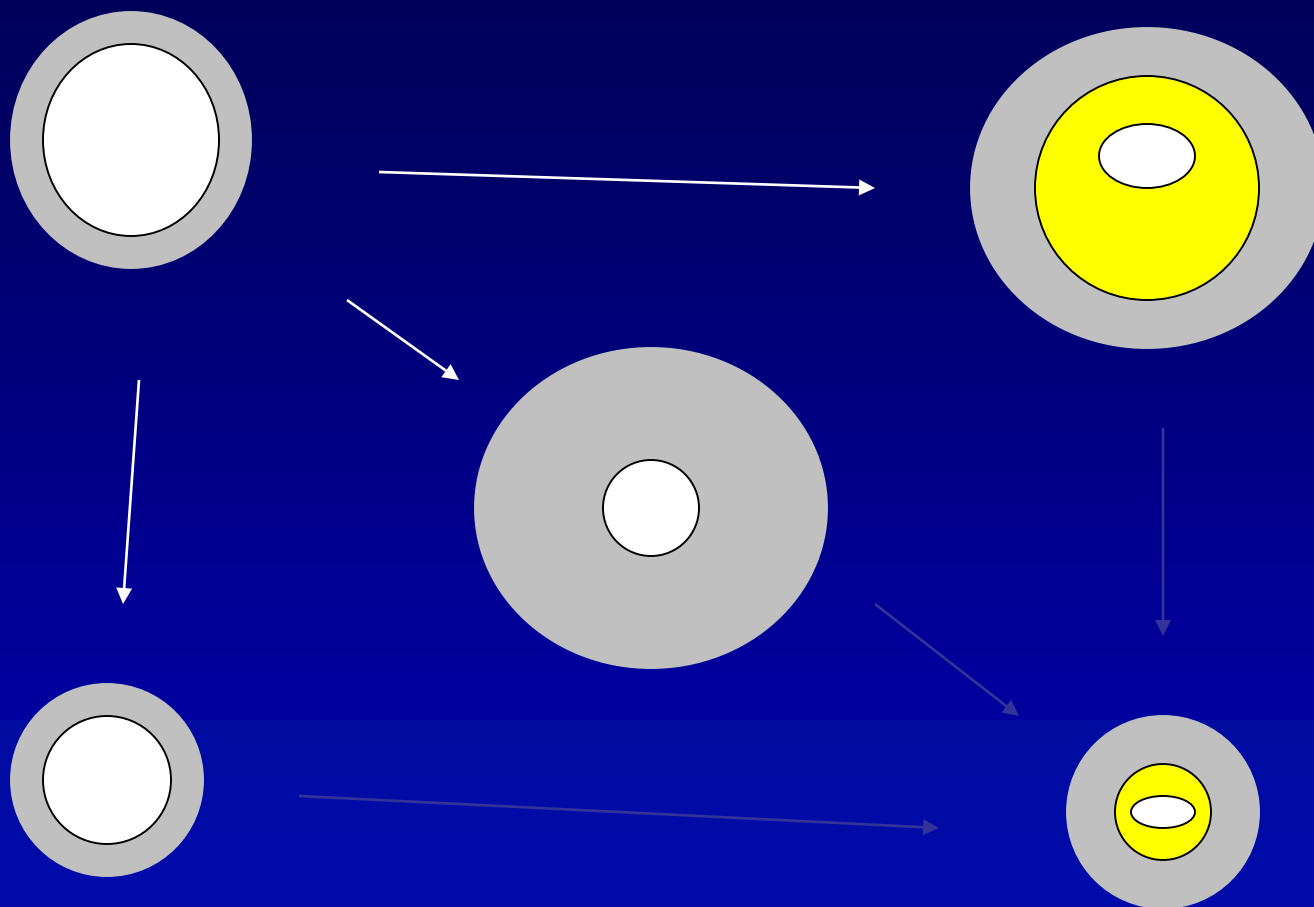
- I have no relevant financial relationships to disclose
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Outline

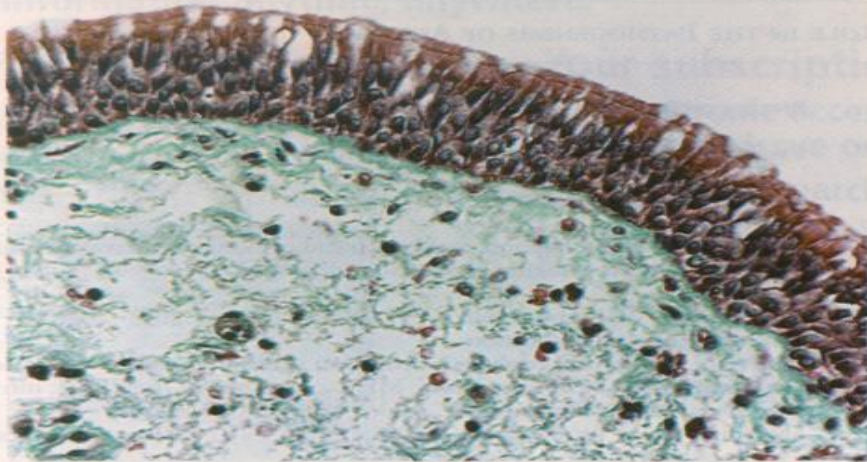
- Definition
- Epidemiology
- Diagnosis
- Management
- New Therapies
- Prevention

Asthma

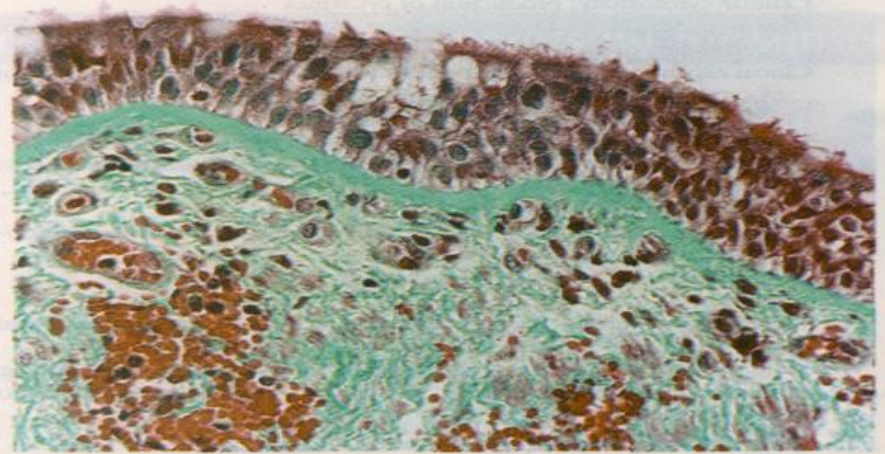
- Chronic inflammatory disorder of the airway which results in recurrent episodes of airflow obstruction that is often reversible
 - Symptoms
 - Airway obstruction
 - Inflammation
 - Hyperresponsiveness



Inflammation in Mild Asthma



Subject Without Asthma



Patient With Mild Asthma

Busse and Lemanske. *N Engl J Med.*
2001;344:350-62.

Epidemiology

- 10% of children in the US: 7 million children under the age of 18
- Prevalence is increasing
- Asthma morbidity and mortality is increasing
- 50% have family history of asthma, rhinitis, eczematous dermatitis, or urticaria

Characteristic**	Number with Current Asthma (in thousands)	Percent with Current Asthma
Total	24,633	7.8%
Child (Age <18)	6,188	8.4%
Adult (Age 18+)	18,445	7.6%
All Age Groups		
0-4 years	935	4.7%
5-14 years	4,033	9.8%
15-19 years	2,107	10.2%
20-24 years	1,655	7.6%
25-34 years	2,916	6.8%
35-64 years	9,907	8.0%
65+ years	3,079	6.6%

Characteristic	Number of persons with current asthma* who reported having one or more asthma attacks (in thousands)	Percent of persons with current asthma* who reported having one or more asthma attacks
Total	11,533	46.9%
Child (Age <18)	2,941	47.5%
Adult (Age 18+)	8,592	46.6%

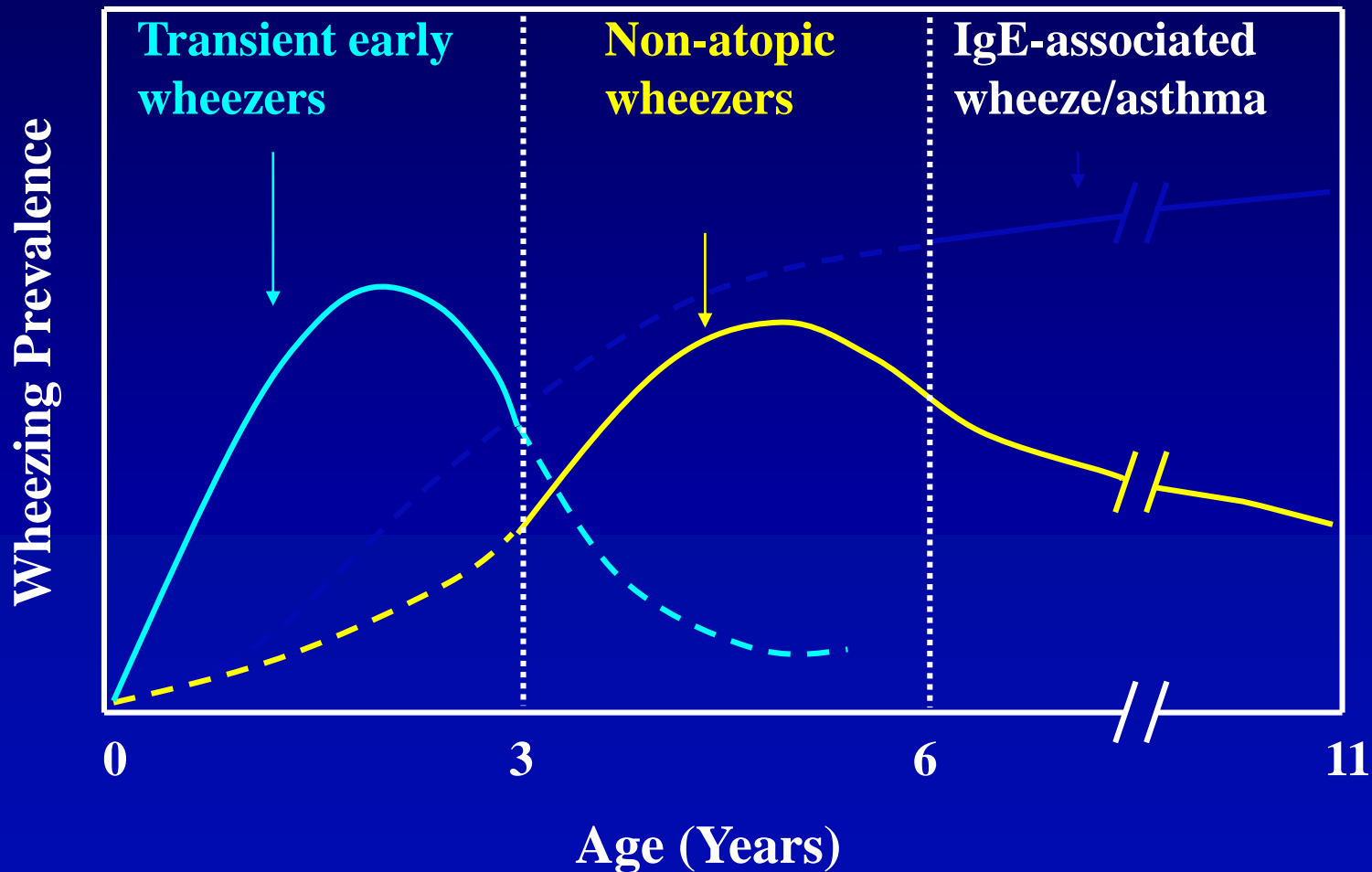
Characteristic	Number	Rate[*] per 10,000
Total	439,435	14.1
Child (Age <18)	136,669	18.3**
Adult (Age 18+)	302,766	13.0**
Race		
White	220,528	8.7
Black	113,522	29.9
Other	27,312	12.6

Onset of Symptoms in Children With Asthma

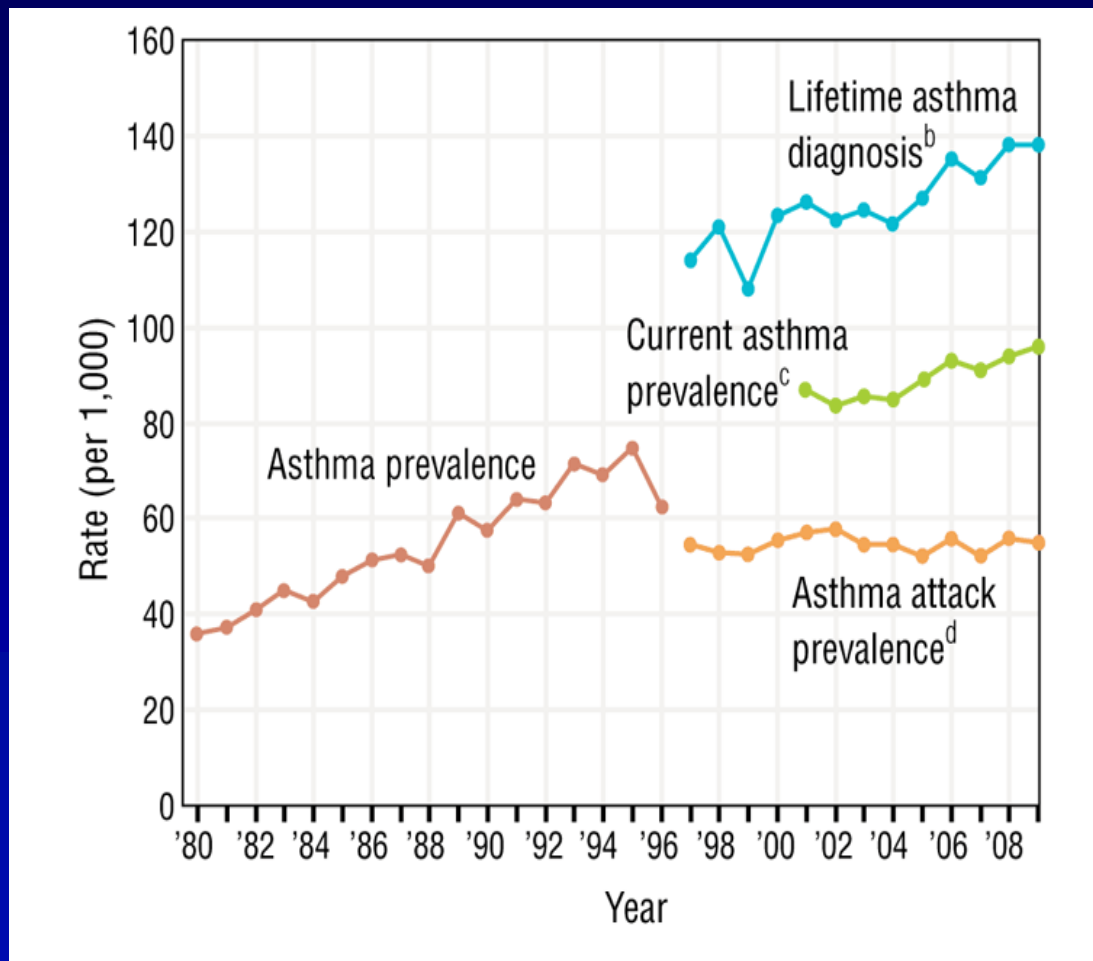


McNicol and Williams. *BMJ* 1973;4:7-11; Wainwright et al. *Med J Aust* 1997;167:218-222.

Natural History of Childhood Asthma



Asthma Prevalence in US Children

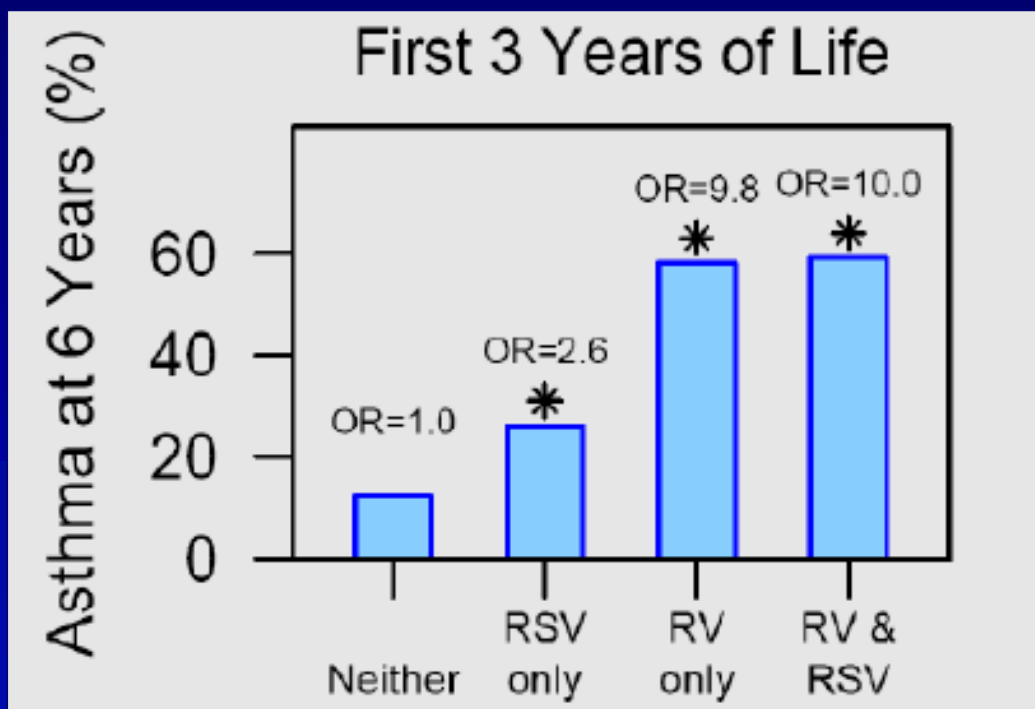


SOURCE: US EPA (NCHS, 2006-2010).

Etiology

- Genetic predisposition –Atopy
 - Atopic component in 50% of patients
 - Associated with eczema, fever or urticaria.
 - Raised IgE, eosinophilia, labile PEF, known sensitivity to allergens
- Infection
 - Viral-induced wheeze occurs in some 20% of children
 - RSV highly associated with subsequent wheeze
 - RV highly associated with persistent wheeze
- Passive smoking
 - During pregnancy
 - Ongoing
- Bronchial hyper-responsiveness

Rhinovirus (RV) Wheezing versus Respiratory Syncytial Virus (RSV) Wheezing in First 3 Years and Asthma at 6 Years



Jackson DJ, Gangnon RE, Evans MD, et al. Wheezing rhinovirus illnesses in early life predict asthma development in high-risk children. *Am J Respir Crit Care Med.* 2008; 178(7):667-672

Clinical features

May be asymptomatic now

Peak flow - not reliable due to poor technique

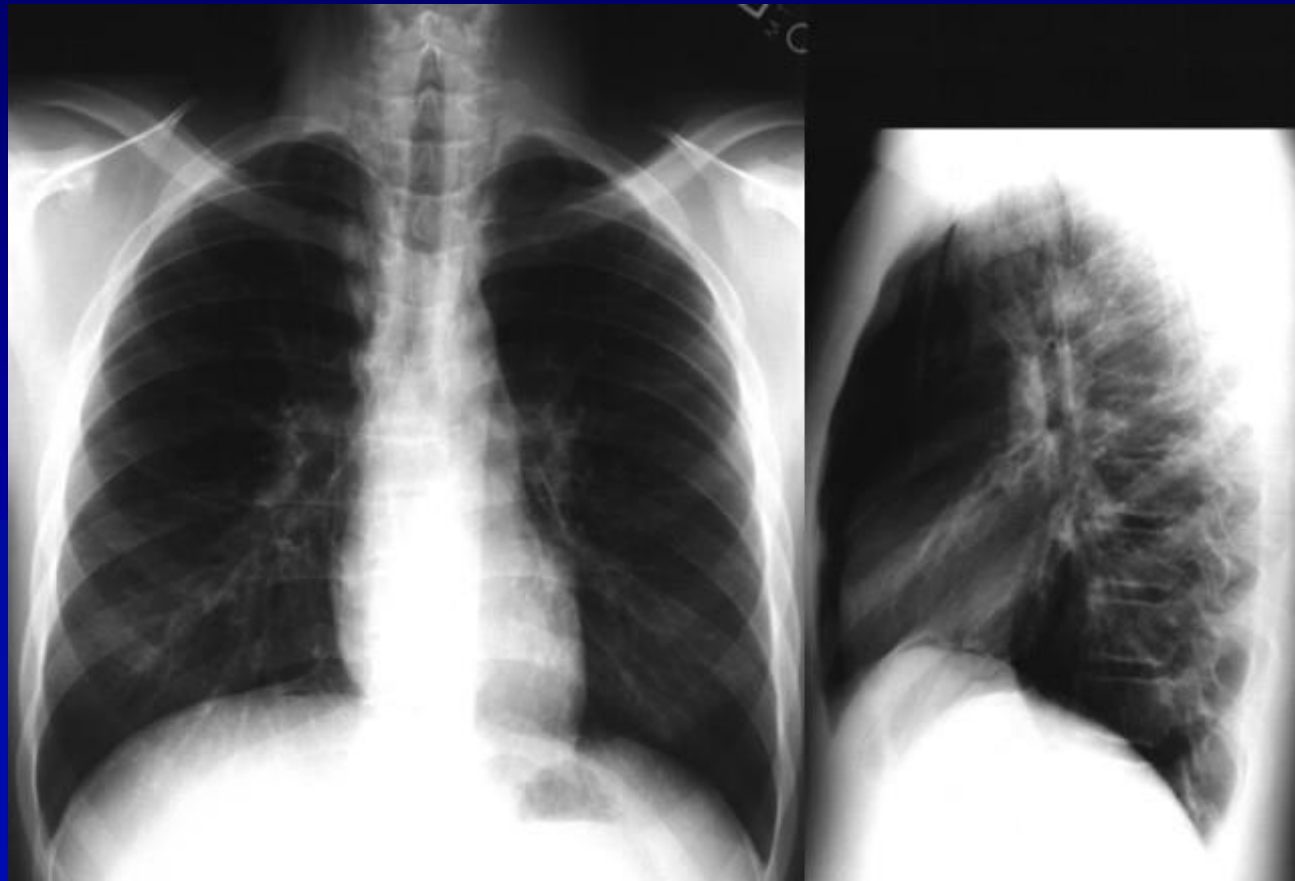
Reversible airflow obstruction on spirometry

Symptoms

- expiratory wheeze
- SOB
- sometimes cough may be the only symptom
- symptoms worse at night or with exposures to allergen, changes in weather, stress
- may feel chest tightness
- young children may vomit or have reduced appetite



CXR



Diagnosis

- **Clinical features that increase the probability of asthma:**

- More than one of the following symptoms especially if frequent, worse at night/early morning/after exercise/exposure to triggers etc.

- Wheeze

- Cough
- difficulty breathing,
- chest tightness

- Atopic disorder

- FH of atopic disorder/asthma

- Improvement in symptoms or lung function with adequate therapy

- **Clinical features that lower the probability of asthma:**

- Symptoms with URI only
- no interval symptoms
- isolated cough in the absence of wheeze or difficulty breathing
- history of moist cough
- prominent dizziness, light-headedness, peripheral tingling
- repeatedly normal physical examination of chest when symptomatic
- normal PEF/spirometry when symptomatic
- no response to a trial of asthma therapy
- clinical features pointing to alternative diagnosis

Asthma Predictive Index

- Identify high risk children (2 and 3 years of age):
 - ≥ 4 wheezing episodes in the past year (at least one must be MD diagnosed)

PLUS

- One major criterion *OR* ■ Two minor criteria
 - Parent with asthma
 - Atopic dermatitis
 - Aero-allergen sensitivity
- Two minor criteria
 - Food sensitivity
 - Peripheral eosinophilia ($\geq 4\%$)
 - Wheezing not related to infection

Modified from: Castro-Rodriguez JA, Holberg CJ, Wright AL, et al. A clinical index to define risk of asthma in young children with recurrent wheezing. *Am J Respir Crit Care Med.* 2000;162(4 Pt 1):1403–1406

**National Asthma Education
and Prevention Program
Expert Panel Report 3**

Guidelines for the Diagnosis and Management of Asthma



Definitions

- Severity: the intrinsic intensity of the disease process
- Control: the degree to which asthma manifestations are minimized by therapy
- Impairment: frequency and intensity of symptoms and limitations patient is experiencing
- Risk: likelihood of exacerbation, decline in lung function or adverse effects of therapy

Goal of Therapy: Control of Asthma

- Reduce Impairment
 - Prevent chronic, troublesome symptoms
 - Require infrequent SABA use
 - Maintain normal pulmonary function
 - Maintain normal activity
 - Meet families' expectations
- Reduce Risk
 - Prevent recurrent exacerbations
 - Prevent loss of lung function
 - Optimal pharmacotherapy with minimal adverse effects of therapy



Long Term Control Medications

- Corticosteroids—inhaled and oral
- Leukotriene Modifiers
- Long-acting beta agonists—with or without inhaled steroids
- Methylxanthines
- Cromolyn sodium
- Immunomodulators

Quick Relief Medications

- Short acting beta agonists:
 - Relief of acute symptoms
 - Prevention of EIB
- Anticholinergics:
 - Additive to beta agonist in severe exacerbation
 - Alternative if beta agonist not tolerated

Stepwise Approach

Aims to:

- Abolish symptoms as soon as possible
- Optimize function by starting treatment at the level most likely to achieve this
- Emphasizes control for ongoing management

Stepwise Approach

- Three age groups (0-4, 5-11, ≥ 12)
- Six steps
- ICS continue as preferred long-term therapy in all ages
- Equal preference for medium dose ICS and low dose ICS + LABA in Step 3 in ≥ 5
- Omalizumab recommended in ≥ 12 for those on Step 5 or 6

FIGURE 4-2a. CLASSIFYING ASTHMA SEVERITY AND INITIATING TREATMENT IN CHILDREN 0-4 YEARS OF AGE

Assessing severity and initiating therapy in children who are not currently taking long-term control medication

Components of Severity		Classification of Asthma Severity (0-4 years of age)			
		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
	Short-acting beta ₂ -agonist 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 Therapy		Step 1	Step 2	Step 3 and consider short course of oral systemic corticosteroids	
(See figure 4-1a for treatment steps.)		In 2-6 weeks, depending on severity, evaluate level of asthma control that is achieved. If no clear benefit is observed in 4-6 weeks, consider adjusting therapy or alternative diagnoses.			

FIGURE 4-1a. STEPWISE APPROACH FOR MANAGING ASTHMA IN CHILDREN 0-4 YEARS OF AGE

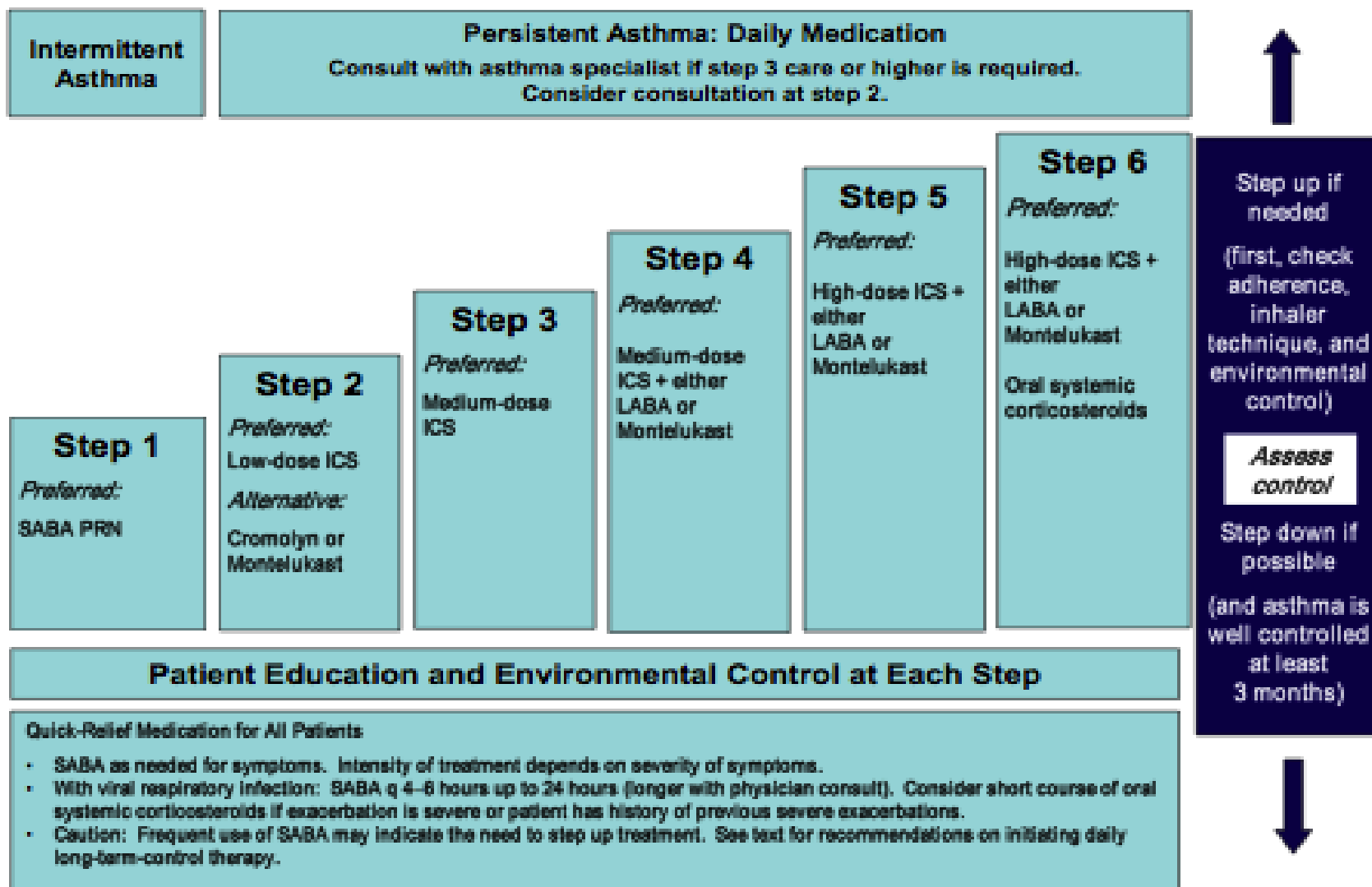


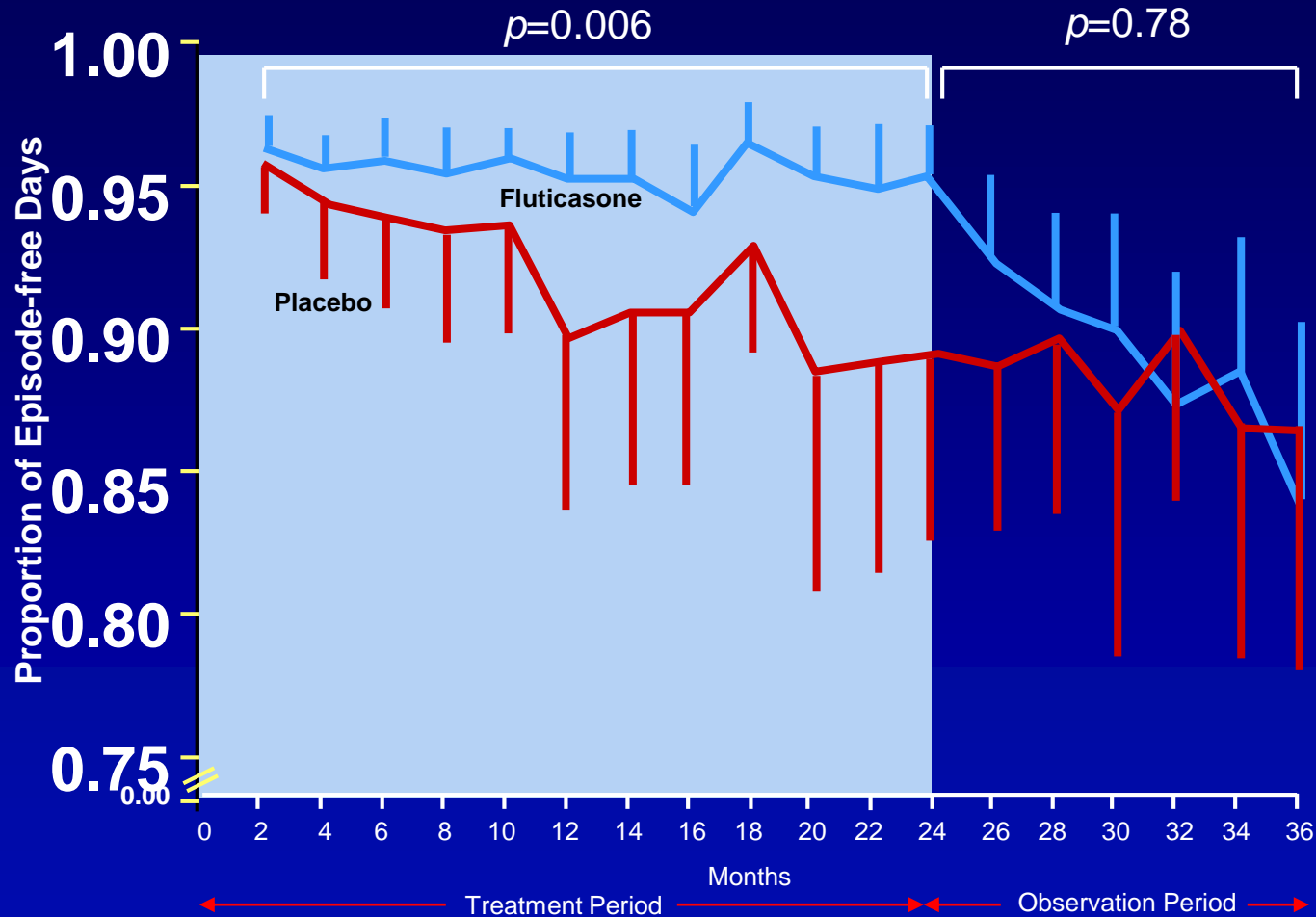
FIGURE 4–3a. ASSESSING ASTHMA CONTROL AND ADJUSTING THERAPY IN CHILDREN 0–4 YEARS OF AGE

Components of Control		Classification of Asthma Control (0–4 years of age)		
		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
	Short-acting beta ₂ -agonist 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 (See figure 4–1a for treatment steps.)		<ul style="list-style-type: none"> • Maintain current treatment. • Regular followup every 1–6 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 2–6 weeks. • If no clear benefit in 4–6 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 4–6 weeks, consider alternative diagnoses or adjusting therapy. • For side effects, consider alternative treatment options.

ICS Therapy in Preschool Children

- Multicenter, double-blind, randomized placebo controlled study designed to determine if ICS therapy can modify the subsequent development of asthma in high risk children
- Children with a positive asthma predictive index (2–3 years of age, N=285) treated with either fluticasone 88 µg BID or placebo for 2 years followed by a year of observation
- Primary outcome variable: Proportion of episode free days

Fluticasone Effect



The increase in symptom free days in the fluticasone cohort during the treatment period was lost in the 12 months subsequent during the observation period.

MIST

- Maintenance vs. Intermittent Inhaled Steroids in Wheezing Toddlers (MIST)



Maintenance versus Intermittent Inhaled Steroids in Wheezing Toddlers (MIST) Study

- 12 month randomized, double blinded, active control: 278 children (12–53 months)
- 4 episodes of wheezing last year: Positive modified asthma predictive index
 - 1 episode: OCS, emergency department, urgent care or hospital
- Primary outcome: Exacerbation with OCS

MIST Study

Run-in: 2 weeks	Treatment Phase: 52 weeks		
Placebo run-in nightly + Albuterol PRN	Randomized Treatment Group	Nightly, <u>except</u> during RTI	During RTIs <u>only</u> for 7 days
	Daily low dose budesonide	0.5 mg PM	Placebo AM 0.5 mg PM
	Intermittent high dose budesonide	Placebo PM	1.0 mg AM 1.0 mg PM

MIST Study

- Exacerbations 0.95/patient year; $p=0.6$
- Similar time to first exacerbation; $p=0.87$
- No difference in treatment failures or episode free days
- Height=0.26 cm average difference;
weight=0.16 Kg average difference

FIGURE 4–2b. CLASSIFYING ASTHMA SEVERITY AND INITIATING TREATMENT IN CHILDREN 5–11 YEARS OF AGE

Assessing severity and initiating therapy in children who are not currently taking long-term control medication

Components of Severity		Classification of Asthma Severity (5–11 years of age)			
		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
	Short-acting beta ₂ -agonist 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 (see note)	≥2/year (see note)	<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 Therapy		Step 1	Step 2	Step 3, medium-dose ICS option	Step 3, medium-dose ICS option, or step 4
(See figure 4–1b for treatment steps.)		In 2–6 weeks, evaluate level of asthma control that is achieved, and adjust therapy accordingly.			

FIGURE 4-1b. STEPWISE APPROACH FOR MANAGING ASTHMA IN CHILDREN 5-11 YEARS OF AGE

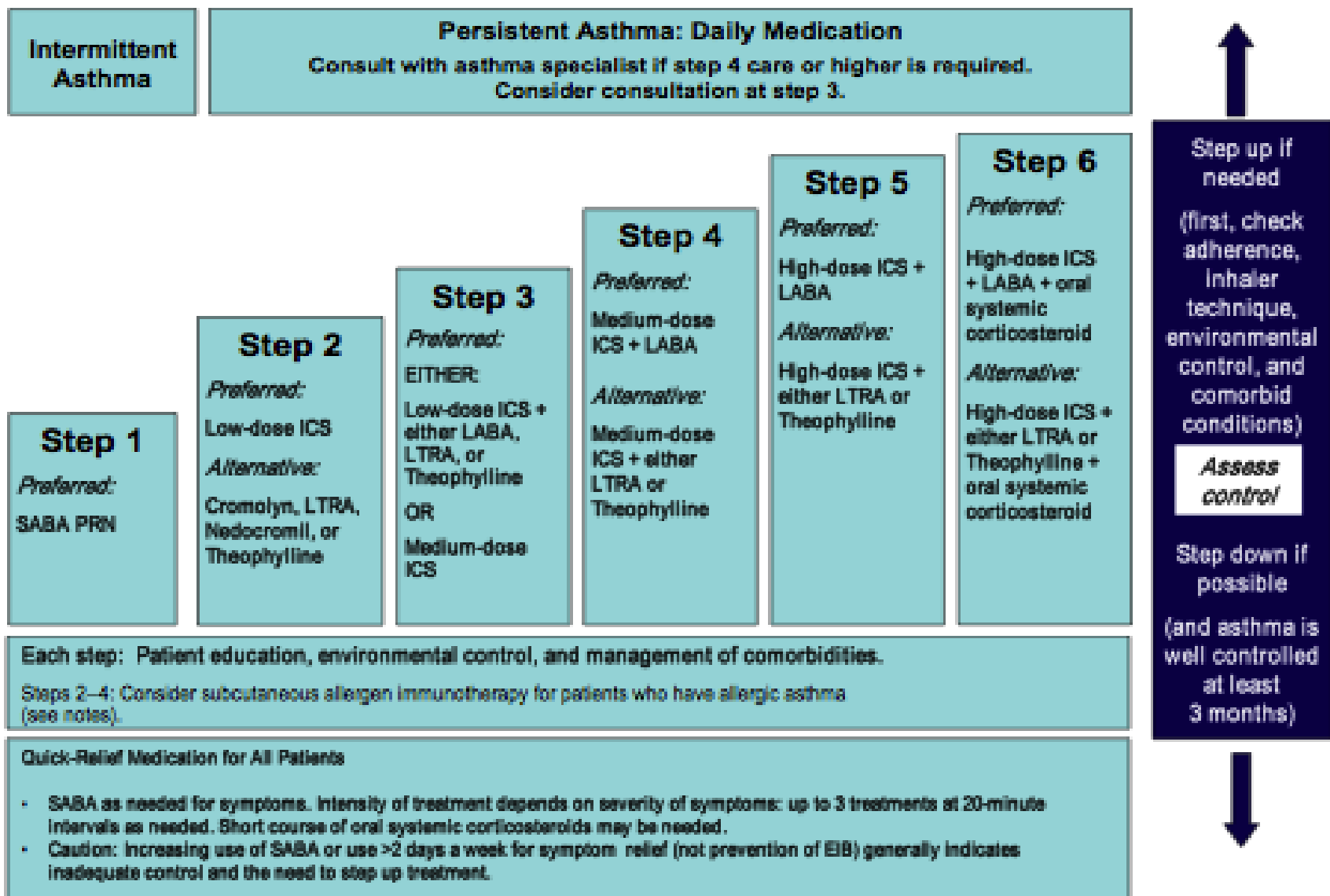
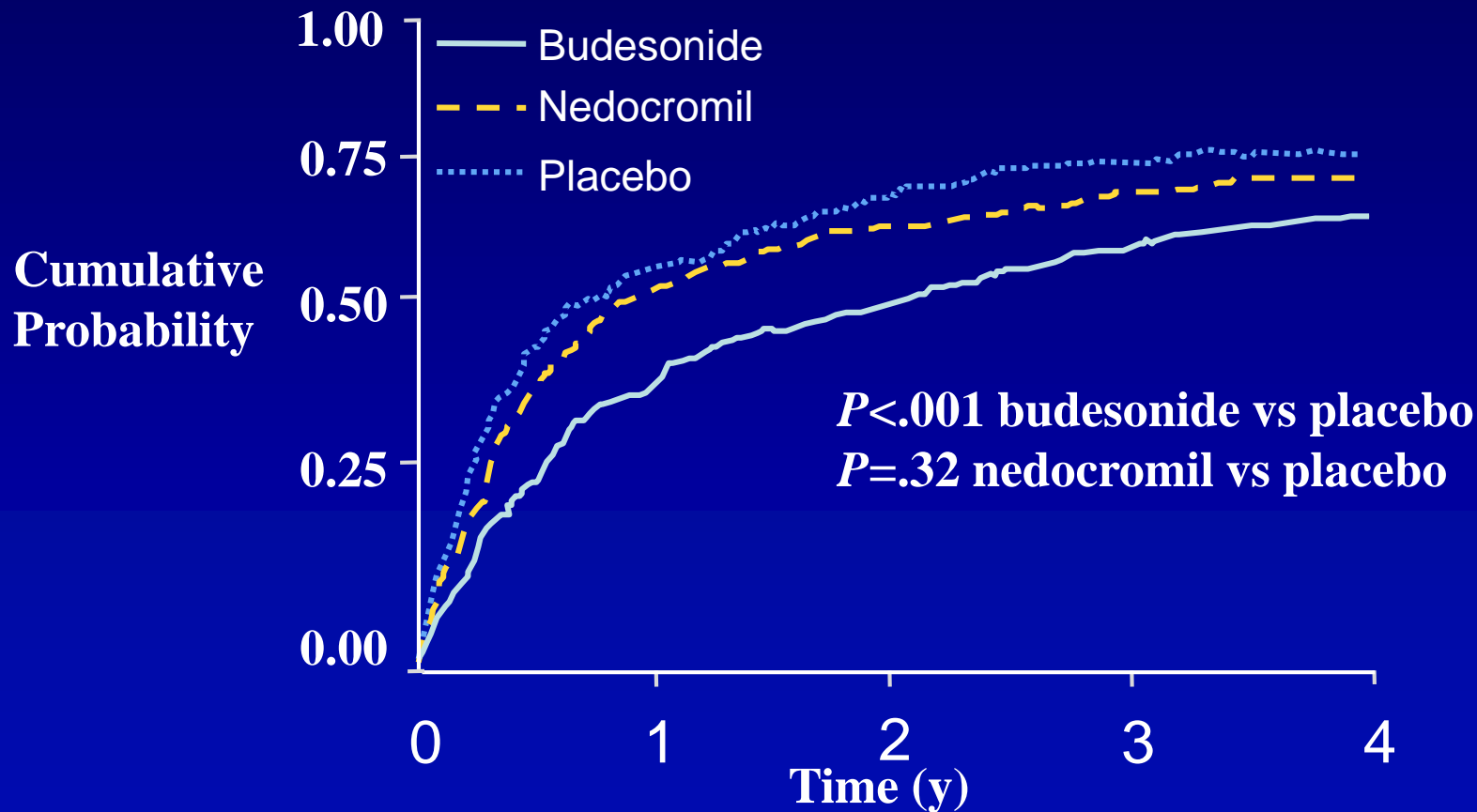


FIGURE 4-3b. ASSESSING ASTHMA CONTROL AND ADJUSTING THERAPY IN CHILDREN 5-11 YEARS OF AGE

Components of Control		Classification of Asthma Control (5-11 years of age)		
		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
	Short-acting beta ₂ -agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week	Several times per day
	Lung function <ul style="list-style-type: none"> • FEV₁ or peak flow • FEV₁/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 (see note)	
		Consider severity and interval since last exacerbation		
	Reduction in lung growth	Evaluation requires long-term followup.		
	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 4-1b for treatment steps.)		<ul style="list-style-type: none"> • Maintain current step. • Regular followup every 1-6 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 2-6 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.

CAMP: ICS Reduced Oral Prednisone Use

First Course of Prednisone

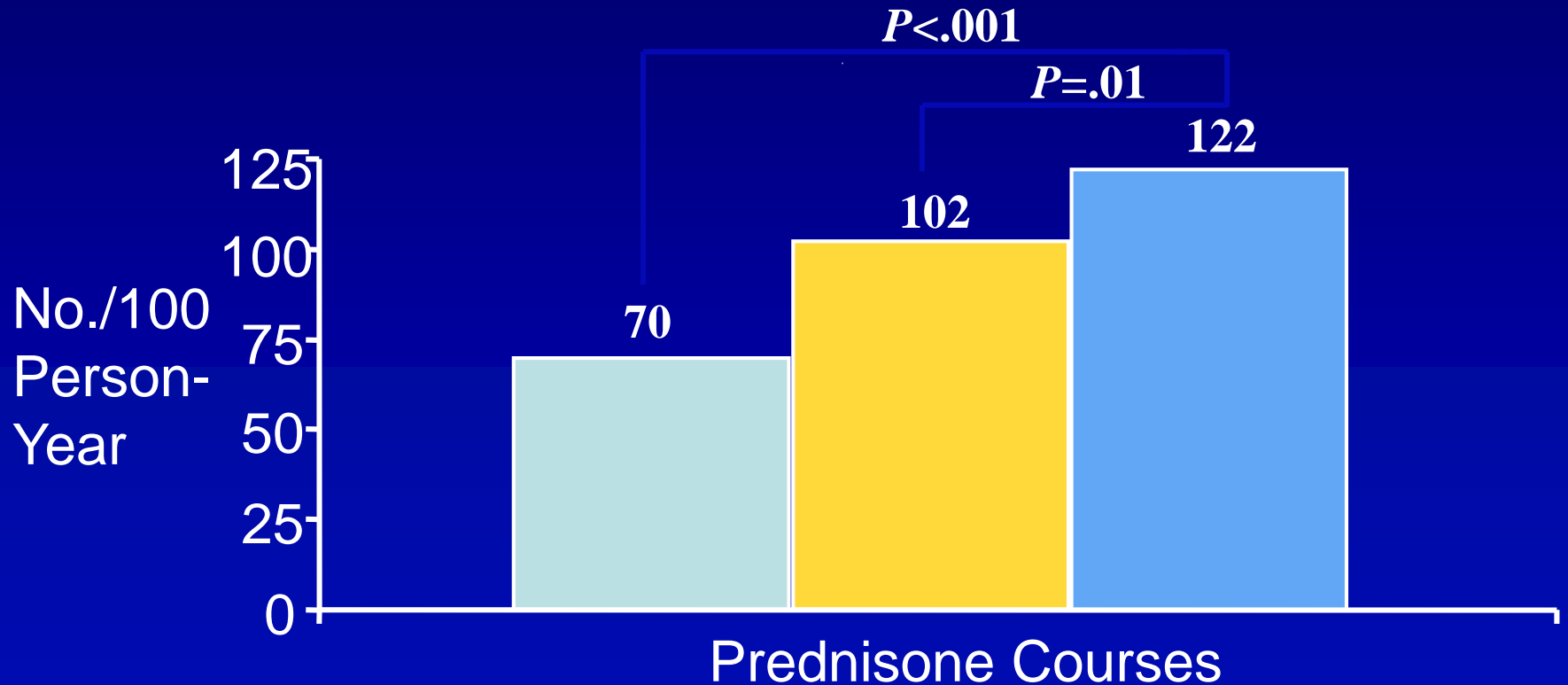


CAMP = Childhood Asthma Management Program.

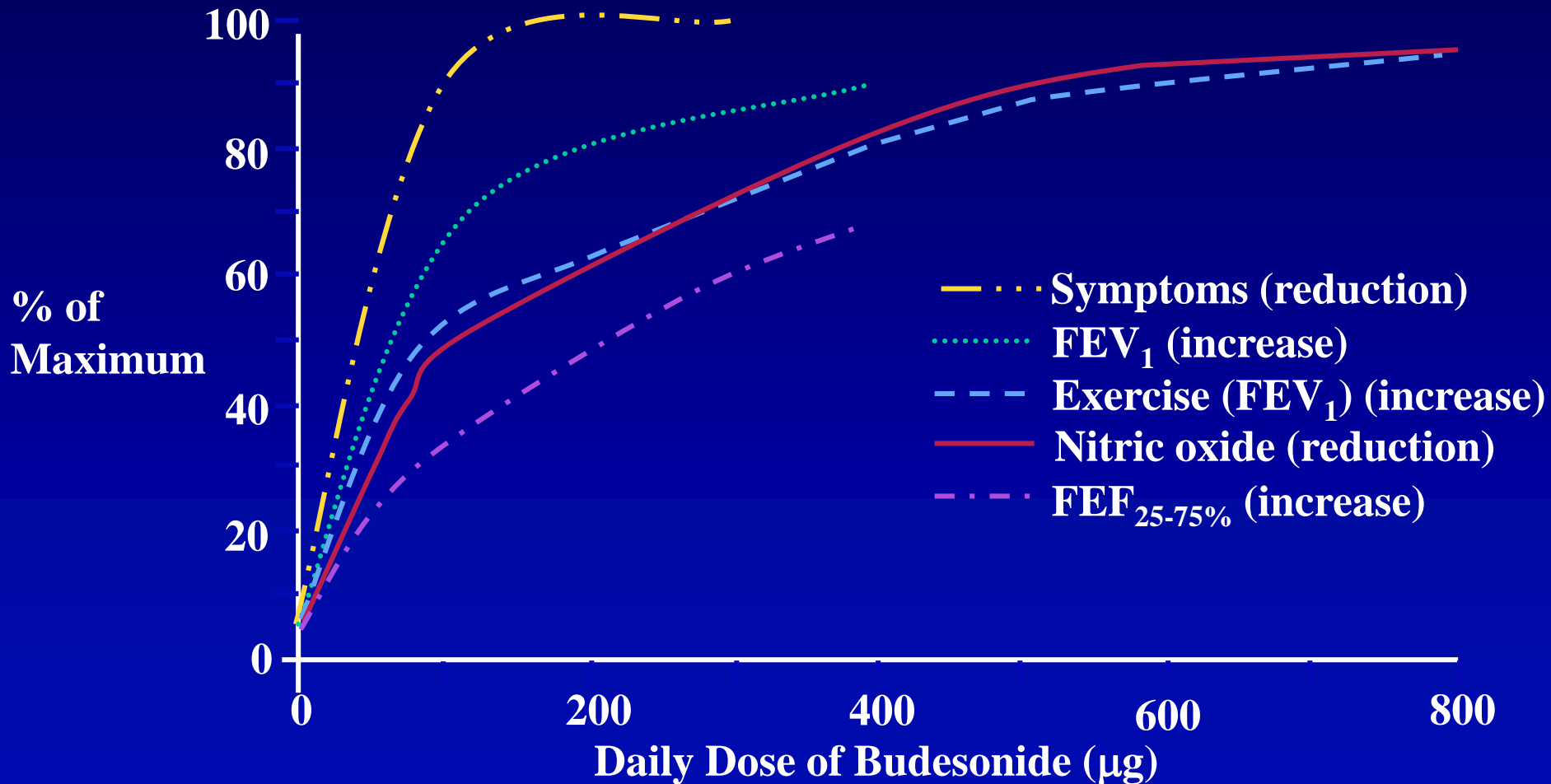
Childhood Asthma Management Program Research Group. *N Engl J Med.* 2000;343:1054-63.

Prednisone Use

■ Budesonide ■ Nedocromil ■ Placebo



Corticosteroid Dose Response Curves for Various Outcomes



Barnes et al. *Am J Respir Crit Care Med.*
1998;157:S1-S53.

FIGURE 4-6. CLASSIFYING ASTHMA SEVERITY AND INITIATING TREATMENT IN YOUTHS ≥ 12 YEARS OF AGE AND ADULTS

— Assessing severity and initiating treatment for patients who are not currently taking long-term control medications

Components of Severity		Classification of Asthma Severity ≥ 12 years of age			
		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
	Short-acting beta ₂ -agonist 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 (see note)	≥ 2 /year (see note)	<p>Consider severity and interval since last exacerbation. 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 and consider short course of oral systemic corticosteroids	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.			

FIGURE 4–5. STEPWISE APPROACH FOR MANAGING ASTHMA IN YOUTHS ≥12 YEARS OF AGE AND ADULTS

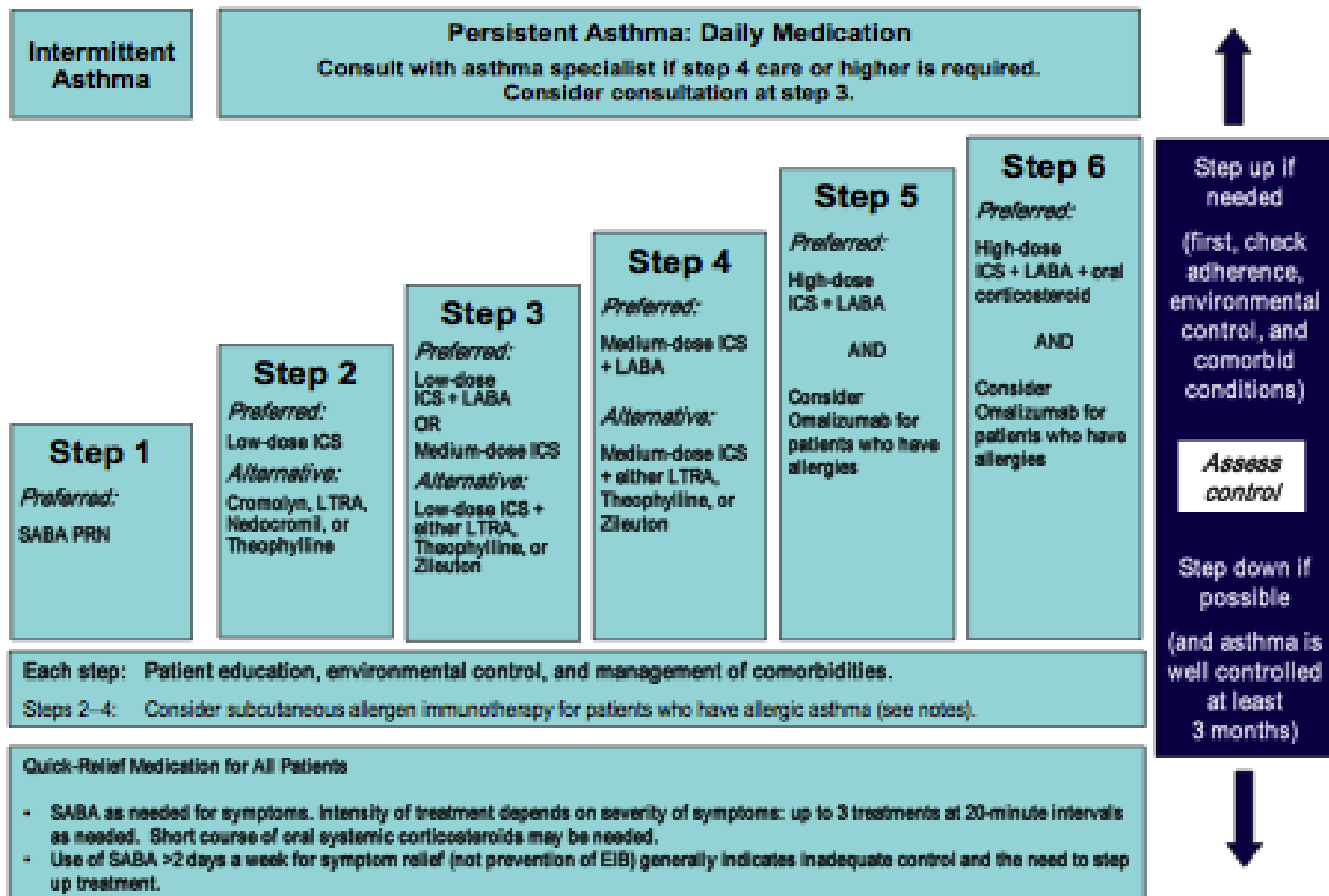


FIGURE 4-7. ASSESSING ASTHMA CONTROL AND ADJUSTING THERAPY IN YOUTHS ≥ 12 YEARS OF AGE AND ADULTS

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 x/month	1–3x/week	≥ 6 x/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
	FEV ₁ or peak flow	$> 80\%$ predicted/ personal best	60–80% predicted/ personal best	$< 60\%$ predicted/ personal best
	Validated questionnaires			
	ATAQ ACQ ACT	0 $\leq 0.75^*$ ≥ 20	1–2 ≥ 1.5 16–19	3–4 N/A ≤ 15
Risk	Exacerbations requiring oral systemic corticosteroids	0–1/year	≥ 2 /year (see note)	
		Consider severity and interval since last exacerbation		
	Progressive loss of lung function	Evaluation requires long-term followup 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)		<ul style="list-style-type: none"> • Maintain current step. • Regular followups 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 2–6 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.

Childhood Asthma Control Test™

Childhood Asthma Control Test for children 4 to 11 years old.

Know the score.

This test will provide a score that may help your doctor determine if your child's asthma treatment plan is working or if it might be time for a change.

How to take the Childhood Asthma Control Test

Step 1 Let your child respond to the first four questions (1 to 4). If your child needs help reading or understanding the question, you may help, but let your child select the response. Complete the remaining three questions (5 to 7) on your own and without letting your child's response influence your answers. There are no right or wrong answers.

Step 2 Write the number of each answer in the score box provided.

Step 3 Add up each score box for the total.





Step 4 Take the test to the doctor to talk about your child's total score.

19
or less

If your child's score is 19 or less, it may be a sign that your child's asthma is not controlled as well as it could be. No matter what the score, bring this test to your doctor to talk about your child's results.

Have your child complete these questions.

1. How is your asthma today?

0  Very bad	1  Bad	2  Good	3  Very good	SCORE <input type="text"/>
--	---	---	---	-------------------------------

2. How much of a problem is your asthma when you run, exercise or play sports?

0  It's a big problem. I can't do what I want to do.	1  It's a problem and I don't like it.	2  It's a little problem but it's okay.	3  It's not a problem.	<input type="text"/>
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3. Do you cough because of your asthma?

0  Yes, all of the time.	1  Yes, most of the time.	2  Yes, some of the time.	3  No, none of the time.	<input type="text"/>
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4. Do you wake up during the night because of your asthma?

0  Yes, all of the time.	1  Yes, most of the time.	2  Yes, some of the time.	3  No, none of the time.	<input type="text"/>
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Please complete the following questions on your own.

5. During the last 4 weeks, on average, how many days per month did your child have any daytime asthma symptoms?

5 Not at all	4 1-3 days/mo	3 4-10 days/mo	2 11-18 days/mo	1 19-24 days/mo	0 Everyday	<input type="text"/>
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6. During the last 4 weeks, on average, how many days per month did your child wheeze during the day because of asthma?

5 Not at all	4 1-3 days/mo	3 4-10 days/mo	2 11-18 days/mo	1 19-24 days/mo	0 Everyday	<input type="text"/>
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7. During the last 4 weeks, on average, how many days per month did your child wake up during the night because of asthma?

5 Not at all	4 1-3 days/mo	3 4-10 days/mo	2 11-18 days/mo	1 19-24 days/mo	0 Everyday	<input type="text"/>
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Please turn this page over to see what your child's total score means.

TOTAL

What Else is New?

- Black box warning for ICS/LABA not present now (and approved to age 6)
- Biologic therapies
 - Omalizumab (age 6 and older)—Anti-IgE
 - Mepolizumab (age 12 and older)—Anti-IL-5
 - Benralizumab (age 12 and older)—Anti-IL-5

Education and Environmental Control

- Multifaceted approach
- Patient education in expanded settings
 - Clinic, ED, hospitalization, pharmacy, schools, community, home
- Environmental control
 - Multiple simultaneous interventions
 - **Consideration of immunotherapy**
 - Treatment of comorbidities

Managing Environmental Factors

- Evaluate for the role of allergens
- Reduce exposure to known sensitized allergens
- Avoid tobacco smoke
- Avoid other respiratory irritants
- Avoid exertion on high pollution days

Managing Environmental Factors

- Stepwise is often more manageable
- Make the bedroom a safe haven
- Don't skip the basics, e.g. change HVAC filters regularly before buying an air filter
- Use available resources:
 - <http://www.epa.gov/asthma/triggers.html>
 - <http://www.nationaljewish.org/healthinfo/conditions/asthma/lifestyle-management/environmental>
 - http://portal.hud.gov/hudportal/HUD?src=/program_offices/healthy_homes/healthyhomes/asthma

Managing Co-Morbidities

- Things to consider when not in control:
 - Intrinsic airway narrowing or obstruction
 - Infection--persistent bacterial bronchitis
 - Aspiration—GERD
 - Other diagnoses—cystic fibrosis, primary ciliary dyskinesia, immunodeficiency

Medication Adherence

- Generally poor independent of severity, control, socioeconomic status
- Difficult to accurately ascertain
 - Self-report
 - Biomarkers – sputum eosinophils, eNO (increased in eosinophilic airway inflammation)
 - Pharmacy inquiries vs claims made
- Strategies for improvement
 - Reminders – medication placement, stickie notes, calendars, cell phone alarms, other electronics
 - Engage the patient directly – Age/Developmentally appropriate “Quizzes” with incentives
 - Asthma camps



Improving Administration

- Reinforce proper inhaler technique
 - Assessment of inhaler technique in 296 children 8-16 years old in 5 pediatric practices
 - 8.1% MDI
 - 15.6% turbuhaler
 - 22% diskus

» Sleath, et al. Pediatrics 2011;
127:642-648

Leveraging Community Resources

- Home Health Nursing visits
 - Environmental assessment/control education
 - Medication reconciliation
 - In-home asthma education
- Schools
 - Administration of ICS by school health staff
 - Tracking of symptoms, ACT
 - Asthma education - ALA (800-LUNG-USA)
 - Open Airways for Schools
 - Asthma 101
 - Need for two-way communication – get high risk patients into the office

Assessing Risk

- ≥ 2 ED visits or hospitalizations in the past year
- Any history intubation, ICU admission, especially in past 5 years
- Use of > 2 albuterol/levalbuterol MDIs in past year
- Severe (persistent) airflow obstruction
- Poor perception of obstruction
- Psychiatric disease

Illness Self-Management

- Summer camp survey: 31% of 9-12 year olds, 77% of 13-16 year olds independently take OTC analgesics, cold meds¹
- 92% feel no need to inform adult caregiver¹
- Over half of inner-city Baltimore and Washington, DC asthmatic children (mean age 8.3 ± 2.0 years) responsible for their own medications²

1. Rudolph, et al. Pediatrics 1993; 91:1182-1184.

2. Eggleston, et al. Pediatrics 1998; 101:349-354.

Asthma Self-Management: Who is Ready?

- Cross-sectional study of K-10th grade
 - Children ≤ 7 lack knowledge, judgment
 - Children consistently 12-16 capable
 - Children 8-11 inconsistent
- Cautions
 - Reassess annually
 - Take into account complexity of regimen

When to refer?

- Diagnostic uncertainty
- Severity at a Step 2-3 (little kids) or above
- Symptoms present from birth
- Excessive vomiting
- Severe URTI
- Persistent wet cough
- Growth faltering
- Family history of unusual chest disease
- Unexpected clinical findings (e.g. focal chest signs or dysphagia)
- Failure to respond to conventional treatment
- Parental anxiety

Questions?