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Asthma Management: Improving asthma care with understanding of the fundamentals

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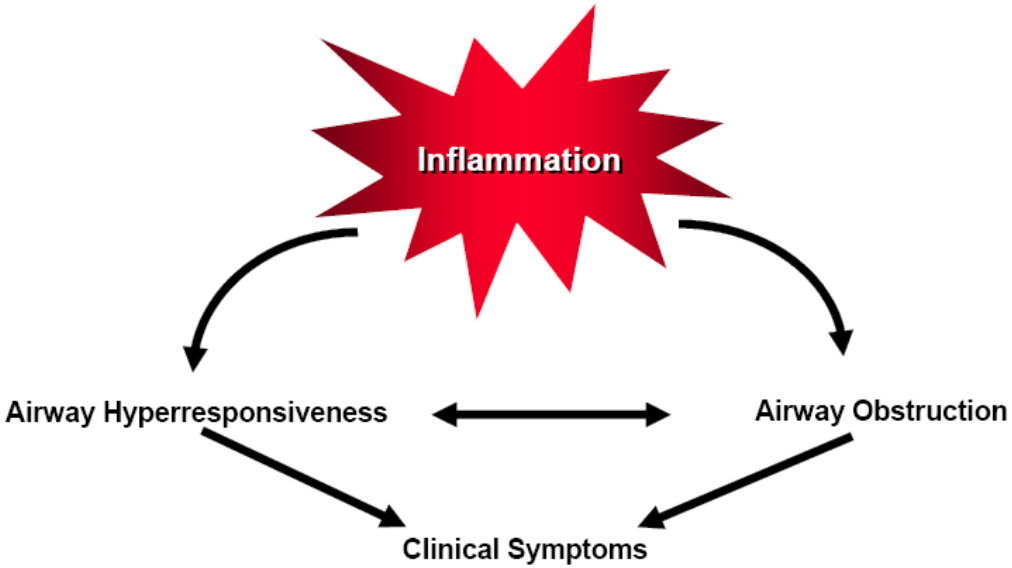
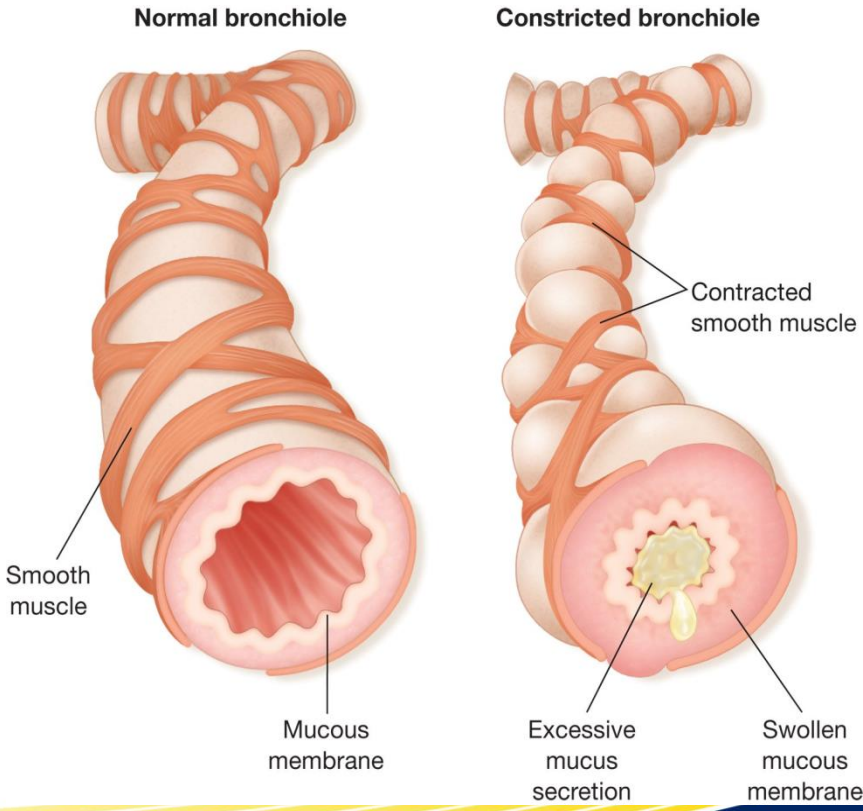
Learning Points

- What is asthma
  - Physiology, epidemiology, pathology
- Asthma:
  - Trigggers, Symptoms and medications
- Understand Asthma Guidelines
  - Defining asthma severity, control
  - Referring to asthma specialist
- Reviewing the importance of technique and compliance
- Evaluate for Co-Morbid Conditions
  - Differential diagnoses
  - Basic screening

Asthma: Basic Definition



- Cough, wheeze, shortness of breath
- Response to bronchodilator



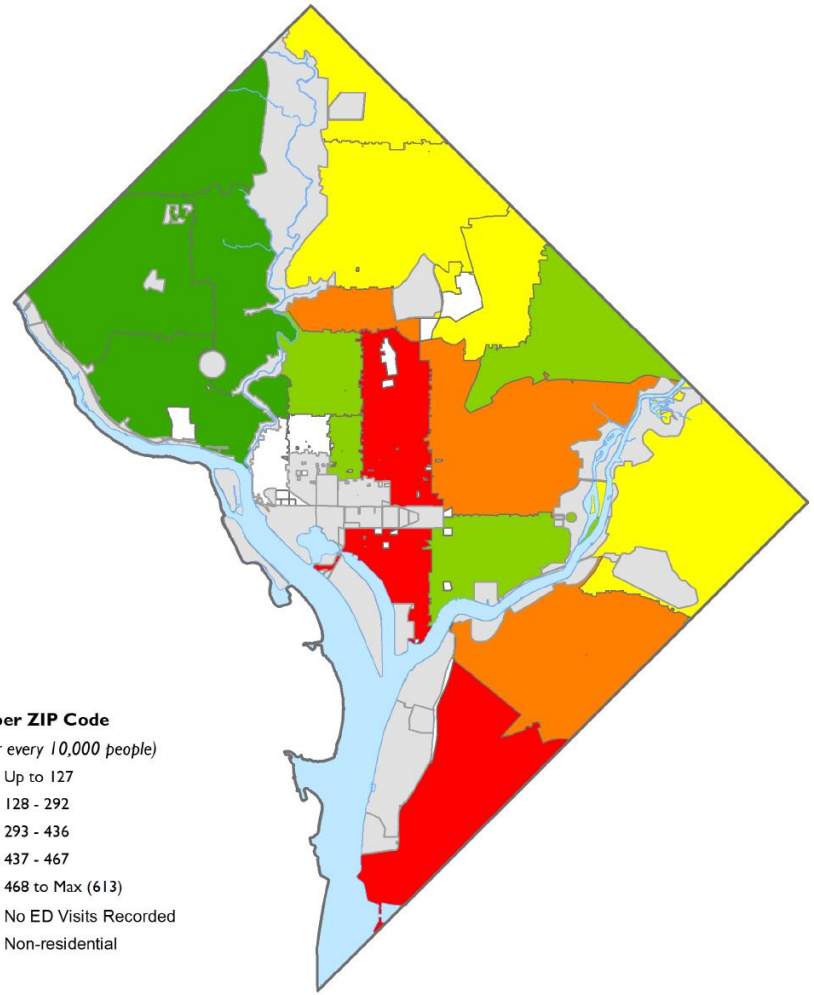
Asthma Epidemiology

- > 7 million children in US
- > $9 billion medical costs
- Most severe 15-25%= 75% of costs
- Hospitalizations
  - 3rd most common cause
  - 6th most costly diagnosis
  - ~30% of all ED visits

*Akinbami, L. J., et al. Pediatrics **123 Suppl 3,** S131–145 (2009).*
Bloom B, et al. National Center for Health Statistics., 2012.
Roemer, M. Agency for Healthcare Research and Quality, 2011.
*Keren, R. et al. Arch Pediatr Adolesc Med **166,** 1155–1164 (2012).*

EMERGENCY DEPARTMENT VISITS IN WASHINGTON, DC - 2010

Asthma as Primary, Secondary or Tertiary Diagnosis (5 - 14 years)

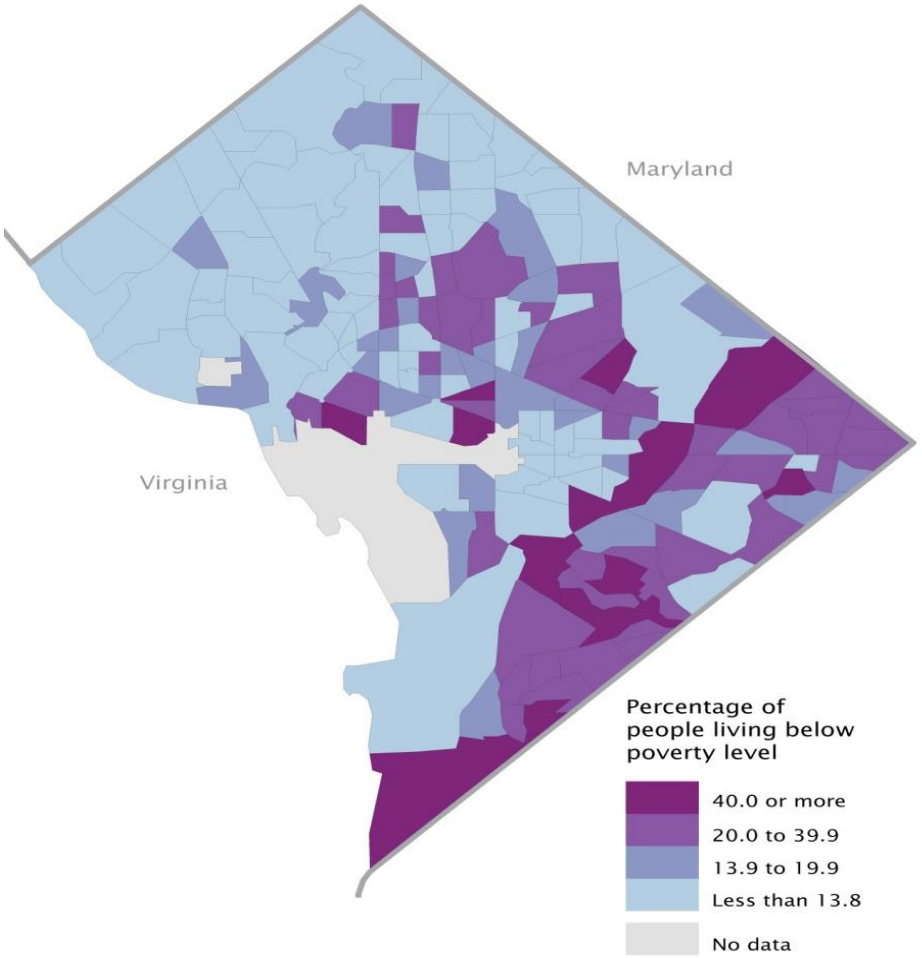


Visits per ZIP Code

(Rate for every 10,000 people)

- Up to 127
- 128 - 292
- 293 - 436
- 437 - 467
- 468 to Max (613)
- No ED Visits Recorded
- Non-residential

Percentage of People in Poverty in the Past 12 Months for the District of Columbia by Census Tract: 2006–2010



Source: U.S. Census Bureau, 2006–2010 American Community Survey. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see <www.census.gov/acs/www>.

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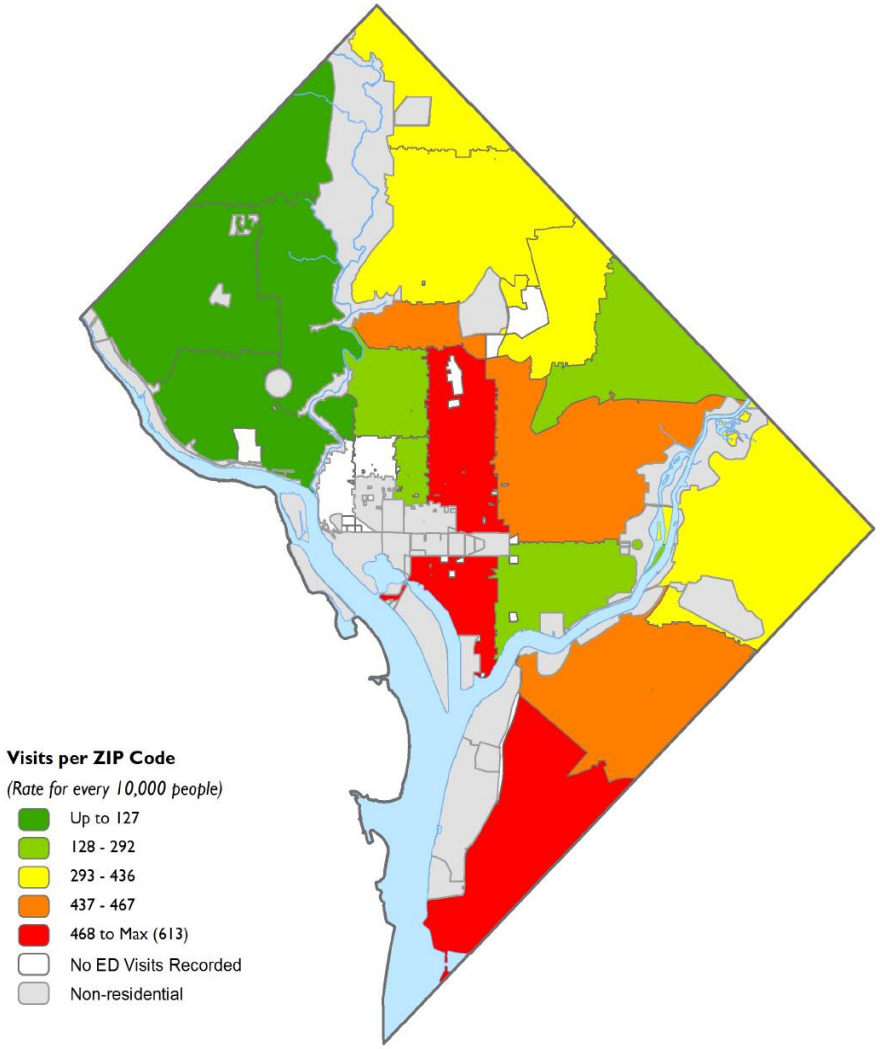
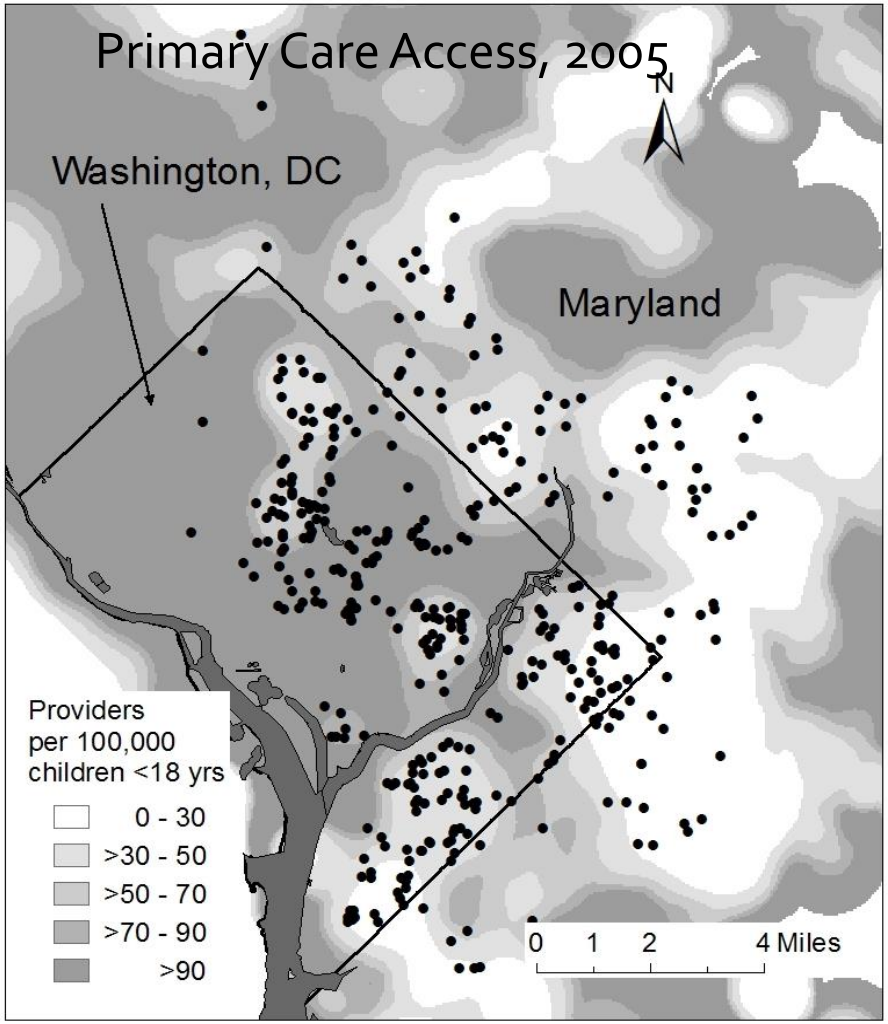
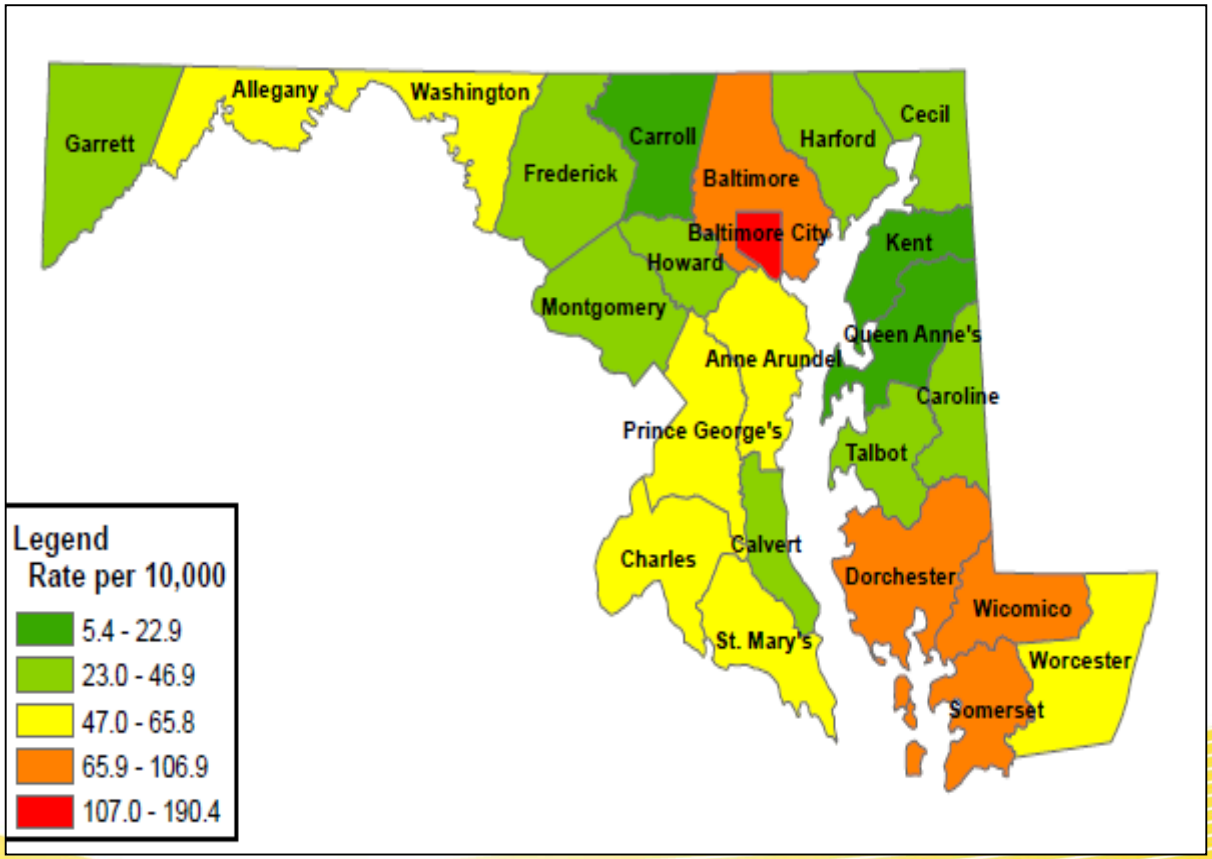
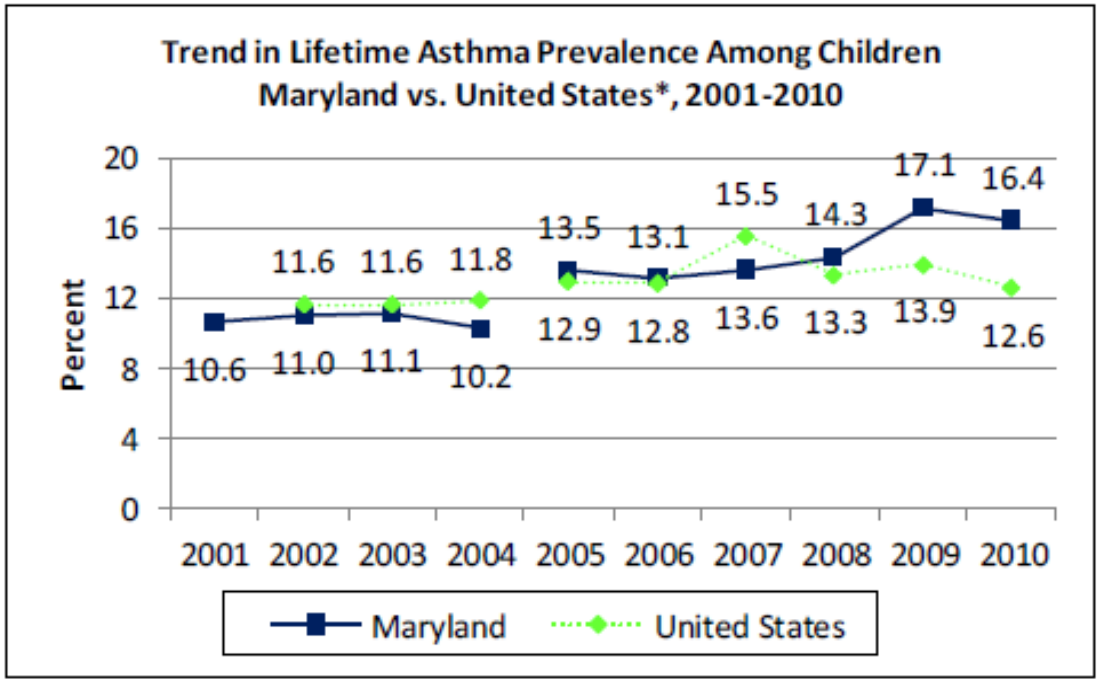




Maryland ED Asthma visits



Prevalence of Asthma among children Ages 0-17 in Maryland



Maryland BRFSS, 2001-2010; CDC BRFSS, 2002-2010.

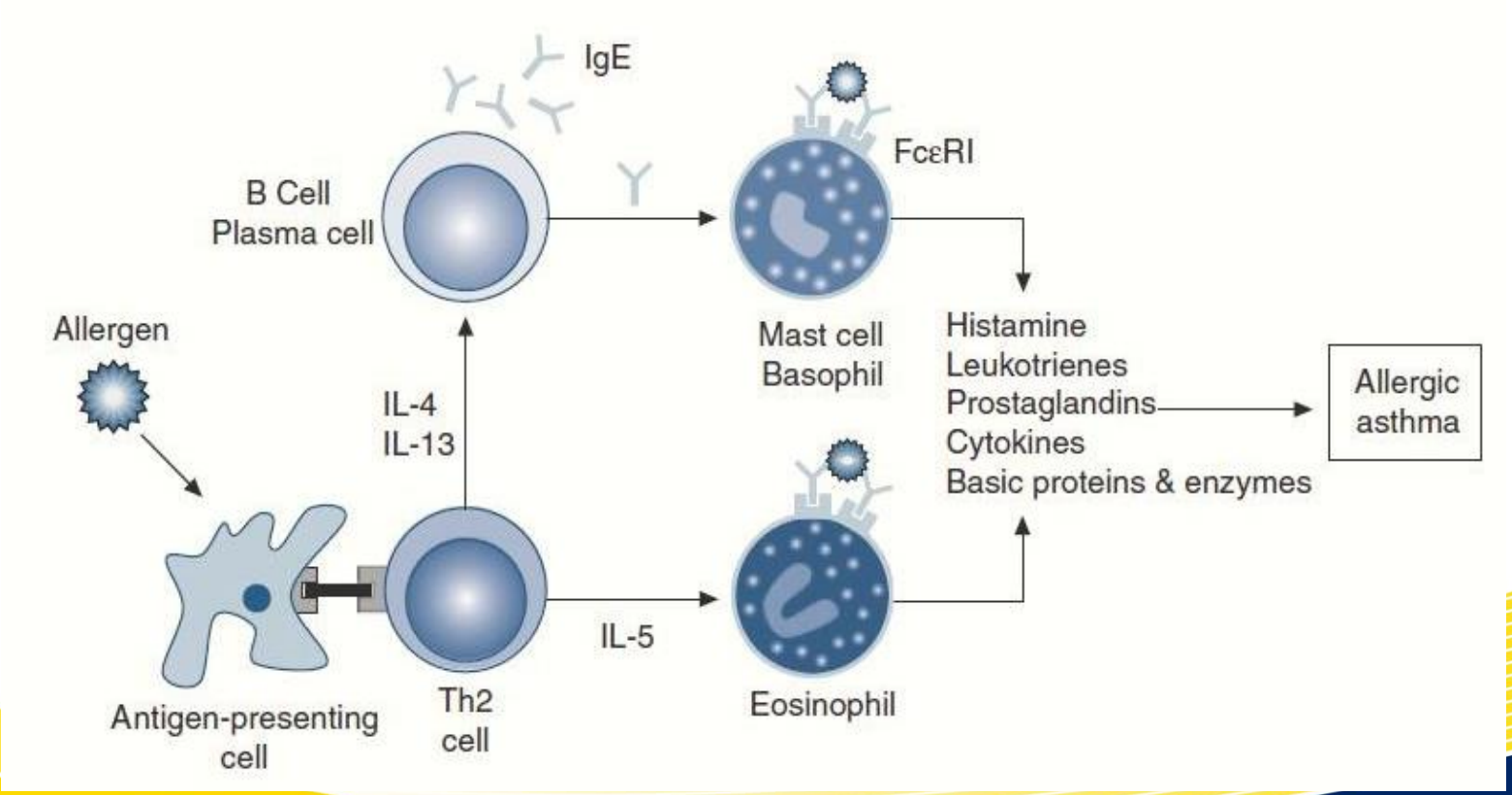
[a] Survey question for lifetime asthma prevalence changed in 2005, data from 2001-2004 are not comparable to 2005-2010 data.

[b] BRFSS data for children is not collected in all states, each year the number of states collecting data on child asthma prevalence has been between 22 and 37 states.

- Lifetime asthma prevalence in Maryland children showed an increase of approximately 55.7% from 2001-2010
- Among children less than 18 years of age asthma prevalence was 16.4% in 2010-approximately 216,000 children
- 11.9% of children in Maryland currently have asthma. Over the past decade, these prevalence rates have been steadily increasing.

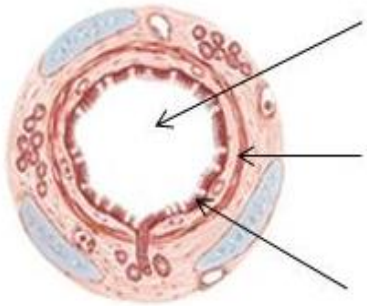
Airway pathology in asthma

The hallmark of asthma is chronic airway inflammation



From: Bradding, P., Walls, A.F. & Holgate, S.T. (2006). The role of the mast cell in the pathophysiology of asthma. J Allergy Clin Immunol 117, 1277–84

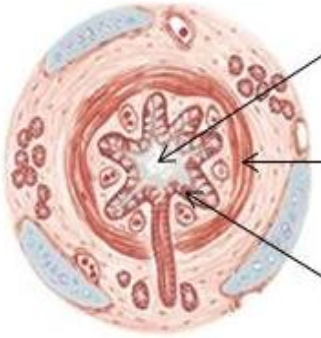
Airway pathology in asthma



Large lumen

Normal smooth muscle layer

Normal airway mucus lining



Narrow lumen

Thickened, hyper-reactive smooth muscle

Increased airway mucus and mucus producing goblet cells

Causes of Asthma

There is no single reason for the onset of asthma

- **Heredity**
- **Exposure to environmental tobacco smoke**
- **RSV (Respiratory Syncytial Virus) during infancy**
- **Too much or not enough exposure to triggers**
- **Air pollution**

Goals of Asthma Management

- No asthma symptoms during day or night, including cough. Sleep through the night.
- Best possible lung function
- No missed school or work
- No hospital or ER visits
- Few side effects from medicines
- Satisfied with asthma care

Early Warning Signs

- Cough
- Mood Changes
- Change in facial appearance
- Breathing changes
- Verbal complaints
- Itchy chin or neck
- Itchy, watery, or glassy eyes
- Runny nose
- Head stopped up
- Sneezing
- Dark Circles under eyes
- Getting out of breath
- Chest hurts

Symptoms of Asthma Flare-up

- Cough
- Wheeze
- Shortness of breath
- Chest tightness
- Retractions

Normal Daytime Breathing Rates

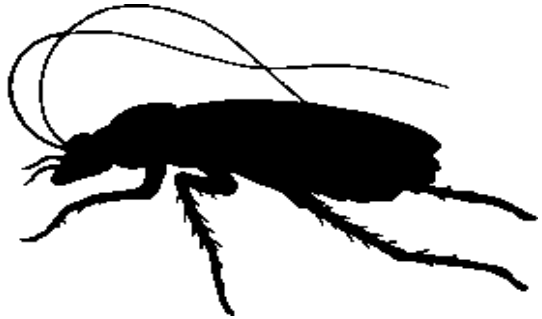
- 0-2 years 25-50 breaths/minute
- 2-5 years 20-30 breaths/minute
- 6-14 years 15-25 breaths/minute
- Adults 10-20 breaths/minute

Triggers

- **THINGS THAT MAKE ASTHMA WORSE**
- **EVERYONE IS DIFFERENT**

Activators/Triggers

Cockroaches



- Control spills, food mess, and leaks
- Use baits

Dust Mites

- Use pillow and mattress covers
- Damp dust
- Wash bedding in hot water

Animal Dander

- No pets is best
- Keep pets out of sleeping area

Activators/Triggers

Tobacco Smoke

- Be careful of secondhand smoke
- Wash hands, use mouthwash

Pollens and Air Pollution

- Midday = high levels
- Use air conditioning, not fans

Molds

- Clean mold with bleach solution
- Plant soil is a source
- Check outdoor, plastic toys and equipment

Activators/Triggers

Strong Odors

- Perfumes, scented candles, cleaning products

Colds and Infections

- Wash hands frequently
- Encourage yearly flu shots

Exercise

- Plan warm up activities
- Allow for pre-medication

Weather

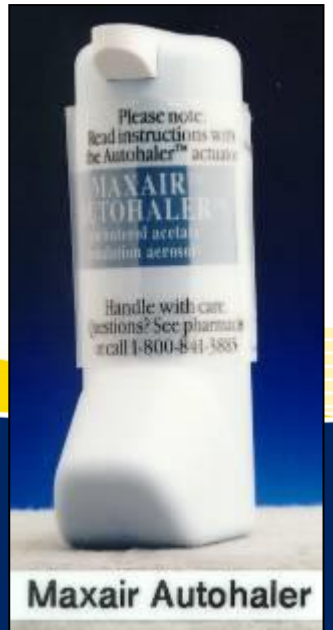
- Sudden changes in temperature
- Cover nose and mouth in cold weather

Controlling Asthma: Medications

Quick Relief Medications

Loosens your muscles & stops the wheezing

Albuterol for Nebulizer



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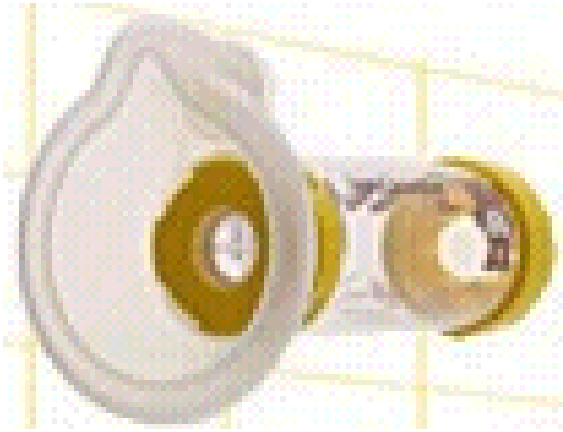
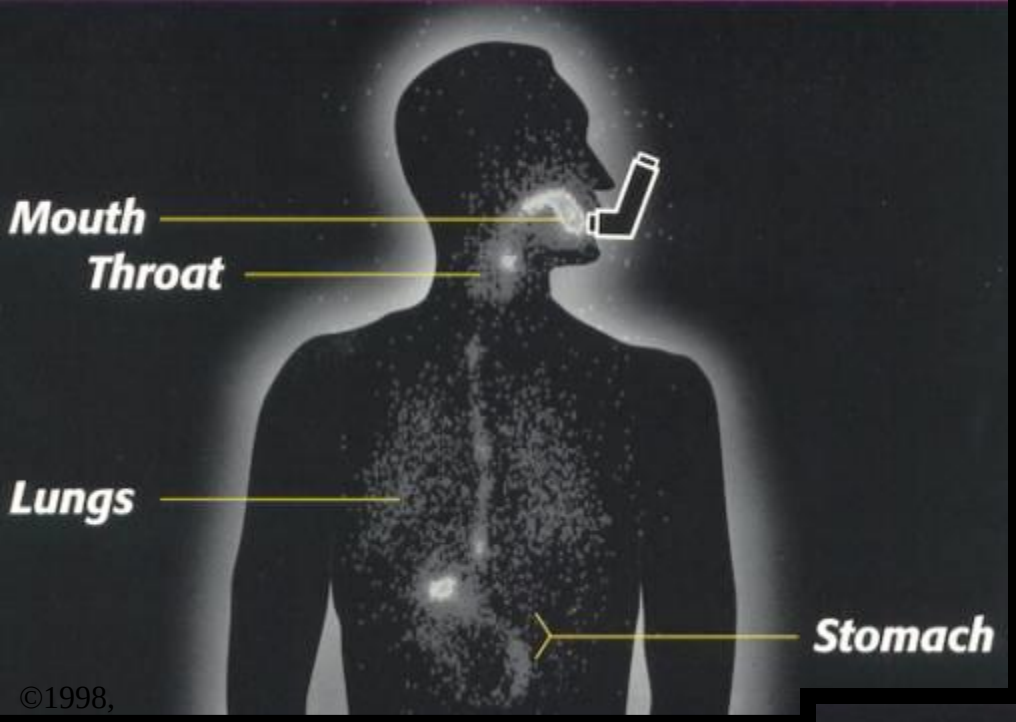
Long-Term, Control Medications

Decrease the inflammation/swelling

Advair

Spacers





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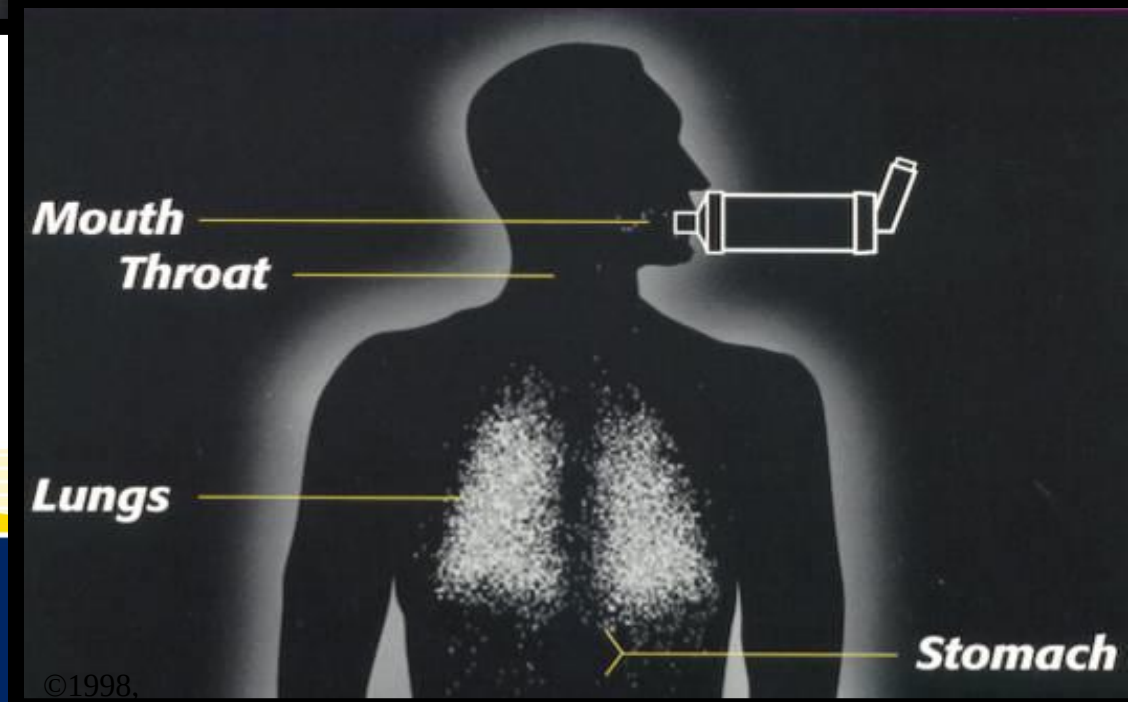
Without Spacer

With Spacer



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Why Control Asthma?

Mucus Plug

Asthma Care Plans

- Care plans can be used to determine how to help a child with asthma based on symptoms and/or peak flow meter readings.
- List asthma medications, when to take them, and how much to take.
- Share copies with childcare providers, school teachers and administration, coaches, babysitters, and anyone else caring for the child.

Asthma Action Plan

Name	School	DOB / /
Health Care Provider	Provider's Phone	
Parent/Responsible Person	Parent's Phone	
Additional Emergency Contact	Contact Phone	

DO NOT WRITE IN THIS SPACE

Place Patient Label Here

Asthma Severity *(see reverse side)*
☐ Intermittent or
Persistent: ☐ Mild ☐ Moderate ☐ Severe

Asthma Control
☐ Well-controlled ☐ Needs better control

Asthma Triggers Identified (Things that make your asthma worse):
☐ Colds ☐ Smoke (tobacco, incense) ☐ Pollen ☐ Dust ☐ Animals
☐ Strong odors ☐ Mold/moisture ☐ Pests (rodents, cockroaches)
☐ Stress/emotions ☐ Gastroesophageal reflux ☐ Exercise
☐ Season: Fall, Winter, Spring, Summer ☐ Other:

Date of Last Flu Shot: / /

Green Zone: Go!–Take these CONTROL (PREVENTION) Medicines EVERY Day

You have **ALL** of these:
- Breathing is easy
- No cough or wheeze
- Can work and play
- Can sleep all night

Peak flow in this area:
to
(More than 80% of Personal Best)
Personal best peak flow:

☐ No control medicines required. **Always rinse mouth after using your daily inhaled medicine.**
☐ , puff(s) inhaler **with spacer** times a day
Inhaled corticosteroid or Inhaled corticosteroid/long-acting β–agonist
☐ , nebulizer treatment(s) times a day
Inhaled corticosteroid
☐ , take by mouth once daily at bedtime
Leukotriene antagonist

For asthma with exercise, ADD:
☐ , puff(s) inhaler with spacer 15 minutes before exercise
Fast-acting inhaled β–agonist

For nasal/environmental allergy, ADD:
☐

Yellow Zone: Caution!–Continue CONTROL Medicines and ADD QUICK-RELIEF Medicines

You have **ANY** of these:
- First sign of a cold
- Cough or mild wheeze
- Tight chest
- Problems sleeping, working, or playing

Peak flow in this area:
to
(50%-80% of Personal Best)

☐ , puff(s) inhaler **with spacer** every hours as needed
Fast-acting inhaled β–agonist
OR
☐ , nebulizer treatment(s) every hours as needed
Fast-acting inhaled β–agonist
☐ Other

Call your DOCTOR if you have these signs more than two times a week, or if your quick-relief medicine doesn't work!

Red Zone: EMERGENCY!–Continue CONTROL & QUICK-RELIEF Medicines and GET HELP!

You have **ANY** of these:
- Can't talk, eat, or walk well
- Medicine is not helping
- Breathing hard and fast
- Blue lips and fingernails
- Tired or lethargic
- Ribs show

Peak flow in this area:
Less than
(Less than 50% of Personal Best)

☐ , puff(s) inhaler with spacer **every 15 minutes,** for **3** treatments
Fast-acting inhaled β–agonist
OR
☐ , nebulizer treatment **every 15 minutes,** for **3** treatments
Fast-acting inhaled β–agonist

Call your doctor while giving the treatments.

☐ Other

IF YOU CANNOT CONTACT YOUR DOCTOR: Call 911 for an ambulance or go directly to the Emergency Department!

REQUIRED Healthcare Provider Signature:
_____ Date:

REQUIRED Responsible Person Signature:
_____ Date:

Follow up with primary doctor in 1 week or:
Phone:
☐ Patient/parent has doctor/clinic number at home

SCHOOL MEDICATION CONSENT AND PROVIDER ORDER FOR CHILDREN/YOUTH:
Possible side effects of quick-relief medicines (e.g., albuterol) include tachycardia, tremor, and nervousness.
Healthcare Provider Initials:
_____This student is capable and approved to self-administer the medicine(s) named above.
_____This student is not approved to self-medicate.
This authorization is valid for one calendar year.
As the RESPONSIBLE PERSON:
☐ I hereby authorize a trained school employee, if available, to administer medication to the student.
☐ I hereby authorize the student to possess and self-administer medication.
☐ I hereby acknowledge that the District and its schools, employees and agents shall be immune from civil liability for acts or omissions under D.C. Law 17-107 except for criminal acts, intentional wrongdoing, gross negligence, or willful misconduct.

Government of the District of Columbia
Vincent C. Gray, Mayor

www.dcasthmapartnership.org

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Coordinated by the National Capital Asthma Coalition
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Asthma guidelines:

NHLBI EPR-3 Guidelines

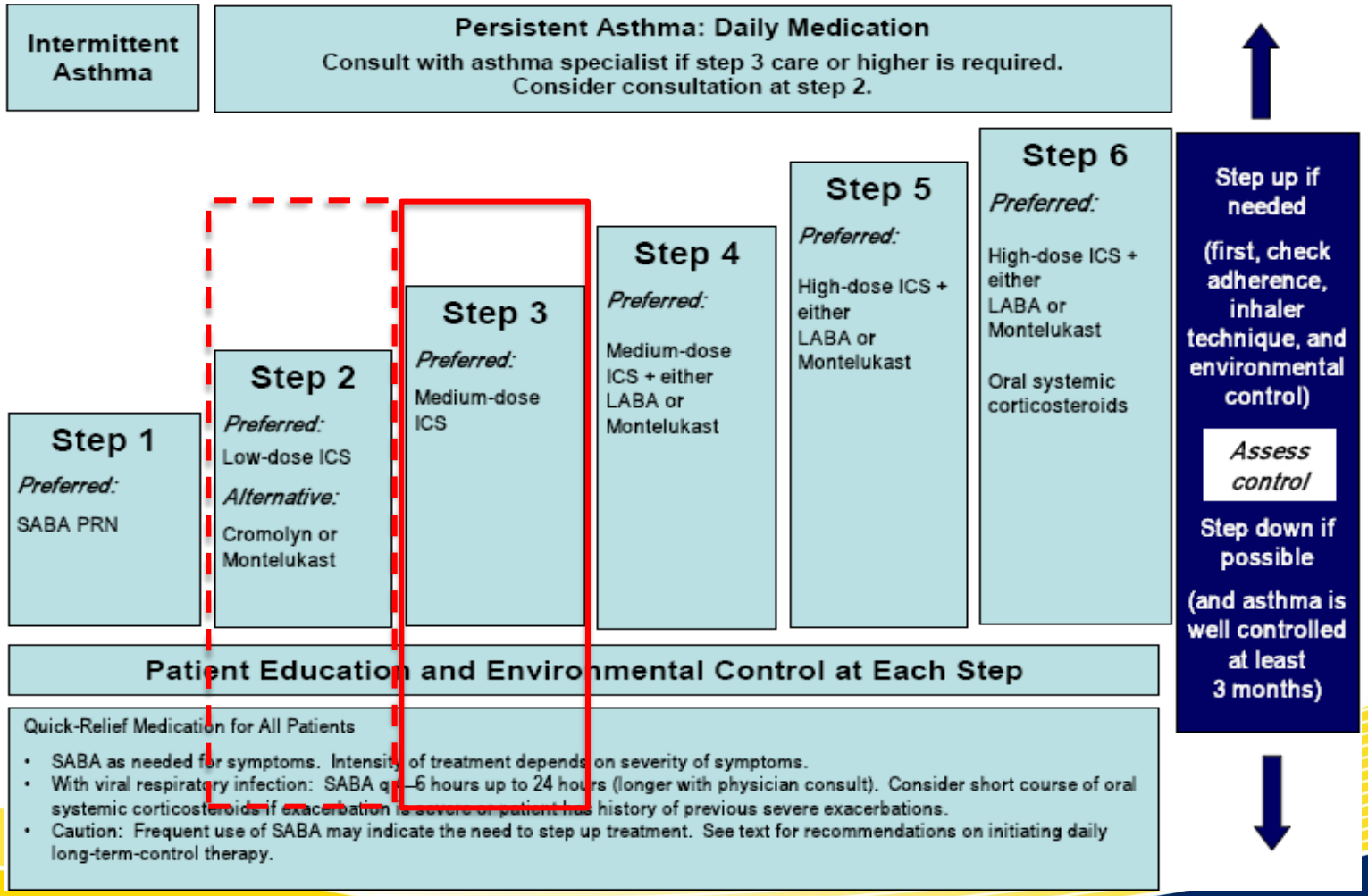
Classifying Asthma & Initiating Treatment

Components of Severity		Classification of Asthma Severity (0–4 years of age)			
			Persistent		
		Intermittent	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		
		← 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.			
Recommended Step for Initiating Therapy (See figure 4–1a for treatment steps.)		Step 1	Step 2	Step 3 and consider short course of oral systemic corticosteroids	
		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.			

Defining Asthma Control

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.)		• Maintain current treatment. • Regular followup every 1–6 months. • Consider step down if well controlled for at least 3 months.	• 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.	• 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.

Age 0-4 Years



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National Heart, Lung, and Blood Institute. Expert panel report 3: guidelines for the diagnosis and management of asthma—full report 2007. www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf.

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Classifying Asthma & Initiating Treatment

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	• Normal FEV_1 between exacerbations • FEV_1 >80% predicted • FEV_1/FVC >85%	• FEV_1 = >80% predicted • FEV_1/FVC >80%	• FEV_1 = 60–80% predicted • FEV_1/FVC = 75–80%	• FEV_1 <60% predicted • FEV_1/FVC <75%
Risk	Exacerbations requiring oral systemic corticosteroids	0–1/year (see note)	≥2/year (see note) →		
		← 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 Therapy (See figure 4–1b for treatment steps.)		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 2–6 weeks, evaluate level of asthma control that is achieved, and adjust therapy accordingly.			

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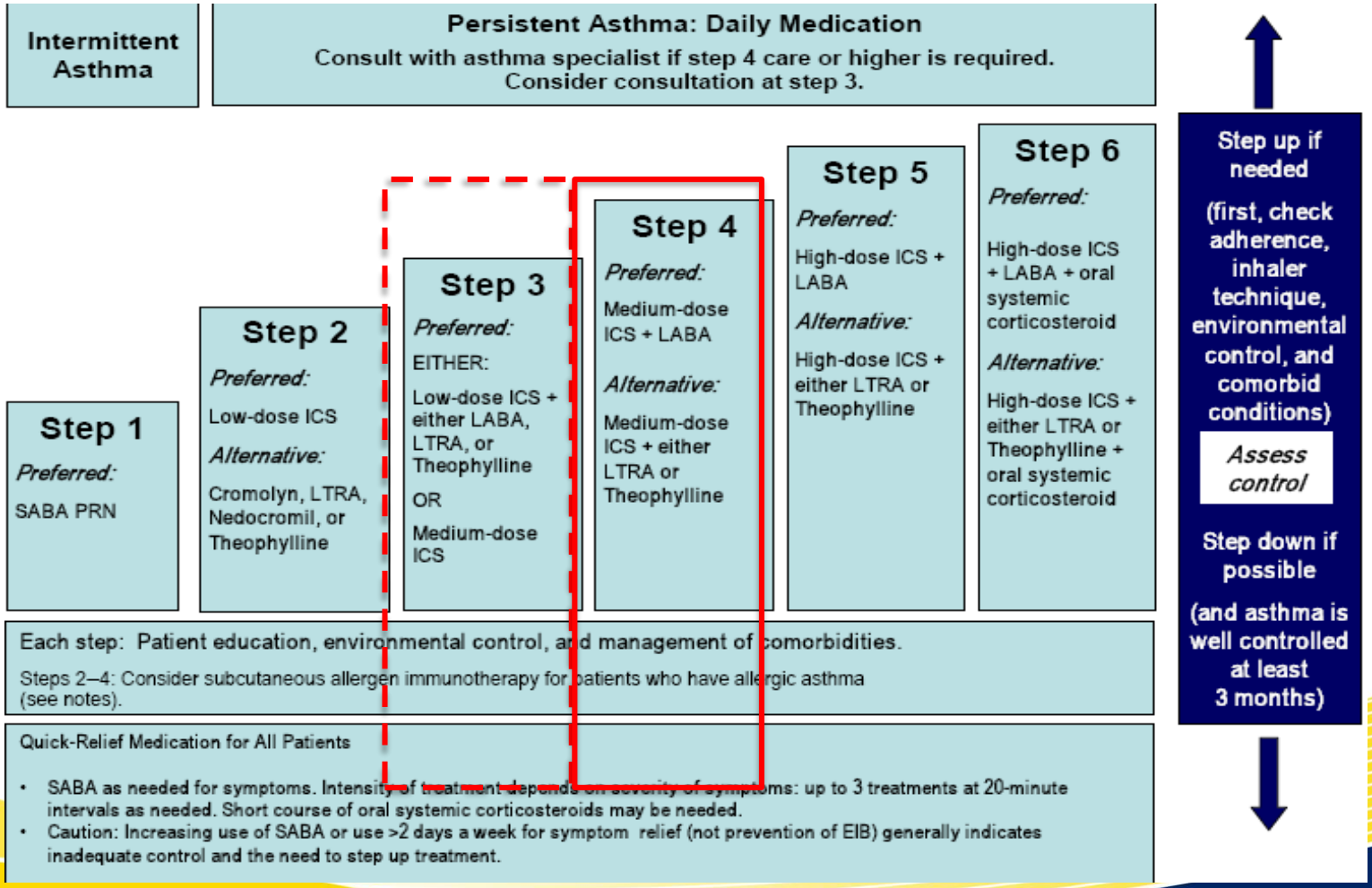
Defining Asthma Control

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			
	• FEV_1 or peak flow	>80% predicted/ personal best	60–80% predicted/ personal best	<60% predicted/ personal best
	• FEV_1/FVC	>80%	75–80%	<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.)		• Maintain current step. • Regular followup every 1–6 months. • Consider step down if well controlled for at least 3 months.	• Step up at least 1 step and • Reevaluate in 2–6 weeks. • For side effects: consider alternative treatment options.	• Consider short course of oral systemic corticosteroids, • Step up 1–2 steps, and • Reevaluate in 2 weeks. • For side effects, consider alternative treatment options.

National Heart, Lung, and Blood Institute. Expert panel report 3: guidelines for the diagnosis and management of asthma—full report 2007. www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf.

Age 5-11 Years



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Long-Term Control Medications

Estimated Comparative Daily Doses for Inhaled Corticosteroids

	Low Daily Dose			Medium Daily Dose			High Daily Dose		
Medication	Child 0–4 Years of Age	Child 5–11 Years of Age	≥12 Years of Age & Adults	Child 0–4 Years of Age	Child 5–11 Years of Age	≥12 Years of Age & Adults	Child 0–4 Years of Age	Child 5–11 Years of Age	≥12 Years of Age & Adults
Beclomethasone HFA 40 or 80 mcg/puff	NA	80–160 mcg	80–240 mcg	NA	>160–320 mcg	>240–480 mcg	NA	>320 mcg	>480 mcg
Budesonide DPI 90, 180, or 200 mcg/inhalation	NA	180–400 mcg	180–600 mcg	NA	>400–800 mcg	>600–1,200 mcg	NA	>800 mcg	1,200 mcg
Budesonide Inhaled Inhalation suspension for nebulization	0.25–0.5 mg	0.5 mg	NA	>0.5–1.0 mg	1.0 mg	NA	>1.0 mcg	2.0 mg	NA
Ciclesonide MDI 80 or 160 mcg/puff	NA	80–160 mcg	160–320 mcg	NA	>160–320 mcg	>320–640 mcg	NA	>320 mcg	>640 mcg
Flunisolide MDI 80 mcg/puff	NA	160 mcg	320 mcg	NA	>320–480 mcg	>320–640 mcg	NA	>480 mcg	>640 mcg
Fluticasone Furoate 100 or 200 mcg/actuation	NA	NA	100 mcg	NA	NA	200 mcg	NA	NA	>200 mcg
Fluticasone Propionate HFA/MDI 44, 110, or 220 mcg/puff	176 mcg	88–176 mcg	88–264 mcg	>176–352 mcg	>176–352 mcg	>264–440 mcg	>352 mcg	>352 mcg	>440 mcg
Fluticasone Propionate DPI 50, 100, or 250 mcg/inhalation	NA	100–200 mcg	100–300 mcg	NA	>200–400 mcg	>300–500 mcg	NA	>400 mcg	>500 mcg
Mometasone DPI# 110 or 220 mcg/inhalation	NA	110 mcg#	220 mcg	NA	110 mcg#	440 mcg	NA	110 mcg#	880 mcg

Key: DPI, dry powder inhaler; HFA, hydrofluoroalkane; MDI, metered-dose inhaler; NA, not available (either not approved, no data available, or safety and efficacy not established for this age group).

For children 4 to 11 years of age: Mometasone starting dose and maximum dose are the same, 110 mcg/day. See: www.asmanex.com.

Therapeutic Issues:

- The most important determinant of appropriate dosing is the clinician's judgment of the patient's response to therapy. The clinician must monitor the patient's response on several clinical parameters and adjust the dose accordingly. Once control of asthma is achieved, the dose should be carefully titrated to the minimum dose required to maintain control.
- Preparations are not interchangeable on a mcg or per puff basis. This figure presents estimated comparable daily doses. *See EPR-3 Full Report 2007 for full discussion.*
- Some doses may be outside package labeling, especially in the high-dose range. Budesonide nebulizer suspension is the only inhaled corticosteroid (ICS) with FDA-approved labeling for children <4 years of age.
- For children <4 years of age: The safety and efficacy of ICSs in children <1 year has not been established. Children <4 years of age generally require delivery of ICS (budesonide and fluticasone HFA) through a face mask that should fit snugly over nose and mouth and avoid nebulizing in the eyes. Wash face after each treatment to prevent local corticosteroid side effects. For budesonide, the dose may be administered 1–3 times daily. Budesonide suspension is compatible with albuterol, ipratropium, and levalbuterol nebulizer solutions in the same nebulizer. Use only jet nebulizers, as ultrasonic nebulizers are ineffective for suspensions. For fluticasone HFA, the dose should be divided 2 times daily; the low dose for children <4 years of age is higher than for children 5–11 years of age due to lower dose delivered with face mask and data on efficacy in young children.
- Children ≤12 years of age (please refer to package insert for age appropriateness, drug interactions and potential adverse effects).

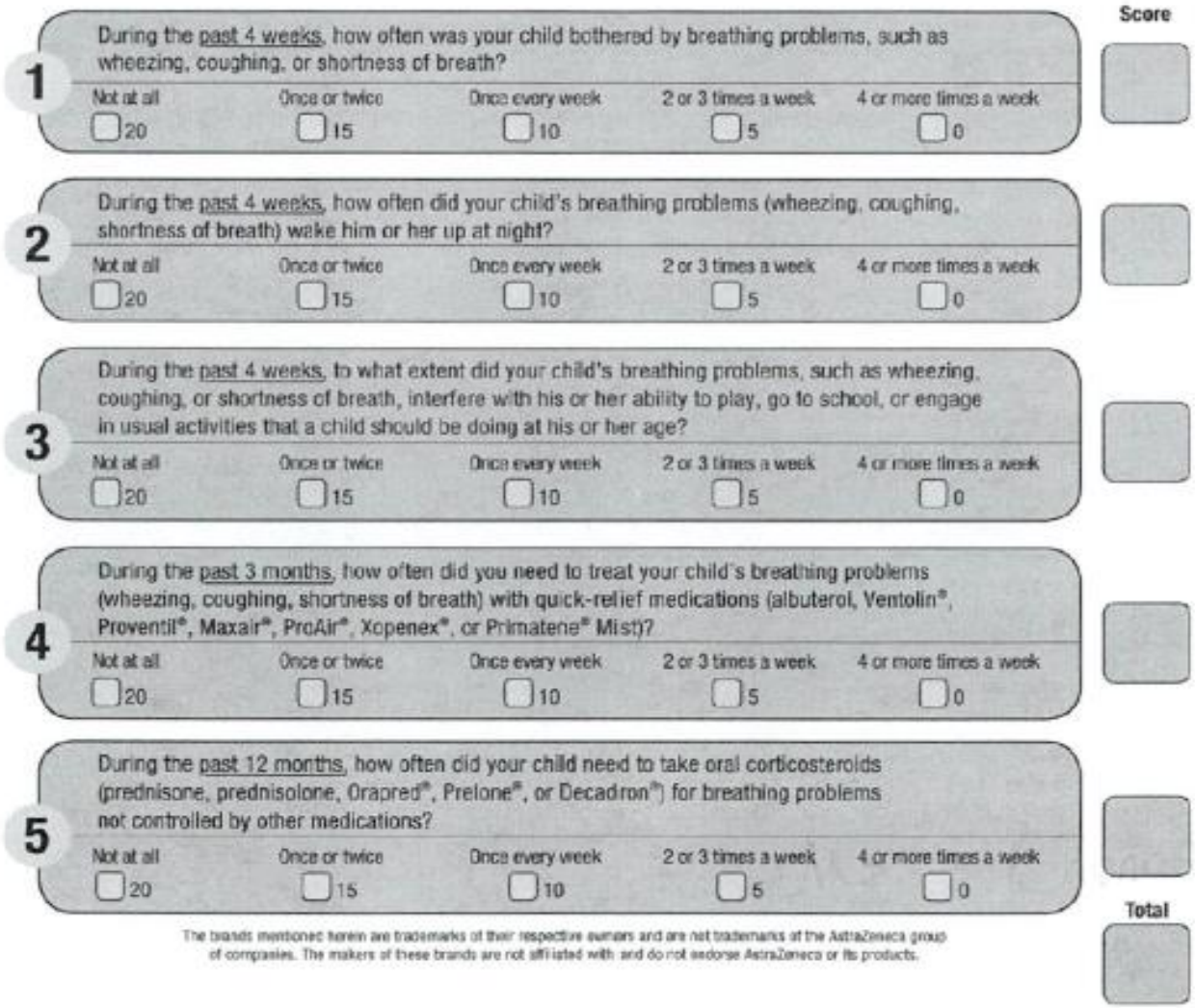
Above list not all inclusive. Check for availability and health plan/insurance formulary when applicable. Use of spacer/holding chamber is recommended with use of metered-dose inhaler (MDI).

Estimated Equipotent Daily Doses of Inhaled Corticosteroids for Children

Drug	Low Daily Dose (µg)	Medium Daily Dose (µg)	High Daily Dose (µg)
Beclomethasone Dipropionate	100 – 200	>200 – 400	>400
Budesonide	100-200	>200- 400	>400
Ciclesonide	80-160	>160-320	>320
Flunisolide	500-750	> 750-1250	> 1250
Fluticasone	100-200	> 200 – 500	>500
Mometasone furoate	100-200	>200 – 500	>400
Triamcinolone acetonide	400-800	>800 – 1200	> 1200

Asthma Control Questionnaires:
TRACK
C-ACT
ACT

TRACK (Test for Respiratory and asthma control in Kids) <5 years of age



Score

1. During the past 4 weeks, how often was your child bothered by breathing problems, such as wheezing, coughing, or shortness of breath?
   Not at all ☐ 20 | Once or twice ☐ 15 | Once every week ☐ 10 | 2 or 3 times a week ☐ 5 | 4 or more times a week ☐ 0

2. During the past 4 weeks, how often did your child's breathing problems (wheezing, coughing, shortness of breath) wake him or her up at night?
   Not at all ☐ 20 | Once or twice ☐ 15 | Once every week ☐ 10 | 2 or 3 times a week ☐ 5 | 4 or more times a week ☐ 0

3. During the past 4 weeks, to what extent did your child's breathing problems, such as wheezing, coughing, or shortness of breath, interfere with his or her ability to play, go to school, or engage in usual activities that a child should be doing at his or her age?
   Not at all ☐ 20 | Once or twice ☐ 15 | Once every week ☐ 10 | 2 or 3 times a week ☐ 5 | 4 or more times a week ☐ 0

4. During the past 3 months, how often did you need to treat your child's breathing problems (wheezing, coughing, shortness of breath) with quick-relief medications (albuterol, Ventolin®, Proventil®, Maxair®, ProAir®, Xopenex®, or Primatene® Mist)?
   Not at all ☐ 20 | Once or twice ☐ 15 | Once every week ☐ 10 | 2 or 3 times a week ☐ 5 | 4 or more times a week ☐ 0

5. During the past 12 months, how often did your child need to take oral corticosteroids (prednisone, prednisolone, Orapred®, Prelone®, or Decadron®) for breathing problems not controlled by other medications?
   Not at all ☐ 20 | Once or twice ☐ 15 | Once every week ☐ 10 | 2 or 3 times a week ☐ 5 | 4 or more times a week ☐ 0

Total

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MedStar G
University

d on You

CACT (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?

SCORE

0	1	2	3	
Very bad	Bad	Good	Very good	

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

0	1	2	3	
It's a big problem, I can't do what I want to do.	It's a problem and I don't like it.	It's a little problem but it's okay.	It's not a problem.	

3. Do you cough because of your asthma?

0	1	2	3	
Yes, all of the time.	Yes, most of the time.	Yes, some of the time.	No, none of the time.	

4. Do you wake up during the night because of your asthma?

0	1	2	3	
Yes, all of the time.	Yes, most of the time.	Yes, some of the time.	No, none of the time.	

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	4	3	2	1	0	
Not at all	1-3 days/mo	4-10 days/mo	11-18 days/mo	19-24 days/mo	Everyday	

6. During the last 4 weeks, on average, how many days per month did your child wheeze during the day because of asthma?

5	4	3	2	1	0	
Not at all	1-3 days/mo	4-10 days/mo	11-18 days/mo	19-24 days/mo	Everyday	

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	4	3	2	1	0	
Not at all	1-3 days/mo	4-10 days/mo	11-18 days/mo	19-24 days/mo	Everyday	

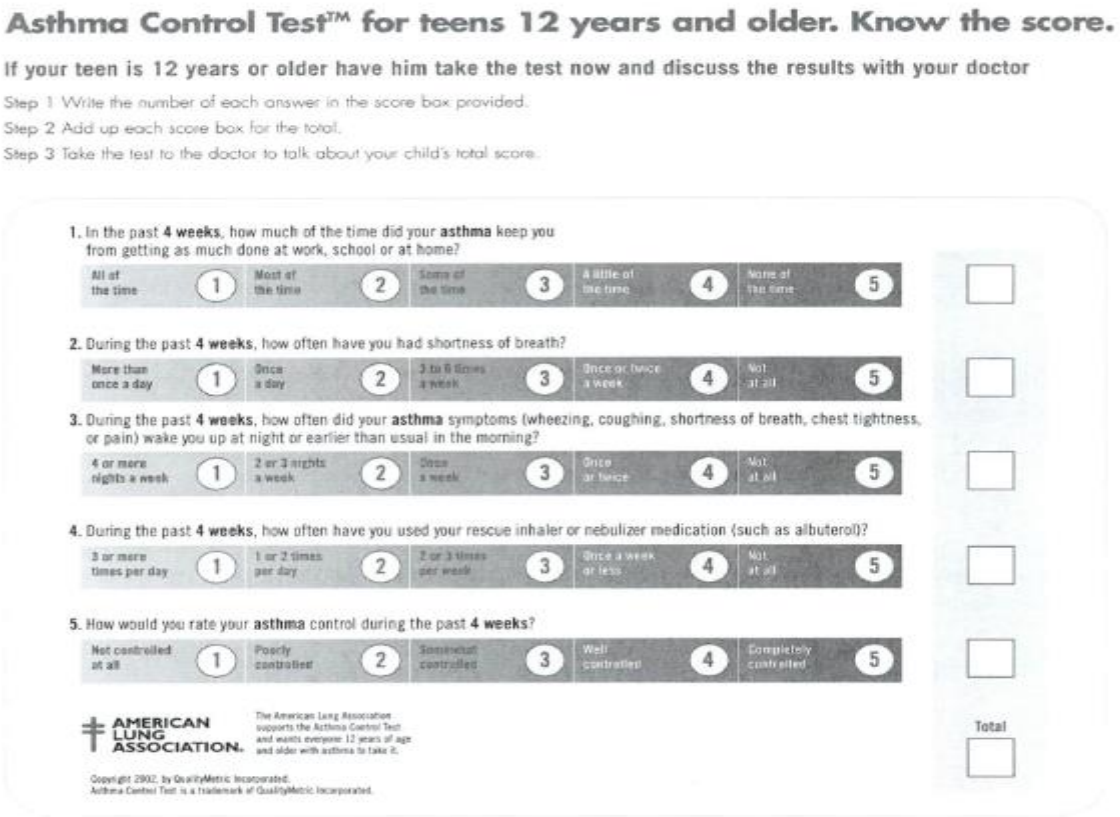
TOTAL

Please turn this page over to see what your child's total score means.

MedStar G
University

ed on You

ACT(Asthma Control Test)



Asthma Control Test™ for teens 12 years and older. Know the score.

If your teen is 12 years or older have him take the test now and discuss the results with your doctor

Step 1 Write the number of each answer in the score box provided.
Step 2 Add up each score box for the total.
Step 3 Take the test to the doctor to talk about your child's total score.

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?

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	

AMERICAN LUNG ASSOCIATION.

The American Lung Association supports the Asthma Control Test and wants everyone 12 years of age and older with asthma to take it.

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Total

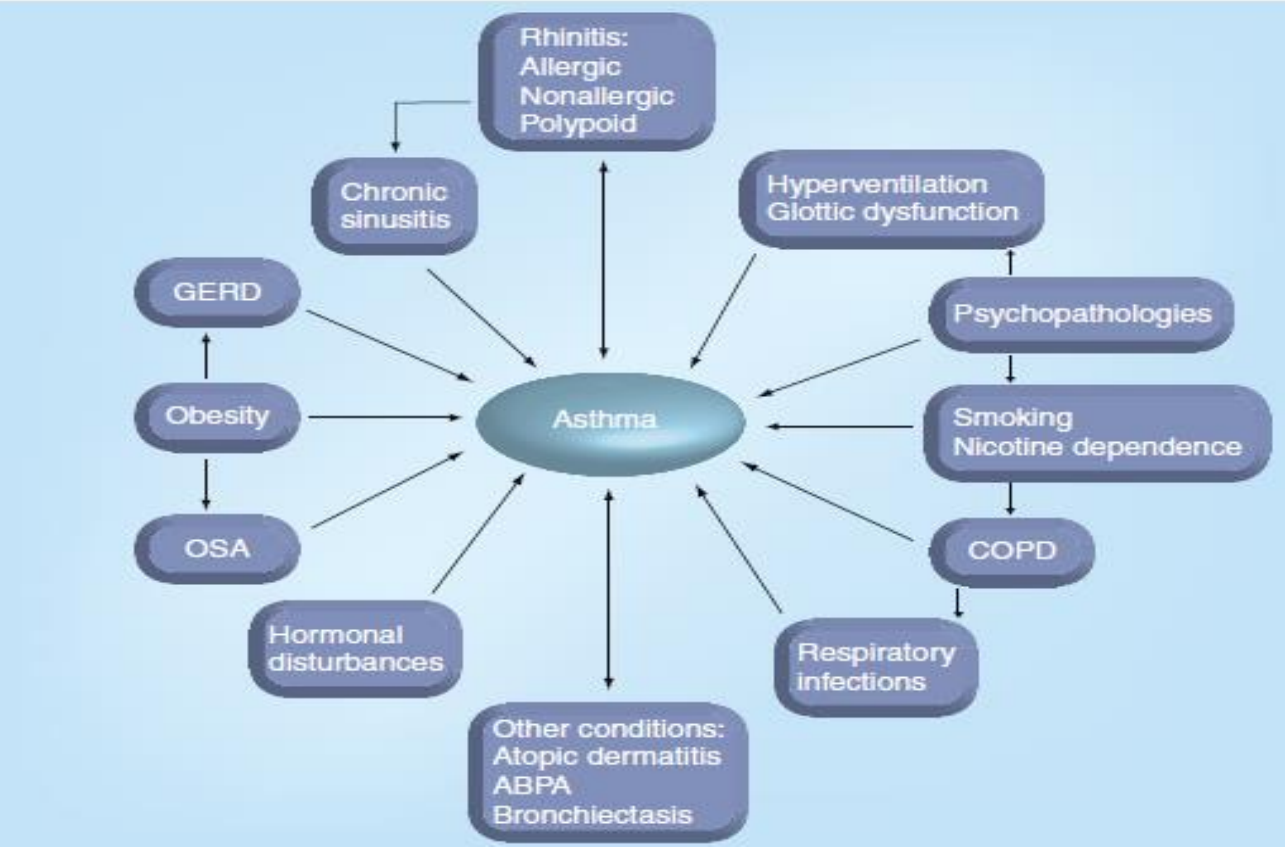
What does it mean if my child scores 19 or less?

- If your child's score is 19 or less, it may be a sign that your child's asthma is not under control.
- Make an appointment to discuss your child's asthma score with their doctor. Ask if you should change your child's asthma treatment plan.
- Ask your child's doctor about daily long-term medications that can help control airway inflammation and constriction, the two main causes of asthma symptoms. Many children may need to treat both of these on a daily basis for the best asthma control.

Referral to an Asthma Specialist
ATS/ERS Recommendations

- Life-threatening asthma exacerbation
- Exacerbation requiring hospitalization
- Step 4 care or higher
  - (step 3 for children 0–4 years of age)
  - Consider referral if patient requires step 3 care (step 2 for children 0–4 years of age)
- >2 oral corticosteroids in 1 year
- Unresponsive to therapy
- Other conditions complicate asthma or its diagnosis
  - Sinusitis, nasal polyps, aspergillosis, severe rhinitis, VCD, GERD).
- Signs and symptoms atypical or problems in differential diagnosis
- Not meeting therapeutic goals
  - After 3–6 months of treatment
- Additional diagnostic testing
  - Allergy skin testing, rhinoscopy, PFTs, bronchoscopy
- Considering immunotherapy
- Additional education and guidance
- Confirm history suggesting inhalant/ingested substance contributes to asthma.

Co-morbidities



Evaluate for Co-Morbid Conditions

ERS/ATS Recommendations

CO-MORBID CONDITIONS	CONDITIONS THAT MIMIC ASTHMA
Rhinosinusitis/Nasal Polyps	**Dysfunctional breathing**
Vocal Cord Dysfunction	**VCD/PVCM**
GE Reflux	**Dysfunctional swallow, Recurrent aspiration**
Obstructive Sleep Apnea	**Anatomical Issue** Fixed obstruction (ring/sling/mass) Dynamic – Malacia
Obesity	**Cystic Fibrosis**
Psychological Factors Hyperventilation Syndrome Anxiety, Depression	**Immunologic/Immunodeficiency** Hyper-IgE Syndromes Eosinophilic Syndromes
ETS/Smoke Exposure	**Primary Ciliary Dyskinesia**
Medications	**Congenital Heart Disease**
Hormonal Influence	**Interstitial Lung Disease**

Risk factors for exacerbation of difficult-to-treat asthma

136 subjects

- 39 had 3 severe exacerbations/yr
- 29 had 1 severe exacerbation/yr

Brinke , et al. *Eur Respir J 2005; 26: 812.*

Conclusions

Odds ratio (OR) associated with 3 exacerbations

a) severe sinus disease, OR 3.7

b) GERD, OR 4.9

c) URIs, OR 6.9

d) Psychological dysfunction, OR 10.8

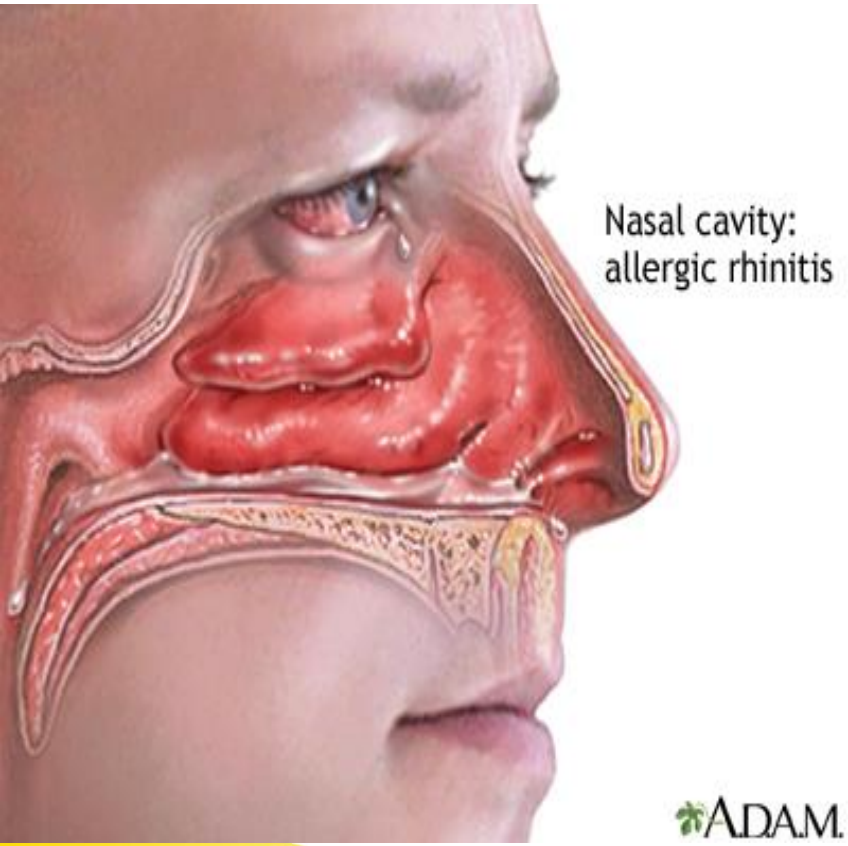
e) Obstructive sleep apnea, OR 3.4

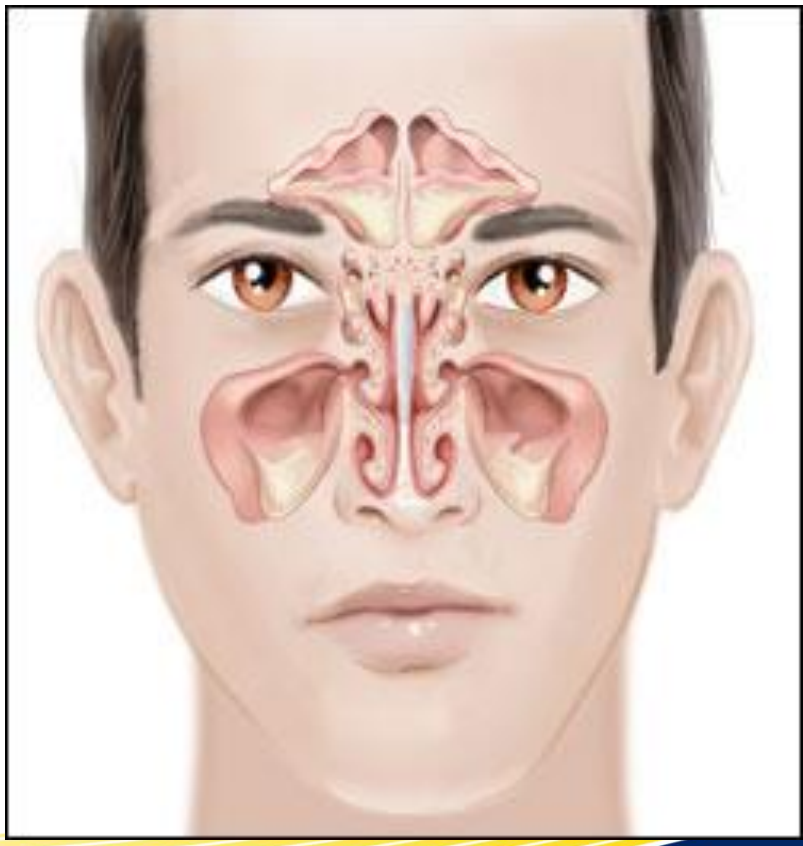
All patients with frequent exacerbations had 1/5 while 52% had 3/5

Brinke , et al. *Eur Respir J 2005; 26: 812.*

Rhinosinusitis

Rhinosinusitis





Rhinosinusitis (Allergic, Nonallergic, Infectious) and Asthma

Incidence and Association

1. Rhinitis linked to sinusitis (rhinosinusitis) and to nasal polyps – all of which are co-morbid conditions of asthma
2. Prevalence substantially higher than that in general population, ranges from 60%- 80%.

Hamouda S, et al. Allergic rhinitis in children with asthma: a questionnaire-based study. Clin Exp Allergy 2008; 38: 761–766.
Masuda S, et al. High prevalence and young onset of allergic rhinitis in children with bronchial asthma. Pediatr Allergy Immunol 2008; 19: 517–522.

Rhinosinusitis (Allergic, Nonallergic, Infectious) and Asthma

Incidence and Association

3. Allergic rhinitis can be a precursor of asthma

4. Deterioration of rhinitis symptoms negatively impacts bronchial responsiveness and conversely adequate management of rhinitis improves asthma

5. Chronic sinus disease may be linked to severe asthma

Bachert C et al. In: Middleton 7th ed. *Allergy: Principles and Practice*, p 991

Rhinosinusitis (Allergic, Nonallergic, Infectious) and Asthma

Incidence and Association

6. Nasal corticosteroids was significantly associated with less ED tx and hospitalizations (adjusted OR 0.75 (95% CI 0.62–0.91) and 0.56 (95% CI 0.42–0.76),

7. Controlling infectious sinusitis may decrease asthma medication needs

Moss MH et al. In: Middleton 6th ed. Allergy: Principles and Practice, 2003, p 1225

Hamoudo S, et al. Allergic rhinitis in children with asthma: a questionnaire-based study . Clin Exp Allergy 2008; 38: 761–766.

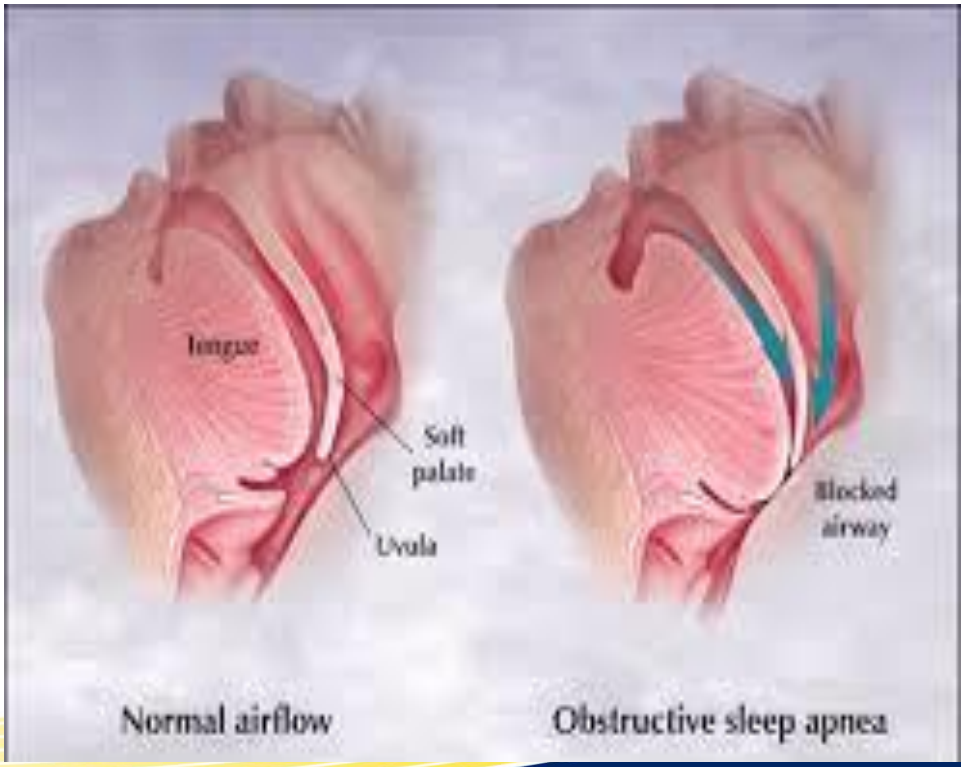
Asthma and Sleep Apnea

Asthma and Sleep Apnea

Obstructive Sleep Apnea is:

1. Complete or partial collapse of the upper airways during sleep with cessation of breathing despite respiratory effort

2. Coexistent daytime somnolence.



Asthma and Sleep Apnea

Symptoms - Children

1. The caregiver reports snoring and/or labored or obstructed breathing during sleep.
2. The caregiver observes at least one of the following:
   - Paradoxical inward rib cage motion during inspiration movement arousals
   - Diaphoresis
   - Neck hyperextension during sleep
   - Excessive daytime sleepiness, hyperactivity, or aggressive behavior
   - Slow rate of growth
   - Morning headaches
   - Secondary enuresis

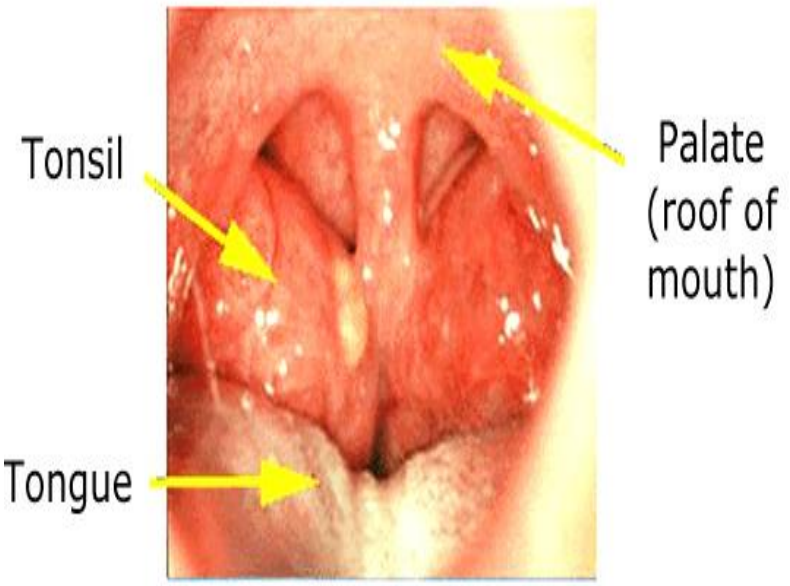
Staevska MP, Baraniuk JN. Rhinitis and Sleep Apnea. In: Baraniuk J, Shusterman D (eds). *Nonallergic Rhinitis*. 2007, Informa Healthcare, New York, 449-472

Asthma and Sleep Apnea

1. Risk of sleep apnea increases with nasal obstruction, large adenoids and tonsils, and elongated face.

2. Rhinitis appears to increase the risk of obstructive sleep apnea.

3. Many other risk factors associated with sleep apnea include obesity, gastroesophageal reflux, endocrine problems, and others.



Asthma and Obesity

OBESITY

IN INFANTS TO PRESCHOOLERS

American Heart Association®
My Heart. My Life.™

1 IN 3 CHILDREN
and adolescents, ages 2-19,
ARE OVERWEIGHT OR OBESE
and nearly **NONE** meet healthy diet and physical activity recommendations.

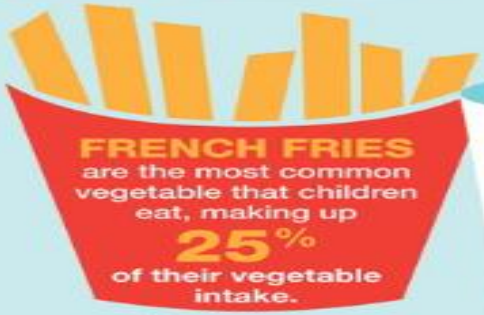
FACT An estimated **12.5 MILLION CHILDREN**, ages 5 years or younger, spend **33 HOURS PER WEEK** in **CHILD CARE SETTINGS** where they may **CONSUME MOST OF THEIR DAILY CALORIES.**

OBESITY is linked to **MORE CHRONIC CONDITIONS THAN:**

increasing the **RISK** of more than **20 PREVENTABLE CONDITIONS**, *including sleep apnea, asthma, heart disease, Type 2 diabetes, osteoarthritis, high blood pressure and high cholesterol stroke.*

RISK FACTORS

- **Children in their early teens who are obese and who have high triglyceride levels have arteries similar to those of 45-year-olds.**
- **Obese children as young as age 3 show indicators for developing heart disease later in life.**
- **Children who are overweight from the ages of 7 to 13 may develop heart disease as early as age 25.**
- **Obese children are twice as likely to die before age 55 than their slimmer peers.**



FRENCH FRIES are the most common vegetable that children eat, making up **25%** of their vegetable intake.

JUICE (which may lack important fiber found in whole fruit) makes up **40%** of children's daily fruit intake.

Between 40% and **50%** **OF TODDLERS**, ages 12- to 35-months-old, **watch MORE television than is recommended.**

Nearly **1/2** **OF PRESCHOOL-AGED CHILDREN DON'T get enough PHYSICAL ACTIVITY.**

The COST of obesity in the United States is staggering, totaling about **$147 billion.**

Children who **EAT HEALTHY FOODS** and **GET DAILY PHYSICAL ACTIVITY** have:

- **FEWER SCHOOL ABSENCES**
- **HIGHER ACADEMIC ACHIEVEMENT**
- **HIGHER SELF-ESTEEM**
- **FEWER BEHAVIORAL PROBLEMS**

OBESITY MAY BE PREVENTED BY

DEVELOPMENTALLY, BIRTH TO AGE FIVE, is an important time to **TEACH** children to **PREFER HEALTHY FOODS and DEVELOP GROSS MOTOR SKILLS,** setting positive patterns and habits.

heart.org/healthierkids

Gastroesophageal Reflux Disease (GERD)

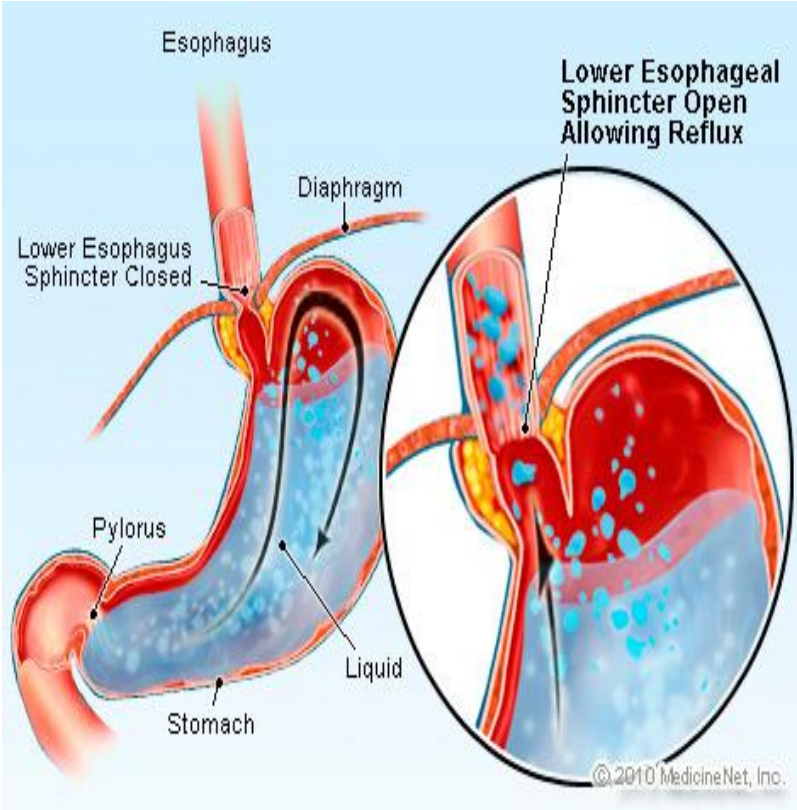
Symptoms of GERD in Childhood

- Regurgitation especially after eating
- Signs of esophagitis (irritability, arching, choking,

  gagging, feeding aversion)

Symptoms resolve in most by 12-24 mo

- Older children abdominal and chest discomfort
- Also, stridor, obstructive apnea, or lower airway disease



Prevalence of pediatric Asthma and GERD

- Prevelence of asthma in 1,980 children with GERD to 7,920 controls without GERD.

- Dx asthma in GERD was twice prevalence of controls (13.2% versus. 6.8%; p,0.0001)

El Serag HB, et al. Extraesophageal associations of gastroesophageal reflux disease in children without neurologic defects. Gastroenterology 2001; 121: 1294–1299.

Cochrane Data Base Review of GERD Treatment for Asthma in Adults and Children (2006)

- 12 randomized controlled trials of Rx for GERD in adults and children
- Interventions included proton pump inhibitors (6), H_2 receptor antagonists (5), surgery and conservative management (1)
- Anti-reflux Rx did not consistently improve lung function, asthma symptoms, nocturnal asthma and medication use
- Conclusion: No overall improvement but subgroups may gain benefit; albuterol use may be decreased

Vocal Cord Dysfunction (VCD)

Vocal Cord Dysfunction (VCD)

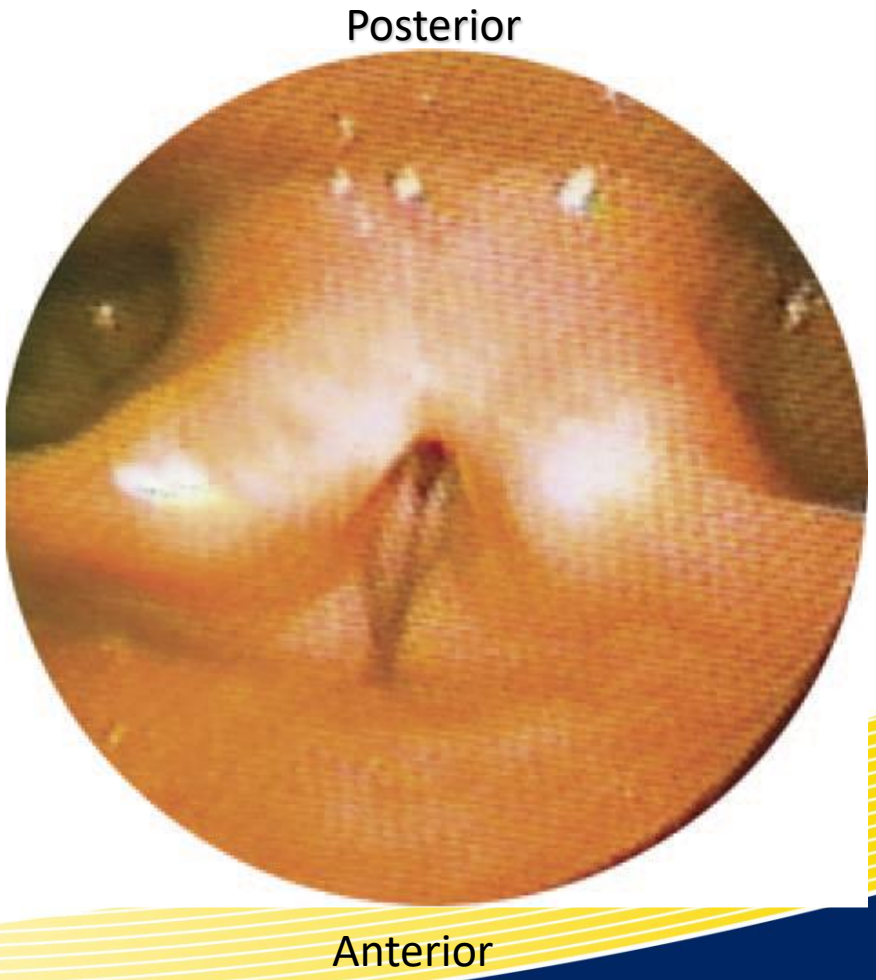
- Paradoxical adduction (closure) of the vocal cords/ folds during inspiration and/or early expiration
- Episodic laryngeal dysfunction triggered by irritant exposures or can occur spontaneously with variable clinical manifestations: chronic cough, frequent throat-clearing, choking episodes
- Masquarades as asthma; exercise–induced asthma, or complicates asthma

-Mikita JA, et al., All Asthma Proc 2006;27:411.
-Bahrainwala AH, et al., Curr Opin Pulm Med 2001;7:8.
-Byrd RP, et al., Postgrad Med 2000;108:37.
-Balkissoon R, In: Nonallergic Rhinitis, Baraniuk JN, Shusterman D (eds): Informa Healthcare USA, Inc., New York, pp. 411, 2007.

VCD

Diagnostic Criteria

- Clinical symptoms and patient history
- Laryngoscopic evidence of abnormal vocal cord movement during breathing
- Spirometry findings of an abnormal flow volume loop (usually the inspiratory loop) or lack of airway hyperactivity.



Vocal Cord Dysfunction (VCD)

95 subjects with VCD

a. Misdiagnosed with asthma for average of 4.8 yrs
b. 42 had VCD alone
c. 53 had VCD with asthma
d. 28% had been intubated

Newman AB et al.
Am J Resp Crit Care Med 1995;152:1382

Psychosocial Problems

Psychosocial Problems

- Stress is linked to many diseases – asthma is no exception
- Stress shown to exacerbate inflammatory diseases
- Stress may alter immune system in direction of Th2 response

Murali, R et al. Psychological Stress and Its Relationship to Cytokines, Stress and Immunity, 2007

Psychosocial Problems

- 781 subjects aged 11-17 yrs with asthma vs. matched non-asthmatics

- 16.3% of the children with asthma met the (DSM)-IV criteria for one or more anxiety or depressive disorders compared with 8.6% of those without asthma (p,0.01).

Chen E, et al. Symptom perception in childhood asthma: the role of anxiety and asthma severity. Health Psychol 2006; 25: 389–395.

Psychosocial Problems

- Higher trait anxiety associated with increased perception of asthma symptoms
- Over perception and blunted perception of asthma sx play a rolein poor asthma control
- Depression particularly dangerous – especially for severe asthma

-Guilbert T et al. In Middleton 7th ed. *Allergy: Principles and Practice*, 2009, pp 1319-1343
-Wright RJ et al. *Am J Respir Crit Care Med* 2002;165:358-365
-Sandberg S et al. *Lancet* 2000;356:982-987

Psychosocial Problems

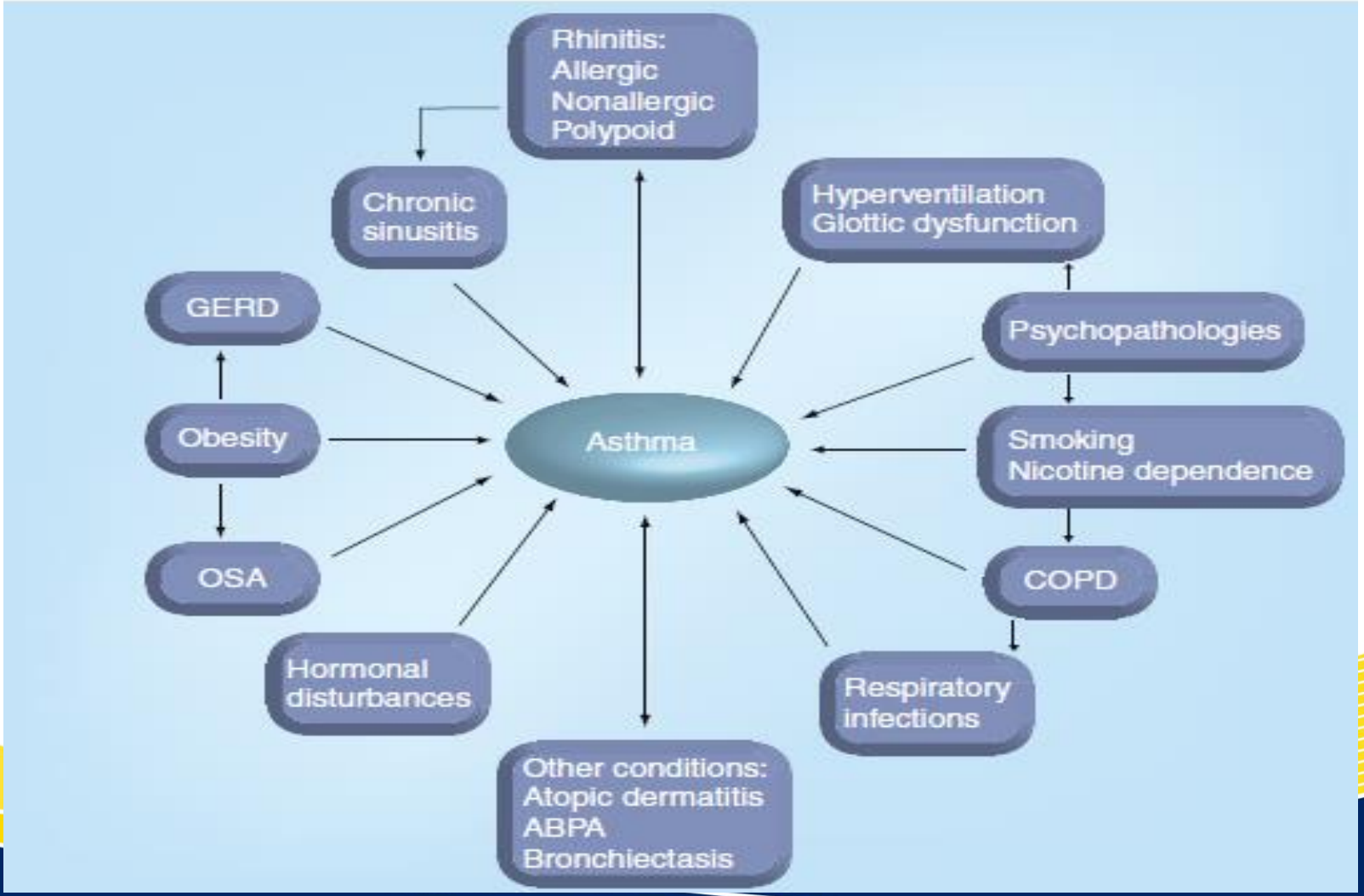
- In adults, increasing levels of depression associated with increased:

  ED visits, hospitalizations, urgent care visits

- In children, negative affect scores are related to asthma symptom scores in a dose-dependent fashion

Mancuso CA Effects of depressive symptoms on health-related quality of life in asthma patients. J Gen Intern Med 2000; 15: 301–310.
Eisner MD, Katz PP, Lactao G, et al. Impact of depressive symptoms on adult asthma

Co-morbidities and Asthma



Conclusions

- Asthma is perhaps the most treatable of all chronic diseases.
- Understanding asthma guidelines, teaching of technique and ensuring compliance with medications is critical to asthma management
- Validated asthma scoring questionnaires can assist with control and management.
- Refer, Refer, Refer
- For optimal outcomes, co-existing and co-morbid conditions must be identified and appropriately treated.