If it shines → Is it gold?
Is wheezing = asthma?

• Seems that there is some “magic” in the asthma world
  — “You can’t call it ‘asthma’ until the child is 2 years of age”
  — “a one year old child can’t have asthma yet”
  — “you need to wait for PFT’s in order to call it asthma”
• It may be very difficult to give a diagnosis of “asthma” to a young child
  “Spirometry is needed to establish a diagnosis of asthma” (2007 NIH guidelines p42)

Asthma Lecture

I will Review
• History of Asthma
• Definition
• Diagnosis of Asthma
• Physiopathology (briefly)
• Differential Diagnosis
• Four components of care

Not today
• Extensive physiopathology
• Details of specific studies
• Theories about its increased prevalence
• Specific medicines
• Case-based treatment examples
• In-patient management

History

• Greek verb “aazein” (“Asthmenein”): to breathe out with open mouth or to breathe heavily
  (special thanks to Dr. Mangos for Greek language expertise)
• The Iliad: first appearance: short-drawn inhalation
• First used as medical word: Corpus Hippocraticum.

History

• Hippocrates school (460-360 B.C.)
  independent medical term or only a symptom?
• Aretaeus of Cappadocia: the greatest clinical description of asthma in later antiquity
• Galen description in conformity with the Hippocratic manuscript and to some level with the declarations of Aretaeus

History

• Asthma patients’ and their treatments from ancient Egyptian times.
• Georg Ebers Papyrus (1870 Egypt) prescriptions in hieroglyphics (700 remedies for asthma)
• An asthma medication to be prepared by mixing few herbs and heating them on a brick. This was done so that the patient can inhale the fumes
• Chinese started inhaling beta-agonists obtained from herbs that contained ephedrine

http://www.copewithasthma.com/history-of-asthma/
History
• Early 20th century asthma: psychosomatic disease
• During the 1930s to 1950s, asthma was known as one of the holy seven psychosomatic illnesses
  - A child’s wheeze was seen as a suppressed cry for his or her mother
  - Psychoanalysts thought that patients with asthma should be treated for depression

Alexander’s (1950)
1. Gastric ulceration
2. Ulcerative colitis
3. Bronchial asthma
4. Essential hypertension
5. Eczema
6. Hyperthyroidism
7. Rheumatoid arthritis

History-William Osler 1982
First edition of the textbook Principles and Practice of Medicine:
• Runs in families.
• Often beginning in childhood and sometimes lasting into old age
• Paroxysms by
  - Climate and atmosphere e.g., hay, dust, cat
  - Fright or violent emotion
  - Diet (overloading of the stomach) or certain foods
  - Upper or lower resp infection
• Spasm of the bronchial muscles
• Swelling of the bronchial mucous membrane
• Inflammation of the smaller bronchioles
• Resemblance to hay fever
• Sputum is distinctive: rounded gelatinous masses ("perles") and Curschmann spirals & octahedral crystals of Leyden

Definition
From the 2007 NIH guidelines:
“Asthma is a common chronic disorder of the Airways that is complex and characterized by variable and recurring symptoms, airflow obstruction, bronchial hyperresponsiveness, and an underlying inflammation”

Physiopathogenesis

Just 3 slides
(not the focus of this presentation)
How common is it?

Asthma Prevalence (6-7 years)

Almost 50% of children wheeze during the first 6 years of life.

Genetic ancestry
Environmental factors
Demographic factors
Social factors

Gene-environment interactions

Asthma

Asthma Prevalence (13-14 years)

Asthma Prevalence (6-7 years)
### Chances of Persistent Asthma

2-3 yo child with recurrent wheezing

<table>
<thead>
<tr>
<th>Major</th>
<th>Minor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parental Asthma</td>
<td>Allergic Rhinitis</td>
</tr>
<tr>
<td>Eczema</td>
<td>Wheezing (not with colds)</td>
</tr>
<tr>
<td></td>
<td>Eosinophils&gt;4%</td>
</tr>
</tbody>
</table>

1 major criteria or 2 minor have a 77% PPV of persistent asthma (97% specificity)

---

### How to make the diagnosis

(2007 NIH guidelines p40)

From the NHBLI guidelines:

The clinician should determine that:

1. Episodic symptoms of airflow obstruction or airway hyperresponsiveness are present
2. Airflow obstruction is at least partially reversible
3. Alternative diagnosis are excluded

---

### Key Indicators

- Wheezing
- History: cough, wheeze, difficulty breathing, chest tightness
- Symptoms occur or worsen with:
  - Exercise, viral infection, pet dander, dust mites, smoke, pollen, weather changes, crying/laughing, airborne chemicals, menstrual signs, etc
- Night symptoms

---

### Asthma and Allergic Disease

**DDx of cough and wheezing in children**

- Allergic Rhinitis
- Infectious Rhinitis
- Sinusitis
- Adenoidal Hypertrophy
- Foreign Body
- Laryngomalacia
- Laryngeal Web
- Tracheomalacia
- TEF
- Tracheal Stenosis
- Vascular Ring
- Pertussis
- Epiglottis
- Toxic Inhalation
- Vocal Cord Dysfunction
- Cystic Fibrosis
- GERD, Aspiration
- Persistent Bact Bronchitis
- Pulmonary Hemosiderosis
- Tumors
- Hyperventilation Syndrome
- Bronchiolitis

---

### Diagnosis

- “Recurrent episodes of cough and wheezing are due most often to asthma in both children and adults”
- “Underdiagnosis of asthma is a frequent problem”
- “bronchitis”, “recurrent bronchiolitis”, “pneumonia”, “wheezy bronchitis”, “RAD”, “recurrent upper airway infections”

---

**DDx-Adults**

- COPD
- Congestive Heart Failure
- Pulmonary Embolism
- Mechanical Obstruction
- Eosinophilic Pneumonia
- Cough sec. to drugs (e.g. ACE inh)
- VCD

**Considerations**

<table>
<thead>
<tr>
<th>Birth</th>
<th>2 mo</th>
<th>4 mo</th>
<th>7 mo</th>
<th>10 mo</th>
<th>13 mo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dx?</td>
<td>Dx?</td>
<td>Dx?</td>
<td>Dx?</td>
<td>Dx?</td>
<td>No readily available PFT's</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>30 yo</th>
<th>2 mo</th>
<th>4 mo</th>
<th>7 mo</th>
<th>10 mo</th>
<th>13 mo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dx?</td>
<td>Dx?</td>
<td>Dx?</td>
<td>Dx?</td>
<td>Dx?</td>
<td>PFT's to assist Dx</td>
</tr>
</tbody>
</table>

**Cases**

- 3 mo old first URI, wheezing
- 30 yo persistent cough after bad URI
- 15 yo wheezing after 30 min of running
- 15 yo wheezing after 4 hours of swimming
- 50 yo baker wheezes with flour
- 25 yo truck driver wheezing post chlorine exposure
- 10 yo persistent non-reversible wheezing
- 10 yo recurrent wheezing
- 7 yo chronic cough, crackles, wheezing, clubbing
- 10 yo hives, vomiting, wheezing with peanuts
- 4 yo with 6 weeks persistent cough
- Other Scenario

**Management**

4 Components of Care
(The Fantastic 4 Components of Care?)

- Component 1: Measures of Asthma Assessment and Monitoring
- Component 2: Education for a Partnership in Asthma Care
- Component 3: Control of Environmental Factors and Comorbid Conditions That Affect Asthma
- Component 4: Medications

**The 4 Components of Asthma Management**

- **Figure 1**
  - Asthma Guidelines 2007 Summary Report
  - Journal of Allergy and Immunology

The 'Fantastic 4' Components of Asthma Management:

- **Component 1**: Measures of Asthma Assessment and Monitoring
- **Component 2**: Education for a Partnership in Asthma Care
- **Component 3**: Control of Environmental Factors and Comorbid Conditions That Affect Asthma
- **Component 4**: Medications
Assessment of the Disease

2 domains

- Impairment (present)
  - Frequency and intensity of symptoms
  - Functional limitations (quality of life)
  - Divided on Severity (at Dx) or Control (at f/u)

- Risk (from past → predict future)
  - Asthma exacerbations (utilization)
  - Progressive loss of pulmonary function (lung growth)
  - Risk of adverse reaction from medication

A&M Domains

Kitchen sink (OCS + others) and very frequent visits (1-2 weeks)?

Big Differences in Management!

LICs and flu in ~1 month?

Assessment & Monitoring

Assessment of Severity

- Initial Evaluation
- When Dx is made
  - Intermittent
  - Persistent
    - Mild
    - Moderate
    - Severe

Monitoring of Control

- F/u visits
- How well controlled is it?
  - Well Controlled
  - Not Well Controlled
  - Poorly Controlled

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

<table>
<thead>
<tr>
<th>Components of Severity</th>
<th>Classification of Asthma Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impairment</td>
<td>Intermittent Persistent Mild Moderate Severe</td>
</tr>
<tr>
<td>Exacerbations</td>
<td>Frequency and intensity (at Dx) and control (at f/u)</td>
</tr>
<tr>
<td>Medications</td>
<td>Frequency and intensity (at Dx) and control (at f/u)</td>
</tr>
<tr>
<td>Risk</td>
<td>Frequency and intensity (at Dx) and control (at f/u)</td>
</tr>
</tbody>
</table>

Recommended Step for Initiating Treatment

Step 1
- Step 2
- Step 3

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

<table>
<thead>
<tr>
<th>Components of Severity</th>
<th>Classification of Asthma Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impairment</td>
<td>Intermittent Persistent Mild Moderate Severe</td>
</tr>
<tr>
<td>Exacerbations</td>
<td>Frequency and intensity (at Dx) and control (at f/u)</td>
</tr>
<tr>
<td>Medications</td>
<td>Frequency and intensity (at Dx) and control (at f/u)</td>
</tr>
<tr>
<td>Risk</td>
<td>Frequency and intensity (at Dx) and control (at f/u)</td>
</tr>
</tbody>
</table>

Recommended Step for Initiating Treatment

Step 1
- Step 2
- Step 3

Classifying Asthma Severity and Initiating Treatment in Youth/Adults >12 Years of Age

<table>
<thead>
<tr>
<th>Components of Severity</th>
<th>Classification of Asthma Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impairment</td>
<td>Intermittent Persistent Mild Moderate Severe</td>
</tr>
<tr>
<td>Exacerbations</td>
<td>Frequency and intensity (at Dx) and control (at f/u)</td>
</tr>
<tr>
<td>Medications</td>
<td>Frequency and intensity (at Dx) and control (at f/u)</td>
</tr>
<tr>
<td>Risk</td>
<td>Frequency and intensity (at Dx) and control (at f/u)</td>
</tr>
</tbody>
</table>

Recommended Step for Initiating Treatment

Step 1
- Step 2
- Step 3

8/9/2011
ASSESSING ASTHMA CONTROL AND ADJUSTING THERAPY IN CHILDREN 0 - 4 YEARS OF AGE

Components of Control

<table>
<thead>
<tr>
<th>Classification of Asthma Control</th>
<th>Well Controlled</th>
<th>Not Well Controlled</th>
<th>Very Poorly Controlled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms</td>
<td>None</td>
<td>Some limitation</td>
<td>Extremely limited</td>
</tr>
<tr>
<td>Nighttime awakenings</td>
<td>None</td>
<td>Some limitation</td>
<td>Extremely limited</td>
</tr>
<tr>
<td>Treatment related absences</td>
<td>None</td>
<td>Some limitation</td>
<td>Extremely limited</td>
</tr>
</tbody>
</table>

Recommended Action

For Treatment

- 0-4 y: If no clear benefit is observed: STOP Rx
  - No benefit = reevaluate therapy
  - Use dose oval and consider alternative therapy

The 4 Components of Asthma Management

- **Component 1**: Measures of Asthma Assessment and Monitoring
- **Component 2**: Education for a Partnership in Asthma Care
- **Component 3**: Control of Environmental Factors and Comorbid Conditions That Affect Asthma
- **Component 4**: Medications
### Component 2: Education for a Partnership in Asthma Care

- **Asthma Self-Management Education at Multiple Points of Care**
  - clinic/office-based education
  - emergency department/hospital-based education
  - education by pharmacists
  - education in school settings
  - community-based interventions
  - home-based interventions

- **Tools for Asthma Self-Management**
  - asthma action plans
  - peak flow meters

- **Establish and Maintain a Partnership**
  - jointly develop treatment goals
  - health literacy (read, count, measure, time, schedule)
  - cultural sensitivity/ethnic considerations

- **Provider Education**
  - implementing guidelines
  - communication techniques
  - clinical decision support
  - systems-based interventions

### Key Educational Messages

- **Significance of the diagnosis**
- **Cause: Inflammation**
- **Controllers vs. quick-relievers**
- **How to use medication delivery devices**
- **Triggers, including second-hand tobacco smoke**
- **Home monitoring/self-management**
- **How/when to reach the provider**
- **The need for continuous on-going interaction with the clinician to step-up and step-down therapy**
- **Annual Influenza vaccine (year-round reminder)**

### Happy Lungs: The Family Asthma Program

**WHAT OUR PROGRAM PROVIDES**

- An Asthma Counselor will provide support to your family and help develop effective communication with your doctor and school.
- An Asthma Counselor will be your partner, assisting with problems of daily obstacles related to asthma.
- Providing information to you and your child in group and individual meetings.
- Individual meetings focus on environment, school and skills for managing asthma.
The 4 Components of Asthma Management

- **Component 1**: Measures of Asthma Assessment and Monitoring
- **Component 2**: Education for a Partnership in Asthma Care
- **Component 3**: Control of Environmental Factors and Comorbid Conditions That Affect Asthma
- **Component 4**: Medications

### Environmental Factors

<table>
<thead>
<tr>
<th></th>
<th>Irritants</th>
<th>Allergens</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Indoor</strong></td>
<td>![Image of pollutants]</td>
<td>![Image of pollen]</td>
</tr>
<tr>
<td></td>
<td>• Smoke (tobacco, stove, candles)</td>
<td>• Pet Dander (cat, dog)</td>
</tr>
<tr>
<td></td>
<td>• Cleaning products</td>
<td>• Cockroaches</td>
</tr>
<tr>
<td></td>
<td>• Perfumes, insecticides</td>
<td>• Mold</td>
</tr>
<tr>
<td></td>
<td>• Other chemicals</td>
<td>• Dust mites</td>
</tr>
<tr>
<td><strong>Outdoor</strong></td>
<td>![Image of pollutants]</td>
<td>![Image of pollen]</td>
</tr>
<tr>
<td></td>
<td>• Pollution</td>
<td>• Pollen</td>
</tr>
<tr>
<td></td>
<td>• Exercise</td>
<td>• Trees</td>
</tr>
<tr>
<td></td>
<td>• Weather changes</td>
<td>• Grasses</td>
</tr>
<tr>
<td></td>
<td>• Infections</td>
<td>• Weeds</td>
</tr>
<tr>
<td></td>
<td>• Etc</td>
<td>• Mold</td>
</tr>
</tbody>
</table>

### Guidance on Environmental Control

- Dust mite interventions
  - impermeable encasings for pillows/mattresses
  - wash linens in hot water
  - HEPA filtration
- Animal allergens
  - keep outside/out of bedroom
  - similar interventions like for dust mites
- Roach control
  - integrated pest management
  - clean up food, spills, trash, leaks
- Mold and mildew interventions
  - air conditioning
  - avoid humidifiers
  - repair pipes and leaks
- Second-hand smoke exposure
- Air Pollution

The 4 Components of Asthma Management

- **Component 1**: Measures of Asthma Assessment and Monitoring
- **Component 2**: Education for a Partnership in Asthma Care
- **Component 3**: Control of Environmental Factors and Comorbid Conditions That Affect Asthma
- **Component 4**: Medications
The 4 Components of Asthma Management

- **Component 1**: Measures of Asthma Assessment and Monitoring
- **Component 2**: Education for a Partnership in Asthma Care
- **Component 3**: Control of Environmental Factors and Comorbid Conditions That Affect Asthma
- **Component 4**: Medications

Comorbid Conditions That Affect Asthma

- Allergic Bronchopulmonary Aspergillosis
- Gastroesophageal Reflux Disease
- Obesity
- Obstructive Sleep Apnea
- Rhinitis/Sinusitis
- Stress, Depression, and Psychosocial Factors

Simplified step up drug plan for asthma

- **STEPWISE APPROACH FOR MANAGING ASTHMA IN CHILDREN 0 - 4 YEARS OF AGE**
  - **Step 1**: Short-Acting Beta2-Agonist (SABA) 
  - **Step 2**: Inhaled Corticosteroids (ICS) 
  - **Step 3**: Reduction of Environmental Triggers
  - **Step 4**: Avoidance of Triggers
  - **Step 5**: Oral corticosteroids if required

- **STEPWISE APPROACH FOR MANAGING ASTHMA IN CHILDREN 5 - 11 YEARS OF AGE**
  - **Step 1**: SABA 
  - **Step 2**: ICS 
  - **Step 3**: LABA 
  - **Step 4**: Combination Therapy (ICS + LABA) 
  - **Step 5**: Oral corticosteroids if required

---

**8/9/2011**
Always make sure other conditions are ruled out.

Medicines need to be frequently titrated when needed.

Use of beta2-agonist >2 days a week for symptom control and the need to step up treatment.

Quick-Relief Medication for All Patients

1. Patient Education and Environmental Control at Each Step
2. Physician Assessment of Patients Every 3 to 6 months
3. Step 1: Initiation of Step Up
4. Step 2: Medication Step Up
5. Step 3: Medical Assessment of Patients
6. Step 4: Follow-up and Re-assessment
7. Step 5: Anti-inflammatory Medication
8. Step 6: Consultation
9. Step 7: Anti-inflammatory Medication
10. Step 8: Consultation

Many Slides Showing the Road Map for Outpatient management

Let’s Wrap it up.

Conclusions

1. Making the diagnosis of asthma in the young patient is not easy
2. Better to over-diagnose than under-diagnose
3. Always make sure other conditions are ruled out in the young child
4. Young children with persistent symptoms may have a different diagnosis than those with recurrent symptoms

Conclusions

5. Asthma is currently managed according to the four components of care (A&M, Ed, Trig/CoMorb, Meds)
6. Young children are evaluated and managed differently than older children and adults
7. Keep in mind the domains of Impairment (5 questions) and risk when seeing pts with asthma
8. Education of the patient/family is essential, AAP, inhaler technique, etc.
9. Triggers and co-morbidities need to be addressed (if not, asthma symptoms will persist)
10. Medicines need to be frequently titrated according to disease activity and risk assessment
11. If something is not working, stop and re-assess. There is plenty help around
Asthma and Allergic Disease

The development of allergies and asthma is common during childhood.

Does asthma produce permanent lung changes after 6 years of age?
The difference in pulmonary function between asthmatic and healthy subjects persists in parallel, independently of the severity of the disease. This is why it is very important to correctly manage asthma in the early childhood period.

Several studies have shown the existence of an “allergic march” during childhood: AD → Food allergy → AR → Asthma → Allergy to inhaled allergens.

Asthma and Allergic Disease

• The role of the pediatrician is essential if there is going to be a modification on the natural history of asthma
• Most children with asthma have permanent damage by age 6 years
• We most intervene early!

Asthma and Allergic Disease

• There are 3 important studies about the natural history of asthma and allergic disease in children:
  – Respiratory, Tucson (1980)
  – German Multicentric (1990)

• The most important findings were:
Asthma and Allergic Disease

The highest incidence of AD is during the first two years of life.

It is commonly believed that infants have few allergies, but AD, food allergy, and wheezing are common by the time an infant reaches 3 months of age.

Asthma and Allergic Disease

As children get older there is an incremental rise in the prevalence of sensitization to inhaled allergens.

Asthma and Allergic Disease

- The early development of allergic disease is signaled by positive skin tests to food allergens during the first years of life.

Asthma and Allergic Disease

- What predisposes an infant to develop allergies?
  - Intrauterine Th2 skewing of the immune system
  - High IgE in umbilical cord
  - Parental history
  - Gender:
    - Males develop "transient asthma" and also "persistent" more than females during childhood
    - Females: asthma associated with obesity and early puberty

Asthma and Allergic Disease

- URI's
  - If RSV+ history there is increased wheezing at 6 years of age, but not at 11 years
  - Pneumonia and croup increase risk of asthma at 11 years

- Cigarette smoke
- Prematurity
Asthma and Allergic Disease

- What protects from developing allergic disease?
  - Breast Feeding: Associated to less AD, but... One study showed an increase in asthma if mother had asthma. Current recommendation: Breast feed anyway.
  - Microbial exposure: endotoxin, nurseries/child care, hep. A.
  - Pets. Are they good or bad?

Asthma and Allergic Disease

- Studies about prevention of allergic disease
  1. Avoidance of allergenic foods:

Asthma and Allergic Disease

- Studies about allergic disease prevention
  2. Cigarette Exposure:

Asthma and Allergic Disease

- Studies about allergic disease prevention
  4. Rx with Inhaled Meds (cromolyn, steroids)

“CAMP” (the Childhood Asthma Management Program Research Group, NEJM Oct 12, 2000)

Multicentric study, randomized, prospective, placebo controlled

1041 children ages 5 to 12 years with mild to moderate asthma

311 “Pulmicort” (Budesonide) 100 ug 2 puffs inh BID (400 ug/day)
312 “Tilade” (Nedocromil) 2 mg 4 puffs inh BID (16 mg/day)

418 placebo: 208 Pulmicort-like placebo and 210 Tilade-like placebo

Asthma and Allergic Disease

- Studies about allergic disease prevention
  3. Antihistamines:

Zyrtec used prophylactically diminished the incidence of asthma in children with positive skin tests to dust and pollen. By 18 months after stopping Zyrtec, only children with pollen allergy continued to showed less incidence of asthma

CAMP Study

This study demonstrated the lack of improvement on FEV1 post-bronchodilator in the treatment groups, but it showed an improvement in symptoms

It is quite possible that the study group age was too old and permanent lung changes took place already
Asthma and Allergic Disease

• Studies about allergic disease prevention

5. Immunotherapy:

Immunotherapy against specific allergens reduces the incidence of asthma in children that have allergic rhinitis, modifying the “allergic march”

We need to consider the risks and benefits of immunotherapy before placing anybody on it

6. Lactobacillus:

Lactobacillus oral supplementation during the first 6 months of life has shown to decrease the incidence of AD at 2 years of age

Lactobacillus have not shown to decrease any other allergic disease (i.e. asthma, allergic rhinitis)

2007 NHLBI Guidelines for the Diagnosis & Management of Asthma

Expert Panel Report-3

Mamta Reddy, MD
Chief, Allergy/Immunology
Director, South Bronx Asthma Partnership

www.nhlbi.nih.gov/guidelines/asthma

The National Asthma Education and Prevention Program (NAEPP)

• Established in 1989 by the National Heart, Lung, and Blood Institute (NHLBI), a component of the U.S. National Institutes of Health (NIH)

**Guidelines for the Diagnosis & Management of Asthma**

NAEPP/NHLBI

**Case Scenarios**

[www.nhlbi.nih.gov/guidelines/asthma](http://www.nhlbi.nih.gov/guidelines/asthma)

---

**Case # 1**

A 3-year old male currently not on any asthma medications has visited your outpatient clinic 3 times in the past 6 months for acute wheezing, each episode lasting 2-3 days. In between episodes, his mother reports nighttime cough about 4 nights per month. This patient’s asthma severity can be **BEST classified as:**

A. Mild Persistent Asthma (Step 2)
B. Moderate Persistent Asthma (Step 3)
C. Severe Persistent Asthma (Step 3)
D. I would not diagnose this child with asthma

---

**Case # 2**

A 7-year old male presents to your clinic in November complaining of daily nocturnal cough for 2 months. He denies symptoms of GER Reflux. He has visited the emergency room twice in the past year where he received albuterol with good symptomatic relief. The **BEST** choice of treatment would be to:

A. Start fluticasone 44 mcg 2 puffs twice daily for 4-6 weeks and then reassess
B. Start fluticasone 110 mcg 2 puffs twice daily for 4-6 weeks and then reassess
C. Start a leukotriene modifier as you suspect his symptoms are likely due to post-nasal drainage from allergic rhinitis
D. I cannot feel confident at this time that this patient should be treated with asthma medications
Quick-Relief Medication for All Patients

Treatments at 20-minute intervals as needed. Treatment depends on severity of symptoms: up to 3 puffs daily.

### Classification of Asthma Severity

<table>
<thead>
<tr>
<th>Severity</th>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3 or 4</th>
<th>Step 5 or 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Moderate</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Severe</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

---

### Case #2

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A. Start fluticasone 44 mcg 2 puffs twice daily for 4-6 weeks and then reassess
B. Start fluticasone 110 mcg 2 puffs twice daily for 4-6 weeks and then reassess
C. Start a leukotriene modifier if you suspect his symptoms are likely due to post-nasal drainage from allergic rhinitis
D. I cannot feel confident at this time that this patient should be treated with asthma medications

### Case #3

A 13-year-old girl presents to your office in May and is currently taking fluticasone 110 mcg 2 puffs twice daily and montelukast 5 mg 1 tablet at bedtime daily. She denies any report of daytime or nighttime asthma symptoms for the past 4 months. Her asthma severity classification is:

A. Intermittent Asthma (Step 1)
B. Mild Persistent Asthma (Step 2)
C. Moderate Persistent Asthma (Step 3 or 4)
D. All medications should be immediately discontinued

### Classifying Severity for Patients Currently Taking Controller Medications

<table>
<thead>
<tr>
<th>Classification of Asthma Severity</th>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3 or 4</th>
<th>Step 5 or 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermittent</td>
<td>Mid</td>
<td>Mid</td>
<td>Mid</td>
<td>Mid</td>
</tr>
<tr>
<td>Persistent</td>
<td>Moderate</td>
<td>Severe</td>
<td>Severe</td>
<td>Severe</td>
</tr>
</tbody>
</table>

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### Notes

- NAEPP Draft Report, EPR 2007
- Inhaled Medications
  - Bronchodilators
  - Steroids
  - Immunomodulators
  - Cystic Fibrosis Medications
  - Side Effects
  - Adherence
  - Monitoring
Case # 3
A 13-year old girl presents to your office in May and is currently taking fluticasone 110 mcg 2 puffs twice daily and montelukast 5 mg 1 tablet at bedtime daily. She denies any report of daytime or nighttime asthma symptoms for the past 4 months. Her asthma severity classification is:

A. Intermittent Asthma (Step 1)
B. Mild Persistent Asthma (Step 2)
C. Moderate Persistent Asthma (Step 3 or 4)
D. All medications should be immediately discontinued

Recommended Action for Treatment
Based on Assessment of Control

<table>
<thead>
<tr>
<th>Well Controlled</th>
<th>Not Well Controlled</th>
<th>Very Poorly Controlled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintain current step of control and medications.</td>
<td>Step up 1-2 steps and revolve in 2-4 weeks.</td>
<td>Consider step down at least 3 months.</td>
</tr>
<tr>
<td>Consider step down if well controlled for at least 3 months.</td>
<td>Step up 1/2 steps and reevaluate in 2-4 weeks.</td>
<td>For side effects, consider alternative treatment options.</td>
</tr>
<tr>
<td>Before stepping up check adherence and environmental control.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Case # 4
A 7-year old female with asthma reports nighttime awakenings about 2 times per week and requires albuterol about 3 times per week. She is currently taking fluticasone 44 mcg 2 puffs twice daily. The BEST next step in your step-up treatment plan would be to:

A. Increase the dose of the inhaled steroid
B. Add a leukotriene modifier
C. Add a long-acting β-agonist
D. Encourage albuterol more frequently, every 4 hours

ASSESSING ASTHMA CONTROL AND ADJUSTING THERAPY IN
YOUTHS ≥ 12 YEARS OF AGE AND ADULTS

STEPWISE APPROACH FOR MANAGING ASTHMA IN YOUTHS ≥ 12 YEARS AND ADULTS

ASSESSING ASTHMA CONTROL AND ADJUSTING THERAPY IN
CHILDREN 5 - 11 YEARS OF AGE
### Case #4

A 7-year old female with asthma reports nighttime awakenings about 2 times per week and requires albuterol about 3 times per week. She is currently taking fluticasone 44 mcg 2 puffs twice daily. The BEST next step in your step-up treatment plan would be to:

- A. Increase the dose of the inhaled steroid
- B. Add a leukotriene modifier
- C. Add a long-acting β-agonist
- D. Encourage albuterol more frequently, every 4 hours

### Case #5

A 5-year old male with asthma reports nocturnal cough 3 nights per week during October through February, but only 3 nights per month during March through September. This patient’s asthma severity can be classified and treated as follows:

- A. Moderate Persistent during winter only, Mild Persistent remainder of the year
- B. Moderate Persistent year-round in order to prevent winter exacerbations
- C. Mild Persistent year-round in order to prevent long-term decrease in lung function
- D. This patient does not have asthma but is at high risk for frequent upper respiratory tract infections with the change of seasons

### Summary of the

New Strategies of the EPR-3

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severity</td>
<td>the intrinsic intensity of the disease</td>
</tr>
<tr>
<td>Control</td>
<td>the degree to which symptoms are minimized</td>
</tr>
<tr>
<td>Responsiveness</td>
<td>the ease of which prescribed therapy achieves asthma control</td>
</tr>
</tbody>
</table>
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D. This patient does not have asthma but is at high-risk for frequent upper respiratory tract infections with the change of seasons

A spacer device can be equally as effective as, and perhaps more effective than, a nebulizer machine in the delivery of inhaled medication.

(circle one) TRUE or FALSE

Case # 6

Referral to an asthma specialist for consultation and co-management should be sought when a patient:

A. Is hospitalized twice in the past year or once in the past month
B. Requires more than two bursts of oral corticosteroids in one year
C. Requires “Step 3” care or higher or is not responding to a treatment plan that is appropriate for patient with “Moderate Persistent Asthma”
D. All of the above

**Case # 5**

A 5-year old male with asthma reports nocturnal cough 3 nights per week during October through February, but only 3 nights per month during March through September. This patient’s asthma severity can be classified and treated as follows:

A. Moderate Persistent during winter only, Mild Persistent remainder of the year
B. Moderate Persistent year-round in order to prevent winter exacerbations
C. Mild Persistent year-round in order to prevent long-term decrease in lung function
D. This patient does not have asthma but is at high-risk for frequent upper respiratory tract infections with the change of seasons

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Case # 6

A spacer device can be equally as effective as, and perhaps more effective than, a nebulizer machine in the delivery of inhaled medication.

(circle one) TRUE or FALSE

Case # 7

Referral to an asthma specialist for consultation and co-management should be sought when a patient:

A. Is hospitalized twice in the past year or once in the past month
B. Requires more than two bursts of oral corticosteroids in one year
C. Requires “Step 3” care or higher or is not responding to a treatment plan that is appropriate for patient with “Moderate Persistent Asthma”
D. All of the above

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A spacer device can be equally as effective as, and perhaps more effective than, a nebulizer machine in the delivery of inhaled medication.

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Referral to an asthma specialist for consultation and co-management should be sought when a patient:

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D. All of the above
Allergic Rhinitis Prevalence

KEY DIFFERENCES FROM 1997 EXPERT PANEL REPORT

- Evidence strengthens recommendations that reducing exposure to indoor allergens can improve asthma control and notes that a modified approach is required, which may reduce exposure and generally be more effective.
- Formaldehyde and volatile organic compounds (VOCs) have been implicated as potential sources for asthma and wheezing.
- Evidence shows that influenza vaccines, while having other benefits, do not appear to reduce either the frequency or severity of asthma exacerbations during the influenza season.
- The section has been expanded to include discussion of ABPA, OSA, and stress as chronic comorbid conditions, in addition to rhinitis, sinusitis, and gastroesophageal reflux, that may interfere with asthma management.

DDx-Children

(2007 NIH guidelines p45)

- Infants and Children
  - Upper airway diseases
    - Allergic rhinitis and sinusitis
      - Obstructions involving large airways
        - Foreign body in trachea or bronchus
        - Vocal cord dysfunction
      - Vascular rings or ligamentous webs
    - Laryngotracheomalacia, tracheal stenosis, or bronchoesplasia
    - Obstructions involving small airways
      - Vocal bronchomegaly or cranial bronchitis
      - Cystic fibrosis
      - Bronchopulmonary dysplasia
    - Other causes
      - Recurrent cough not due to asthma
      - Aspiration from swallowing mechanism dysfunction or gastroesophageal reflux