Pharmacologic Management of All Things Wheezy and Icy

Asthma Mimickers: Evaluating and Treating Wheezing and Coughing in Infants and Children

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HOW PARENTS DESCRIBE COUGH

Wet, dry, hacking, baryky, seal-like, brassylke, like a smoker, choking, irritated, deep, productive, non-productive, lodge, tight, paroxysmal, honking, staccato...

“Neither the character nor the timing of the cough are good predictors of the cause.”

ETIOLOGY OF COUGH

"COUGH CAN BE CAUSED BY ONE OR ALL OF THE FOLLOWING MECHANISMS:
1. AIRWAY INFLAMMATION AND PRODUCTION OF EXCESSIVE MUCUS
2. SPASM OF BRONCHIAL SMOOTH MUSCLE
3. DIRECT STIMULATION OF COUGH RECEPTORS."

CONSIDER/ASSESS THE ENTIRE AIRWAY

PATHOPHYSIOLOGY

Nose Blowing

Contaminated fluid inflammation

Vascular permeability

Impaired mucociliary clearance

Sinus obstruction

Thickened secretions

COUGH & WHEEZE VS STRIDOR/INFANTS & CHILDREN
DIFFERENTIAL DIAGNOSIS

• RECURRENT VIRAL RESPIRATORY TRACT INFECTIONS: "DAYCARE-ITS"; LASTS UP TO TEN DAYS, NO SYMPTOMS BETWEEN INFECTIONS, ALSO THINK COULD BE PERNUIS OR TUBERCULOSIS

• CROUP

• CONGENITAL ANOMALIES: NOISE BREATHING, [CARDIAC-MURMUR, CYANOSIS, FIT, TACHYPIE, TACHYCARDIA], POOR RESPONSE TO ASTHMA MEDICATIONS

• REFLUX: COUGH WITH FEEDING, VOMITS EASILY AFTER FEEDING, POOR RESPONSE TO ASTHMA MEDICATIONS

• INFECTION/IMMUNODEFICIENCY: RECURRENT INFECTIONS, BUT NOT JUST RESPIRATORY, FEVER, PIT
• **Foreign body Aspiration**: abrupt severe cough, stridor during play or eating, focal lung sounds (or absence)

**Location of Impacted Foreign Bodies**

<table>
<thead>
<tr>
<th>Location</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Larynx</td>
<td>1.0%</td>
</tr>
<tr>
<td>Trachea</td>
<td>5.9%</td>
</tr>
<tr>
<td>L Main Bronchi</td>
<td>30.2%</td>
</tr>
<tr>
<td>R Main Bronchi</td>
<td>30.4%</td>
</tr>
<tr>
<td>L Lob Bronchi</td>
<td>5.0%</td>
</tr>
<tr>
<td>R Lob Bronch</td>
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**COUGH & WHEEZE VS STRIDOR/INFANTS & CHILDREN DIFFERENTIAL DIAGNOSIS**

- Environmental/ETS
- Cystic Fibrosis: recurrent chest infections, FTT, malabsorption, cough soon after birth, non-productive cough
- Primary Ciliary Dyskinesia: cough, recurrent infections including ear, chest, sinuses, purulent nasal secretions, situs inversus, poor response to asthma medications
- Paradoxical Vocal Cord Motion/Vocal Cord Dysfunction: usually brought on by exercise

**COUGH & WHEEZE IN INFANTS & CHILDREN**

**RAO or Reactive Airways Disease (RAVD)**

Viral-induced or post-viral airway hyper-reactivity (think post bronchiolitis, RSV, rhinovirus, parainfluenza, metapneumovirus)

Don’t forget pertussis—the cough of 100 days

*The earlier the onset of symptoms consider a congenital/anatomic abnormality such as a vascular ring, tracheoesophageal fistula, trachea/bronchomalacia, gastroesophageal reflux/aspiration syndrome, swallowing dysfunction, history of prematurity/bronchopulmonary dysplasia, history of intubation, cardiovascular disease*
COUGH & WHEEZE/CHILDREN
In order to determine the etiology of the cough, we should determine whether the cough/wheeze is associated with other signs/symptoms or not, such as:
• Careful auscultation of wheeze: location, focal or generalized, inspiratory or expiratory, homophonic or heterophonic
• Other respiratory symptoms
• Feeding difficulties
• Failure to thrive
• Fever
• Abnormal secretions
• Nasal symptoms
• Developmental delay
• Clubbing

CHRONIC COUGH/SCHOOL AGE THROUGH ADOLESCENCE
• Asthma
• Allergies
• Sinus disease
• Reflux
• Congenital anomalies
• Infection/immunodeficiency
• Psychogenic/Habit Cough
• Environmental/ETS
• Cystic Fibrosis
• Bronchiectasis
• Primary Ciliary Dyskinesia

CHRONIC COUGH DIFFERENTIAL DIAGNOSIS
When does a cough become chronic?
A chronic cough is one lasting ~4-8 weeks or more
Opinion about duration of coughing varies
GINA 2018 DIAGNOSTIC FEATURES OF ASTHMA

**History of variable symptoms:** Presentation is different in infants, toddlers & children:

“Descriptors may vary between cultures and age e.g. children may be described as having heavy breathing”

**Features suggesting a diagnosis of asthma in young children:**

- **Cough:** recurrent, persistent, worse at night, occurring with activity, laughing, crying, ETS, in the absence of a respiratory infection
- **Wheeze:** recurrent including during sleep or triggered by activity, laughing, crying, ETS or air pollution
- **Dyspnea:** heavy or difficult breathing with activity, laughing, crying
- **Reduced activity tolerance/endurance compared to peers:** wants to be carried
- **A history of other allergic disease (eczema or allergic rhinitis) or asthma in first-degree relative
- **Clinical improvement after two to three months of controller treatment and worsening after it is discontinued.**

ASTHMA IN CHILDREN

Gene/environment interactions are important to the expression of asthma.
INDOOR POLLUTION

ARE ALL OF THESE MEDICATIONS APPROVED, APPROPRIATE AND COVERED BY INSURANCE FOR USE IN CHILDREN?
ICS AS PER EPR-3:
WHAT ABOUT THE INITIATION AND USE OF ICS IN INFANTS AND YOUNG CHILDREN UNDER FOUR YEARS OF AGE?
WE HAVE TO DO A VOYAGER CAREFUL HISTORY OF THE PATIENT'S PRESENTATION OF SYMPTOMS.

- The initiation of long-term control therapy is recommended for reducing the frequency and severity of exacerbations in infants and young children who had four or more episodes of wheezing in the last year and more than two episodes a year and who have ever had one of the following: a familial history of asthma, a physician's diagnosis of food allergy, or evidence of immunization to allergens.
- Follow-up for four weeks: evidence of improvement in 24-hour peak expiratory flow, reduction in use of rescue medication, and improvement in the child's quality of life, but their use should not be initiated or prolonged for the purpose of changing the progression of underlying severity of the disease.

CAUTION:
- Follow growth: ICS and systemic corticosteroids; use monitor for adrenal insufficiency.
- AAP/PCP: Tandem: high dose ICS.

ICS AS PER EPR-3:
- Corticosteroids: block late-phase reaction to allergens, reduce airway hyperresponsiveness, and inhibit inflammatory cell migration and activation. They are the agent of choice and effective anti-inflammatory medication currently available (Evidence A). ICS are used in the long-term control of asthma.
- ICS are the most effective long-term therapy available for mild, moderate, or severe persistent asthma. In general, ICS are well tolerated and safe at the recommended dosages (Evidence A).
- The potential but small risk of adverse events from the use of ICS treatment is well balanced by their efficacy (Evidence A).

ALVESCO/CICLESONIDE 80/160MCG
AS PER REFERENCE: "ADDITIONAL PEDIATRIC CONSIDERATIONS RELATIVE TO OTHER INHALED CORITICOSTEROIDS: CICLESONIDE MAY EXHIBIT LESS EFFECT ON INSUFFICIENCY DUE TO ITS BEING A PRODRUG WHICH IS ACTIVATED IN THE LUNGS. IN FOUR PEDIATRIC PATIENTS, RESOLUTION OF HPA SUPPRESSION WAS REPORTED AFTER SWITCHING FROM FLUTICASONE TO CICLESONIDE THERAPY (HELLER 2010)."

**ASTHMA MEDICATIONS: LONG-TERM CONTROL FOR MODERATE/SEVERE ASTHMA**

**LABA: LONG-ACTING BET2-AGONIST**
- FORMOTEROL
- SALMETEROL

* MUST BE USED IN COMBINATION WITH AN ICS
* MUST NOT BE USED IN PLACE OF QUICK RELIEF MEDICATION: ALBUTEROL

ADVAR (MDI and DPI; ISSUES/generic: Wixela InhaLe and Duo RespClick
(Also generics)

**NOTE IF YOU WANT TO PRESCRIBE FLUTICASONE/SALMETEROL THERE ARE FIVE CHOICES EACH IN THREE DIFFERENT STRENGTHS**
- DULERA (MDI, TWO STRENGTHS)
- SYMBICORT (MDI, TWO STRENGTHS)
- "NEW" SPIRA (Respimat 1.25 mcg tiotropium generic)

**LAMA: LONG-ACTING MUSCARINIC ANTAGONIST**
- INHALATIONS ADMINISTERED ONCE A DAY

**COUGH & WHEEZE/TREATMENT**

TREATMENT VARIES AND IS AIMED AT THE UNDERLYING CONDITION:
- OTC COUGH/COLD MEDICATIONS NOT RECOMMENDED FOR CHILDREN
- HERBAL/HOMOPATHIC TREATMENT-MAY OR MAY NOT BE OK
- ASTHMA THERAPY ISSUES: ADHERENCE TO CONTROL TREATMENT, PROPER ADMINISTRATION, ENVIRONMENTAL CONTROL
- ALLERGY THERAPY ISSUES: ADHERENCE, PROPER USAGE, ENVIRONMENTAL CONTROL
- REFLUX: ADHERENCE, PROPER USAGE
- ANY BARRIERS TO ACCESS PRESCRIBED MEDS/LIMITED PRESCRIPTION PLAN FORMULARIES/Covered Medication/Device NOT APPROPRIATE FOR USE BY CHILDREN
- AIRWAY CLEARANCE

**WHEN MEDICATION SWITCHING THREATENS CARE OF CHILDREN WITH ASTHMA—CHOP FOCUSLAB BRIEF 2018**

* "FORMULARY CHANGES OFTEN DO NOT ACCOUNT FOR THE MEDICATIONS CHILDREN NEED TO MAINTAIN HIGH ADHERENCE TO THEIR MEDICATIONS, WHICH CAN MAKE IT DIFFICULT FOR CHILDREN TO TAKE THEIR MEDICATIONS EVEN SEEMINGLY SMALL CHANGES TO MEDICATIONS SUCH AS THE COLOR, SHAPE OR SIZE COULD CONFUSE CAREGIVERS, DISRUPT A CHILD’S ROUTINE, LEAD TO MIXING UP MEDICATIONS AND RESULT IN POOR MEDICATION ADHERENCE.”

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EVERYTHING IS A FIGHT TO GET MEDICATIONS: HOW THE QUEST FOR LOWER DRUG PRICES IS HURTING CHILDREN WITH ASTHMA

(CNN 02/15/19)

MY PATIENT LOVES BASKETBALL AND PLAYS EVERYDAY. OVER THE PAST TWO YEARS HIS MOTHER HAS SEEN HIM ON THE SIDELINES WHEEZING AND GASping FOR AIR. DURING THESE TWO YEARS, HE HAS HAD TO CHANGE HIS ASTHMA MEDICATION THREE TIMES AS DICTATED BY HIS MEDICAID INSURANCE. (THREE DIFFERENT BRANDS OF COMBINATION INHALER: MDI AND DPI)

Mom says her son was doing well on his combination MDI two years ago.

Mom said, "We've been dealing with changing his medications over and over again for insurance purposes. Why does everybody think that they can just change my son's medicine so haphazardly? They don't know how it affects him. They don't know what type of asthma he has, what his issues are. They don't know his triggers and they don't know how many times I've had to change his medicine."

RESOURCES

THE GLOBAL INITIATIVE FOR ASTHMA (GINA) STRIVES TO INCREASE AWARENESS OF ASTHMA AMONG HEALTH PROFESSIONALS, HEALTH AUTHORITIES, AND THE GENERAL PUBLIC. OUR GOALS INCLUDE IMPROVING DIAGNOSIS, MANAGEMENT AND PREVENTION OF ASTHMA, BY STIMULATING RESEARCH, AND PROVIDING EVIDENCE-BASED EDUCATIONAL RESOURCES FOR WORLDWIDE USE.

• HTTPS://WWW.CNN.COM/2019/02/15/HEALTH/ASTHMA-MEDICATION-SWITCHING/INDEX.HTML
  Everything is a fight to get medications: How the quest for lower drug prices is hurting children with asthma

• HTTPS://POLICYLAB.CHOP.EDU/POLICY-BRIEFS/MEDICATION-SWITCHING-THREATENS-CARE-CHILDREN-ASTHMA
  When Medication Switching Threatens Care of Children With Asthma

JACKSON, D. J. ET AL. "QUANTIFYING INHALED GLUCOCORTICOIDS TO PREVENT CHILDHOOD ASTHMA EXACERBATIONS." N ENG J MED 2018; 378: 891-901.