Chronic Cough in a 15 minute Office Visit

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As a result of attending this session
- Be knowledgeable about different causes of chronic cough in children
- Formulate a plan to determine the cause of the cough
- Institute a treatment plan that will help lead to cough resolution

What is cough?
- Cough (Latin: tussis)
- Coughing can be either voluntary or a reflex
- Defensive reflex that enhances
  - mucociliary function
  - clears excessive secretions
  - protects from aspiration of foreign materials
- Children who do not cough effectively are at risk for atelectasis, recurrent pneumonia, aspiration and retention of secretions

Cough

- According to CDC, cough is the most common symptom for medical office visits\(^1\)
- In children is usually related to viral respiratory infections\(^2\)
- 35-45% of school aged children still cough 10 days after the onset of a cold\(^3\)
- 10% of preschool children have cough 25 days after the URI\(^2\)
- Healthy school aged children may cough as often as 11x per day \(^3\)

Phases of a Cough

- Inspiration: Deep inspiration to lengthen the expiratory muscles
- Compression: Glottis closes and the vocal cords contract to shut the larynx
  Diaphragm and external intercostal muscles contract, creating a negative pressure around the lung
- Expiration: Glottis opens releasing air at over 100 mph and audible coughs

Evaluation of Child with Cough

- Detailed history
- Physical exam
- Chest x-ray (if chronic cough)
- Spirometry if able

Classifying a Cough

- Cough is classified based on its duration, quality, or timing
- These helpful indicators guide to differential diagnosis to determine etiology
- Etiology:
  - specific (attributable to an underlying problem)
  - non-specific (absence of identifiable problem)
Five Important Questions in the History

Duration:
1) How long has the child coughed?
   - acute (< 2 weeks), subacute (2-4 weeks), chronic (> 4 weeks)
   - Most acute and subacute coughs are associated with URIs

Quality:
2) Is the cough wet (productive) or dry?
3) What is the character/nature of the cough?
   - barking, brassy, staccato, spasmodic, whooping, honking

Timing:
5) What time of day/night is the cough worst?
   - Night more common with asthma and pertussis
   - Cough gone at night with habit cough

Cough etiology: specific (attributable to an underlying problem) or non-specific (absence of identifiable problem)

Physical Exam
- General appearance of chronic disease
- Vital signs and possibly O2 sats
- Growth parameters, FTT, obesity
- Work of breathing
- If able ask patient to cough if not already
- Good ENT exam
- Auscultate lungs
- Auscultate heart
- Examine for edema, cyanosis, clubbing
Evaluation of Child with Cough

- Detailed history
- Physical exam
- Chest x-ray (if determined chronic unexplained cough)
- Spirometry if able

Chest X-ray

- Normal
  - Typical in habit cough
  - But also in foreign body, asthma, early CF, bronchiectasis
- Bilateral peribronchial accentuation (cuffing)
  Finding suggests diffuse airway inflammation or infection
  - Asthma
  - CF
  - Protracted bacterial bronchitis
  - Chronic aspiration
  - PCD
  - If infiltrates most common RML
- Asymmetry in aeration or vascular markings
  - Partial airway obstruction
  - FB, vascular compression, bronchial stenosis

Chest X-ray

- Right middle lobe infiltrate
  - Frequently seen in obstructive airway disease
- Hilar adenopathy
  - Mycobacteria, fungal infection, sarcoidosis, or tumor
- Mediastinal widening
  - Infant—thymus?
  - Children—chronic infection, marked lymphadenopathy, or neoplasm
- Peribronchial accentuation with linear atelectasis, dilated and thickened airways
  - Bronchiectasis—abnormal dilatation of bronchial tree
  - Dilatation of bronchi and bronchioles due to elastic tissue and smooth muscle destruction
  - See tram-tracking, parallel lines, ring shadows
Spirometry (PFTs)

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Other Tests

- Bronchoscopy
  - Useful if suspicion for foreign body is high
- Mantoux Testing (Tuberculin Skin Test)
  - To screen for tuberculosis infection
- Esophageal pH monitoring
- Sinus imaging
- Allergy Testing
- Chest CT

Nonspecific Cough Algorithm:

1. Signs and symptoms of respiratory disease?
   - No
2. CXR and/or Spirometry abnormal?
   - No
3. Is cough characteristic of anything?
   - No

   - Dry: Treat like asthma
   - Wet: Antibiotics 2-3 weeks

   Watch, wait, and review
   - Review in 1-2 weeks
   - Trial of therapy

Specific Cough Algorithm:

1. Signs and symptoms of respiratory disease?
   - Yes
   - Evaluate for Specific cough

2. CXR and/or Spirometry abnormal?
   - No
   - Reversibility?
     - Yes
     - Confirm with 4 week trial of asthma medication
     - No

3. Is cough characteristic of anything?
   - Yes
   - Evaluate for Specific cough

Specific causes of chronic cough in children

Specific Cough Differential Diagnosis

- Asthma
- Allergic Rhinitis or PND
- GERD
- Infection
- Pertussis or Para pertussis
- Persistent endobronchial infection
- Foreign Body
- Cystic Fibrosis
- Primary Ciliary dyskinesia
- Immunodeficiency
- Recurrent aspiration
- Anatomical airway abnormalities (TEF, laryngeal cleft, tracheobronchomalacia)
- Tic (Habit) cough
- Psychogenic cough
- Chronic infections
- Bronchiectasis
- Cavitary lung disease
- Congenital heart disease
- Hemosiderosis
- Vascular lesions
- Physical/chemical irritation

Examples of Specific Causes of Cough

- Symptoms
  - Wheezing
  - Dry Cough (Exercise and 24 hour)
  - Atopy
- Diagnosis
  - Asthma
- Confirmation
  - PFTs (pre and post)
  - Allergy tests
  - Trial of asthma medicines
Chronic Cough

- Symptoms
  - Clearing throat
  - Allergic salute
  - Worse when lying down
- Diagnosis
  - Upper airway cough syndrome (UACS)
  - The artist formally known as “post nasal drip”
- Confirmation
  - Allergy tests
  - Trial of allergy medications (antihistamines, nasal steroids, LTRA, decongestants; 2-4 weeks)

PBB (Protracted Bacterial Bronchitis)

- Symptoms
  - Wet productive cough
  - More common in <6 years old
  - Sounds like a 2 pack a day smoker first thing in the morning
  - Worse when changing posture
  - Wheeze vs rattle
- Confirmation
  - PBB
  - Treatment for 2 weeks with amoxicillin/clavulanate is life changing
  - (70% relapse)
  - Definitive diagnosis is BAL

PBB (Protracted Bacterial Bronchitis)

- Child usually <6 years old with a persistent 'wet' cough
- Relatively new diagnosis in our less antibiotic world
- Persistent endobronchial infection
- Most common organisms:
  - non-typable Haemophilus influenzae (NTHi),
  - Streptococcus pneumoniae
  - less commonly Moraxella catarrhalis.
- More than one organism often found in BAL samples, along with rhinovirus, adenovirus, RSV and parainfluenza too
- PBB appears to be a Biofilm Disease

“Biofilm: An aggregate of microbes with a distinct architecture. A biofilm is like a tiny city in which microbial cells, each only a micrometer or two long, form towers that can be hundreds of micrometers high. The “streets” between the towers are really fluid-filled channels that bring in nutrients, oxygen and other necessities for live biofilm communities.

Bacteria growing in a biofilm are highly resistant to antibiotics, up to 1,000 times more resistant than the same bacteria not growing in a biofilm...”
Chronic Cough

- **Symptoms**
  - Wet productive cough
  - Recurrent pneumonias
  - Recurrent sinusitis/otitis

- **Diagnosis**
  - CF, PCD, immunodeficiency, bronchiectasis

- **Confirmation**
  - Sweat chlorides
  - Ciliary function tests
  - Immune studies
  - HRCT/bronchoscopy

Chronic Cough

- **Symptoms**
  - Paroxysmal cough
  - Cough to the point of vomiting
  - Inspiratory stridor or whoop

- **Diagnosis**
  - Pertussis or Para pertussis

- **Confirmation**
  - Pre antibiotics - culture/PCR
  - 100 days of cough with failure of all medications

Chronic Cough

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Chronic Cough

- **Symptoms**
  - Choking with feeds
  - Cough
  - Recurrent aspiration

- **Diagnosis**
  - Swallowing disorder or TEF

- **Confirmation**
  - Modified barium swallow
  - Barium esophagram
  - Video fluoroscopy

Chronic Cough

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  - Paroxysmal cough
  - Cough to the point of vomiting
  - Inspiratory stridor or whoop

- **Diagnosis**
  - Pertussis or Para pertussis

- **Confirmation**
  - Pre antibiotics - culture/PCR
  - 100 days of cough with failure of all medications
**Chronic Cough**

- **Symptoms**
  - Honking cough
  - Disappears when distracted or asleep
- **Diagnosis**
  - Habit or psychogenic cough
- **Confirmation**
  - Observe patterns
  - Exclude other causes
  - Improves with suggestion therapy

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**Chronic Cough**

- **Symptoms**
  - Dry cough
  - Breathlessness developing over months
- **Diagnosis**
  - Interstitial lung disease
  - Interstitial pneumonia
  - Idiopathic pulmonary fibrosis
  - Hypersensitivity pneumonitis
  - Sarcoidosis
- **Confirmation**
  - Spirometry
  - HRCT
  - Autoimmune markers
  - Lung biopsy

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**Chronic Cough**

- **Symptoms**
  - Progressive cough
  - Weight loss
  - Fevers
  - Fatigue
- **Diagnosis**
  - Chronic infection (TB, fungal, parasites)
- **Confirmation**
  - TB skin test
  - Chest X-ray
  - Bronchoscopy

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**Chronic Cough**

- **Symptoms**
  - Hemoptysis
- **Diagnosis**
  - Bronchiectasis, Congestive heart failure, Hemosiderosis, TB, vascular lesions
- **Confirmation**
  - Chest x-ray
  - HRCT chest
  - CBC with diff
What are the top causes of cough in pediatrics?

- Infection: 18%
- Airway Hyperreactivity: 34%
- GER: 24%
- Other: 24%


What are the top causes of cough in pediatrics?

- Asthma: 25%
- Protracted bronchitis: 27%
- Upper airway cough syndrome: 5%
- GE Reflux: 20%
- Other: 23%


Putting it all together

1) How long has the child coughed?
2) Is the cough wet or dry?
3) What is the character /nature of the cough?
4) What makes it better/what makes it worse?
5) What time of day/night is the cough worst?

Chronic Cough Overview

- Watch and wait 1-2 weeks
- Normal chest x-ray and spirometry
- If no better consider
  - More watching
  - Looking at triggers
  - Dry cough-asthma treatment
  - Wet cough-antibiotics
- Abnormal studies pursue specific causes
- If therapy started-important to evaluate if there is a response to treatment or not
- Exacerbating factors addressed also
Management of Chronic Cough

- Reassurance and periodic reevaluation
- GERD and sinusitis are uncommon isolated causes of chronic cough in children when no supporting symptoms are present — no evidence to support empiric treatment
- Improvement in cough with allergic rhinitis has been seen with cetirizine, mometasone, and nasal spray. It may take 2-4 weeks.
- Don’t use antibiotics for a viral infection

AAP Position on Use of Codeine- and Dextromethorphan-Containing Cough Remedies in Children

- Over-the-counter cold medications for children under age 2 were pulled from store shelves in 2008.
- No EBM found that supports the efficacy and safety (including codeine) or dextromethorphan as antitussives in children.
- Suppression of cough in many pulmonary airway diseases may be hazardous and contraindicated.
- Significant potential for serious adverse effects

Treatment

- A trial of bronchodilators is warranted in children with chronic cough if there are signs of other allergic disease
- Avoidance of tobacco smoke — evidence to support that exposure increases risk for chronic cough
- Buckwheat honey 20% more improvement than placebo
- Saline solution/humidifier
- Vapor rubs
- UpToDate has patient information: Cough in Children (The Basics) 2015
As a result of attending this session, I encourage you to incorporate these changes in your practice:

- In coughs that have been present for more than 4 weeks, consider it may be a protracted post viral syndrome that needs no treatment
- If need to treat, obtain good history, chest x-ray and spirometry
- Think about infection, asthma or other causes of the cough
- If your therapy isn’t working— regroup
- Don’t use OTC cough and cold remedies