“Evaluating a child with recurrent cough and night time symptoms”

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No disclosures
Objectives:

At the end of this session, the participant would be able to:

• Discuss the mechanics of coughing
• List differential diagnoses of recurrent cough and nighttime symptoms apart from childhood asthma
• Discuss effective and efficient management options in a good stepwise approach based on gathered clinical evidence
Cough is protective

first identify and treat the underlying reason
before suppressing cough
Cough receptors

• important airway protective reflexes
• Cough receptors - respond to temperature, chemicals and mechanical stresses
  • in the pharynx, larynx, trachea and bronchi
• normal child will cough on average 11 times per day when they are well

Mechanics of cough

• Cough receptors
• medulla oblongata
• sequence of events:
  deep inspiration → closure of glottis → forceful contraction of the respiratory muscles → glottis opens → forceful expulsion of air, mucus and potentially foreign body
What could go wrong?

• during initial deep inspiration - could inhale food material in the pharynx or larynx → more choking or coughing

• cough reflex affected with altered consciousness
Natural history of acute cough

• Due to upper respiratory tract infection (URTI)
  - 1 in 10 normal children are still coughing 3 weeks later (post-infectious cough)

• Cough receptor hypersensitivity (CRH) - recurrent prolonged acute coughing following viral URTI
  - may last weeks to months

Cough reflex hypersensitivity

![Diagram showing the timeline of cough reflex hypersensitivity following a viral URTI.](Diagram.png)

Warrants investigation

- Sudden/acute onset of cough with a choking episode (or suspected inhaled foreign body)
- Relentless progressive cough
- Possible underlying diagnosis because of associated weight loss, night sweats (e.g. TB)
- Hemoptysis
- Signs of chronic lung disease (poor growth, finger clubbing, chest wall abnormality and abnormal lung sounds)
- Coughing with history of recurrent pneumonia
- Cough starting in neonatal period
- Swallowing difficulties
- With craniofacial abnormality
- With neuromuscular disorder
- Dyspnea – chronic or exertional
- Wet cough lasting more than 3-4 weeks
History taking

1. How and when the cough started?
2. Is the cough an isolated symptom?
3. What triggers the cough?
4. Does the cough disappear when the child goes to sleep?
5. What is the nature and quality of the cough?
6. What treatments has the child been tried on and how beneficial were they?
History taking

7. What other medication is used? e.g. ACE inhibitors
8. Is there a family history of respiratory, allergic or infectious disease?
9. Does the child smoke? Do the parents smoke? Is there evidence of any environmental pollutant at home?
10. How disruptive is the cough?
11. Is there evidence of Obstructive Sleep Apnoea? How large are the tonsils?
Characteristic cough types

• Pertussis or whooping cough

• Tracheomalacia/Tracheoesophageal fistula

• Psychogenic cough
Characteristic cough types

• Pertussis

spasms or paroxysms of cough followed by gasping (whoop)
the characteristic whoop may not be heard in very young infants or older children and adolescents

• Tracheomalacia/Tracheoesophageal fistula

loud or brassy cough

• Psychogenic cough

dry repetitive ‘ticlike’; honking; not being disturbed by the cough; disappear when the child is engrossed in an activity or asleep
Wet versus dry cough

- Terminology: ‘a chesty cough’ or a ‘smoker’s cough’
- < 5 years of age usually rarely spit out phlegm (rather swallow it)
- Chronic productive or wet cough
  - suggests underlying cause for mucous hypersecretion
- Dry cough
  - suggests airway irritation, inflammation or a non-airways cause of the cough
Physical exam

• General inspection (growth; failure to thrive)
• Atopic status (eczema, allergic salute)
• Low muscle tone (feeding difficulties; neuromuscular conditions with respiratory sequelae)
• Craniofacial and palatal abnormalities associated with swallowing dysfunction
• Nose and throat exam - rhinitis or post-nasal drip; dental caries associated with acid reflux
Physical exam (continued)

- Wax in the external auditory meatus - can be associated with chronic cough
  - Via stimulation of the Arnold’s nerve reflex
- Digital clubbing
- Chest deformity
- Abnormal breath sounds or reduced or asymmetrical air entry
- Cardiovascular abnormalities may point to a particular diagnosis
- Enlarged lymph glands, liver or spleen (possible chest masses or TB)
Physical exam (continued)

- worth to observe the child’s cough
  - Older children - cough on request
  - Younger children - sound of the cough and the presence of palpable airway secretion by placing one hand on the anterior and the other hand on the posterior chest
Diagnostics

• Feeding evaluation (speech and swallow specialist) – for infants with cough and feeding difficulties

• Sputum analysis (cell count)/culture
  - high eosinophils (>3%) count - supportive evidence for asthma
  - bacteria with neutrophils - protracted bacterial bronchitis

• Chest radiograph if warranted; give indications for further investigations
  - may not be indicated if a mild specific disorder is definitively diagnosed (e.g. asthma / allergic rhinitis or if a pertussis-like illness is clearly resolving)
  - a normal chest radiograph does not always exclude significant pathology (e.g. bronchiectasis); further imaging may be needed
Diagnostics (continued)

• Spirometry and bronchodilator responsiveness
  - Children > 5 years of age
• Allergy testing – skin prick testing or IgE specific tests
  - When positive put the cough into a background of atopy and make
  • cough variant asthma a possible diagnosis
Chronic cough (>8 weeks)

- GERD – 27%
- UACS (upper airway cough syndrome) – 23%
- Asthma – 13%
- Infection – 5%
- Aspiration – 2%
- Multiple etiologies – 20%

_Chest_ 2009; 136: 811-815
It clearly is not ethically correct to subject all children to a full battery of potentially invasive tests for conditions that experience shows is likely low probability.
Post-infectious cough or pertussis

- Pertussis (1/3 of children > 5 years old)
  - median duration of cough: 4 months
- Mycoplasma
- Respiratory viral infection eg rhinovirus or RSV

- Cough resolves overtime
- Likely due to a slow recovery of airway mucosal epithelial cells (during this time with cough receptor hypersensitivity)
- Asthma therapy not beneficial

Cough variant asthma

- Some children with asthma have coughing as the predominant feature (and not wheezing)
- If high asthma predictive index, trial of asthma therapy (inhaled corticosteroids-ICS)
- Especially if presence of atopic diseases (eczema, allergic rhinitis)
- **Trial** (therefore, objective end points)
  - negative response suggests the coughing is unresponsive to ICS/asthma unlikely
  - positive response may indicate natural resolution of the cough or cough variant asthma
- if cough recurs then the medication can be restarted
  - a second positive response is suggestive of cough variant asthma
Allergic Rhinitis and/or post nasal drip (upper airways syndrome)

- May have throat clearing or snorting type cough
- Should respond to:
  - allergen exclusion where possible
  - Intranasal steroids with or without antihistamines
Psychogenic cough

• 2 types of psychogenic cough:
  • dry repetitive ‘tic-like’ cough after an episode of bronchitis (not very disruptive and often cough became a habit)
  • Bizarre honking cough (very disruptive to school and family life, bring some secondary gain for the child)
• cough reduces when the child is engrossed in some activity and when asleep
• biofeedback, distraction and suggestion psychotherapies
Other potential causes

• wax in the external ear canal has been associated with chronic coughing
• hypertrophied tonsillar tissue impinging on the epiglottis
Gastroesophageal reflux (GERD)

- more difficult to show GERD to be the cause of cough in children
- GERD work-up (conflicting results):
  - multichannel intraluminal impedance
  - pH monitoring
- empirical treatment helps GERD but may not help with respiratory symptoms
ACE inhibitors

• Dry cough which stops once the ACE inhibitor is stopped
• However, children with cardiac problems can also cough for other etiologies such as associated airway problems or pulmonary edema
• Kartagener’s syndrome or immunodeficiency
Children’s Interstitial Lung disease (chILD)

• usually presents with tachypnea but early evolving cases can be associated with a dry repetitive cough
Productive (wet) cough

- Persistent bacterial bronchitis
- Cystic Fibrosis
- Immune deficiencies
- Primary ciliary disorders
- Recurrent pulmonary aspiration
- Retained inhaled foreign body
Chronic brassy barking or seal-like cough

• suggests a tracheal or glottic cause (eg tracheo- and/or bronchomalacia)

• many children who have undergone tracheooesophageal fistula (TOF) surgery have tracheomalacia and develop a loud cough (“TOF – cough”)

- especially disruptive during an intercurrent infection
Relentlessly progressive cough

• progressively becoming more severe and violent needs investigated early

• Causes:
  • Pertussis
  • expanding intrathoracic tumor
  • retained inhaled foreign body
  • TB
Summary

• making the correct diagnosis and then managing the underlying condition

• treatment of the symptom of cough in isolation is unsatisfactory

• cough suppressants are no more than soothing preparations for the throat; cough suppressants such as opioids which are effective usually produce significant sedation if used in the dose required for cough suppression

(little evidence of benefit in chronic cough without a clear underlying diagnosis)

• remove the child from environmental tobacco smoke or other pollutant exposure.

• make a specific diagnosis and use specific treatments