The young child with recurrent cough and wheeze

Marco’s simplistic take on the matter....
Cough is the most common symptom in children

Marco Zampoli Allergy meeting July 2012
The main purpose of investigating a chronic/recurrent cough or wheeze is to exclude any treatable or serious underlying condition.
10 things you **must** exclude with significant chronic cough

1. Post infectious eg pertussis, viral
2. Chronic infection eg TB, persistent bronchitis
3. Allergy eg asthma, allergic rhinitis, sinusitis
4. Environmental exposures eg cigarette smoke, Household fuels
5. Aspiration syndromes eg GOR, laryngeal incompetence, TOF
6. Chronic lung diseases due to many causes eg bronchiectasis, CF, post infectious BO, Interstitial lung diseases
7. Foreign body
8. Cardiac failure
9. Habit cough (physcogenic cough)
10. Medication eg ACE inhibitors

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When is a chronic cough significant or not isolated?

- > 8 weeks present *most* days
- Getting progressively worse ie non-remitting
- Keeps child awake at night or disrupts family and daily activities
- Productive, purulent or haemoptysis
- NOT isolated
  - Onset with choking incident
  - Associated with noisy breathing
  - Associated with persistent hyperinflation
  - Associated with signs of underlying chronic illness eg FTT, CLD, clubbing
  - Associated with feeds
  - Abnormal Chest x-ray

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Figure 1  Illustration of how patterns of cough intensity vary over time. Reproduced with permission of the publishers from Marais et al.\textsuperscript{21}.
Things you need to ask about the cough

- When did it start?
- How did it start?
- What “air does the child” breath everyday?
- Attending crèche or not?
- TB exposure or not?
- Did or does it always start with a cold/fever?
- What kind of cough? Wet/dry/paroxysmal
- Productive or not?
- What is the pattern day-day and over time?
- Does it go away and then recur? (recurrent vs persistent)
- What are the triggers and what helps?
Specific pointers identified from history, examination, chest x-ray, spirometry (≥ 5 years)

Yes

(Wheezing episodes, other atopy)

Asthma

No

Isolated cough, otherwise well child

Is the cough truly troublesome?

Yes

(Clearing throat, allergic salute)

Post nasal drip/allergic rhinitis

No

(Wet/productive cough)

Persistent endobronchial infection
• CF
• PCD
• PBB
• ID

No response

Test for BDR or home PEFR monitoring

Reassure, observe, follow-up

No

Trial anti-asthma medication

Yes

(Choking with feeds, chesty after feeds)

Recurrent aspiration

(Brassy or barking cough)

Tracheo/bronchomalacia, airways compression

Cough bizarre, disappears when asleep, "la belle indifference"

Psychogenic cough

No response

Stop anti-asthma medication

Consider further investigations, and follow-up

Yes

Stop anti-asthma medication

Restart anti-asthma medication only if cough relapses

(Dry cough, breathless restrictive spirometry)

Interstitial lung disease

(Progressive cough, weight loss, fevers)

TB

BTS guidelines 2008

Marco Zampoli, MRC Pathology, July 2012
Recurrent or ‘nasty’ viral infections account for most children with isolated chronic or recurrent coughs.
Mechanisms of Coughing in viral RTI

Cough generator in brainstem

Vagus nerve

Increased sensitivity of Cough receptors:
- URTI
- Larynx
- LRTI
- oesophagus

Virus infection

Increased neural receptors and afferent nerve stimulation

Cytokine release eg IL-1

Cholinergic stimulation of muscarinic receptors

Leukotriene release

Increased neurotransmitter levels eg Substance P > vasodilation, mucous production

Mucosal inflammation

Mucous production

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Symptom duration with viral RTI

- 5-6 colds per year normal
- Average cough duration 1-3 weeks
- Persistent cough and mucopurulent secretions common for weeks after URTI
- No effective Rx
Treating significant isolated chronic cough

- **post infective dry cough** (viral/pertussis), watch, reassure and see. No role for OTC medications
- Persistent bronchitis/wet cough
- Atopy, PAR or possible asthma
- Environmental exposures eg Smokers, crèche
- Habit cough

Treatment

- Antihistamine eg Largactil. LTA eg monteleukast
- Antibiotics 10-14 days and review
- Trial of asthma Rx: oral (5 days) or 3 months ICS. Stop Rx if well: Rx AR if present
- Smoking lecture. Consider removing from crèche
- Counsel, behavioural interventions, chlorpromazine or pholcodeine.

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Where is the “wheeze” noise generated?
Upper airway
EXTRA THORACIC

Thoracic inlet

Lower airway
INTRA THORACIC
Intra vs extra thoracic obstruction

Extra thoracic obstruction:
Worse on inspiration = stertor/stridor

Intra thoracic obstruction:
worse on expiration = wheeze
Large/central airway obstruction

Wheeze: monophonic /throughout expiratory phase

- Tracheal and/or main bronchi obstruction
- **Bilateral air trapping/hyperinflation** ABSENT
- Sometimes ‘brassy’ cough and/or stridor

**Congenital**

- Tracheal stenosis /complete rings
- Vascular rings
- Mediastinal Tumours /bronchogenic cysts

**Acquired:**

- TB nodes
- Foreign body

*Often causing localised hyperinflation (Ball-valve) and/or atelectasis*

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Bilateral airway compression

Bilateral airway compression with ball-valve obstruction LMB

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Peripheral/small airways obstruction

Wheezing: end expiratory = narrowing of the peripheral airways due to AIRWAY pathologies > forced expiratory effort > dynamic compression of small and large airway.

*Most common cause of wheeze*

*BILATERAL air trapping/hyperinflation*

**Acute Episodic/recurrent:**

- Asthma
- Bronchiolitis and viral-triggered wheeze
- Acute aspiration/inhalation injury

**Persistent:**

- chronic aspiration
- post infectious eg. Bronchiolitis Obliterans
- CF and PCD
- Cardiac failure
Recurrent vs persistent wheeze

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Large airway obstruction

CXR, Lodox
TB investigations, Ba swallow bronchoscopy, CT chest

wheeze

Peripheral airway obstruction

Recurrent

Episodic viral wheeze/bronchiolitis
Multi trigger wheeze
Aspiration asthma

post infectious COPD/BO
Aspiration and GORD
CF
Recurrence severe infections due to PID/HIV
BPD
Cardiac disease

Environmental exposures identify Triggers eg fever, cold
Atopy history and investigations
Feeding history

Aspiration workup
Sweat test
Immunoglobulins
HIV
Sputum culture

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### Recurrent and persistent wheeze by age

<table>
<thead>
<tr>
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<th>Recurrent wheeze</th>
<th>Persistent wheeze</th>
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<tbody>
<tr>
<td><strong>&lt; 1 year</strong></td>
<td>Bronchiolitis&lt;br&gt;Aspiration episodes</td>
<td><strong>With Bilateral air trapping = small airway</strong>&lt;br&gt;•Aspiration syndrome&lt;br&gt;eg GORD, laryngeal incompetence&lt;br&gt;•CF; cilliary dyskinesia&lt;br&gt;•Post infectious PAO eg BO from RSV, adenovirus&lt;br&gt;•BPD&lt;br&gt;•Cardiac failure</td>
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<tr>
<td></td>
<td></td>
<td><strong>Without air trapping = large airway</strong>&lt;br&gt;Tracheobronchial obstruction eg vascular ring, TB nodes, congenital tracheal stenosis</td>
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<tr>
<td><strong>&gt; 1 year</strong></td>
<td>Bronchiolitis&lt;br&gt;<strong>Episodic viral wheeze</strong>&lt;br&gt;Multi-trigger wheeze&lt;br&gt;Asthma</td>
<td>Above <em>PLUS</em>&lt;br&gt;Uncontrolled /undiagnosed asthma&lt;br&gt;Foreign body aspiration/aspiration&lt;br&gt;TB nodes&lt;br&gt;Post –infective Bronchiolitis obliterans&lt;br&gt;CF&lt;br&gt;Immunoglobulin deficiencies &gt; recurrent infections</td>
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Recurrent wheezing patterns in young children

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Viral or episodic wheezing

- Cough and wheezing associated only with viral RTI with complete recovery between each episode
- Remove avoidable exposure to infections eg creche
- Smoke exposure
- Short acting BD when needed
- Trial of Monteleukast or ICS if symptoms very frequent or severe
- Use age-appropriate delivery devices
Multi-trigger wheeze

- Identify triggers
- Remove avoidable exposure to infections eg creche
- Smoke exposure
- Trial of ICS (Budesonide 100-200 ug BD). Consider stopping after few months to evaluate the need.
- Trial of monteleukast?
- Short acting BD as needed
- Short course oral corticosteroid for severe symptoms needing admission
- Treat co-existing PAR, atopic symptoms
- Consider stopping treatment and observation if asymptomatic for long time

Cough and wheeze associated with viral RTI AND other triggers
Concluding remarks...

- A careful detailed history is essential
- Cough as *only* symptom is *not* asthma
- Identify wheezing or coughing patterns
- Evaluate the patient **WHEN THEY ARE WELL**
- Investigations are mostly indicated for persistent symptoms or serious underlying illness a consideration
- Trials of therapies must be stopped if no benefit or unlikely the reason for symptom improvement.