Asthma and wheeze in children

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What is wheeze?

- A high pitched musical noise
- Indicates lower airway obstruction
  - Listen for a prolonged expiratory phase
- Low agreement between physicians and parents
- Parents often report rattles, stertor, stridor as “wheeze”

“What do you mean when you use the word wheeze?”
Red Flags

- Daily or constant symptoms
  - Infant with wheeze every day since birth
  - Daily wet or moist cough

- Failure to thrive
- Digital clubbing
What Is Asthma in Children?

- No single definition
- No definitive diagnostic test
- Varying syndromes by age

- Congenital problems
- Bronchiolitis
- Preschool Wheeze/Asthma
- School Age Asthma

Not salbutamol responsive
Salbutamol responsive
Congenital issues
Presentation

May present in infancy or older

Constant noisy breathing and signs of increased work of breathing

Often present as recurrent acute illness

“What is your child’s breathing like during a usual week?”
Causes

- Structural narrowing – malacia, stenosis
- Compression – blood vessels or heart
- Functional – chronic aspiration/dysphagia
- Chronic illness – CF/immune deficiency
Case 1

- 10 month old
- Admit for “Recurrent bronchiolitis”
- Wheeze since 3 – 4 months of age
- Tachypnoea with wheeze all the time
- Worse when feeding or playing
- Not responsive to salbutamol or atrovent
- Growing well
- Tachypnoea with wheeze all the time
Case 1(2)

- Recommended bronchoscopy
  → Airway narrowing in lower trachea (tracheomalacia)

Lessons from Case 1

- Beware daily wheeze
Bronchiolitis
Bronchiolitis

- Acute wheezy illness in infant
- Triggered by viral illness
  - RSV, rhinovirus, adenovirus, HMV
- Shortness of breath, wheeze, hyperexpansion, crackles in chest
- Treatment is supportive and avoiding cross infection
- Consider outpatient referral if recurrent
Salbutamol and steroids

- Bronchodilators not effective (as of yet)
- Steroids are not indicated in bronchiolitis
Pre-school Wheeze
Pre-School Wheeze

- Two distinct groups
  - Those who only wheeze with viruses (infrequent)
  - Those with frequent wheeze
  - Pattern does not predict later asthma or not

Only regular wheezers (incl those with frequent viral exacerbations) benefit from preventers → treat as asthma

Can swap groups – review and trial off meds each 3 months
Figure 1A Diagnostic pathway for asthma and wheeze in children 1 – 4 years

Child with respiratory symptoms.
Are the symptoms typical for asthma? (see Table 1)

- **Yes**
  - Frequency and pattern of symptoms.
  - Frequent typical symptoms between viral illnesses or flare ups.
  - Frequent symptoms with viral illnesses (more than 8 weekly) but no symptoms between flare ups.
  - Infrequent symptoms with viral illnesses only (up to every 8 weeks.)

- **No**
  - Consider other diagnoses. Refer and investigate as appropriate. A trial of asthma therapy may be helpful.

**Trial of asthma therapy for at least 8 weeks.**

- **Improves with preventer?**
  - **Yes**
    - ‘Preschool asthma’
    - Trial of asthma therapy. (see Figure 4)
    - Evaluate response and reconsider diagnosis after 3 months.
  - **No**
    - ‘Infrequent or frequent preschool wheeze’
    - Reliever as needed.
    - ICS not indicated.
Inhaled corticosteroids in preschoolers

- **DO** benefit “interval” symptoms
- **MAY NOT** prevent exacerbations
- **DO NOT** prevent loss of lung function
- **DO** result in loss of linear growth
Systemic steroids/Prednisolone

- Only recommended in severe pre school wheeze (in hospital)
- Not well studied in preschool asthma
  - No positive studies except severe - Why?
  - They all get better anyway

SO WHAT?
- Normal to have 8 – 10 viral illnesses per year
- That’s 30 – 50 days of prednisolone

This recommendation remains contentious
Figure 3: Stepwise approach to treatment of children with wheeze 1-4 years

**Step 1**
Maintenance Low dose ICS if frequent symptoms and SABA reliever therapy (as required) or Montelukast if severe exacerbations

**Step 2**
SABA reliever therapy

**Step 3**
Maintenance Low dose ICS and SABA reliever therapy (as required) plus Montelukast if control is not achieved

**Step 4**
Same as Step 3 plus Referral to a paediatrician

**Step Up** to achieve control and reduce risk of exacerbation

**Step Down** — if stable for 3 months step down in incremental reverse fashion

If relapses, resume previous step of treatment
Case 2

- Four year old girl
- 2 x previous admit with wheeze requiring IV treatment (parainfluenza 3)
- Presented acutely with wheeze, requiring ICU admit and IV treatment (rhinovirus)
- On flixotide
  - No interval symptoms except salbutamol with exercise
  - No eczema or hayfever
  - Sister with asthma

What preventive treatment next?
Case 2 (2/2)

- Added montelukast
- Discharged from clinic but readmitted the next day
- Now on regular flixotide and regular montelukast (adult dose)
  - No interval symptoms or regular salbutamol
  - Fingers crossed
Lessons from Case 2

- Regular montelukast better than PRN
- Often cannot prevent exacerbations in this age group
- Can reduce interval symptoms/improve QOL
Case 3

- 14 month old presented to PICU with severe wheeze and coryza
- Ex 34/40 infant

What question next?
Case 3 (2/2)

- Salbutamol about 2 x per week for wheeze
- Commenced on flixotide
- Resolution of interval symptoms but exacerbations continue
- For montelukast if another severe episode

Lesson from Case 3

- Pre-schoolers with frequent wheeze will benefit from flixotide
School age asthma
Figure 2: Asthma management as a continuous cycle of monitoring and reassessment, adapted from GINA (1)

- Diagnosis
  - Symptom control & risk factors (including lung function)
  - Inhaler technique & adherence
  - Patient preference ★
  - Health Literacy

- Review Response
  - Symptoms
  - Exacerbations
  - Side-effects
  - Patient satisfaction ★
  - Lung function

- Assess
  - Asthma medications
  - Non-pharmacological strategies
  - Treat modifiable risk factors

- Adjust Treatment
Goal: All children who have asthma are correctly diagnosed promptly

- In children
  - based on having characteristic symptoms in absence of another cause AND assessing response to treatment

- In adults
  - based on having characteristic symptoms in absence of another cause cause AND measures of airflow obstruction
Figure 1B Diagnostic pathway for asthma and wheeze in children 5 – 15 years

Child with respiratory symptoms. Are the symptoms typical for asthma? (see Table 1)

Typical

‘Suspected asthma’
Consider long function testing (PEF, spirometry)

Trial of asthma therapy for at least 8 weeks. (see Figure 5)

Responds to asthma therapy?

Yes

Asthma reasonably likely

Diagnose and treat as asthma. (see Figure 5)

Evaluate response and reconsider diagnosis after 3 months.

No

Asthma not likely

Check adherence/compliance and inhaler technique.

Reconsider diagnosis. Further investigation eg. spirometry and reversibility test.

Asthma likely

Further investigation eg. spirometry and reversibility test. A trial of asthma therapy may be helpful. (see Figure 5)

Asthma not likely

Consider other diagnoses.

Refer, investigate and treat as appropriate for other disorder.
Considerations in poor control

- Not taking medication
- Poor inhaler technique
- Asthma plus other problem
- Not asthma
Figure 4: Stepwise approach to treatment of children with asthma 5-15 years

**STEP UP** to achieve control and reduce risk of exacerbation
(inhaler technique and adherence must be checked before considering a step up)

**Step 1**
- Maintenance Low dose ICS
- SABA reliever therapy (as required)
- Montelukast may be used as an alternative with SABA reliever therapy

**Step 2**
- Maintenance Low dose ICS/LABA and SABA reliever therapy (as required)
- In patients 12 years or older Single ICS/LABA Maintenance and Reliever Therapy **(SMART)** may be used

**Step 3**
- Standard dose ICS/LABA therapy and SABA reliever therapy (as required)
- In patients 12 years or older SMART therapy may be used
- Consider adding Montelukast
- Consider referral to a paediatrician

**Step 4**
- Standard dose ICS/LABA therapy and SABA reliever therapy (as required)
- In patients 12 years or older SMART therapy may be used
- Consider High dose ICS/LABA or add on treatment
- Definite referral to a paediatrician

**Step 5**
- Standard dose ICS/LABA therapy and SABA reliever therapy
- In patients 12 years or older SMART therapy may be used

**STEP DOWN** - trial reducing preventer therapy after a period of 3 months

*Montelukast not funded in this instance
**Budesonide 100mcg and Formoterol 6 mcg
Case 4

- 12 year old girl
- 2 episodes respiratory arrest, both after viruses - Runny nose then onset of wheeze
- Had been non-compliant with seretide each time
- Currently adherent
- Night waking 2x per week
- Salbutamol every day – laughing, cold air, exercise
Case 4

- Spirometry
  - FEV1 44%, FVC 84%, FEV1/FVC 46%

- Salbutamol response
  - +88%

- Treatment?
  - Change brand of inhaler (to vannair)
  - Montelukast
  - One month course prednisone
Case 4 - end

- Subsequent reviews
  - “improved but current poor control”
- Recurrent courses of steroids
- Trialled SMART therapy
- ?Theophylline
- ?Omalizumab – IgE > 2000
  - Next mAb funded soon*
- Dysfunctional breathing clinic
- Discuss psychosocial
Questions?

HOW AM I STILL BREATHING

IF SHE HAS MY NOSE?