

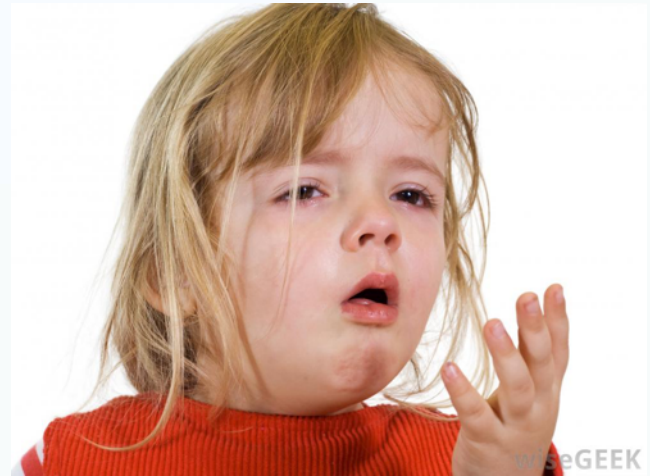
# Paediatric Wheeze and pneumonia

[RCH Asthma](#)  
[RCH bronchiolitis](#)  
[RCH pneumonia](#)  
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# Case

- Charlotte is a 2 ½ year old who presents to ED with shortness of breath and wheeze.
- She had been picked up from daycare by her parents after the daycare staff reported that she had started coughing and become wheezy. The staff had followed the asthma action plan and given her 6 puffs but it had not made a difference.
- She has a history of wheeze which resolves with ventolin. She had been seen in ED previously with wheeze and sent home.



What else do you want to know  
in the history?

# Case 1

- She had a cold on the morning of attending daycare.
- She was playing with other children in the daycare by the dolls house when the staff noticed she had started coughing and wheezing.
- She was born at term via caesarian section (elective repeat)
- She is fully immunised
- She has no allergies
- She has an older sister aged 4
- Her parents smoke (outside the house)
- She has not interval symptoms
  - No night cough
  - Good exercise tolerance
- There is no atopy in her or her family
- She has no fever, has been drinking & eating well and there are no other issues on system enquiry

# Examination

- Vitals: alert and talking freely
- Weight 20kg
- RR 28, HR 88, temp 37, sats 96%
- Well hydrated
- Mild intercostal and subcostal recession
- Bilateral wheeze, more on the right base
- Normal Cvs, abdo, neuro, joints and no rashes

What is your differential diagnosis?

# DDx – for paediatric wheeze

- **Viral induced wheeze**
  - *Fits with the history but ? Not improve with ventolin in daycare*
- **Asthma**
  - *Need to check response to ventolin*
  - *BUT – no suggestion of interval symptoms/ atopy*
- **Foreign body inhalation**
  - *Fits with sudden onset – but no witnessed choking or aspiration*
- **Viral pneumonitis**
  - *Fits with no response to ventolin*
  - *BUT no crackles on examination*
- **Pneumonia (bacterial)**
  - *BUT short history, unusual to only have wheeze and no crackles and no fever*
- **Cardiac failure**
  - *BUT hx too short, no signs of cardiac involvement on examination*

# Wheeze

Reversible  
bronchoconstriction  
(with bronchodilator)

- Wheeze - the sound

Hyper-responsive  
inflammatory airway disease



# Paediatric breath sounds

[Paediatric breath sounds youtube](#)

# Wheeze v Asthma

## Very difficult to distinguish in the under 5 population

- VIRAL WHEEZE

- Under 5 years
- Viruses only trigger
- Well in between episodes
- Minimal atopy
- Predominantly neutrophils in airways (compared to eosinophils)

- ASTHMA

- 2 years and above (classically over 5)
- Multiple triggers
  - Pollen/ grasses
  - House dustmite/ Animals
  - Viruses
  - Cold
  - Exercise
  - Emotions
- May have interval symptoms
  - Night cough
  - Exercise limitation
- Atopy/ Fhx atopy

# Why distinguish between the two?

- Suggestion that there no improved outcome if STEROIDS are used in viral wheeze
- [Insert Lancet link](#)
- This has resulted in a change to recent guidelines:
  - Reducing need for steroids
  - Altering the dose of steroids
  - [Insert link](#)
- Children may “outgrow” both – but long term data suggests impact on adult lung function and risk for COPD
- Viral wheeze esp common if:
  - Smokers
  - Bronchiolitis<1 year (RSV/ rhinovirus)
  - <40 week gestation
  - Caesarian delivery (also true for asthma)

What is your plan of action for  
Charlotte?

Severity	Signs of Severity	Management
<b>Mild</b>	<p>Normal mental state</p> <p>Subtle or no increased work of breathing accessory muscle use/recession.</p> <p>Able to talk normally</p>	<p>Salbutamol by MDI/ <u>spacer</u> (dose below table) - give once and review after 20 mins. Ensure device / technique appropriate.</p> <p>Good response - discharge on B2-agonist as needed.</p> <p>Poor response - treat as moderate.</p> <p>Oral prednisolone for acute episodes which do not respond to bronchodilator alone - 2 mg/kg (max 60 mg) initially, only continuing with 1 mg/kg daily for further 1-2 days if there is ongoing need for regular salbutamol.</p> <p>Provide written advice on what to do if symptoms worsen. Consider overall control and family's knowledge. Arrange follow-up as appropriate.</p> <p>( <u>discharge pack</u> )</p>
<b>Moderate</b>	<p>Normal mental state</p> <p>Some increased work of breathing accessory muscle use/recession</p> <p>Tachycardia</p> <p>Some limitation of ability to talk</p>	<p><b>Oxygen</b> if O<sub>2</sub> saturation is &lt; 92%. Need for Oxygen should be reassessed.</p> <p>Salbutamol by MDI/ <u>spacer</u> - 1 dose ( <u>dose below</u> ) every 20 minutes for 1 hour ; review 10-20 min after 3rd dose to decide on timing of next dose.</p> <p>Oral prednisolone - 2 mg/kg (max 60 mg) initially, only continuing with 1 mg/kg daily for further 1-2 days if there is ongoing need for regular salbutamol.</p>

# Imp: Mild Viral wheeze

- *RCH asthma guideline for mild wheeze*
- 6 puffs of salbutamol via spacer (with facemask)
- Review 20 mins after salbutamol
- No role for steroids

What are the other categories  
of acute wheeze/ asthma?

<b>Severe</b>	<p>Agitated/distressed</p> <p>Moderate-marked increased work of breathing accessory muscle use/recession.</p> <p>Tachycardia</p> <p>Marked limitation of ability to talk</p> <p><b>Note: wheeze is a poor predictor of severity.</b></p>	<p><b>Oxygen</b> as above</p> <p><b>Salbutamol</b> by MDI/ <u>spacer</u> - 1 dose (dose below) every 20 minutes for 1 hour; review ongoing requirements 10-20 min after 3rd dose. If improving, reduce frequency. If no change, continue 20 minutely. If deteriorating at any stage, treat as critical.</p> <p><b>Ipratropium</b> by MDI/ <u>spacer</u> - 1 dose (dose below) every 20 minutes for 1 hour only.</p> <p><b>Aminophylline</b> If deteriorating or child is very sick. Loading dose: 10 mg/kg i.v. (maximum dose 500 mg) over 60 min. Unless markedly improved following loading dose, give continuous infusion (usually in ICU), or 6 hourly dosing (usually in ward). <u>Drug doses</u></p> <p><b>Magnesium sulphate 50% (500 mg/mL)</b> Dilute to 200 mg/mL (by adding 1.5mls of sodium chloride 0.9% to each 1ml of Mg Sulphate) for intravenous administration</p> <ul style="list-style-type: none"><li>• 50 mg/kg over 20 mins</li><li>• If going to ICU, this may be continued with 30 mg/kg/hour by infusion</li></ul> <p><b>Oral prednisolone</b> (2 mg/kg); if vomiting give <b>i.v. methylprednisolone</b> (1 mg/kg)</p> <p>Involve senior staff. Arrange admission after initial assessment.</p>
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<b>Critical</b>	<p>Confused/drowsy</p> <p>Maximal work of breathing accessory muscle use/recession</p> <p>Exhaustion</p> <p>Marked tachycardia</p> <p>Unable to talk</p> <p><b>SILENT CHEST, wheeze may be absent if there is poor air entry.</b></p>	<p>Involve senior staff.</p> <p><b>Oxygen</b></p> <p><b>Continuous nebulised salbutamol</b> (use 2 x 5mg/2.5L nebulisers undiluted) - see below re toxicity.</p> <p><b>Nebulised ipratropium</b> 250 mcg 3 times in 1st hr only, (20 minutely, added to salbutamol).</p> <p><b>Methylprednisolone</b> 1 mg/kg i.v. 6-hourly.</p> <p><b>Aminophylline</b> as above</p> <p><b>Magnesium sulphate</b> as above. In ICU patients on Mg infusion, aim to keep serum Mg between 1.5 and 2.5mmol/L.</p> <p>May also consider <b>i.v. salbutamol</b>. Limited evidence for benefit. 5 mcg/kg/min for one hour as a load, followed by 1-2 mcg/kg/min.</p> <p><b>Beware salbutamol toxicity: tachycardia, tachypnoea, metabolic acidosis. Can occur with both IV and inhaled therapy. Lactate commonly high. Consider stopping/reducing salbutamol as a trial if you think this may be the problem.</b></p> <p>Aminophylline, magnesium and salbutamol must be given via separate IV lines.</p> <p>Intensive care admission for respiratory support (facemask CPAP, BiPAP, or intubation/IPPV) may be needed.</p>
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# Case

- 20 minutes later she is playing with her toys, has no work of breathing but still has some wheeze in the right base
- Her observations: RR24, HR 98, sat 99%, temp 37

What is your management?

# Management

- Discharge home
- Continue salbutamol 6 puffs every 3-4 hours
- GP review in 1-2 days – provide letter for GP
- Asthma action plan – [WA Asthma Action Plan](#)
- Check and document inhaler technique  
[RCH videos showing good inhaler technique](#)
- Return if deterioration/ parental concern
- Script for salbutamol if needed

# Asthma **Action** Plan For Children

## When Well

- No wheeze, cough or chest tightness
- Can play and exercise without wheeze, cough or chest tightness
- Need reliever puffer less than 3 times a week (not including before exercise)
- Not waking at night due to asthma symptoms

### What should I do?

#### Preventer/Combination Medication:

Give  puffs  times a day everyday.  
 mg  
 tablet once a day.

#### Reliever:

Up to  puffs, if needed

## When Unwell

- Starting to get a tight cough, wheeze or chest tightness
- Increased asthma with a cold
- Waking at night with asthma symptoms

### What should I do?

Give  (reliever)   
 Up to 3 - 4 hourly as needed:

- 2 – 6 puffs via spacer (Less than 6 years old)
- 2 – 12 puffs via spacer (6 years or older)

If on daily preventer medication, continue same dose as usual or follow your doctors instructions

## Severe

- Needing reliever **more than every 3 hours** for one or more of the following:
- Wheeze
- Chest tightness
- Sucking in around neck, ribs or tummy with breathing

### What should I do?

Keep giving  puffs of  (reliever)  as needed.

Start Oral steroid if prescribed:  
 mg (  .ml)

**And see a doctor or come into hospital AS SOON AS POSSIBLE**

## Danger Signs

- Needing reliever **more than every ½ hour**, OR
- Blue lips, OR
- Difficulty speaking or feeding due to breathlessness OR
- Frightened OR
- Exhausted

### What should I do?

**CALL AN AMBULANCE on 000**

While waiting stay calm and give:  
 (reliever)   
**4 puffs every 4 minutes**  
 Use a spacer if available

Name:  Ph:   
 Signature:  Date:

Patient name :

## EXTRA MEDICINE TO TAKE AFTER GOING HOME:

Date:

Prednisolone/ Redipred: .mg (.....ml) once a day for.. .. days with food

Reliever : puffs . times a day for .. days

Other: . . . . .

Take 2 puffs of reliever medication before sport

## FOLLOW-UP (please tick which)

GP follow up in ... days/weeks

Outpatient Clinic ..... weeks  
(this will be posted to you a month before)

Asthma Nurse ..... weeks

Consultant rooms .. weeks

PMH Asthma Nurse Tel: **9340 8713**

## RETURN to hospital or see a doctor as soon as possible if your child:

- Starts **working harder to breath**, sucking in around the neck, tummy, or ribs with breathing OR
- Starts needing their reliever puffer **more than every 3 hours**

## Call an AMBULANCE if your child has any one of the following:

- Needs their reliever puffer more than every ½ hour OR
- Is blue at the lips OR
- Has difficult speaking or feeding due to breathlessness OR
- Is frightened or exhausted

While waiting for the ambulance give your child their **reliever puffer 4 puffs every 4 minutes**. Use a spacer if available

## IS YOUR CHILDS' ASTHMA UNDER CONTROL?

Does your child have any of the following symptoms when they seem well?

- **NIGHT TIME** or **EARLY MORNING** wheeze, chest tightness or cough?
- Wheeze, chest tightness or cough with **EXERCISE**?
- Using their **RELIEVER** 3 times a week, or more to relieve asthma symptoms (not including before sport)?
- **MISSING SCHOOL** because of their asthma?

Answer yes, to any one of these? Then your child should see their family **doctor** to look at ways to get their asthma under better control.

# Asthma resources

- [Action plans from National Asthma Australia](#)
- [WA Asthma Action Plan](#)
- [Asthma devices](#)
- [RCH videos showing good inhaler technique](#)

# Case

- Charlotte represents to the ED 3 months later.
- She is toxic, has had a fever for 3 days and has reduced oral intake. She has a history of a wet cough
- She arrives with a note from the GP stating that she is concerned about a chest infection. The GP has already treated 3 previous chest infections and on each occasion she improved. On each occasion she had crackles at the right base and on the 2<sup>nd</sup> occasion, a CXR confirmed right lower lobe changes
- Temp 38.5, RR 36, HR 110, Sats 92%



What is your impression/  
diagnosis?

What is your management?

# Case

## HISTORY

- Details of current episode
- Details of previous episodes
- Infectious contacts
- Wheeze/ asthma symptoms/ interval symptoms
- Hydration history
- Immunisations/ allergies/ pmhx
- Growth

## EXAMINATION

- Observations
- Weight and height
- Respiratory examination
- ENT

## INVESTIGATIONS

- CXR
- Bloods (given recurrent history ? Immunodeficiency – FBE, ESR, CRP, BC, UEC)

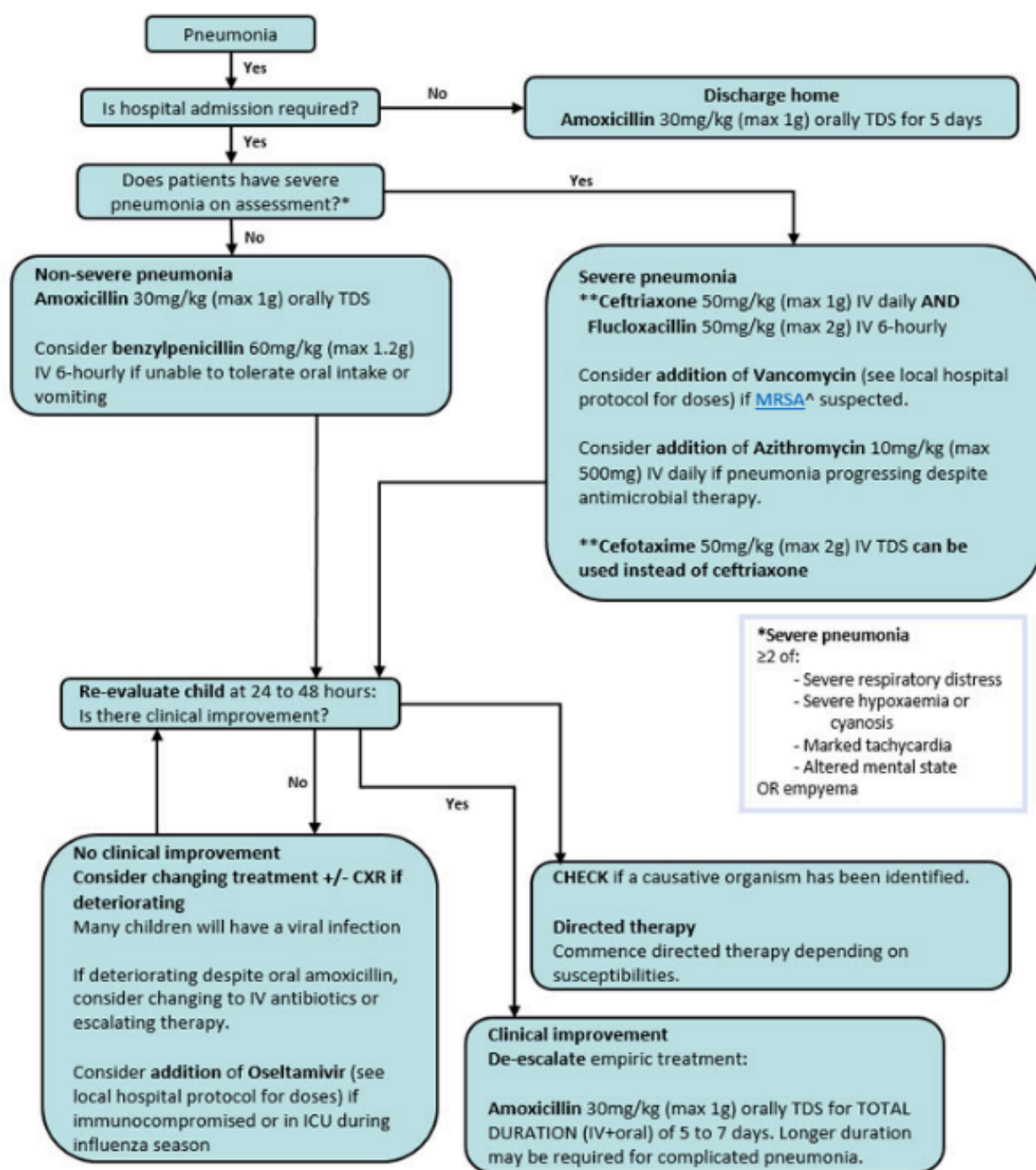
# Case

- After arrival in ED she has an icy pole and angel cream applied
- Weight 18kg
- Examination reveals right sided crackles and reduced air entry
- CXR confirms a Right lower lobe pneumonia
- On review after the CXR her temp is 36.9; RR 28, HR 100 and sats 95%



Your registrar reviews the patient and wants to send her home on oral antibiotics  
– do you agree?

# RCH community acquired pneumonia



# Indications for iv versus po antibiotics in community acquired pneumonia

- Cochrane review of iv versus oral antibiotics
- Are po or iv antibiotics needed for childhood community acquired pneumonia?
- What about cases where the child has a pre-existing condition eg cardiac/ chronic lung/ cerebral palsy?
- RCH Cerebral palsy chest infection guideline

Are you still happy for the  
child to go home on oral  
antibiotics?



# Reasons for escalation of care

- Repeated Right lower lobe pneumonia
  - Risk of foreign body inhalation
  - Or anatomical obstruction ? Mass/ bronchiectasis
  - Partially treated infection ? Inadequate/ incorrect antibiotics?
- Recurrent infection
  - Risk of immunodeficiency

What do you do if you disagree with a senior clinician?

# Graded assertiveness

- A method that can often assist in situations of conflict or when team members have diverging thoughts.
- The gradient starts from the least confrontational progressing to the most confrontational as required and as determined by the extent or urgency of the situation.
- Assertiveness is not the same as aggression, which is based around intimidation and lack of respect.
- The use of a gentle cue may be all that is required to effectively communicate a differing opinion allowing for a new perspective.
- If not, assertiveness can be escalated in a non threatening manner until each team member is satisfied that their concerns have been addressed.

# Graded assertiveness examples:

Level one: express initial concern with an 'I' statement

*I am concerned about . . .*

Level two: make an enquiry or offer a solution

*Would you like me to...*

Level three: ask for an explanation

*It would help me to understand . . .*

Level four: a definitive challenge demanding a response

*For the safety of the patient we need to .....now.*

# Case

- The registrar decides to send the patient home with GP follow up
- Oral amoxicillin is prescribed

# Case

- Charlotte is seen 4 months later in the paediatric outpatient clinic
- She presents with ongoing recurrent wet cough
- She has dropped from the 25<sup>th</sup> to the 5<sup>th</sup> centile for her weight
- On auscultation she has right basal crackles with some mild wheeze

What is your diagnosis and what is your plan of action?

# Case

- The outpatient team are concerned about the recurrent nature and it's localisation. They are worried about a foreign body and or other obstruction
- CXR confirms ongoing right lower lobe consolidation
- The family confirm that her chest infections started a few weeks after her visit to ED
- She is referred to the paediatric respiratory team for a bronchoscopy and they find a radiotranslucent doll's shoe in addition to bronchiectasis. She requires a prolonged course of iv antibiotics, chest physio and has long term consequences – her family file a complaint about the delayed diagnosis



What do you think are the learning points from this case?

# Learning points

- Importance of a clear history – especially thinking about other causes of wheeze eg foreign body
- Importance of clear communication – eg GP knowing to review for persistent right sided changes; parents knowing to return for early review if no improvement
- Significance of persistence changes in right base (recurrent chest infections)
- Importance of appropriately timed follow up
- Did the doctors involved advocate for their patient?

On reflection – would you have managed the patient differently?

Has this changed your practice?