Respiratory Emergencies

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Respiratory Problems

- It can be helpful to think of problems within the Respiratory System as being primarily:
  - Airway problems
  - Breathing problems
  - Ventilation problems
Upper Airway Obstruction
Upper Airway Obstruction

- The upper airway can become obstructed by:
  - The **tongue**
    - Unconscious patient
    - Allergic reaction (anaphylaxis, angioneurotic oedema)
  - An **inhaled foreign body**
  - **Swelling of the throat**
    - Anaphylaxis
    - Infections
    - Retropharyngeal tumours & abscesses
The Tongue: The Unconscious Patient

- Symptoms and signs of upper airway obstruction in the unconscious patient
  - At risk
    - Patient laying on their back
    - Seated with neck flexed/extended
  - Apnoea (complete airway obstruction)
  - Snoring (partial airway obstruction)
  - Tracheal tug
  - Inability/difficulty to ventilate the patient
Management

• Open the airway and keep it open!
  – Chin lift
  – Jaw thrust
  – Airway adjuncts (OPA, NPA)
  – Suction, if required (and available)
  – Recovery position
Foreign Body

- Aspiration of food & vomitus are the commonest causes across all age ranges
- Wide variety of different objects in kids
- “Café coronary” symptoms & signs
- Sudden onset stridor, wheeze, apnoea in unattended kids
The Choking Patient

• Management follows the “Choking Patient” protocol and is age/size related
  – Heimlich manoeuvre
  – Chest compressions
  – Backslaps
  – Direct vision removal
  – Crichothyrotomy
Swelling of The Throat: Symptoms & Signs

• A patient with upper airway obstruction:
  – Leans forwards
  – Drools
  – Has **stridor**, the rasping noise made during inspiration
  – Becomes SOB and may then collapse and die, very rapidly

• If due to infection, may also be systemically unwell, feverish and toxic

• If due to anaphylaxis, may have wheeze, urticaria, angio-oedema, shock
Epiglottitis

• Is a condition that affects both adults and children
• May be caused by bacteria other than HiB
• Rapid progression of both upper airway obstruction and systemic symptoms and signs
  – Apprehension
  – Leaning forwards
  – Drooling
  – Stridor
  – Toxic
  – Progresses to apnoea and cardio-respiratory arrest
Epiglottitis
Epiglottitis: Management

• If suspected, do not look in, or instrument the airway
• Call for help immediately
  – 999 ambulance
  – Air ambulance/Emergency Doctor to scene
• Airway adjuncts won’t work
• ETI is very difficult
• Emergency cricothyrotomy/tracheostomy is required
Quinsy

• A quinsy is a peri-tonsillar abscess and develops over a longer period of time than epiglottitis, usually starting with a sore throat that becomes steadily worse

• May have trismus

• Usually not as toxic and progression to complete obstruction is not as rapid, although abscess may burst causing haemorrhage into the airway
A Quinsy (Peri-Tonsillar Abscess)
Airway Obstruction
Quinsy: Management

• As per epiglottitis, as it may be difficult to distinguish between the two and instrumenting the mouth can also result in complete obstruction

• Immediate admission is required
Croup

• Croup = Laryngo-tracheo-bronchitis
• Croup can present in many different ways from mild to severe and from constant to intermittent
• A barking cough & hoarse voice are common findings
• Progression to complete obstruction of the airway can be unpredictable and very rapid
Croup Scoring Systems

• Modified Taussig Score
• Modified Westley Score

• These are based upon 2 things:
  – The severity of the symptoms and signs of obstruction
  – Whether they are present at rest, or only on effort
Croup: Modified Taussig Score

- **Stridor**
  - None: 0
  - On crying or exertion: 1
  - At rest: 2
  - Severe (biphasic): 3

- **Retractions**
  - None: 0
  - On crying or exertion: 1
  - At rest: 2
  - Severe: 3

**Score**

- **Mild:** 1-2
  - Treat and discharge

- **Moderate:** 3-4
  - Treat and refer

- **Severe:** 5-6
  - 999 and nebulised adrenaline

- Mild 1-2
- Treat and discharge
- Moderate 3-4
- Treat and refer
- Severe 5-6
- 999 and nebulised adrenaline
Modified Westley Score

- **Inspiratory stridor:**
  - Not present - 0 points
  - When agitated/active - 1 point
  - At rest - 2 points

- **Intercostal recession:**
  - Mild - 1 point
  - Moderate - 2 points
  - Severe - 3 points

- **Air entry:**
  - Normal - 0 points
  - Mildly decreased - 1 point
  - Severely decreased - 2 points

- **Cyanosis:**
  - None - 0 points
  - With agitation/activity - 4 points
  - At rest - 5 points

- **Level of consciousness:**
  - Normal - 0 points
  - Altered - 5 points

- **Total Possible Score 0-17:**
  - <4=mild croup
  - 4-6=moderate croup
  - >6=severe croup
Simple Summary

• Severe croup = severe respiratory distress, cyanosis, exhaustion
  – Nebulised adrenaline 5ml of 1:1000
  – Dexamethasone 0.15mg/kg/prednisolone 1mg/kg
  – Oxygen
  – Admit

• Moderate croup = clinical signs at rest, which worsen when active
  – Dexamethasone 0.15mg/kg/prednisolone 1mg/kg
  – Admit

• Mild-Moderate croup = clinical signs when active or upset
  – Dexamethasone 0.15mg/kg/prednisolone 1mg/kg
  – Home with “Croup Advice Sheet”

• NB Patients given prednisolone require a second dose the following day
• Can give nebulised budesonide/Pulmicort 2mg as a single dose, or 1mg x 2, 30 mins apart
Bronchiolitis: At Risk Groups

- Prematurity (<37/40)
- Low birth weight
- Age < 12/52
- Most kids only have URTI involvement but 40% progress to LRTI symptoms and signs
  - Cough
  - Wheeze
  - Miserable
  - Poor feeding
<table>
<thead>
<tr>
<th></th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
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<tbody>
<tr>
<td><strong>O₂ Sats</strong></td>
<td>&gt; 95%</td>
<td>92 - 95%</td>
<td>&lt; 92%</td>
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<tr>
<td><strong>Recessions</strong></td>
<td>None / mild</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
<tr>
<td><strong>Grunting</strong></td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td><strong>Nasal Flaring</strong></td>
<td>-</td>
<td>+/-</td>
<td>++</td>
</tr>
<tr>
<td><strong>Apnoea</strong></td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td><strong>Feeding</strong></td>
<td>Normal</td>
<td>&gt; 50%</td>
<td>&lt; 50%</td>
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<tr>
<td><strong>Behaviour</strong></td>
<td>Normal</td>
<td>Irritable</td>
<td>Lethargic</td>
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<tr>
<td></td>
<td></td>
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<td>Floppy</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>↓GCS</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Inconsolable</td>
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</table>
Bronchiolitis: Management

• Difficult to determine what works and what doesn’t, especially in primary care
  – Salbutamol
  – Ipratropium
  – Steroids
  – Saline

• The mainstay of treatment is supportive care in hospital
Anaphylaxis

• Anaphylaxis is more likely if:
  – Sudden onset of symptoms, with rapid progression
  – May be Airway, Breathing, or Circulation-predominant symptoms
  – May have known allergy
  – Skin changes may be present (flushing, urticaria, angioedema)
  – May be accompanied by GI symptoms (vomiting, abdominal pain, incontinence)
Anaphylaxis

- Reactions tend to occur within minutes and are rapidly progressive
- Reactions to IV allergens are more rapid than stings, which are more rapid than ingested allergens
- Patients with a history of asthma and patients on beta-blockers may have more severe and rapidly progressive reactions
Anaphylaxis: Assessment

• The symptoms depend upon whether the predominant response is Airway, Breathing or Circulatory compromise

  – **Airway:** Stridor, SOB
  – **Breathing:** Wheeze, SOB
  – **Circulation:** Hypotension, tachycardia, cardiac arrest
  – +/- **Skin & GI symptoms**
Management

• When the symptoms pose a threat to life:

  – Airway: Swelling, hoarseness, stridor
  – Breathing: Tachypnoea, wheeze, fatigue, cyanosis, Sats <92%, confusion
  – Circulation: Pallor, cold & clammy, hypotensive, faintness, drowsy, coma
Anaphylaxis: Action

- Call for help
- Administer 100% O2
- Adrenaline 1:1000 given IM
  - Adults 500mcg (0.5mL)
  - Child > 12yo 500mcg (0.5mL)
  - Child 6-12yo 300mcg (0.3mL)
  - Child < 6yo 150mcg (0.15L)
- Dose can be repeated after 5 minutes, if there is no improvement, at a different site
Adrenaline

• Adrenaline 1:1000 comes in:
  – 1mg/1mL vial, so need insulin syringe & IM needle but can then give 500mcg
  – 1mg/1mL MiniJet disposable system can deliver 500mcg
  – EpiPen, Anapen, Jext systems come in either:
    • 300mcg
    • 150mcg
  – May need to give more than is in the pen
• Can rub the site to improve absorption
Anaphylaxis: Action

- IV fluids (crystalloid), where there are circulatory system symptoms & signs
- Give this as a bolus and re-assess the response before giving further fluids
  - Adults: 500-1000mL
  - Child: 20mL/Kg
Anaphylaxis: Action

- Chlorphenamine (IM or slowly IV)

- Adults & kids >12yo: 10mg
- Kids 6-12yo: 5mg
- Kids 6/12 – 6yo: 2.5mg
- Babies < 6/12: 250mcg/Kg
Anaphylaxis: Action

• Hydrocortisone (IM or slowly IV)
  – Adults & kids >12yo 200mg
  – Kids 6-12yo 100mg
  – Kids 6/12 – 6yo 50mg
  – Babies < 6/12 250mg
Anaphylaxis: Special Cases

- In Breathing-predominant anaphylaxis:
  - Can follow BTS guideline for Acute Asthma, using nebulised salbutamol/ipratropium

- Glucagon can be given to patients taking non-cardio-selective beta-blockers suffering an anaphylactic reaction, as adrenaline can cause severe hypertension and bradycardia in this group of patients
Middle Airway Problems

• Bronchospasm secondary to either anaphylaxis or asthma is the main life-threatening condition that affects the middle airways

• The Confidential Enquiry Into Asthma Deaths In The Eastern Region:
  – 80% of attacks were not sudden
  – In 2/3 of these patients, medical management did not comply with national guidelines
  – Seasonal & behavioural factors in sudden deaths
Signs & Symptoms Of Middle Airway Problems

• The early signs and symptoms are:
  – Breathlessness (SOBOE progressing to SOBAR)
  – Cough
  – Wheeze

• Caused by narrowing of the tubes for ANY reason
  – Asthma
  – Bronchiolitis in babies
  – Foreign body
Signs & Symptoms

- This can progress rapidly, with:
  - The increasing use of accessory muscles
  - Tachypnoea, with the inability to complete a sentence
  - Tachycardia
  - A fall in the PFR to 33-50% of normal & Sats to 92-98%

- As the patient decompensates
  - PFR falls further to < 33% of normal
  - Sats drop to <92%
  - Altered mental state
Decompensation

• As the patient decompensates, you get:
  – Apprehension, confusion, exhaustion
  – Cyanosis
  – Silent chest
  – Bradycardia & hypotension
  – Respiratory +/- cardiac arrest
Assessment & Management

- BTS/SIGN/NICE have produced excellent charts for the assessment and management of patients with severe and life-threatening asthma in both adults and kids of different ages.
- These need to be readily available in the surgery, along with the equipment and drugs required to deliver care to this standard.
Management of Acute Exacerbation of Asthma / Wheeze
Primary Care Clinical Assessment Tool for Children Over 2 Years

History
• Breathless/wheeze/cough/chest tightness
• Viral or allergic trigger
• Previous episodes or interval symptoms
• Family or personal history of asthma, eczema or atopy
• Current
• Previous treatment and responses

Assessment

Examination
• Speech
• Respiratory rate
• Chest wall expansion and movement
• Use of accessory muscles
• Auscultation of chest – reduced air entry, wheeze, prolonged expiration
• Oxygen Saturation (Sats)
• Peak flow measurement (≥5yrs but often unreliable in younger age)

Consider other diagnosis
• Pneumonia
• Bronchitis in under 1yr old
• Croup
• Foreign body

Discharge from hospital and GP
Patient must be stable have minimal recession with Sats ≥92% and manage 3-4 hourly between doses of inhaler
• Discharge on salbutamol 2-10 puffs up to 4 hourly via spacer + facemask
• Complete a 3 day course of Prednisolone, child < 5 yrs 20mg; 5-12 yrs 30-40mg for 3 days; 12-18 yrs 40mg for 3-5 days (or 2mg/kg dose up to 40mg)
• Give Acute Asthma Management Plan
• Check inhaler technique and regular medication
• Review overall asthma control and consider need to step up medication
• Arrange a review at GP practice within 48 hours and give advice on re-accessing medical care if condition worsens e.g. OOH service (or open access to Children’s Assessment Unit if an option.)

Full Respiratory assessment in 7-14 days in primary care

Think TTT – consider compliance with existing Therapy, Inhaler Technique and Triggers before stepping up treatment.

Table 1: Normal Paediatric Values

<table>
<thead>
<tr>
<th>Height(m)</th>
<th>Height(f)</th>
<th>Predicted PEF PEFR (L/min)</th>
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<tbody>
<tr>
<td>0.05</td>
<td>2'5'</td>
<td>57</td>
</tr>
<tr>
<td>0.90</td>
<td>3'11'</td>
<td>95</td>
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<tr>
<td>0.95</td>
<td>3'1'</td>
<td>104</td>
</tr>
<tr>
<td>1.00</td>
<td>3'3'</td>
<td>115</td>
</tr>
<tr>
<td>1.05</td>
<td>3'5'</td>
<td>127</td>
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<tr>
<td>1.10</td>
<td>3'7'</td>
<td>141</td>
</tr>
<tr>
<td>1.15</td>
<td>3'9'</td>
<td>157</td>
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<tr>
<td>1.20</td>
<td>5'11'</td>
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<tr>
<td>1.25</td>
<td>4'1'</td>
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</tr>
<tr>
<td>1.30</td>
<td>4'3'</td>
<td>212</td>
</tr>
<tr>
<td>1.35</td>
<td>4'5'</td>
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<tr>
<td>1.40</td>
<td>4'7'</td>
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<td>1.50</td>
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</tr>
<tr>
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<td>5'3'</td>
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<tr>
<td>1.60</td>
<td>5'5'</td>
<td>345</td>
</tr>
<tr>
<td>1.65</td>
<td>5'7'</td>
<td>370</td>
</tr>
<tr>
<td>1.70</td>
<td>5'9'</td>
<td>393</td>
</tr>
</tbody>
</table>

Table 2: Predicted Peak flow: for use with EU/EN13826 scale PEF metres only

<table>
<thead>
<tr>
<th>Respiratory Rate at Rest</th>
<th>Heart Rate</th>
</tr>
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<tbody>
<tr>
<td>≤2-5yrs 25-30 breaths/min</td>
<td>≤2-5yrs 30-60 breaths/min</td>
</tr>
<tr>
<td>&gt;2-5yrs 30-60 breaths/min</td>
<td>&gt;2-5yrs 60-90 breaths/min</td>
</tr>
<tr>
<td>&gt;7-12yrs 15-20 breaths/min</td>
<td>&gt;7-12yrs 20-30 breaths/min</td>
</tr>
</tbody>
</table>

Life Threatening
• Sats <92% plus any of the following
• Silent chest
• Poor respiratory effort
• Exhusted and unstable
• Confusion/coma/agitation
• Cyanosis
• Bradycardia
• Respiratory arrest
• PEF not recordable or <33% predicted or best

Moderate Exacerbation
• Able to talk
• Moderate respiratory distress/wheeze
• Sats ≥92%
• PEF ≥50% predicted or best (5yrs)
• RR ≥25/min HR ≤140/min 5-12yrs
• RR ≤33/min HR ≤125/min 12-18yrs
• RR ≤25/min HR ≤110/min ...

Severe
• Previous attack within last 2 weeks
• Too breathless to talk or complete sentence
• Marked respiratory distress/wheeze
• Sats <92%
• PEF <50% predicted or best
• RR >40/min HR >140/min 5-12yrs
• RR >33/min HR >125/min 12-18yrs
• RR >25/min HR >110/min ...

Give Salbutamol 2-10 puffs via spacer+facemask (one puff at a time)
• increase by 2 puffs every 2 minutes up to 10 puffs according to response
• Assess response and repeat if necessary
• Give salbutamol solution
• Prednisolone 20mg
• 2-5yrs and 30-40 mg > 5yrs or 2mg/kg dose (maximum 40mg)

Give Nebulised Salbutamol (using 6-8L oxygen): ≤5yrs 2.5mg & > 5yrs 5mg

Good response
• Reassess within 1 hour
• Solute of no use of accessory muscles
• Minimum wheeze ≤3 breaths/min
• Rising PEF in >5yrs

Poor Response
• Reconsider diagnosis or severe life threatening episode
• Call 999
• Give high flow oxygen via fitted face mask aim for Sats 94-98%
• Give nebulised Salbutamol (using 6L-8L oxygen): ≤5yrs 2.5mg & > 5yrs 5mg
• Give nebulised Ipratropium Bromide (using 6L-8L oxygen): ≤12yrs 250mcg, ≥12yrs 500mcg repeated every 20-30 mins

Ensure a health professional stays with child
• Contact duty paediatric registrar or consultant to arrange admission

Poor Response
• Reconsider diagnosis or severe life threatening episode
• Continue administer oxygen driven nebulised salbutamol if symptoms are severe whilst transferring the child to the emergency department

Ref: The British Thoracic Society (BTS) and SIGN Guideline on the Management of Asthma (Revised Jan 2012) and thanks to The Suffolk Respiratory Pathway Group
July 2013
Discussion Points

• The drug of first choice is oxygen
  – Do you have some/enough?
  – The correct delivery device (100% non-rebreather mask)?
  – Masks available for both adults & kids?
  – Aim to maintain Sats of 94-98%
Bronchodilator

• The next drug is a bronchodilator (salbutamol), which can be administered by:
  – MDI & spacer, if nothing else is available
  – Start with 2-10 puffs, then increase by 2 puffs every 2 minutes (max 10 puffs), if required

• An oxygen-driven nebuliser is the best method, at a rate of 6L/min
  – Do you have adult/paediatric nebuliser masks?
  – Remember to return to a 100% O2 mask post-neb
• Should I use salbutamol on its own, or add ipratropium and when?
  – Salbutamol is a beta-agonist bronchodilator
  – Ipratropium is an anti-cholinergic/muscarinic bronchodilator, which also decreases secretions
  – May work synergistically together
  – May get less tachycardia
  – Can be co-administered:
    • Separate drugs in same nebuliser mask
    • Combivent (2.5mg/500mcg)
  – Guidelines favour salbutamol first, with ipratropium either afterwards in life-threatening asthma, or after assessing the response in severe asthma
Bronchodilator

• What should I do if we are still in trouble?
  – Re-nebulise
  – Exclude a pneumothorax

• Is there ever a place for a beta-agonist injection?
  – Yes, in an unconscious patient
  – Salbutamol or terbutaline S/C, or slowly IV
Steroids

• Steroids take 6 hours to work, regardless of the route of administration
• The oral route is fine, if the patient can manage to take them & keep them down
  – Prednisolone
    • Adult: 40-50mg
    • Kids: 1mg/kg (max 40mg) or 2mg/kg (max 60mg) if already on prednisolone
  – Hydrocortisone succinate can be given IV
    • < 2yo 25mg
    • 2-5 yo 50mg
    • 5-12 yo 100mg
    • Adults 100mg
Ventilation/Perfusion = Gas Exchange

- Ventilation: The process of moving air into and out of the lungs
- Perfusion: The process of blood flowing through the lungs

- Capillary endothelium
- Connective tissue
- Alveolar epithelium
- Alveolus

- CO₂
- O₂
Ventilation

• Gas exchange is impaired if there is fluid in the alveoli:
  – Clear fluid
    • Pulmonary oedema
    • Secretions
  – Pus (lobar pneumonia)

• Pulse oximetry is extremely useful to detect this, especially in kids and in atypical pneumonias
Perfusion Problem

- **Pulmonary embolus** blocks the blood vessel supplying the lungs, which obstructs gas exchange
- **Pulmonary Embolus Syndrome**
Pulmonary Embolus Syndrome

Pulmonary embolism should be suspected in all patients who present with new or worsening SOB, chest pain, or sustained hypotension without a clear alternative cause

- Less than half the patients who die of a PE have a diagnosis made before death
- 35-40% of patients who have a DVT have a subclinical PE
- Be aware of the symptoms & signs of PES
Risk Assessment for a PE

• Symptom History
  • Sudden onset, or unexplained gradual SOB
  • Pleuritic chest pain, or pain made worse on breathing, bending, stooping
  • Sudden onset collapse, vomiting, sweaty, shock

• Risk assess
  • DVT, immobility, cancer, thrombotic tendency, COCP, pregnancy

• Signs
  • Low sats, tachycardia, tachypnoea, hypotension
In Summary

• Respiratory emergencies can be due to:
  – Airway problems
  – Breathing problems
  – Ventilation/Perfusion problems

• Pulse oximetry can be extremely useful in the assessment and management of these patients
ANY QUESTIONS?