The acutely ill child – ABC’s
The acutely ill child...

• Requires quick evaluation to determine the level of urgency
• Is examined to find signs of emergency, priority or non-urgency.
• Is benefitted by an orderly approach based on the ABCs
  • Airway
  • Breathing
  • Circulation
  • Deficits (neurologic signs)
Emergency signs!

• Must be recognized and treated immediately:

"A" and "B" (Airway and Breathing)

• Airway obstruction
• Severe respiratory distress
• Central cyanosis
Anatomy

Child

Cricoid

Narrowest point

Adult
Effect of secretions and edema on airway diameter and resistance

<table>
<thead>
<tr>
<th></th>
<th>Normal</th>
<th>Edema 1mm</th>
<th>Resistance (Rα / radius^4)</th>
<th>Cross-section area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant</td>
<td>4 mm</td>
<td></td>
<td>↑ 16x</td>
<td>↓ 75%</td>
</tr>
<tr>
<td>Adult</td>
<td>8 mm</td>
<td></td>
<td>↑ 3x</td>
<td>↓ 44%</td>
</tr>
</tbody>
</table>
Signs of Respiratory Distress

- Stridor
- Tachypnea
- Tachycardia
- Grunting
- Retractions
- Agitation
- Flaring/head-bobbing

- Inability to lie down
- Accessory muscles
- Wheezing
- Sweating
- Prolonged expiration
- Pulsus paradoxus
- Apnea
- Cyanosis
Respiratory rates by age

<table>
<thead>
<tr>
<th>Age</th>
<th>Respiratory Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 2 months</td>
<td>&lt; 60 breaths/minute</td>
</tr>
<tr>
<td>2 – 12 months</td>
<td>&lt; 50</td>
</tr>
<tr>
<td>1 – 6 years</td>
<td>&lt; 40</td>
</tr>
<tr>
<td>6 years</td>
<td>&lt; 30</td>
</tr>
</tbody>
</table>

- Small children have higher metabolic rate, higher oxygen consumption and less respiratory reserves than older children and adults. This can lead to respiratory failure more quickly!
Emergency measures "A" and "B"

- Foreign body? ⇒ Remove
- Airway obstructed ⇒ Airway manoeuvres
- Not breathing ⇒ Ventilate with bag and mask
- Give oxygen
- Mechanical ventilation?
- Consider laboratory tests: Hb, WBC, glucose, malaria, etc.
- Make sure the child is warm!
## Intubation

<table>
<thead>
<tr>
<th>Age</th>
<th>kg</th>
<th>ETT</th>
<th>Length (lip)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newborn</td>
<td>3.5</td>
<td>3.5</td>
<td>9</td>
</tr>
<tr>
<td>3 mos</td>
<td>6.0</td>
<td>3.5</td>
<td>10</td>
</tr>
<tr>
<td>1 yr</td>
<td>10</td>
<td>4.0</td>
<td>11</td>
</tr>
<tr>
<td>2 yrs</td>
<td>12</td>
<td>4.5</td>
<td>12</td>
</tr>
</tbody>
</table>

**Children > 2 years:**

- **ETT size:** \( \frac{\text{Age}}{4} + 4 \)
- **ETT depth (lip):** \( \frac{\text{Age}}{2} + 12 \) (alt. ID x 3)
Emergency signs!

- Must be recognized and treated immediately:

  "C" (Circulation)

- Signs of shock
- Signs of severe dehydration
- Central cyanosis
Signs indicating shock

- altered consciousness, lethargy
- bleeding
- cool extremities
- prolonged capillary refill
- weak and rapid pulse
- poor skin turgor
- sunken fontanelle, eyes
Hemodynamic Response to Hemorrhage

% of Control

100

Vasc Resistance

Blood Pressure

Cardiac Output

% Plasma Loss

25%

50%

15 MKAIC 2011
Normal heart rate and blood pressure by age

<table>
<thead>
<tr>
<th>Age</th>
<th>HR</th>
<th>Systolic BP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newborns</td>
<td>110-160</td>
<td>50-60</td>
</tr>
<tr>
<td>&lt;1</td>
<td>110-160</td>
<td>60-80</td>
</tr>
<tr>
<td>2-5</td>
<td>95-140</td>
<td>80-100</td>
</tr>
<tr>
<td>5-12</td>
<td>80-120</td>
<td>90-110</td>
</tr>
<tr>
<td>&gt;12</td>
<td>60-100</td>
<td>100-120</td>
</tr>
</tbody>
</table>

Pre-Hospital Paediatric Life Support, BMJ Books 1999
History indicating shock

- trauma
- bleeding
- severe diarrhea, decreased urination
- high fever (sepsis, dengue)
- known heart disease (distended veins, enlarged liver)
Emergency measures "C"

- Give oxygen
- Make sure the child is warm
- Secure IV access
  - Peripheral iv within short time (where?)
  - Intraosseus access
Figure 4-12. Intranasal needle placement. (A) Insert needle at the level of tibial tubercle on the medial portion of the tibia. (B) The needle is aimed caudally and laterally.
Emergency measures “C”!

- Fluid therapy
  - Initial fluid bolus 10 – 20ml/kg NS (Normal saline) or LR (Lactated Ringer’s) as quickly as possible.
  - Check response, repeat if necessary.
  - If no response after 60 – 80 ml/kg, consider ongoing losses or obstruction (pneumothorax, cardiac tamponade)
  - Consider transfusing

- Caution if severe malnutrition
Emergency signs!

• Must be recognized and treated immediately:

"D" (Disability)

• Convulsions
• Coma
Limited neurologic exam, "AVPU"
GCS + pupillary reaction

Awake
Responds to Voice (= lethargic)
Responds to Pain
Unresponsive (= coma)

Serious injury = GCS < 8
Note focal findings!

Factors that affect outcome:
- GCS
- Hypoxemia
- Hypovolemia/hypotension

Glasgow Coma Scale for Head Injury

**Glasgow Coma Scale, Eye opening**
- Spontaneous: 4
- To loud voice: 3
- To pain: 2
- None: 1

**Verbal response**
- Oriented: 5
- Confused, disoriented: 4
- Inappropriate words: 3
- Incomprehensible sounds: 2
- None: 1

**Best motor response**
- Obey: 6
- Localizes: 5
- Withdraws (flexion): 4
- Abnormal flexion posturing: 3
- Extension posturing: 2
- None: 1
History indication neurologic disease

- dehydration, poor feeding
- fever, outbreak of meningitis
- age for febrile seizures (< 6 months)
- trauma
- intoxication
- previous kidney, liver disease or diabetes
Emergency measures “D”!

• Don’t forget the “ABCs”
• If ABCs are ok, place in safe position
• If convulsing, start acute therapy p.r. or i.v / i.m. (diazepam, midazolam, phenobarbital, phenytoin)
• Acute tests – glucose (if testing not available, give glucose bolus and observe the reaction)
  
• Consider specific treatment of DKA, intoxication, surgery (trauma, bleeding)
Finally….

… when the ABCs are all ok, it's probably time to go back and start all over again!!!

Thank-you for your attention!