Pediatric Assessment

“What you don’t know can kill them “
Lana Helton-Clark RN-BC,CPEN, EMT-P
Le Bonheur Children’s Hospital
Disclosure Statement

I have no actual or potential conflict of interest in relation to this program/presentation.
Objectives

- Identify key anatomic & physiologic characteristics of infants and children
- Discuss / be familiar with the components of a pediatric assessment
- Describe interventions needed to manage life threatening conditions found in the primary assessment.
- Identify normal age-group related vital signs and discuss use of appropriate equipment to obtain them
Anatomy & Physiology

Airway

- Tongue is large in proportion to oropharynx
- Epiglottis is U-shaped, higher and more anterior
- Larynx is positioned more anterior and cephalad
- Cricoid cartilage is the narrowest part of the airway and trachea is funnel shaped.
- Airway diameter is proportional to child’s size as is the length of the trachea
- Head is large in proportion to body with weak supporting musculature
Anatomy of Pediatric Airway

Airway comparison

Figure 1. Comparison Of Infant And Adult Airway


Airway Diameter

<table>
<thead>
<tr>
<th>Normal</th>
<th>Edema</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Increased resistance due to edema increasing wall thickness by 1 mm</td>
</tr>
<tr>
<td>Infant</td>
<td>50% reduction in lumen</td>
</tr>
<tr>
<td>4 mm</td>
<td>2 mm</td>
</tr>
<tr>
<td>Infant</td>
<td>Additional resistance due to narrow lumen</td>
</tr>
<tr>
<td>Adult</td>
<td>25% reduction in lumen</td>
</tr>
<tr>
<td>5 mm</td>
<td>3 mm</td>
</tr>
</tbody>
</table>
Anatomy of Pediatric Airway

Intubation anatomy

Pediatric airway
Anatomy & Physiology

Breathing

- Lung tidal volume is approx. 10ml/kg (adult 500ml)
- Metabolic rate is twice that of adults with twice the oxygen consumption
- Ribs are cartilaginous and intercostal muscles are immature
- Chest wall is thin thorax is small with very little fat or developed musculature
- Diaphragm is the major muscle of breathing in infants and toddlers
Anatomy & Physiology

Normal chest x-ray

Foreign body ingestion
Anatomy & Physiology

Circulation

- Myocardium fibers are shorter and less elastic
- Infants have a higher cardiac output (200ml/kg) than adults (100 ml/kg) and stroke volume is limited
- Circulating blood volume is 90ml/kg in infants 80ml/kg in children (adults 70ml/kg)
- Greater % total body weight is water.
Scene Survey

Hazards

• note presence of potential hazards or visible mechanism of illness or injury
• presence of pills, household chemicals etc. may indicate toxic ingestion
• injury and history that do not coincide may indicate abuse
Scene Survey

Relationships / interaction

• observe interaction with the caregiver and the child and determine appropriateness.

• other important assessments include orderliness, cleanliness and safety of the home as well as general appearance of the child, indications of substance abuse or special needs devices.
Pediatric Equipment
Pediatric Assessment

Initial Assessment

- Initial impression (Pediatric Assessment Triangle)
- Primary Survey (A B C D E) with vital signs
- Secondary Survey
- Ongoing Assessment
Initial Assessment

- First priority is to gain an initial impression
- Utilization of Pediatric Assessment Triangle
- Hands off approach – look and listen
- 60 seconds or less
- “sick“ or “not sick“
Pediatric Assessment Triangle

- Appearance
  - Abnormal Tone
  - ↓ Interactiveness
  - ↓ Consolability
  - Abnormal Look/Gaze
  - Abnormal Speech/Cry

- Work of Breathing
  - Abnormal Sounds
  - Abnormal Position
  - Retractions
  - Flaring
  - Apnea/Gasping

- Circulation to Skin
  - Pallor
  - Mottling
  - Cyanosis
Primary Survey

• A – airway
• B - breathing
• C - circulation
• D - disability
• E - exposure and environment
Airway

- Maintain c-spine if trauma is suspected
- Determine if airway is patent
- Use airway maneuvers to open airway
- Assess airway
- Insert adjunct if necessary
- Perform tracheal intubation if airway patency cannot be maintained by other means
Breathing

- Assess for spontaneous respiration
- Listen for breath sounds
- Assess respiratory rate effort and chest expansion
- Note signs of increased work of breathing
Breathing

Accessory muscle usage

Positioning to breathe
Breathing

Tripoding

Nasal flaring
Circulation

- Assess for and control any sign of external bleeding
- Assess central and peripheral pulses
- Determine if heart rate is within normal limits
- Evaluate skin color temperature and moisture
- Measure blood pressure
Circulation

A. Amputation of several fingers on hand

B. Puncture wound to knee

C. Severe scalp wound
## Pediatric Vital Sign Normal Ranges

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Respiratory Rate</th>
<th>Heart Rate</th>
<th>Systolic Blood Pressure</th>
<th>Weight in kilos</th>
<th>Weight in pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newborn</td>
<td>30 - 50</td>
<td>120 - 160</td>
<td>50 - 70</td>
<td>2 - 3</td>
<td>4.5 - 7</td>
</tr>
<tr>
<td>Infant (1-12 months)</td>
<td>20 - 30</td>
<td>80 - 140</td>
<td>70 - 100</td>
<td>4 - 10</td>
<td>9 - 22</td>
</tr>
<tr>
<td>Toddler (1-3 yrs.)</td>
<td>20 - 30</td>
<td>80 - 130</td>
<td>80 - 110</td>
<td>10 - 14</td>
<td>22 - 31</td>
</tr>
<tr>
<td>Preschooler (3-5 yrs.)</td>
<td>20 - 30</td>
<td>80 - 120</td>
<td>80 - 110</td>
<td>14 - 18</td>
<td>31 - 40</td>
</tr>
<tr>
<td>School Age (6-12 yrs.)</td>
<td>20 - 30</td>
<td>70 - 110</td>
<td>80 - 120</td>
<td>20 - 42</td>
<td>41 - 92</td>
</tr>
<tr>
<td>Adolescent (13+ yrs.)</td>
<td>12 - 20</td>
<td>55 - 105</td>
<td>110 - 120</td>
<td>&gt;50</td>
<td>&gt;110</td>
</tr>
</tbody>
</table>
Disability

- Determine the level of responsiveness
- Use the AVPU scale
- Consider the pediatric GCS
- Question the parent / caregiver about normal mood, activity level or cognitive baseline
- Administer oxygen if needed
## Pediatric GCS

<table>
<thead>
<tr>
<th>Category</th>
<th>Best Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye opening</td>
<td></td>
</tr>
<tr>
<td>Spontaneous</td>
<td>4</td>
</tr>
<tr>
<td>To speech</td>
<td>3</td>
</tr>
<tr>
<td>To pain</td>
<td>2</td>
</tr>
<tr>
<td>None</td>
<td>1</td>
</tr>
<tr>
<td>Verbal</td>
<td>(Modified for Infants)</td>
</tr>
<tr>
<td>Oriented</td>
<td>Babbles</td>
</tr>
<tr>
<td>Confused</td>
<td>Irritable</td>
</tr>
<tr>
<td>Inappropriate words</td>
<td>Cries to pain</td>
</tr>
<tr>
<td>Moans</td>
<td>Moans</td>
</tr>
<tr>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Motor</td>
<td></td>
</tr>
<tr>
<td>Follows commands</td>
<td>6</td>
</tr>
<tr>
<td>Localizes to pain</td>
<td>5</td>
</tr>
<tr>
<td>Withdraws to pain</td>
<td>4</td>
</tr>
<tr>
<td>Abnormal flexion</td>
<td>3</td>
</tr>
<tr>
<td>Abnormal extension</td>
<td>2</td>
</tr>
<tr>
<td>None</td>
<td>1</td>
</tr>
<tr>
<td>Glasgow Coma Scale</td>
<td></td>
</tr>
<tr>
<td>Best possible score</td>
<td>15</td>
</tr>
<tr>
<td>Worst possible score</td>
<td>3</td>
</tr>
<tr>
<td>If tracheally intubated</td>
<td></td>
</tr>
<tr>
<td>Best possible score while intubated</td>
<td>10T</td>
</tr>
<tr>
<td>Worst possible score while intubated</td>
<td>2T</td>
</tr>
</tbody>
</table>
Exposure/ Environment

- Undress the patient / preserve body heat
- Respect modesty
- Keep child covered
Secondary Survey

Two components of the Secondary Survey

- Focused History
- Physical examination
Secondary Survey

Focused History-

- Is often obtained simultaneously during the Physical examination
- Use SAMPLE as a guide to organize history
- Identify the chief complaint
Secondary Survey

- S- signs and symptoms
- A- allergies
- M – medications
- P- past medical history
- L- last oral intake
- E – events surrounding the illness or injury
Secondary Survey

Physical Exam

- To detect non-life-threatening conditions and provide care
- Detailed head to toe exam
Secondary Survey

Head / Face

- Inspect the scalp and skull, palpate for depressions or protrusions
- Inspect ears and eyes for drainage / bruising
- Inspect nose and mouth for drainage / foreign body
Secondary Survey

Neck

- Inspect veins (flat or distended)
- Use of accessory muscles
- Palpate for subcutaneous emphysema
- Check tracheal position
Secondary Survey

Chest

- Inspect work of breathing
- Auscultate breath sound and heart tones
- Palpate chest wall
Secondary Survey

Abdomen

- Inspect for distention or wounds or discoloration
- Auscultate bowel sounds
- Palpate all four quadrants
Secondary Survey

Pelvis / Genitalia

- Inspect meatus and scrotum
- Palpate pelvis at iliac crest pushing inward and downward
- Assess strength and quality of femoral pulses
Pelvic Fracture
Secondary Survey

Extremities

- Inspect skin for any wounds, rashes or medical devices
- Palpate skin temperature, moisture and capillary refill
- Assess pulses, motor, and sensory function
Secondary Survey

Posterior Body

- Inspect for wounds, rashes, edema
- Auscultate posterior thorax
- Palpate the posterior surfaces for wounds, rashes etc.
Ongoing Assessment

- Re-evaluate patient condition
- Assess effectiveness of interventions
- Observe for changes or trends in patient condition
- Alter care and interventions as needed
Summary

Assessment of the ill or injured pediatric patient involves a systematic process utilizing the initial assessment as well as the components of the Primary, Secondary and Ongoing Assessment to get a clear picture of patient condition and necessary interventions.

Recognition of life-threatening conditions requires knowledge of anatomic and physiologic characteristics unique to infants and children.

Use of appropriate equipment to assess and intervene is essential to quality care.
References

