Pediatric Assessment

Objectives

• Distinguish the 3 components of the PAT.
• Assess pediatric-specific features of initial assessment.
• Integrate findings to form a general impression.
• Describe the focused history and PE.
Pediatric Assessment Triangle

Appearance

Breathing

Circulation

**Appearance**

- Tone
- Interactivity
- Consolability
- Look/gaze
- Speech/cry
Work of Breathing

- Abnormal airway sounds
- Abnormal positioning
- Retractions
- Nasal flaring
- Head bobbing

Circulation to Skin

- Pallor
- Mottling
- Cyanosis
Case Study 1: “Cough, Difficulty Breathing”

- 16-month-old boy presents with cough and difficulty breathing.
- Past history is unremarkable. He has had nasal congestion and low-grade fever for 2 days.

**Pediatric Assessment Triangle**

- **Appearance**: Alert, smiling, nontoxic
- **Breathing**: Audible inspiratory stridor at rest
- **Circulation**: Pink
**Key Questions**

What information does the PAT tell you about this patient?

What is your general impression?

**Pediatric Assessment Triangle: Respiratory Distress**

- **Appearance**
  - Normal

- **Breathing**
  - Abnormal

- **Circulation**
  - Normal
General Impression

- Stable
- Respiratory distress
- Respiratory failure
- Shock
- CNS dysfunction
- Cardiopulmonary failure/arrest

Case Progression/Outcome

- Initial assessment:
  - Respiratory distress with upper airway obstruction.
- Initial treatment priorities:
  - Leave in a position of comfort.
  - Obtain oxygen saturation.
  - Provide oxygen as needed.
  - Begin specific therapy.
**Case Study 2:**
“Severe Difficulty Breathing”

- 3-month-old girl presents with severe difficulty breathing.
- Child was seen in the ED 2 days earlier and was sent home with a diagnosis of bronchiolitis.
- Her difficulty breathing has increased.

*What further information would you like?*

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**Pediatric Assessment Triangle**

**Appearance**
Lethargic; glassy stare; poor muscle tone

**Breathing**
Marked sternal and intercostal retractions; rapid and shallow respirations

**Circulation**
Pale with circumoral cyanosis
Questions

What is your general impression?

How does this impression guide your management?

Pediatric Assessment Triangle: Respiratory Failure

- **Appearance**: Abnormal
- **Breathing**: Increased or decreased (late)
- **Circulation**: Normal or abnormal
Case Progression/Outcome

• General impression:
  – Respiratory failure with impending cardiopulmonary failure.

• Management priorities:
  – Support oxygenation and ventilation with bag mask; prepare for endotracheal intubation.
  – Assess cardiac function, vascular access.
  – Continually reassess after each intervention.

Case Study 3: “Vomiting”

• 10-month-old boy with 24-hour history of vomiting and diarrhea.
  – Diarrhea is watery without blood.

• Attempts at oral rehydration by mother were unsuccessful.
  – Called ambulance when child became listless and refused feedings.
Pediatric Assessment Triangle

**Appearance**
Listless; responds poorly to environment

**Breathing**
Effortless tachypnea; no retractions

**Circulation**
Pale face and trunk; mottled extremities

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**Case Progression/Outcome**

- Initial impression:
  - Shock
- Management considerations:
  - Provide oxygen by mask.
  - Obtain quick vascular access.
  - Administer volume-expanding crystalloid normal saline or lactated Ringer solution in 20-mL/kg increments.
  - Continue reassessment and complete examination.
**Case Study 4: “Lethargy”**

- 4-month-old girl brought to ED by her mother after falling from the bed onto carpeted floor.
- Mother states she took a very long nap and is still “sleepy.” It is 3 hours since the fall.
Pediatric Assessment Triangle

**Appearance**
Lethargic; poorly responsive to environment

**Breathing**
Normal

**Circulation**
Normal

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Pediatric Assessment Triangle: CNS/Metabolic Dysfunction

**Appearance**
Abnormal

**Breathing**
Normal

**Circulation**
Normal
Case Progression

• General impression:
  – Primary CNS or metabolic dysfunction

• Management priorities:
  – Provide oxygen, closely monitor ventilation.
  – Obtain vascular access and rapid glucose screen.
  – Perform further physical assessment.
  – Obtain blood for laboratory tests cultures, metabolic studies.
  – Perform CT of the head and radiography.

General Impression

• PAT
• Hands-on assessment of ABCDEs
  – Pediatric differences
Airway

- Manual airway opening maneuvers
  - Head tilt-chin lift, jaw thrust
- Suction
  - Can result in significant improvement in infants
- Age-specific obstructed airway support:
  - Younger than 1 year: Back slap/chest thrust
  - Older than 1 year: Abdominal thrust
- Advanced airway techniques

Breathing: Respiratory Rate

<table>
<thead>
<tr>
<th>Age</th>
<th>Respiratory Rate (breaths/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant</td>
<td>30 to 60</td>
</tr>
<tr>
<td>Toddler</td>
<td>24 to 40</td>
</tr>
<tr>
<td>Preschooler</td>
<td>22 to 34</td>
</tr>
<tr>
<td>School-aged child</td>
<td>18 to 30</td>
</tr>
<tr>
<td>Adolescent</td>
<td>12 to 16</td>
</tr>
</tbody>
</table>

Slow or fast respirations are worrisome.

\[ MV = TV \times RR \]
Breathing: Auscultation

- Listen with stethoscope over midaxillary line and above sternal notch
  - Stridor: Upper airway obstruction
  - Wheezing: Lower airway obstruction
  - Grunting: Poor oxygenation; pneumonia, drowning, pulmonary contusion
  - Crackles: Fluid, mucus, blood in airway
  - Decreased or absent breath sounds: Obstruction

Circulation: Heart Rate

<table>
<thead>
<tr>
<th>Age</th>
<th>Normal Heart Rate (beats/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant</td>
<td>100 to 160</td>
</tr>
<tr>
<td>Toddler</td>
<td>90 to 150</td>
</tr>
<tr>
<td>Preschooler</td>
<td>80 to 140</td>
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<tr>
<td>School-aged child</td>
<td>70 to 120</td>
</tr>
<tr>
<td>Adolescent</td>
<td>60 to 100</td>
</tr>
</tbody>
</table>

HR > 180
Circulation

- Pulse quality:
  - Palpate central and peripheral pulses
- Skin temperature:
  - Reverse thermometer sign
- Capillary refill
- Blood pressure:
  - Minimum = 70 + (2 x age in years) for children 1 year and older

Disability

- Quick neurologic examination
- AVPU scale:
  - Alert
  - Verbal: Responds to verbal commands
  - Painful: Responds to painful stimulus
  - Unresponsive
- (Pediatric) Glasgow Coma Scale
Exposure

- Proper exposure is necessary to evaluate physiologic function and identify anatomical abnormalities.
- Maintain warm, ambient environment and minimize heat loss.
- Monitor temperature.
- Warm IV fluids.

Initial Assessment
Case 4

A: There are gurgling upper airway sounds.
B: Patient has irregular respirations.
C: Infant is pale.
D: Infant responds to painful stimuli. Pupils are equal but react sluggishly to light.
E: Infant shows signs of trauma.

What are your management priorities?
Case Progression (1 of 3)

- Extremity examination shows pattern bruising and fingerprints suggesting forceful shaking.

Case Progression (2 of 3)

- Examination of the fundi reveals bilateral retinal hemorrhages.
Case Progression (3 of 3)

- Vascular access is obtained, screening blood glucose level is 86 mg/dL, and infant is given oxygen by mask and suctioned.

*Based on the two parts of the initial assessment, what are your management priorities now?*

Management Priorities

- Rapid sequence intubation, secure airway using drugs to blunt increases in intracranial pressure.
- Deliver 100% oxygen.
- Monitor end-tidal carbon dioxide and oxygen saturation.
- Provide IV volume-expanding crystalloid fluids.
- Perform CT of head and obtain neurosurgical consultation.
Case Development

- Head CT reveals bilateral subdural bleeding.
- Skeletal survey reveals old rib fractures.
- Infant is admitted to the pediatric intensive care unit.
- Father is charged with child abuse.

Developmental Issues and the PAT

What does a normal PAT look like in a 2-week-old?
A 2-month-old?
PAT: Normal 2-Week-Old Infant

Appearance
Eyes open; moves arms and legs; strong cry

Breathing
Abdomen rises and falls with each breath

Circulation
Face and trunk normal; hands and feet blue; cutis marmorata in cool, ambient environment
**PAT: 2-Week-Old in Shock**

**Appearance**
- Irritable; alternating irritability/lethargy; lethargy; unresponsive

**Breathing**
- Seesaw movements of abdomen and chest; retractions, nasal flaring

**Circulation**
- Pallor true mottling (patches of pallor and cyanosis or erythema)

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**Assessment: Younger Than 2 Months**

- Consoled when held, gently rocked
- Brief awake periods
- Little or no eye contact
- No social smile
- Does not recognize parents vs strangers
- Limited behavioral repertoire
Assessment: 2 to 6 Months Old

- When possible, do much of the examination in caregiver’s lap/arms. Signs to look for:
  - Social smile
  - Recognizes caregivers
  - Tracks light, faces
  - Strong cry, increasing vocalization
  - Rolls over, sits with support

Assessment: 6 to 12 Months Old

- Sit or squat to get at eye level when examining, use toe-to-head approach. Signs to look for:
  - Socially interactive, babbles
  - Sits without support, increased mobility
  - Everything goes in mouth
  - Stranger/separation anxiety
Assessment: 1 to 3 Years Old

• “Terrible twos”
• Increased mobility
• Curious about everything, no fear
• Egocentric, very strong opinions
• Not swayed by logic
• Language comprehension greater than expression

Assessment: 4 to 10 Years Old

• Analytical, understands cause and effect
• Cooperative, age of reason
• But:
  – Child might have misconceptions about the body.
  – Child may overestimate implications of illness/injury and misinterpret information.
  – Independence may crumble when the child is sick.
Assessment: Adolescent

• Similar to toddlers:
  – Risk-takers, no fear of danger, and don’t anticipate consequences. Not swayed by commonsense.
  – Dependence shifts from family to peers.
• Techniques for assessment:
  – Respect privacy, provide concrete explanations.
  – Talk to the teen not the parents.
  – Do not succumb to provocation.

Focused History

• Complete history, including mechanism of injury or circumstances of illness
• Use SAMPLE mnemonic
  – Signs/symptoms
  – Allergies
  – Medications
  – Past medical problems
  – Last food or liquid
  – Events leading to injury or illness
SAMPLE

S – Symptoms (Signs are important but they are objective.)
A – Allergies
M – Medications
P – Past Medical History
L – Last Oral Intake (Sometimes also Last Menstrual Cycle.)
E – Events Leading Up To Present Illness / Injury

Detailed Physical Examination

- Establish a clinical diagnosis.
- Plan sequence of laboratory testing and imaging.
Ongoing Assessment

• Systematic review of assessment points:
  – PAT
  – ABCDEs
  – Repeat vital signs
  – Reassessment of positive anatomical findings, and physiologic derangements
  – Review of effectiveness and safety of treatment
  
  assess, intervene, reassess (AIR)

The Bottom Line

• Begin with PAT followed by ABCDEs.
• Form a general impression to guide management priorities.
• Treat respiratory distress, failure, and shock when recognized.
• Focused history and detailed PE.
• Perform ongoing assessment throughout ED stay.
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