Objectives

- Discuss key physiologic differences in children versus adults
- Discuss challenges in the examination of the pediatric ED patient
- Review developmental stages in children & how that relates to ED assessment

Children are not just little adults

CC: 9 day old with dyspnea

Looks: minimal respiratory distress, sleeping in mom’s arms

ABCs: intact

What do you ask the parents?

AMPLE: NKDA
No meds
Term infant, NSVD
Last fed just before arrival
Parents noted rapid, shallow respirations with feeds since birth, worsening now

What do you look for on exam?

Children are not just little adults

PE:
VS 36.3 186 70 75/47 99%ra
Heart RRR S1S2, 2/6 SEM
Lungs CTA bilaterally, subcostal retractions
2+ femoral pulses bilaterally, <2 sec cap refill

What do you think of the vital signs?
Do you want any studies?

Lesson 1:
Pediatric vital signs vary with age
Learn ranges for vital signs in children (or where to look this up!)
Children are not just little adults

<table>
<thead>
<tr>
<th>AGE</th>
<th>RESPIRATORY RATE</th>
<th>HEART RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1</td>
<td>30-60</td>
<td>100-160</td>
</tr>
<tr>
<td>1-2</td>
<td>24-40</td>
<td>90-150</td>
</tr>
<tr>
<td>2-5</td>
<td>22-34</td>
<td>80-140</td>
</tr>
<tr>
<td>6-12</td>
<td>18-30</td>
<td>70-120</td>
</tr>
<tr>
<td>&gt;12</td>
<td>12-16</td>
<td>60-100</td>
</tr>
</tbody>
</table>

Lower limits of systolic blood pressure:
- 0–28 days: 60 mm Hg
- 1–12 months: 70 mm Hg
- 1–10 years: 70 mm Hg + (2 × age in years)

Children are not just little adults

Common causes of tachycardia:
- Fever
- Anxiety
- Pain

First and most sensitive sign of cardiovascular compromise

Children are not just little adults

Common causes of tachypnea:
- Fever
- Anxiety
- Pain

First and most sensitive sign of respiratory compromise

Children are not just little adults

Accurate blood pressure is often difficult to obtain!
- lack of cooperation
- appropriate selection of the blood pressure cuff

Respiratory failure most common cause of pediatric cardiac arrest
Children are not just little adults

Compensated Shock
↓
Decompensated Shock

Hypotension is a late finding in pediatric shock

Back to our patient...
CXR showed mild cardiomegaly
EKG normal
ECHO revealed VSD and PFO
Cardiology consult and admission for developing heart failure secondary to CHD

Why can't you tell me what is wrong?

CC: 4 year old with fever
Looks: sleepy
ABCs: intact

What do you ask the parents?

AMPLE: NKDA
no meds
Autistic, non-verbal
5 days of fever, began vomiting yesterday. Decreased PO & urine output. Patient unable to indicate pain but mom knows 'something is wrong'

What do you look for on exam?

Why can’t you tell me what is wrong?

PE:
VS 110/80 150 24 97%RA 103.1
Cries with exam, no tears
Mild erythema in post OP w/o exudate

What do you want to do?

Lesson 2:
Be patient with non-verbal patients. Frequent reassessment is key.

Listen to the parents. Parents usually know their children best.
**Why can't you tell me what is wrong?**

- WBC 27.6
- Rapid Strep neg
- UA large ketones, -LE, no WBC
- CXR neg

Repeat examinations despite IVF- patient crying, mom thinks possibly some discomfort during abdominal palpation

What do you do now?

**Why can't you tell me what is wrong?**

- Abdominal US shows acute appendicitis
- Surgery consult, IV antibiotics
- Admit to operating room

**Nonverbal patients in the ED**

Acute disease often presents with non-specific symptoms

- Use family members to assist in history & exam
- Pay close attention to dentition, TM, skin
- Increased risk of abuse in these patients!

Laboratory/radiographic studies usually beneficial if no clues on history & exam

**Fun at Grandma’s House**

CC: 22 month old male who is “too sleepy,” here with Grandma

Looks: difficult to arouse

ABCs: intact, positive gag

What do you ask the parents?

<table>
<thead>
<tr>
<th>Age</th>
<th>Developmental pearls</th>
<th>Examination hints</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-6 years</td>
<td>Advancing communication skills Fantasize (fears)</td>
<td>Explain exam, procedures. Encourage participation.</td>
</tr>
<tr>
<td>6-11 years</td>
<td>Independence established for basic functions Interest in learning</td>
<td>Include in medical decision making.</td>
</tr>
<tr>
<td>12-18 years</td>
<td>Abstract thinking developed</td>
<td>Maintain privacy during exam. May ask caregiver to leave room.</td>
</tr>
<tr>
<td>6-18 months</td>
<td>6 weeks smile 4 months rolls 6 months sits</td>
<td>Observe infant interactions with caregiver. Exam with infant in lap.</td>
</tr>
<tr>
<td>18 months- 3 years</td>
<td>9 months crawls 1 year walks simple words</td>
<td>Stranger anxiety peaks. Distraction tools Exam in caregiver’s lap.</td>
</tr>
<tr>
<td>6-18 months</td>
<td>Exploring environment answer simple questions</td>
<td>Ask direct questions. Can point to location of pain.</td>
</tr>
</tbody>
</table>
Visiting Grandma, found asleep on the floor, unable to wake up. Called 911.

What do you look for on exam?

Patient somnolent, withdraws to pain only. Pupils are pinpoint.

Why is this child altered? Or is he just tired?

What do you do now?

Lesson 3:
When a child is not acting normal, think through the causes of altered mental status to piece the picture together. Children can be quite mischievous!

Altered Mental Status DDx
1. Vital sign abnormality
2. Structural
3. Infectious
4. Toxic/metabolic
5. Psychiatric

What is highest on your differential for this patient?

‘One Pill That Can Kill a Toddler’ Drugs
Benzocaine Methadone
Beta blockers Oil of wintergreen
Calcium channel blockers Phenothiazines
Camphor Quinidine
Chloroquine Quinine
Clonidine Sulfonyleurases
Colchicine Theophylline
Diphenoxylate
Lindane

Opiate Toxidrome
Decreased RR
Depressed mental status
Constricted Pupils
Decreased bowel sounds

How do you treat this?
Fun at Grandma’s House

Exam consistent with lomotil ingestion
High dose narcan to reverse CNS effects
Admit to PICU on narcan drip

To Image or Not?

CC: 8 month old fell out of baby carrier

Looks: quiet, but interacts

ABCs: intact

What do you ask the parents?

To Image or Not?

AMPLE: NKDA
No meds
No PMH
Mom carrying baby front facing in baby carrier, slipped & fell forward. Baby landed face first on sidewalk, cried immediately. Mom thought baby more sleepy.

What do you look for on exam?

To Image or Not?

PE:
VS 36.8 130 24 90/60 99%ra
Patient playing with toy as you enter the room.
Cries during exam, consoles quickly. Frontal scalp hematoma.

What would you like to do? Mom wants a CT scan…

To Image or Not?

Lesson 4:

Avoid unnecessary radiation in children.

Keep abreast of the literature and educate your patients.

To Image or Not?

6 predictors of clinically important TBI (ciTBI) for <2 years old (Kupperman 2009):
1. Altered mental status
2. Non-frontal scalp hematoma
3. LOC ≥5 seconds
4. Severe mechanism
5. Palpable or unclear skull fracture
6. Not acting normal per parent

Sensitivity of 99-100% for ciTBI
6 predictors of ciTBI for ≥2 years old (Kupperman 2009):
1. Altered mental status
2. Severe headache
3. Any LOC
4. Severe mechanism
5. Signs of basilar skull fracture
6. History of vomiting

Sensitivity of 97% for ciTBI

### Pediatric GCS

#### Eye Opening

<table>
<thead>
<tr>
<th>&lt;1 year</th>
<th>&gt;1 year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 None</td>
<td>None</td>
</tr>
<tr>
<td>2 Painful stimuli</td>
<td>Painful stimuli</td>
</tr>
<tr>
<td>3 Shouting</td>
<td>Verbal stimuli</td>
</tr>
<tr>
<td>4 Spontaneous</td>
<td>Spontaneous</td>
</tr>
</tbody>
</table>

#### Verbal

<table>
<thead>
<tr>
<th>&lt;2 years</th>
<th>2-5 years</th>
<th>&gt;5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>2 Grunts to pain</td>
<td>Grunts to pain</td>
<td>Incomprehensible sounds</td>
</tr>
<tr>
<td>3 Persistent crying</td>
<td>Cries to pain</td>
<td>Inappropriate words</td>
</tr>
<tr>
<td>4 Cries but consolable</td>
<td>Inappropriate words</td>
<td>Confused</td>
</tr>
<tr>
<td>5 Babbles/coos</td>
<td>Appropriate words</td>
<td>Oriented</td>
</tr>
</tbody>
</table>

#### Motor

<table>
<thead>
<tr>
<th>&lt;1 year</th>
<th>&gt;1 year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 None</td>
<td>None</td>
</tr>
<tr>
<td>2 Decerebrate</td>
<td>Decerebrate</td>
</tr>
<tr>
<td>3 Decorticate</td>
<td>Decorticate</td>
</tr>
<tr>
<td>4 Withdraw to pain</td>
<td>Withdraw to pain</td>
</tr>
<tr>
<td>5 Localize pain</td>
<td>Localize pain</td>
</tr>
<tr>
<td>6 Spontaneous</td>
<td>Obey commands</td>
</tr>
</tbody>
</table>

### To Image or Not?

Back to your patient...

Meets 1 criteria- not acting normally per parent
Risk <1% ciTBI
Observe in ER over an hour, patient very appropriate, parent reassured. Given strict return precautions.

### 2 month old female

CC: Crying

Looks: Crying in mom’s arms

ABCs: intact

VS: 117/64 130 24 100%ra 99.0

What do you ask the parents?
2 month old female

AMPLE:
- NKDA
- FT, SVD
- History of reflux, on Prevacid

Began crying earlier in the day, inconsolable. Taking decreased PO with decreased UOP. No fevers/URI symptoms.

What do you look for on exam?

Lesson 5:
Learn why babies cry.
Know when it is normal and what to look for.

Causes of excessive crying in infants

- Trauma
- Abuse
- Corneal abrasion
- Hair tourniquet
- Gastrointestinal
  - Constipation
  - GER
  - Rectal Fissure
  - Feeding intolerance
- Infection
  - UTI
  - Meningitis
  - Otitis media
  - Viral illness
- Colic
  - Begins at 2 weeks of life, crying more than 3 hours per day, more than 3 days per week, for more than 3 weeks

Take off all clothing- normal exam

Fluorescein stain eyes- large right-sided corneal abrasions.

To prove crying from abrasions- Propericaine drop placed in both eyes, no further crying!

Rx- home with Erythromycin ointment

• Vital signs in children have a wide range of normal. Understand ‘benign’ causes of abnormal to differentiate ‘sick’ versus ‘not sick’
• Non-verbal pediatric patients present a special challenge. Listen to caregivers.
• Tailor your interactions with pediatric ED patients to their developmental level.