University of Washington School of Medicine
Division of Emergency Medicine

EM Clerkship: Approach to the pediatric patient in the ED

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?

Children are not just little adults

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?

Children are not just little adults

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

AGE	RESPIRATORY RATE	HEART RATE
<1	30-60	100-160
1-2	24-40	90-150
2-5	22-34	80-140
6-12	18-30	70-120
>12	12-16	60-100

Children are not just little adults

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

Tachypnea→ increased work of breathing→ abnormal/decreased breath sounds→ pallor→ altered mental status

Respiratory failure most common cause of pediatric cardiac arrest

Children are not just little adults

Accurate blood pressure is often difficult to obtain!

- lack of cooperation
- appropriate selection of the blood pressure cuff

Children are not just little adults

Compensated Shock

↓

Decompensated Shock

Hypotension is a late finding in pediatric shock

Children are not just little adults

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?

Why can't you tell me what is wrong?

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?

Why can't you tell me what is wrong?

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

Why can't you tell me what is wrong?

<u>Nonverbal patients in the ED</u>
Acute disease often presents with non-specific symptoms

Use family members to assist in history & exam

Pay close attention to dentition, TMs, skin

Increased risk of abuse in these patients!

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

Why can't you tell me what is wrong?

Age	Developmental pearls	Examination hints
0-6 months	6 weeks smile 4 months rolls 6 months sits	Observe infant interactions with caregiver. Exam with infant in lap.
6-18 months	9 months crawls 1 year walks simple words	Stranger anxiety peaks. Distraction tools Exam in caregiver's lap.
18 months- 3 years	Exploring environment answer simple questions	Ask direct questions. Can point to location of pain.

Why can't you tell me what is wrong?

Age	Developmental pearls	Examination hints
3-6 years	Advancing communication skills Fantasize (fears)	Explain exam, procedures. Encourage participation.
6-11 years	Independence established for basic functions Interest in learning	Include in medical decision making.
12-18 years	Abstract thinking developed	Maintain privacy during exam. May ask caregiver to leave room.

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?

Fun at Grandma's House

AMPLE: NKDA
Albuterol inhaler prn
Asthma
Visiting Grandma, found asleep on the floor, unable to wake up. Called 911.

What do you look for on exam?

Fun at Grandma's House

PE:
VS 37.2 120 12 80/60 98%ra
Patient somnolent, withdraws to pain only. Pupils are pinpoint.

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

What do you do now?

Fun at Grandma's House

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!

Fun at Grandma's House

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?

Fun at Grandma's House

<u>'One Pill That Can Kill a Toddler' Drugs</u>

Benzocaine
Beta blockers
Calcium channel blockers
Camphor
Chloroquine
Clonidine
Colchicine
Diphenoxylate
Lindane
Methadone
Oil of wintergreen
Phenothiazines
Quinidine
Quinine
Sulfonylureas
Theophylline

Fun at Grandma's House

<u>Opiate Toxidrome</u>

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.

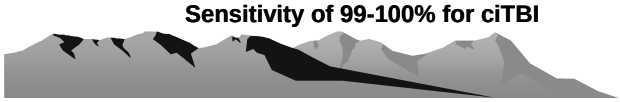
Keep abreast of the literature and educate your patients.

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



To Image or Not?

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

	<1 year	>1 year
1	None	None
2	Painful stimuli	Painful stimuli
3	Shouting	Verbal stimuli
4	Spontaneous	Spontaneous

Pediatric GCS

Verbal

	<2 years	2-5 years	>5 years
1	None	None	None
2	Grunts to pain	Grunts to pain	Incomprehensible sounds
3	Persistent crying	Cries to pain	Inappropriate words
4	Cries but consolable	Inappropriate words	Confused
5	Babbles/coos	Appropriate words	Oriented

Pediatric GCS

Motor

	<1 year	>1 year
1	None	None
2	Decerebrate	Decerebrate
3	Decorticate	Decorticate
4	Withdraw to pain	Withdraw to pain
5	Localize pain	Localize pain
6	Spontaneous	Obey commands

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?

2 month old female

Lesson 5:

Learn why babies cry.

Know when it is normal and what to look for.

2 month old female

Causes of excessive crying in infants

Trauma
Abuse
Corneal abrasion
Hair torniquet

Gastrointestinal
Constipation
GER
Rectal Fissure
Feeding intolerance

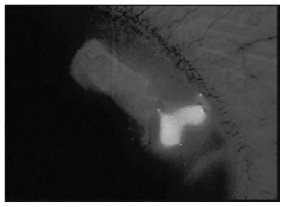
Infection
UTI
Meningitis
Otitis media
Viral illness

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

2 month old female

Take off all clothing- normal exam

Fluorescein stain eyes- large right-sided corneal abrasions.



2 month old female

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

Rx- home with Erythromycin ointment

Conclusion

- 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.