EM ITE Review Pediatric Topics

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February 2022

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Disclosures

- Nothing to disclose

2

Poll Everywhere

- Pollev.com/kellylevasse402
- Text:
- KellyLevasse402 to 22333 once to join

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ObjectivesOB JOBJECTIVES

- Brief overview of common pediatric illnesses
- Review pediatric cases
- Board style questions
- Pediatric Pearls

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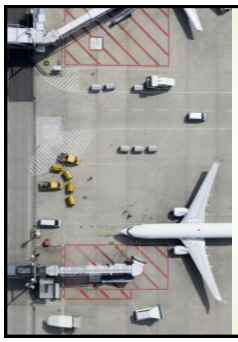

AIRWAY

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11-month-old male presents to the emergency department at 12am with parents for complaint of difficulty breathing. He had noisy breathing and when they found him in bed but was not blue. He had has a barky cough. What is the most likely dx and Tx?

- Asthma give albuterol
- Foreign body aspiration, surgery
- Croup, dexamethasone
- Choking episode, discharge home
- Viral upper respiratory track infection, discharge home

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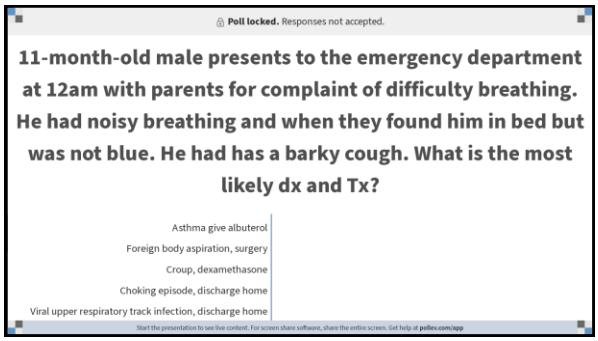

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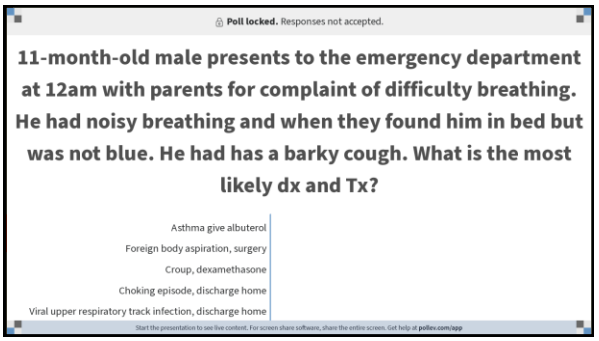

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Croup

- Stridor
- Vaponephrine/ racemic epinephrine
- Dexamethasone

9

Epiglottitis

- Young children - unvaccinated
- Respiratory distress –
  - tripod position
  - Drooling
- Early intubation under controlled situation

10

Bacterial Tracheitis

- Any age, vaccination status does not matter
- Typical scenario: patient has been sick with cold symptoms for several days and then suddenly has severe respiratory distress.
- Stridor, fever

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Bronchiolitis

- 8-month-old who presents with 3 days of worsening difficulty breathing. Runny nose, coughing, congestion, no vomiting or diarrhea, not eating well but drinking OK.
- Exam: HR 150, RR 40, pulse ox 98% on room air
- Auscultation: diffuse rales, rhonchi, no nasal flaring, no grunting.

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Bronchiolitis

- Etiology and pathophys
  - Pulmonary infection of young children characterized by wheezing
  - Most common cause – RSV
  - Most infections occur in the winter
  - Occurs up to 2 yrs of age

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Bronchiolitis

- Etiology and pathophys
  - Infection causes death of the cells that line the bronchi, which then slough into the lumen
  - Increased production of mucus
  - Eventual plugging of the bronchi from necrotic epithelium and mucus that produces hyperinflation and atelectasis

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Bronchiolitis

- Signs and symptoms
  - Begins and URI
  - Over 2 – 5 days signs of respiratory distress appear
  - Parents often hear the child wheezing
  - Fever in 2/3 of pts
  - Often appear ill – younger are sicker
  - RR often at least 40 but may be 80 – 100
  - Nasal flaring, retractions
  - With ventilatory muscle fatigue may see grunting respirations
  - Only in the most severe cases will you see cyanosis

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Bronchiolitis

- Life threatening complications
  - Apnea (considered to be unpredictable)
  - Dehydration
  - Respiratory failure
  - Rarely bacterial superinfection

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Bronchiolitis

- Management:
  - Treat the symptoms
  - Hypoxia – oxygen, nasal cannula, high flow!
  - If strong family history of asthma, atopic dermatitis may trial albuterol
  - Severe respiratory distress – vaponephrine

  - **DO NOT USE STEROIDS**

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Bronchopulmonary Dysplasia (BPD)

- Etiology and Pathophys
  - Chronic lung disorder secondary to perinatal lung insults
  - Newborns requiring prolonged ventilation are at risk
  - Diagnosis- Infants who are >28 days old, receiving supplemental oxygen, and who have significant clinical, radiologic or blood gas abnormalities

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BPD

- Signs and symptoms
  - Tachypnea, retractions at rest or during mild respiratory infections
  - Hyperinflated lungs
  - On auscultation may have crackles, wheezes or decreased breath sounds
  - Some may have dyspnea or FTT
  - Gas – PaCO2 >45 often despite RR of 60-80

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BPD

- Management
  - Hospitalized pts with resp rates > 70 -80 bpm or a significant change from baseline
  - Increasing hypoxia or hypercarbia, poor feeding associated with resp symptoms, or new pulmonary infiltrates
  - If Sx are mild - consider outpatient with supplemental oxygen, bronchodilators and inhaled corticosteroids
  - Consider antibiotic therapy- if possible bacterial infection

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Real Case:

	Event	
3/11/2016		
23:31	Patient arrived in ED	
23:32	Travel Screening	TRAVEL SCREENING - Have you traveled outside the USA or has family or friends you live with traveled outside the USA in the past 21 day No
23:32:34	Patient roomed in ED	To room POOL TRIAGE RO
23:34:05	Patient transferred	From room POOL TRIAGE RO to room PEDS CARE RO
23:34:05	Patient transfer to Care Area	Patient transferred to Care Area
23:47	Vitals ED	Vital Signs - Heart Rate : 167 -Resp: 34 -Temp: 97.5 °F (36.4 °C) -Temp Source: Tympanic -SpO2: 89 % -FiO2 %: 21 % Height and Weight - Weight: 11.36 kg (25 lb 1.4 oz) -Weight Source: Infant scale
23:47	Custom Formula Data	Height and Weight - Percent Weight Change Since Birth: 0 Other flowsheet entries - Age: 2.00
23:50	RC Asm	Pt Care Documentation - Add'l Info: called to b/s pt desat 70's - NRM placed on pt, HFNC setting up
23:50	Triage Start	Triage Start - Begin Triage: Yes
23:50:41	Triage Started	

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ER Course?

Differential Dx?

Work-Up?

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What do you think is the most likely diagnosis?

- A. Croup
- B. Asthma
- C. Pneumonia
- D. Foreign body
- E. Bronchiolitis
- F. Other

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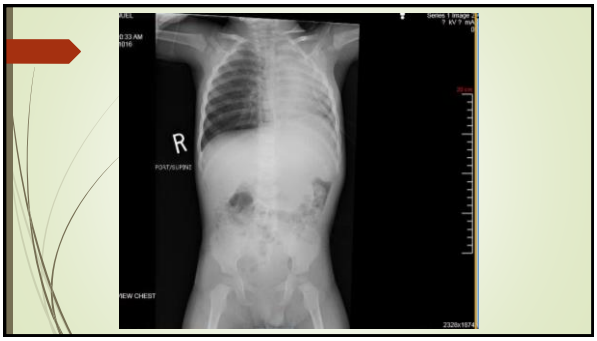

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Aspiration

- Haugen – first to report a series of deaths in restaurants
  - Café coronary is a fatal upper airway obstruction that occurs to adults who spontaneously swallow large pieces of meat while they laugh or chat.
- Most common – rt side
- 80% of cases < 3 years (peak 1–2 years)
- CDC – 33% of choking episodes occur in infants and 75% in < 3 years old
- In a review of 81 cases –
  - 77.8% <5 years
  - 16% 5-12
  - 6.2%>15

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Aspiration

- food items comprise > 50% of nonfatal choking episodes in the US
- High-risk foods: hot dogs, hard candies, nuts, seeds, raw fruits and vegetables, and gum
- Among high-risk toys: latex balloons, marbles, balls, and spherical toys
- Qualities that make both toys and foods more dangerous: being small enough to fit in the airway, having a cylindrical shape, and being compressible, which can create a tight obstruction of the patient's airway

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Aspiration

- Classic triad - cough, wheezing and decreased air entry
  - Up to 50% of children with known foreign body ingestion are asymptomatic
- Cough 75% to 85% of patients and has a high sensitivity but low specificity
- H/O choking is reported in 80% to 90%, but the absence of choking does not rule out aspiration
- *A witnessed or reported episode of coughing and choking in association with an observed foreign object in the mouth should prompt consideration of bronchoscopy for further evaluation*
- Medical history is the most important predictive part of the evaluation. There is evidence for considering bronchoscopy if there is significant history suggestive of foreign body aspiration, even in the setting of normal physical examination findings.

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Preventions

- The Federal Hazardous Substance Act uses the small-parts test fixture, a cylinder simulating a child's mouth and pharynx, to define a small object that requires a ban of the object for children younger than age 3 years and a hazard warning. The diameter is 3.17 cm (1.25 in), with a depth ranging from 2.54 cm (1 in) to 5.71 cm (2.25 in). In addition, the CSPA mandates balls to have a minimum diameter of 1.75 in if intended for children
- There are no similar regulations or legislation for food products, despite bills being presented to Congress.
- AAP recommends:
  - Hard candy and gum not be given to children younger than age 5 years
  - Raw vegetables and fruit be cut up into small pieces
  - Children always be supervised while eating AND be seated when eating– not running, walking, or lying down
- Caregivers should also be familiar with choking-related rescue maneuvers

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Infant

34

Brief Resolved Unexplained Events (BRUE)

- Definition:
- Clinicians should use the term BRUE to describe an event occurring in an infant <1 year of age when the observer reports a sudden, brief, and now **resolved** episode of ≥1 of the following:
  - cyanosis or pallor
  - absent, decreased, or irregular breathing
  - marked change in tone (hyper- or hypotonia)
  - altered level of responsiveness
  - Diagnose a BRUE only when there is no explanation for a qualifying event after conducting an appropriate history and physical examination

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BRUE

- What to do?
- May briefly monitor patients with continuous pulse oximetry and serial observations
- Should
  - offer resources for CPR training to caregiver
  - educate caregivers about BRUE
  - use shared decision-making

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American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN®

- **Evaluation and Management of Well-Appearing Febrile Infants 8 to 60 Days Old**
- Pediatrics. 2021;148(2). doi:10.1542/peds.2021-052228

- Published August 2022
- Now 3 age groups
  - 8-21 – same as always – blood, urine and LP with antibiotics and admission
  - 22-28 – CHANGE – possibly NO LP, (CRP, Procalcitonin no WBC),
  - 29-60 – blood (CRP, Procalcitonin), and urine, if urine positive not necessary to LP and can be sent home on antibiotics

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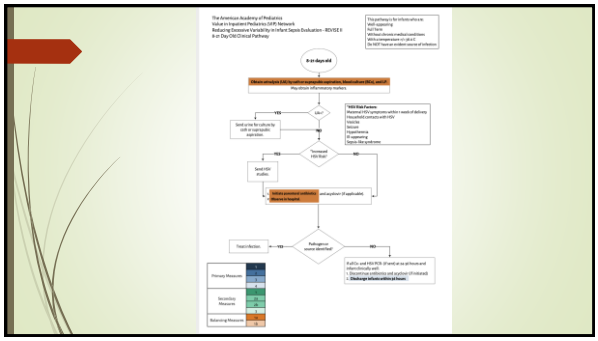

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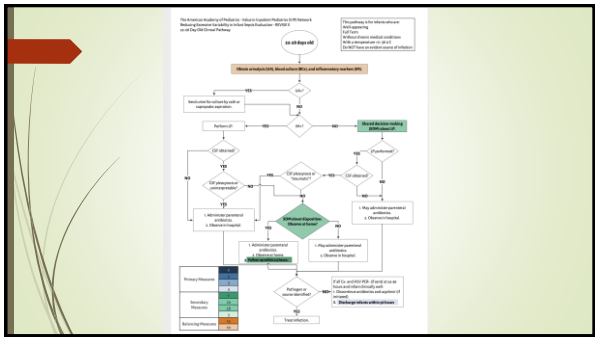

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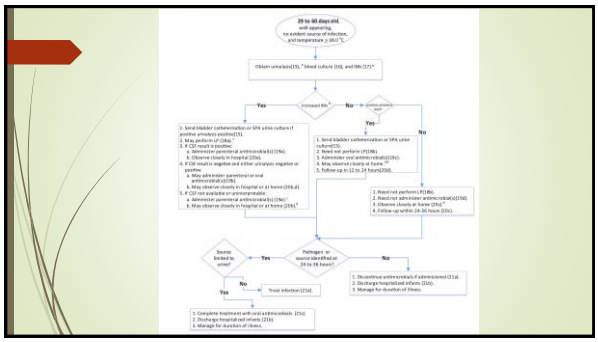

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A 12 day old who was delivered at home and received no prenatal care is brought in for evaluation of a purulent eye discharge and cough. Examination reveals diffuse conjunctival injection and greenish discharge. What is the most likely etiologic agent?

- Staph aureus
- Adenovirus
- Chlamydia trachomatis
- Nisseria Gonorrhea

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Ophthalmia neonatorum

- Cases occurring in the 1st month of life
- Bacterial causes must be suspected within 2 weeks of birth
- Gram stain and culture
- Fluorescein staining…always
- Need STD Hx & prenatal care Hx from mother
- Neonate should be examined for evidence of systemic gonococcal infection
  - Blood and CSF testing with hospitalization

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conjunctivitis

PEARLS

- Viral, up to 50% of viral infections are adenovirus
- Antibiotic use should be *judicious*…wait, what? Yes, judicious.
- Other causes include:
  - Bacterial
  - Chemical- including antibiotics!
  - Allergic and vernal (seasonal allergy)

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GI

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Case#1

- 2-month-old female with vomiting for the past three days, getting worse today
- The vomitus is nonbloody, nonbilious
- She still is hungry and has normal amount of wet diapers
- No diarrhea, no fever, no cold symptoms
- No known sick contacts, no recent travel
- PMHx – born full term to drug addicted mother, lives with foster mother for the past 5 days
- Other history unknown

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Case #1

- Vitals normal
- Vomiting is getting more forceful
- What test do you order and what is the likely diagnosis?

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Pyloric Stenosis

- Most common cause of metabolic alkalosis in infancy
- Most common reason for abdominal surgery in the first 6 mo of life
- Incidence 1-250 to 1,000 depending on geographic location
- Boys > girls 4:1
- Greater in Caucasians
- Etiology – unknown (acquired vs. congenital)
- Gastric outlet obstruction results from
  - Hypertrophy of the pyloric muscle

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Pyloric Stenosis – Signs/ Symptoms

- Symptoms can start at 3 weeks after birth (range 3 weeks – 5mo. Typically 5 weeks-2months)
- Symptoms usually begin as spitting up progressing to emesis, often projectile
- PE may show a dehydrated infant who is an avid sucker
- May palpate and olive-like mass in the upper abdomen

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Pyloric Stenosis - Diagnosis

- Electrolytes – hypochloremic, hypokalemic metabolic alkalosis
  - Loss of acid
  - Retention of bicarbonate
- Initially vomiting results in excessive loss of HCl and KCl which
- As intravascular volume decreases (dehydration) the concentration of HCO_3 in the plasma increases leading to contraction alkalosis

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Pyloric Stenosis - Diagnosis

- Abdominal us –
  - Pyloric muscle thickness of >4mm and a pyloric length >16mm have a diagnostic sensitivity and specificity of 89% and 100%

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Pyloric Stenosis - Management

- Correction of fluids and electrolytes
- Corrective surgery – pyloromyotomy
- Prognosis - excellent

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Case #2

- 20-month-old female
- H/O crying episodes over the past 3 to 4 hours each lasting 1-2 minutes each
- Pt acts OK in between crying episodes
- No abdominal distention, diarrhea, constipation, blood in the stools, vomiting
- No history of fever, or refusal to feed

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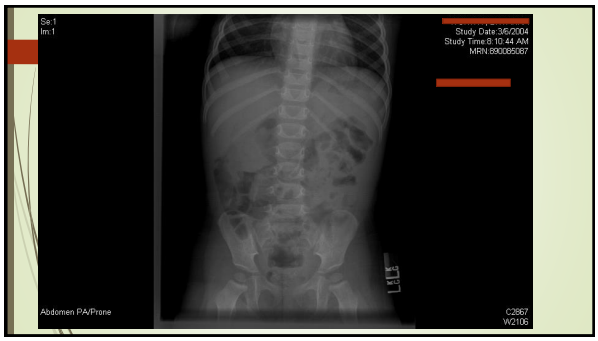

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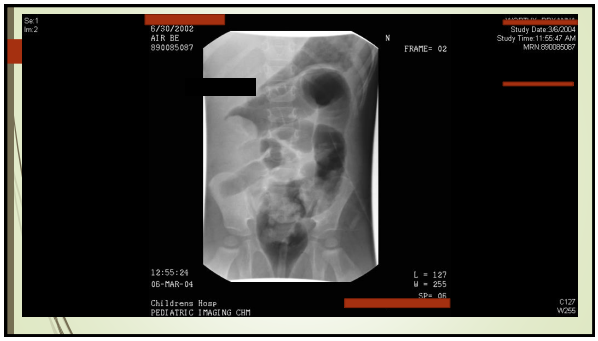

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Intussusception

- Is the telescoping of one portion of the bowel into another
- Venous engorgement and ischemia of the intestinal mucosa cause bleeding and production of mucous, which results in the classic description of red "currant jelly" stool
- Age – 6mo to 3 years
- 90% are idiopathic
- May have preceding URI or diarrheal illness

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Intussusception – Signs/ Symptoms

- Pts present with intermittent pain – occurs at intervals of 10-20 min
- Vomiting with loose or watery stools after 12-24 hours will see bloody stools
- Initially abdominal exam is benign
- Gold standard test - ultrasound
- Treatment – air enema, Curative in 95% of patients

59

Case #3

- 3 do FT baby who presents with vomiting 3 times after her last feed
- No fevers, no diarrhea, otherwise acting well, opening eyes
- No known sick contacts
- Vomitus looks yellowish
- What test do you order?

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Malrotation with Volvulus

- Rotational anomalies occur because of an arrest in normal rotation of the embryonic gut leading to abnormal position of duodenojejunal junction
- Occurs in 1/200 to 1/500 but symptomatic malrotation occurs in 1/6000 births
- 2/3 of patients who require surgery are <1 month of age
- 30-60% of pts have an associated anomaly

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Malrotation with Volvulus

- Presents as acute abdominal pain in a previously healthy child
- **Must suspect in any child with bilious emesis**
  - >90% of patients present with this
- Need to go to surgery within hours to prevent systemic decompensation
- Can result in infarction of the entire small intestine

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Malrotation with Volvulus

- Diagnosis
- Abd x-rays – usually not helpful
- Upper GI – see corkscrew or birds beak appearance
  - the imaging features in approximately 15% of upper GI tract examinations are equivocal and lead to a false-positive or false-negative interpretation

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UpToDate_Intestinal malrotation

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Malrotation with Volvulus

- Get the patient to surgery
- Correct any electrolyte imbalances and treat for signs of sepsis
- Patients can do very well if treated appropriately and quickly

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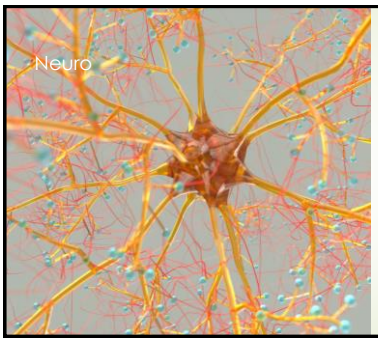

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Causes of Seizures

- Any age:
  - Isolated event with no obvious cause
  - Infectious (meningitis)
  - Tumor
  - hypocalcemia, hyponatremia
- Infants
  - Perinatal asphyxia or in-utero stroke
  - Genetic syndrome
- Younger Children
  - fever
- Older Children
  - Tumor or a neurodegenerative

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Kids are Different

- Children >6 yrs tend to have seizures that are similar to adults
- Younger children/ infants have less complex behaviors
- Difficult to determine a change in consciousness in infants and young children
- Typical generalized tonic-clonic and absence seizures are extremely uncommon in the first two years of life and never occur in the newborn

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Febrile seizures

- Seizure occurring between 6 months and 5 years of age that is associated with a fever [temp >38C (100.4F)] but without the evidence of intracranial infection or other defined cause or neurologic disease
- Are the most common seizure disorder in childhood
- Affect 2 - 5% of children between the ages of 6 months and 5 years

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FEBRILE SEIZURE: TWO TYPES

Simple Febrile	Complex Febrile
6 months – 5 years of age	6 months – 5 years of age
Febrile before, during or after seizure	Febrile before, during or after seizure
Seizure lasting **less** than 15 minutes	Prolonged (lasting **more** than 15 minutes)
Generalized seizure, and	**Focal** seizure, or
Occurs once in a 24-hour period	Occurs more than once in 24 hours

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Febrile seizure

- Family history of febrile seizures in an immediate family member in 25% to 40% of cases
- After the first febrile seizure, approximately 33% of patients will have at least one recurrence and about 9% will have three or more episodes
- 75% of recurrences will happen within 1 year
- Less than 5% chance of subsequent epilepsy

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Causes of neonatal seizures

- First 24hrs:
  - Hypoxic ischemic encephalopathy
  - Infection (TORCHES)
  - Direct drug effects
  - Metabolic (hypoglycemia, hypocalcemia)
  - Intracranial hemorrhage
  - Pyridoxine dependency
- > 24hr
  - Infection (Meningitis, sepsis, herpes)
  - Intracranial hemorrhage and malformations
  - Metabolic
  - Drug withdrawal

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Ortho

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5-year-old fell off money bars and had immediate wrist pain You obtain an x-ray and this is the finding. What is the diagnosis and next best step?

A. normal x-ray; Give Ibuprofen and discharge home
B. Buckle fracture; Place in Cast and discharge home to follow up with orthopedic surgery
C. Salter Harris type II fracture; place in cast, discharge home to follow up with surgery
D. Salter Harris type III fracture; Place in cast and discharge home to follow up with surgery
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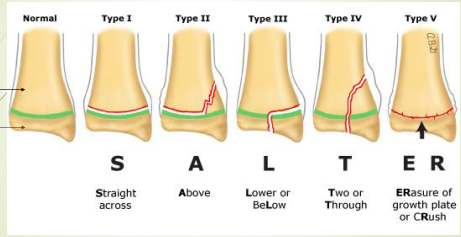
SALTER HARRIS FRACTURES



https://www.uptodate.com/contents/general-principles-of-fracture-management-fracture-patterns-and-description-in-children?search=salter%20harris%20fracture&source=search_result&selectedTitle=3~11&usage_type=default&display_rank=3#H15

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Supracondylar fractures

- Most common elbow fracture
- Kids 3-7 years of age

- Mechanism – fall on outstretched arm (70%) or fall onto elbow
- Children <3 years – fall is usually less than 3 feet
- Monkey bars!!!!

- 3 types
- Nerve Injuries

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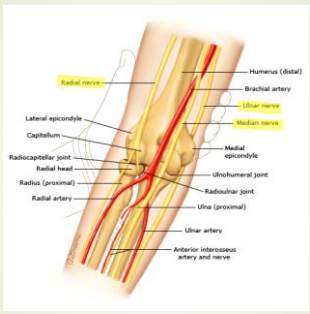

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Lines of Elbow

- Anterior humeral line:
  - A line drawn down the anterior surface of the humerus should intersect the middle third of the capitellum.
- Posterior Fat Pad Sign

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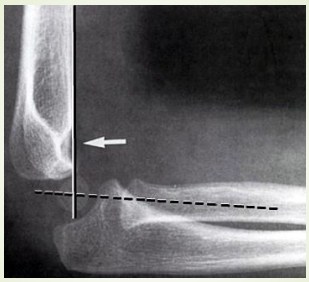

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81

https://www.medscape.com/answers/415822-185731/which-radiographic-findings-are-characteristic-of-pediatric-supracondylar-elbow-fracture

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Radial Head Subluxation: NURSEMAID ELBOW

- Annular ligament slips over the head of the radius and slides into the radiohumeral joint and gets stuck.
- 1-5 years of age
- Hold arm straight by side or flexed at elbow by side
- Do not need imaging – if clear mechanism of pulling
- Reduce: **hyper-pronation** or supination
- Ensure movement of elbow – discharge home

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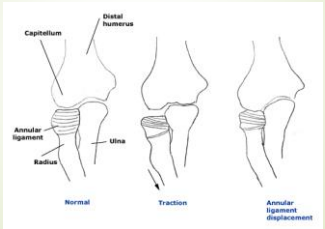
Radial Head Subluxation



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Text **KELLYLEVASSE402** to **22333** once to join

9-year-old male who presents with 2 days of abdominal pain and a new rash today. There is no recent travel history, and there are no known sick contacts. The patient has no past medical history, no allergies and is up to date with him immunizations.

A. Malrotation with volvulus
B. Mesenteric Adenitis
C. Intussusception
D. Appendicitis
E. Cholelithiasis

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85

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HSP

- Henoch-Schönlein Pupura (aka IgA vasculitis)
  - Most common form of systemic vasculitis in children
  - Usually self-limited

88

Epidemiology

- Primarily a childhood disease: 3-15 years old
  - Peak: 4-6 years old
  - 10% of cases occur in adults
  - 10-20 per 100,000 children <17 years old
- Male predominance
- White > Asian > Black
- Fall, Winter, Spring > Summer
  - ~50% have associated preceding URI, especially streptococcus

89

Classification Criteria

- 2005: European League Against Rheumatism (EULAR) and Paediatric Rheumatology European Society (PRES)
- Purpura without ↓ platelets & coagulopathy PLUS 1 of the following:
  - Abdominal Pain
  - Arthritis or Arthralgia
  - Renal Involvement
  - Leukocytoclastic vasculitis or proliferative glomerulonephritis, with predominent IgA deposition

90

Pathogenesis

- Immune-mediated leukocytoclastic SMALL vessel vasculitis
- IgA and C3 deposition in affected organs
  - Vessel walls
  - Kidney
- Unknown cause
  - ? Alteration in glycosylation of IgA
  - ? Elevated levels of anticardiolipin antibodies
  - ? Increased transforming growth factor

91

Clinical Manifestation

- Classic Tetrad
  - Palpable purpura
    - No thrombocytopenia or coagulopathy
    - May even see blisters
  - Arthritis
  - Abdominal pain
  - Renal disease
- Development over days to weeks
- May vary in presentation order, but usually purpura and joint pain appear first

92

Clinical Manifestations – Skin

- **Purpura**
  - Present in nearly 100% of cases
  - 30% of the time not the presenting complaint
  - Erythematous, macular, urticarial wheals
  - Coalesces → ecchymoses, petechiae and palpable purpura
  - Appears in crops
  - **Symmetrically distributed**
  - Located in gravity-dependent areas: lower extremities – children; buttocks – toddler; face, trunk and upper extremities – babies
- Subcutaneous edema
  - Dependent and periorbital areas
  - Common in children < 3 years of age

93

Clinical Manifestations – Joint

- Arthritis or arthralgia
  - 50-75% of cases
  - Transient, migratory, oligoarticular
  - Lower extremity, large joints
  - Swelling and tenderness, without effusion, erythema or warmth

94

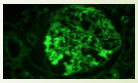
Clinical Manifestations – GI

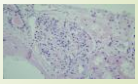
- Abdominal Pain
  - Typically within 8 days of rash
  - Occurs in 50% of cases
  - GIB in 20-30% of cases
  - Submucosal edema and hemorrhage
- GI complications
  - **Intussusception**
    - Edema, hemorrhage → pathological lead point
    - Usually small bowel
  - Pancreatitis
  - Gallbladder involvement
  - Bowel perforation
  - Protein-losing enteropathy

95

Clinical Manifestations – Renal

- Nephropathy – 20-54% incidence
- ↑ Incidence in older children and adults
- Most common = hematuria +/- RBC casts +/- mild proteinuria
- Progressive renal disease – rare (<1%)
  - Nephrotic range proteinuria
  - Elevated creatinine
  - Hypertension
  - Renal biopsy = IgA nephropathy findings





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Clinical Manifestations – Lung

- Diffuse pulmonary alveolar hemorrhage (DAH)
  - Rare: prevalence = 0.8% to 5%
    - Literature review from 1966 to 2010: 17 reported cases
    - More common in older male children and adults
  - Signs/Symptoms:
    - Hemoptysis (75%)
    - Drop in hemoglobin (74%)
    - Chest infiltrate (94%)

97

Clinical Manifestations – Other

- Scrotum
  - 2-38% incidence, rarely presenting symptom
  - Pain, swelling, tenderness → mimics torsion when unilateral
- Nervous System
  - Headache
  - Seizure
  - Hypertensive encephalopathy
  - Posterior reversible encephalopathy (PRES)
  - Focal neurological deficits such as ataxia
  - ICH

98

Workup/Diagnosis

- Usually a clinical diagnosis
  - If in doubt → CBC to confirm normal platelet count and prothrombin time
- Biopsy of skin or kidney will confirm the diagnosis
  - Renal biopsy reserved for patients with significant impairment
- No diagnostic laboratory test

99

Workup/Diagnosis

- Renal Studies
  - Urinalysis (UA)
  - Creatinine
    - For pediatrics, may omit if normal BP and UA
- If significant abdominal pain → US or barium or air enema to r/o intussusception
- If scrotal symptoms → US to r/o torsion
- If respiratory symptoms → chest radiograph to evaluate for DAH

100

Management

- Usually self-limited
- Symptoms resolve within 4 weeks
- Most able to discharged home

Indications for Hospitalization	Hospital Management
Unable to tolerate PO	Parenteral hydration
Severe abdominal or joint pain	Parenteral pain control, consider steroids, workup for GI complications
Significant GI bleeding	Serial HgBs, rarely transfusion
Altered Mental Status	Evaluation for ICH
Renal abnormality (↑creatinine, HTN, proteinuria)	BP monitoring/management, consideration for fluid restriction
Difficulty breathing	Consider airway management, steroids and cyclophosphamide

101

Goals of Treatment for HSP

- Pain control
  - Acetaminophen or NSAIDs
    - Naproxen 10-20mg/kg divided BID; avoid with active GIB and glomerulonephritis (Grade 2C)
  - Glucocorticoids (Grade 2C)
    - Somewhat controversial, not routinely used to treat symptoms or prevent complications (Grade 1B)
    - May be considered with severe abdominal pain, shortens duration
    - Does not change clinical course
    - Could obscure abdominal catastrophes associated with HSP
    - 4-8 week taper, if used.
      - Initial PO dosing: Prednisone 1-2mg/kg/day, max 60mg/day
      - Initial IV dosing: Methylprednisolone 0.8-1.6mg/kg/day, max 64mg/day

102

Follow-up

- UA and BP monitoring every 1-2 weeks for up to 2 months to monitor for renal involvement
- Known renal involvement → follow-up with pediatric nephrology
  - <1% will have long-term renal disease

103

HSP Recurrence

- 1/3 of patients will have recurrence
- Usually 4 months between episodes
- Risk of recurrence highest in those with more severe course
  - Presence of nephritis
  - Evidence of acute inflammation
  - Treatment with steroids
  - DAH

104

Hemolytic Uremic Syndrome

- Common causes of acute renal failure in children
- Typically occurs in children under age 5; mean age 3 yrs
- May occur in outbreaks related to the most common offending agent
  - *E. coli* O157:H7- Shiga toxin
  - Frozen ground beef products and spinach, fast food ground beef, etc.
- ARF in 55-70% of pts (85% recovery rate)
- Mortality 5-15%

105

Hemolytic uremic syndrome

CLASSIC FINDINGS
- Microangiopathic hemolytic anemia
- Acute renal failure or nephropathy
- Thrombocytopenia

Injury to renal vascular endothelium, results in hemolysis, platelet aggregation

CLASSIC PRESENTATION
- Watery diarrhea
- Crampy abdominal pain
- +/- fever

Abrupt onset → w/in 1 wk

- Bloody diarrhea in 89% of pts by day 5 [5]
- Increased abdominal pain

106

HUS workup

CBC – Hgb as low as 5 g/dL; PLT may be less than 50,000.
- +/- leukocytosis
- Hemolysis on peripheral smear

CMP – ARF and associated electrolyte abnormalities (high K, low Na)

U/A – RBC's and RBC casts, protein

STOOL STUDIES
- Nonbloody diarrhea: stool for fecal leukocytes may prompt W/U
- Bloody diarrhea: stool culture!

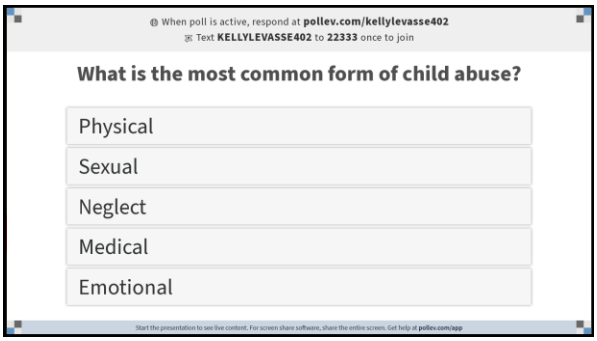
107

HUS Treatment

- Mainly supportive care
  - IVF hydration
  - Pain control
- RBC transfusion – significant anemia
- Platelet transfusion- life-threatening bleeding only
- Dialysis PRN
- Antibiotics?? Controversial but NO
- No Antidiarrheals – need motility to push that toxin out

108

109



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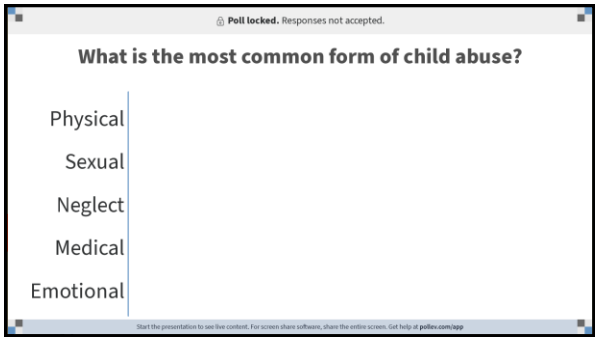

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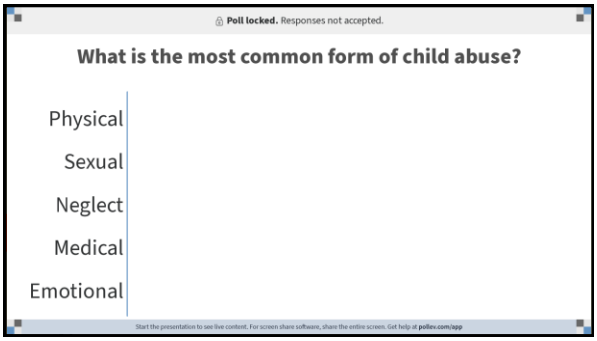

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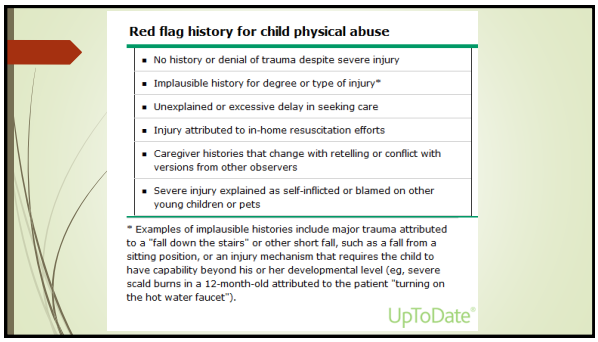

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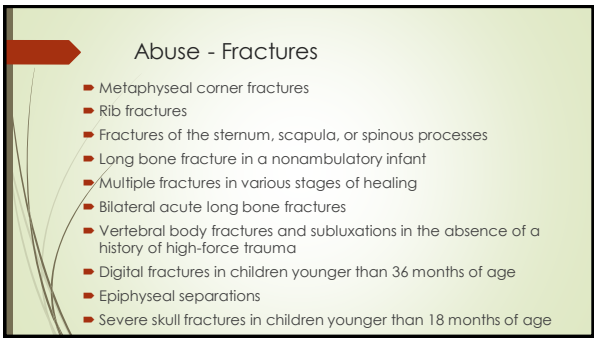

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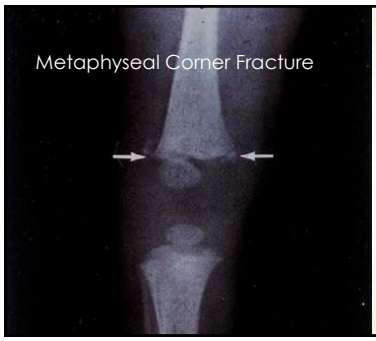

- Pathognomonic for abuse
- Due to shaking, or pulling and twisting
- Appears as a triangular fragment (corner)

115

Abuse - Bruises

- Any bruising in infants 4 months of age or younger
- More than 1 bruise in a pre-mobile infant and more than 2 bruises in a crawling child
- Bruises located on the trunk, ear, neck, jawline, cheek, or buttocks
- Bruises with a pattern of the striking object (eg, slap, belt, or loop marks; spoons; spatulas; or other objects)
- Human bite marks

116

Abuse - Burns

- Scalds in children <5 years of age that do not fit an unintentional spill pattern
- Scalds from hot tap water due to immersion, demonstrating a sharp upper line of demarcation ("high tide mark"), affecting both sides of the body symmetrically or involving the lower extremities and/or perineum
- Burns that have a sharply demarcated edge in the shape of the burning object (eg, clothing iron, spatulas, spoons, grates, metal hairdryer grids, curling irons, or the metal tops of butane cigarette lighters)
- Cigarette burns that appear as discreet circular burns 8 to 12 mm in diameter and are deep (eg, third-degree burns)

117

Abuse – Oral Injuries

- Lip lacerations or bruising, especially in nonambulatory infants
- Lingual or labial frenulum tears, especially in nonambulatory infants
- Tongue lacerations, especially in nonambulatory infants
- Bruising or wounds of the buccal mucosa, gums, or palate, especially in nonambulatory infants
- Missing or fractured teeth with an absent or implausible history
- Maxillary or mandibular fractures with an absent or implausible history
- Bruising, lichenification, or scarring at the corners of the mouth from being gagged

118

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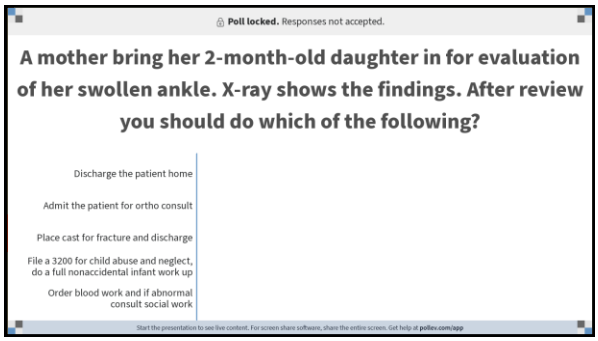

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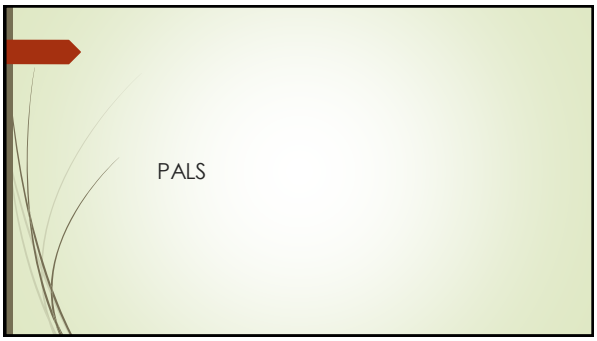

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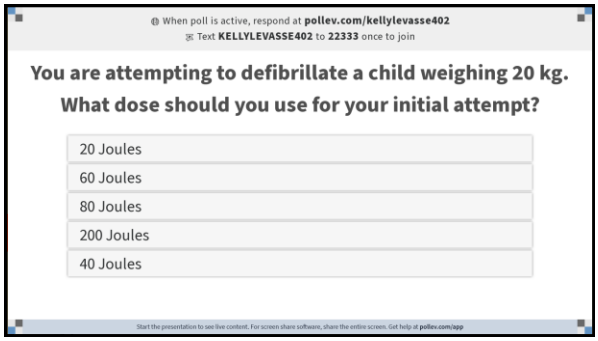

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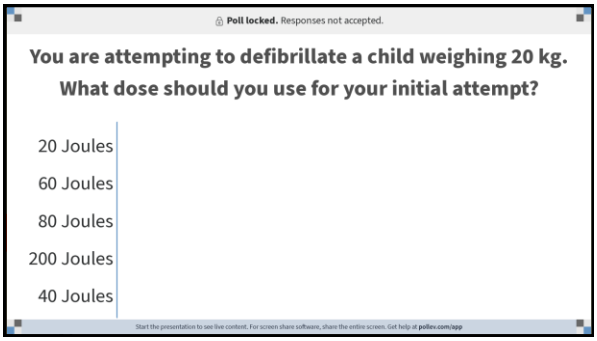

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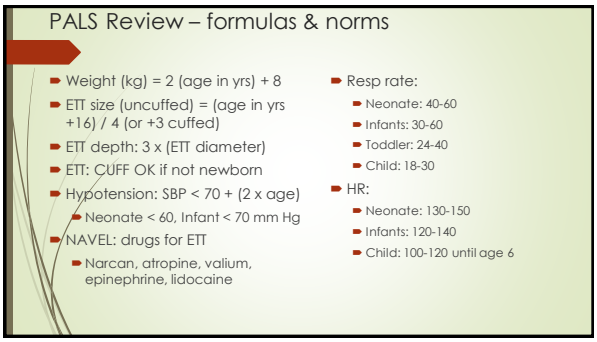

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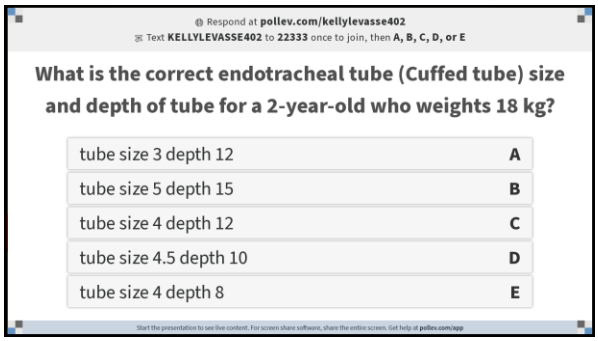

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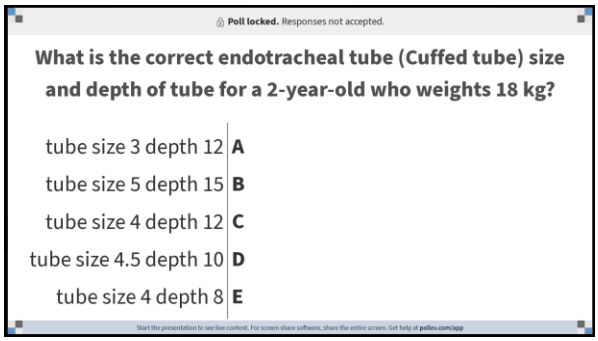

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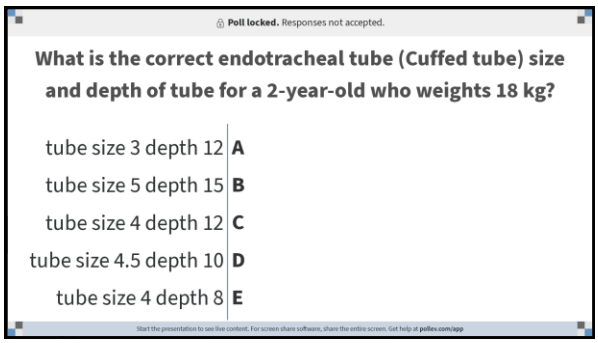

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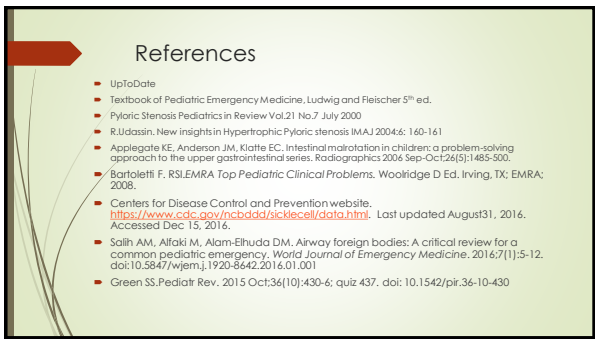

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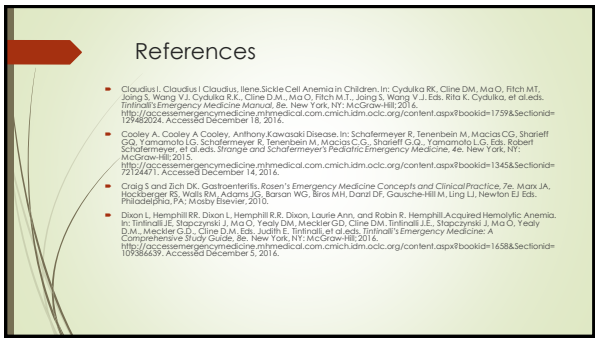

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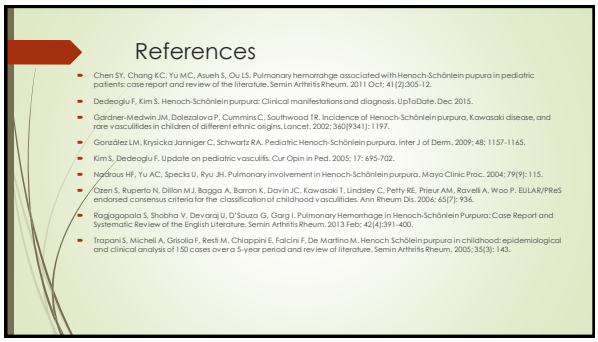

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Resources – about choking hazards

- **Parent Resources from the AAP at HealthyChildren.org**
- https://www.healthychildren.org/English/news/Pages/Keeping-Kids-Safe-from-Swallowing-Dangerous-Items.aspx
- https://www.healthychildren.org/English/safety-prevention/at-home/Pages/Dangers-of-Magnetic-Toys-and-Fake-Piercings.aspx
- https://www.healthychildren.org/English/safety-prevention/at-home/Pages/Childproofing-Your-Home.aspx

133

Questions?

- Good luck, you will do great
- Go with your first answer
- Always remember, this too shall pass
- Questions about PEM:
- Kelly Levasseur
- klevasse@dmc.org

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