100 CARDINAL PED PRESENTATIONS

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CASES 21-30

What is this lecture about?

- Pediatric – exclusive to or commonly seen in kids
- Not a Zebra (ie something I've either seen during my career or know has been seen in our PED)
- Not a horse either – ie something you may make it through training without seeing
- Emergency practitioner can make the diagnosis or at least suspect it
- Emergency practitioner *should* make the diagnosis or at least suspect it, and can make a difference by either getting diagnostic studies, appropriate consultations, and starting initial management or by not doing unnecessary work-up

Quick info in 3 slides

- Classic case – build on illness scripts to reinforce when you should suspect this entity
- What should make you suspect this diagnosis
- Basics of diagnosis and ED management
- You can look it up for more detail, but you can’t look it up until you at least suspect it
- FOAM resources for additional readings

How to use this lecture

- After the initial case presentation, think about the differential diagnosis
- Helpful framework: SPIT
  - *What is the most Serious diagnosis?*
  - *What is the most Probable diagnosis?*
  - *What is the most Interesting diagnosis?*
  - *What is the most Treatable diagnosis (ie what diagnosis should the EP do something about ASAP)?*
- Write down what you think is the diagnosis – commit!
  - *At the end, see how many you got right*

4 month old with abnormal movements

- 4 month old ex-full term infant born without any complications
- Brought in by parents because has been having repetitive brief abnormal movements as shown in their video
  - *Movements occur in clusters of 10-30 at a time, several times a day*
  - *Occur mostly during awake time*
  - *Not yet rolling over*
- VS normal, weight 6.1kg, neuro exam unremarkable, not hypotonic

Video can be found at https://www.youtube.com/watch?v=aVoJtsIvqOU

4 month old brought in for poor feeding and constipation

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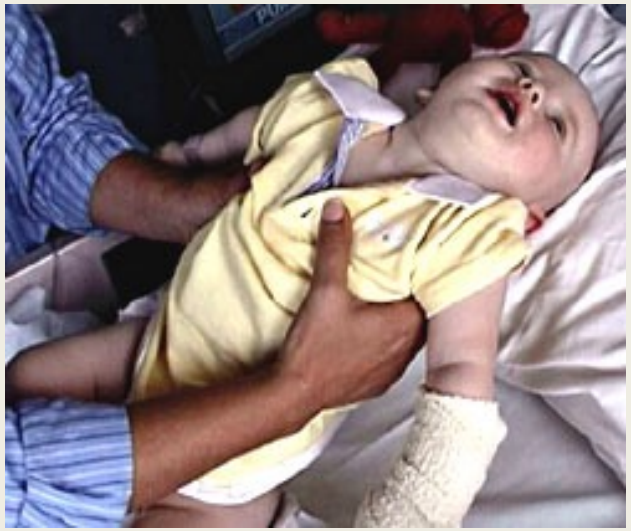
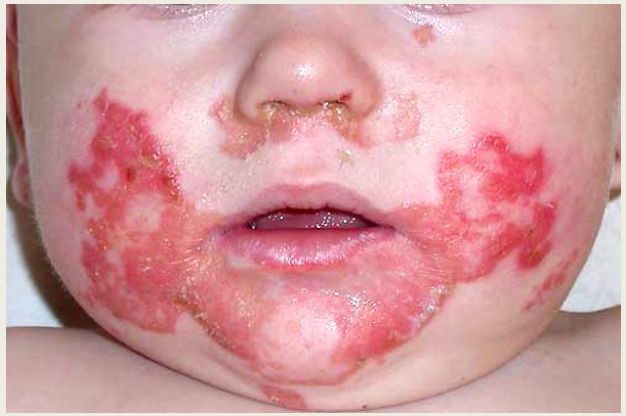
- Pre parents, baby's cry also sounds different, less loud
- No fever, vomiting, cyanosis, ill contacts
- VS temp 37.6, HR 130, RR 30, BP 74/38, 02 sat 97%. Baby is hypotonic and appears to have mild ptosis
- You observe the baby feeding from a bottle and the baby has a weak suck

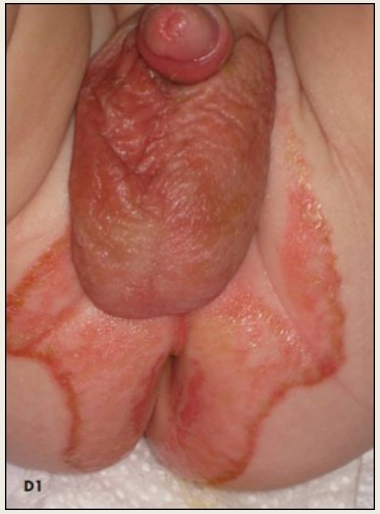


www.medbullets.com

5 month old with rash on face and in diaper area



- 5 month old boy, ex full term NSVD to 28yo G1P1, no complications
- Brought in for 1 month of face and diaper rash, not improving despite trying antifungal, barrier cream, mupirocin ointment
- Also having some diarrhea x 1 month, no fever
- Formula feeding 6-8 oz four times a day + baby food, weaned from breast milk 1 ½ months ago
- Temp 37.5, HR 140, RR 32, BP 76/34
- Rash consists of erythematous, well demarcated plaques on cheeks and buttocks



5 month old with fever, rash, diarrhea

- 5 month old with 6 days of fever and 3 days of rash and “diarrhea”
  - *”Diarrhea” is 6 loose stools per day instead of usual 2, no blood*
- Previously healthy, born NSVD, no complications, no medications
- Saw PMD on day 2 of fever, and was diagnosed with otitis media and prescribed amoxicillin
- PE: mildly toxic appearing, no nuchal rigidity, HEENT normal (including no otitis), lungs clear, heart RRR no murmur, abdomen benign, no lymphadenopathy, exam otherwise normal
- CBC WBC 14.5, 70% N, Hct 27, Platelets 350, ESR 60, ALT 80, AST 40, Urine wbc 15, gram stain negative, viral respiratory panel negative

6 month old inconsolable and blue

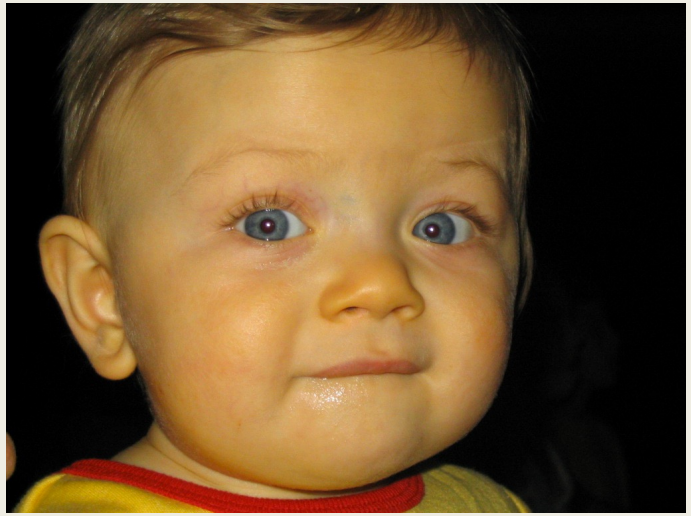
- Just came to LA from Mexico
- Child woke up from a nap and started crying, then turning blue, then bluer and bluer
- History of “sopla” and told will need “cirugia” of ”corazon”
- Patient is crying non-stop, hyperpneic, cyanotic with pulse ox 60% and not improving with blow by O2 by mask
- He is alert, well hydrated, and afebrile. Lung, cardiac, and abdominal exam appear normal (but are difficult to do because of the child’s crying), and you do not hear a murmur.

6 month old with hypoglycemic seizure

- 6 month old ex-full term infant noted to be having a seizure on parent's video monitor at 6am
- EMS called, blood glucose 20 in the field, 5cc/kg D10 given with resolution of seizure
- Parents had decided to let baby "cry it out" and baby slept through the night for first time; they are feeling guilty
  - *Especially because +FH of SIDS death in sibling at age 4 months*
- VS: temp 37.7, HR 130, RR 32, BP 76/34, 02 sat 100%
- Groggy (post-ictal?), anterior fontanelle soft and flat, heart no murmur, lungs clear, abdomen soft, hepatomegaly with liver down 4cm, no rash
- Labs: glucose now 100, anion gap acidosis with bicarb 14, urine no ketones, ammonia 90

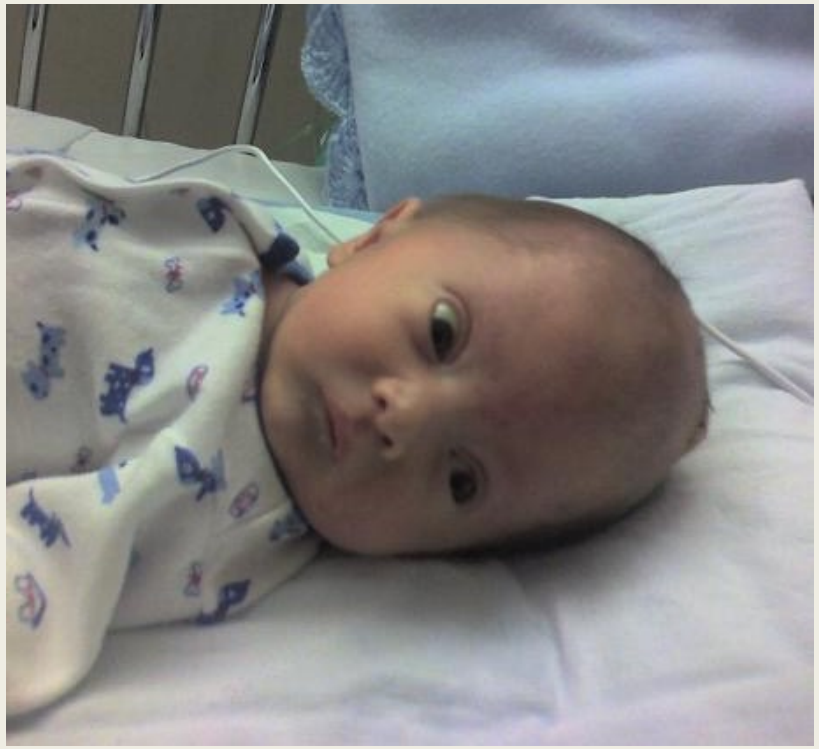
7 month old with yellow skin

- 7 month old female, ex 37 wk born NSVD to 35yo G2P2 mom, no complications
- Brought in for gradual yellowing of skin noted over last ½-1 week
- No fever, vomiting, diarrhea, rash
- Was jaundiced in first week of life which gradually resolved without phototherapy
- Eating commercial baby food – fruits and vegetables, started solids around age 5 months
- VS normal, yellow skin but anicteric, remainder of exam normal, no hepatomegaly



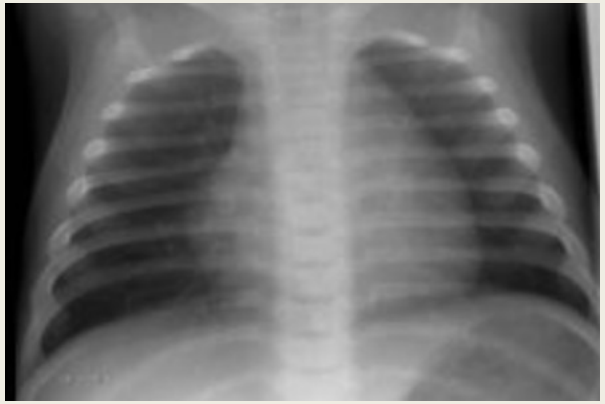
8 month old with vomiting and lethargy

- 8 month old ex-26 week premie, has been home from NICU x 4 months
- 2 days of vomiting 3-4 x/day, non-bloody, non-bilious, and per parent seems lethargic
- Parent is brand new foster parent, has had baby for only 3 days, and is unable to give additional history on NICU problems or course
- VS temp 37.7, HR 140, RR 28, BP 75/40
- Baby is awake but quiet – per foster parent sleeps a lot, no nuchal rigidity, lungs clear, heart RRR, no murmur, abdomen benign, no rash, nonfocal neuro
- What do you check the head for?



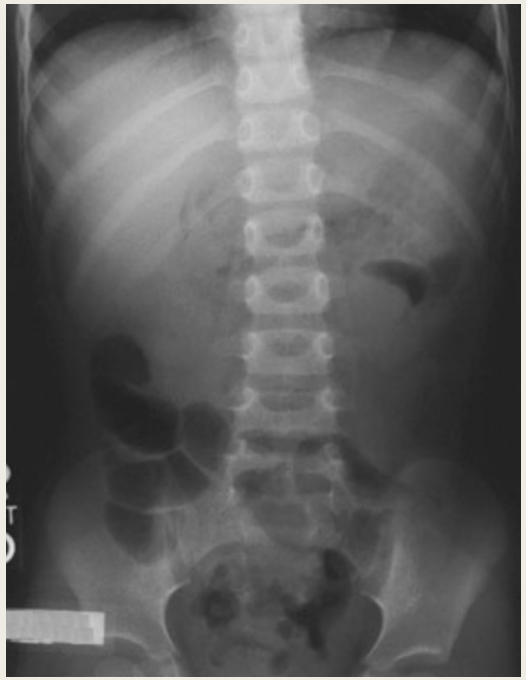
https://oliversmiracle.files.wordpress.com

9 month old with altered mental status



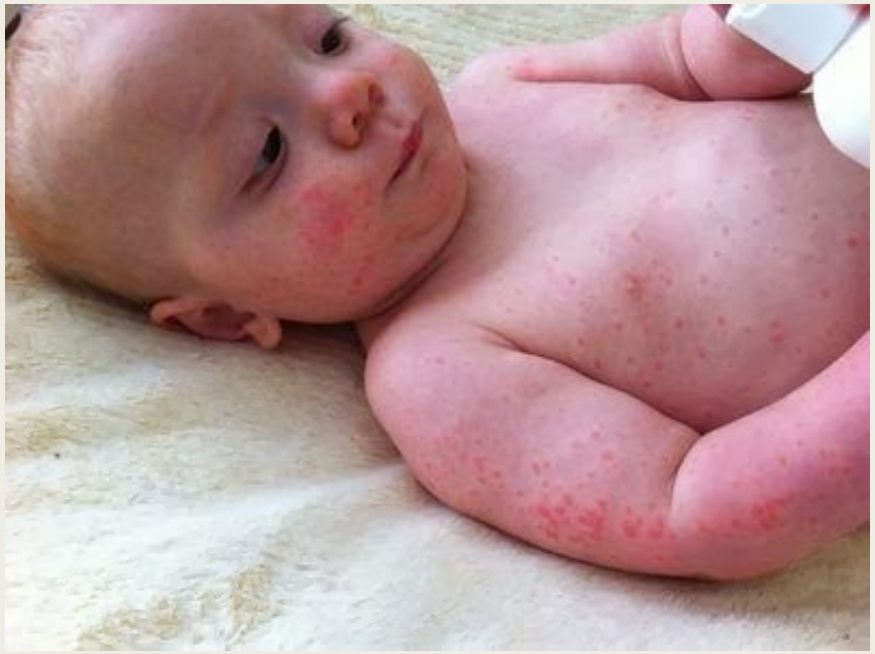
http://oftankonyv.reak.bme.hu/tiki-index.php?page=Pediatric+radiology

- 9 month old ex-full term, brought in for 1 day of lethargy
- Patient was well until a few hours ago when he became unarousable
  - *It was not noted to be his nap time*
  - *Parents tried verbal and gentle physical stimulation*
  - *After about 10 minutes, he awoke again, although remained less active than usual*
  - *20 minutes later he had another episode of unresponsiveness*
- On exam, he is sleepy but not comatose, temp 37.6, HR 120, RR 28, BP 76/34, 02 sat 100%. Anterior fontanelle flat, lungs clear, heart RRR no murmur, perfusion adequate, abdomen soft, nondistended, nontender, no rash
- Labs unremarkable, head CT negative, CXR/KUB shown



10 month old with rash after fever

- 10 mo old had 3 days of high fever
- Immunizations up to date
- Seen in ED on day 2, UA negative, RSV/Flu negative, discharged home
- Fever resolved, then broke out in rash
  - *Blanching pink macules and papules on face, trunk, extremities*
- Has been well appearing and nontoxic throughout illness, feeding well



www.healthcare-online.org

Did you write down what you thought the answers were? Answers on following slides

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Infantile spasms (West syndrome) – suspect it

- Presents at < 1 year old, peak between 3 and 7 months old
- Brief spasms occurring in clusters of 2-125 spasms at a rate of up to 13 per minute
  - *Flexion spasms ("salaam seizures") that appear similar to bowing at the waist, flexion of extremities*
  - *Extension spasms with flexion of upper body and extension of legs*
- Typically occur when infant awake or just woke up
- Neurodevelopmental regression frequently

Infantile spasms (West syndrome) – diagnose and manage it

- Once suspect diagnosis clinically, refer to pediatric neurologist for confirmation
  - *Neurologist may work up as outpatient or admit to expedite work-up*
- EEG shows characteristic pattern known as hypsarrhythmia
- 50-70% will have an associated underlying etiology, eg CNS malformation, chromosomal abnormality, inborn error, TORCH infection
  - *MRI and genetic/metabolic testing are indicated (although not in ED)*
- Main treatment is ACTH, mechanism of action unknown
  - *Anti-convulsants other than Vigabatrin are not effective*
- 85% have poor neurodevelopmental outcome, even with treatment
- For more information: https://www.youtube.com/watch?v=3Nx975d2J7U

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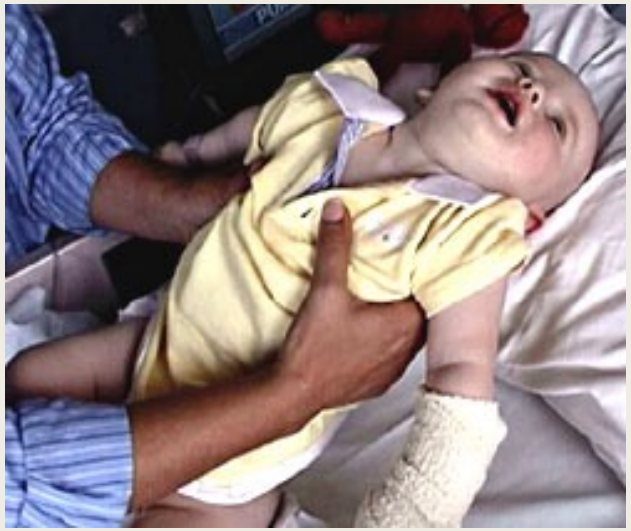

www.medbullets.com

Infant botulism – suspect it

- From intestinal colonization of Clostridium botulinum with toxin release
  - *Associated with ingesting honey and corn syrup (never give to baby < 1 year old), home canned foods, soil contamination*
- Affects infants < 12 months old, peak 2-8 months (median 3-4 months)
  - *Infant bowel flora and decreased gastric acid predisposes*
- Commonly present with constipation, poor feeding
  - *Weakness, hypotonia, weak cry, decreased gag and suck reflexes, ptosis, decreased extraocular movements*
  - *Main complication is respiratory failure from muscle weakness*

Infant botulism – diagnose and manage it

- Must clinically suspect, consult neurology and ID, and admit to PICU (due to risk of respiratory failure)
- Diagnosis confirmed by stool sample for C. botulinum spores or botulinum toxin, but may take several days to result
- Presumptive diagnosis based on clinical presentation and EMG findings of short, low-amplitude motor potentials
- Treated empirically if highly suspect with Botulism immune globulin (BIG) obtained from California DHS www.infantbotulism.org
  - *Antibiotics not indicated and may worsen disease by increasing toxin release*
- May require respiratory support with mechanical ventilation until recovers
- For more information: http://dontforgetthebubbles.com/infantile-botulism/ and http://www.medbullets.com/step2-3-pediatrics/20607/infantile-botulism

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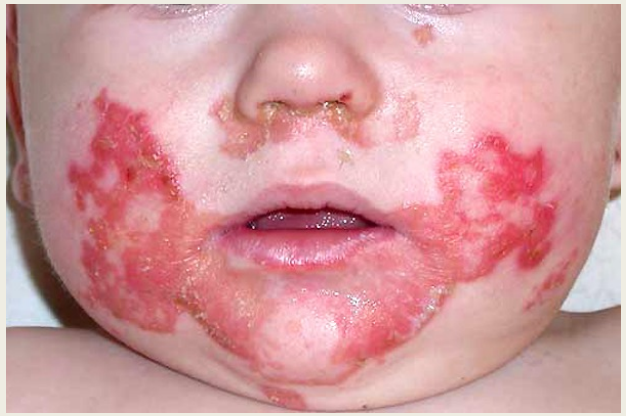
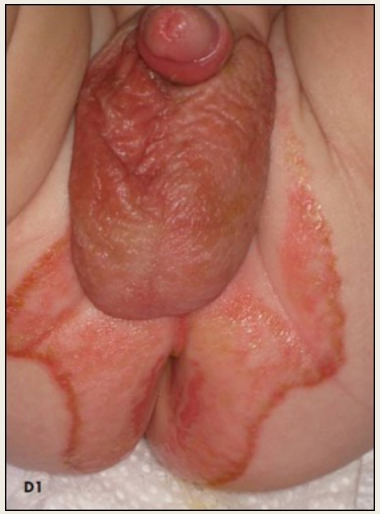


http://www.anatomybox.com/wp-content/uploads/2012/03/acrodermatitis-ernteropathica.jpg



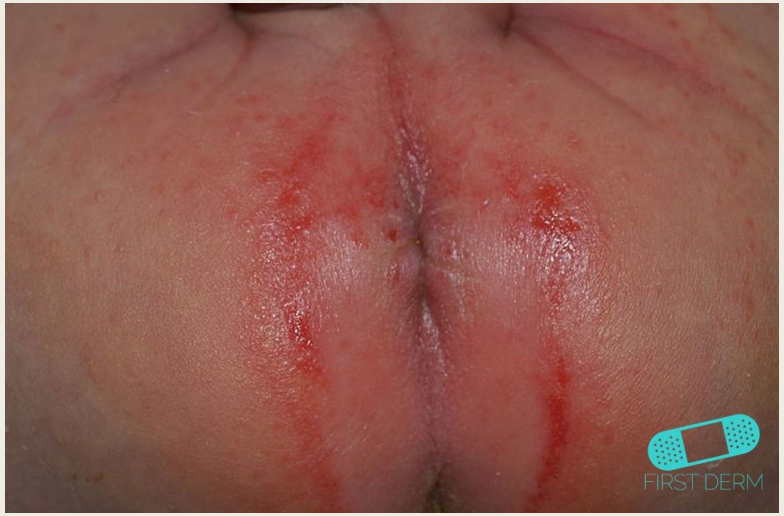
http://www.rheumatologynetwork.com

Acrodermatitis enteropathica – suspect it, diagnose it, manage it

- Zinc deficiency – may be congenital or acquired
- Diaper dermatitis that is erythematous, well demarcated, and resistant to usual treatments for diaper rash
- Lesions also common on cheeks, periorificial and acral areas of body
- Alopecia and nail dystrophy common, appreciated mainly in older patients
- Congenital form presents a few weeks to a month after weaning from breast milk, or during breastfeeding if mom zinc deficient
- Diagnosis confirmed by serum zinc levels
- Treat with zinc supplementation, expect improvement within 5-10 days

Review: other common diaper rashes

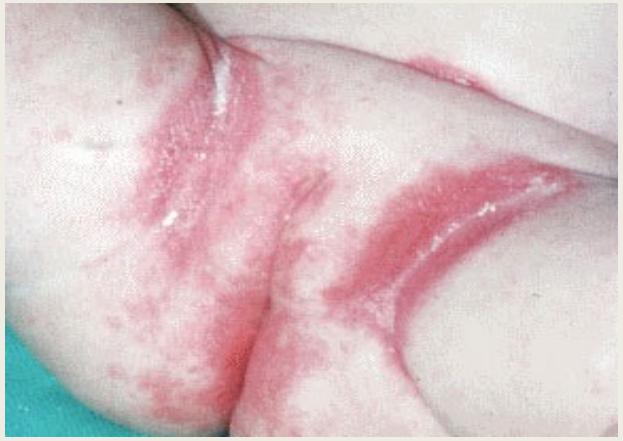
https://www.firstderm.com/diaper-rash/



- **Irritant diaper dermatitis**
- Affects areas touching the diaper, folds often spared, can become erosive (Jacquet's)
- Treat with frequent diaper changes, thick layer barrier creams, hypoallergenic products (soap, wipes, diapers etc), mild corticosteroids topical BID if very inflamed

For more information: http://pedemmorsels.com/diaper-dermatitis/ and http://learnpediatrics.sites.olt.ubc.ca/files/2010/07/Diaper-rash.pdf

https://pedclerk.bsd.uchicago.edu/page/diaper-rash



- **Candidal diaper dermatitis**
- Bright red, moist appearing, in skin folds, with satellite lesions
- Risk factors: recent antibiotics, check for oral thrush
- Treat with topical nystatin ointment or clotrimazole cream

PEARL
Do NOT use Mycolog or Lotrisone combined steroid + antifungal as the steroid component is too potent for baby skin

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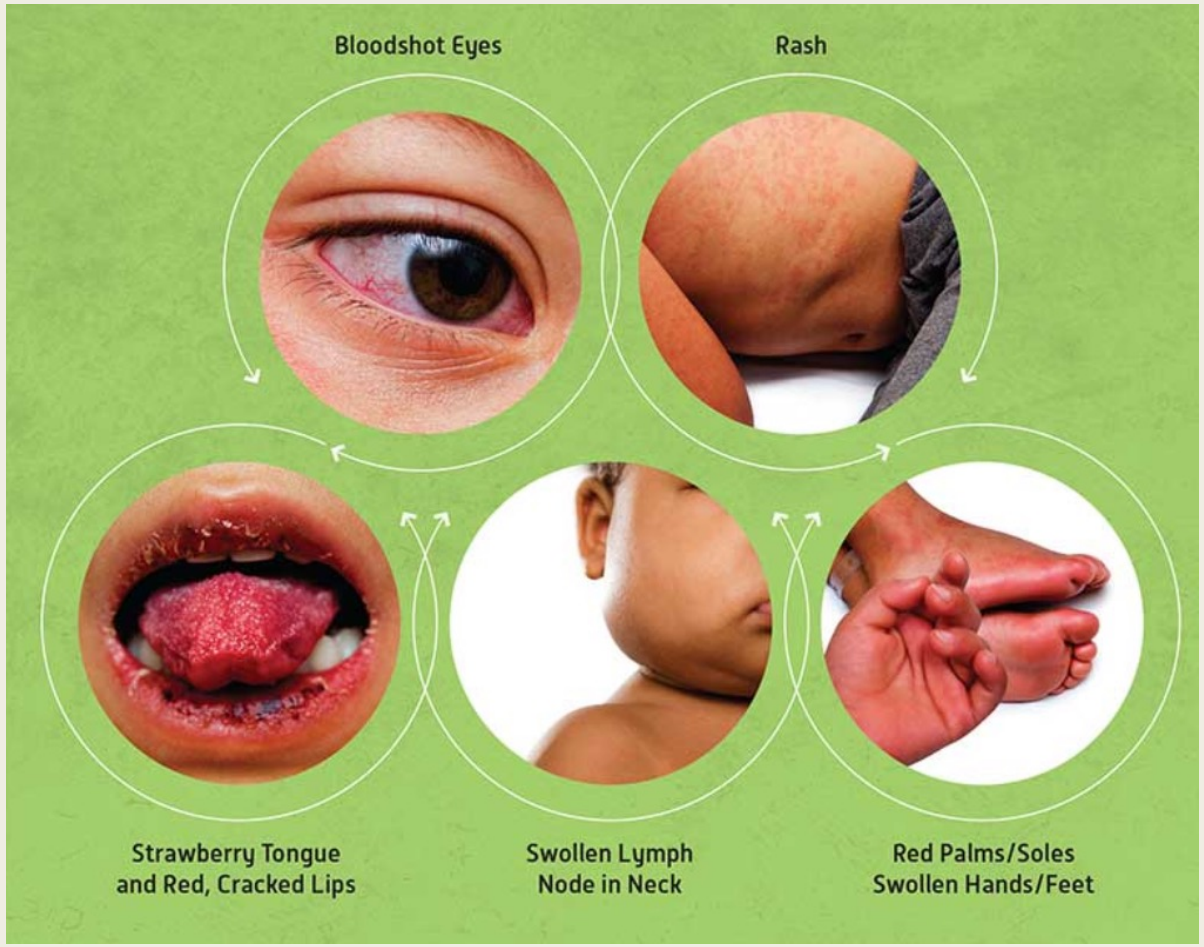
(Atypical / Incomplete) Kawasaki's – suspect it

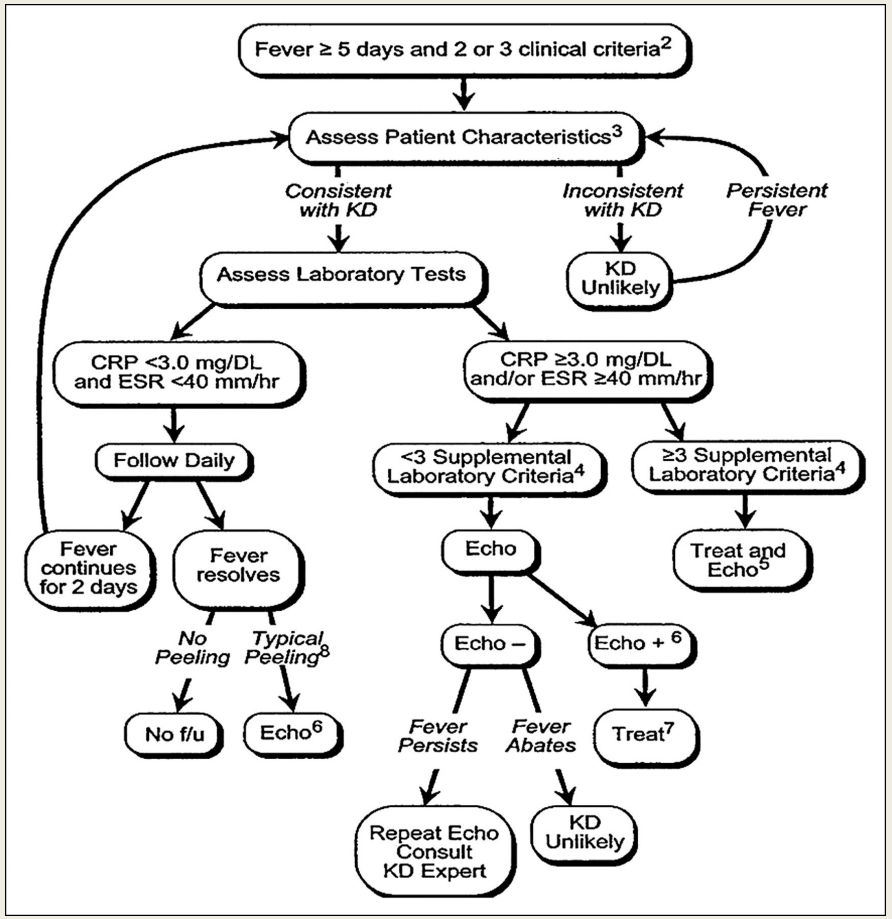
- Classic Kawasaki
  - *5 days of fever + 4/5 criteria*
- Incomplete or Atypical Kawasaki
  - *5 days of fever + 2-3 criteria*
  - *< 6 months old and ≥ 7 days of fever, even if no other criteria*
- Whenever you write "fever x 5 days" in your note, think Kawasaki's!



Kawasaki Disease Foundation

(Atypical / Incomplete) Kawasaki's – diagnose and manage it

- Send CRP or ESR, CBC, Albumin, ALT, UA
- Supplementary lab criteria
  - *Albumin ≤ 3, anemia for age, ALT > 50, Platelets > 450 after 7 days, WBC > 15, pyuria > 10*
- Echocardiogram if CRP ≥ 3 or ESR ≥ 40
  - *Treat empirically if ≥ 3 lab criteria or echo positive*
- Admit, ID consult, high-dose aspirin, IVIG
- Algorithm http://pemsource.org/wp-content/uploads/2016/06/Kawasaki-.pdf
- More info: http://pedemmorsels.com/tag/kawasaki-disease/



Fimbres AM, Shulman ST: Kawasaki Disease. Pediatrics in Review 2008;29(9):308-315

6 month old inconsolable and blue

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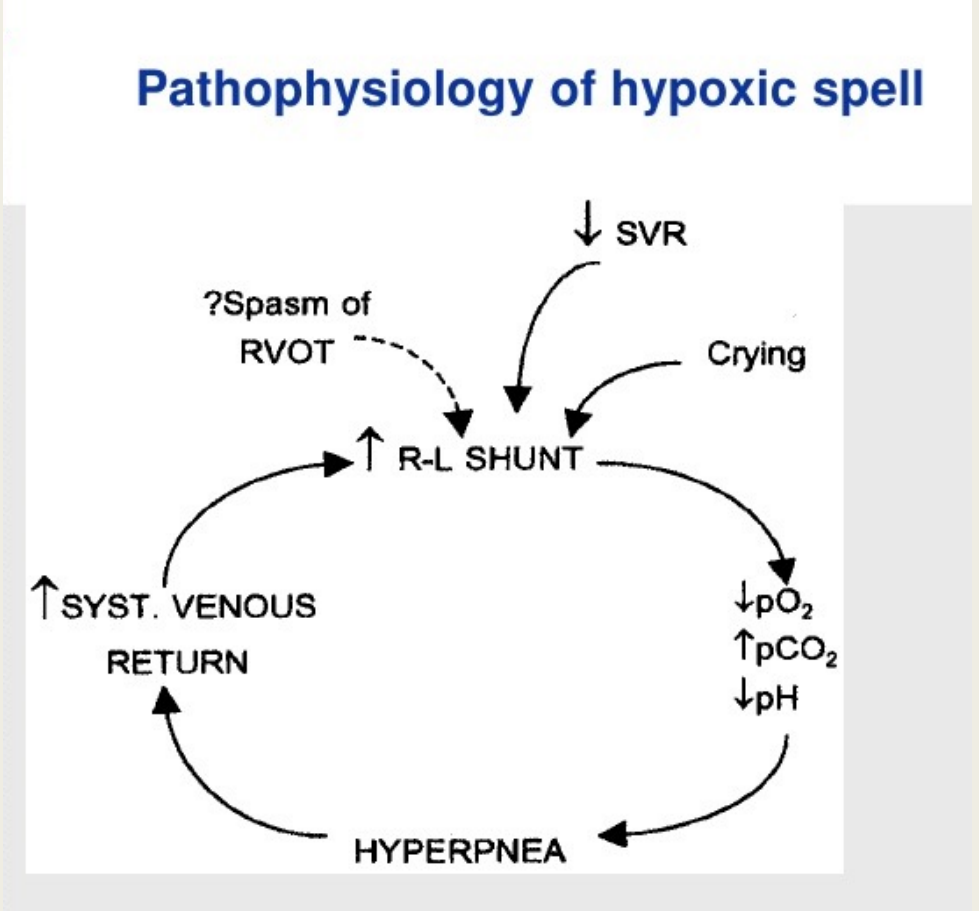
- Child woke up from a nap and started crying, then turning blue, then bluer and bluer
- History of “sopla” and told will need “cirugia” of ”corazon”
- Patient is crying non-stop, hyperpneic, cyanotic with pulse ox 60% and not improving with blow by O2 by mask
- He is alert, well hydrated, and afebrile. Lung, cardiac, and abdominal exam appear normal (but are difficult to do because of the child’s crying), and you do not hear a murmur.

Hypercyanotic spell – suspect it

- Not just Tetralogy of Fallot
  - *Mixing lesions and pulmonary stenosis*
- Most common 6 wks – 6 mos
- Triggers: fever, defecation, feeding, awakening, dehydration, crying
- Inconsolable crying, worsening cyanosis, hyperpnea, quieter or no murmur, may have seizure



http://www.slideshare.net/taem/pediatric-cardiovascular-problems-in-emergency-setting-1-5-feb-2011

Hypercyanotic spell – diagnose and manage it

- Clinical diagnosis based on h/o congenital heart disease, classic presentation of cyanosis / low 02 sat not improved by 02, hyperpnea, somewhat abrupt onset of symptoms
- Knee-chest position (increase SVR), calm & comfort child, oxygen (decrease PVR), morphine (intranasal fentanyl if no IV), 10 cc/kg NS bolus (increase SVR), ketamine, propranolol or metoprolol or esmolol, phenylephrine, bicarb if significant metabolic acidosis
- Don't mess around with getting CXR, EKG, Echo if strongly suspicious
- Do consult pediatric cardiology
- For more info: http://pedemmorsels.com/hypercyanotic-spells/ and for drug doses http://cardioiap.org/hyper_cyanotic_spell.aspx

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- EMS called, blood glucose 20 in the field, 5cc/kg D10 given with resolution of seizure
- Parents had decided to let baby "cry it out" and baby slept through the night for first time; they are feeling guilty
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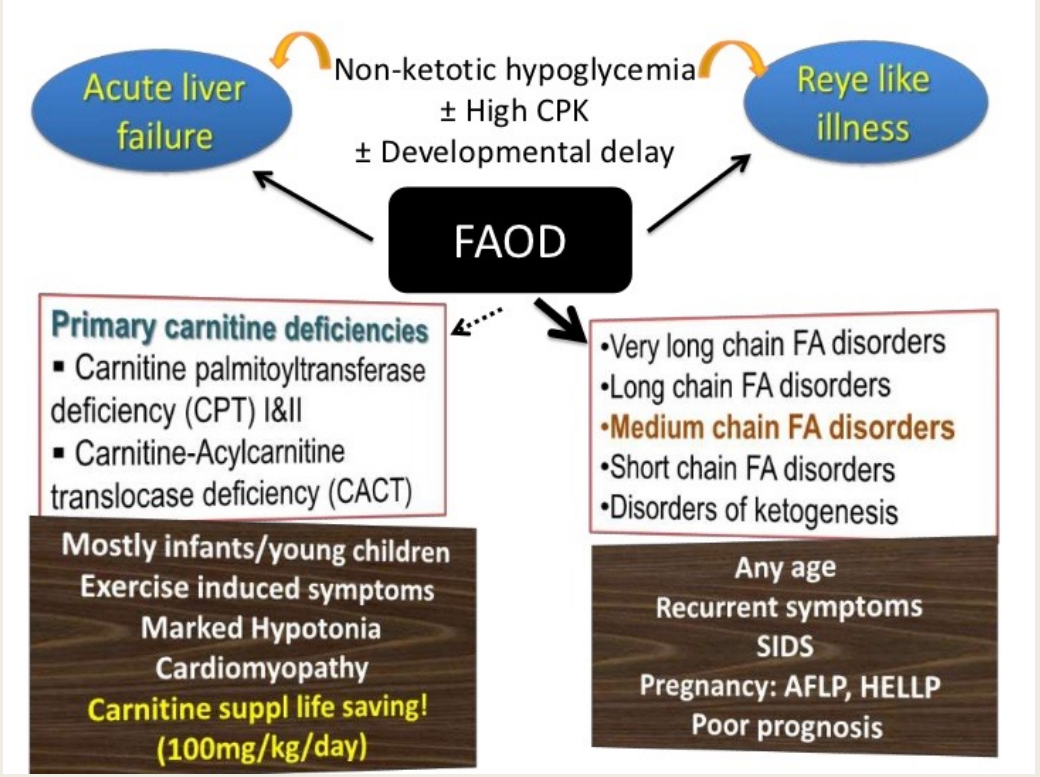
Fatty acid oxidation disorder – suspect it

- Typically presents in < 2 year old, but may present throughout life, even adulthood if mild
  - *Often after period of fasting (as infant gives up night feeds)*
  - *Sometimes associated with stress eg viral illness leading to decreased po intake*
  - *May have had previous unexplained episodes*
  - *May have family history of SIDS, sudden death, seizures*
- Vomiting, lethargy/coma, non-ketotic hypoglycemia, hepatomegaly, anion gap acidosis, hyperammonemia (but mild-mod, less than urea cycle disorder)



https://www.slideshare.net/childrenliverindia/interpret-tests-for-metabolic-diseases-talk-sk-yachha

Fatty acid oxidation disorder – diagnose and manage it

- Reverse hypoglycemia with D10W 2 cc/kg for neonates, 5 cc/kg for older, then start D10 1/2NS maintenance fluids
  - *Recheck bedside glucose often, may need 12-15 mg/kg/min glucose*
- Suspect inborn error? Order CBC, Chem panel (iStat if ill appearing or seizure), LFTs, VBG, ammonia, lactate, pyruvate, bedside glucose, urine/serum ketones
  - *Send urine organic acids, urine and serum amino acids, free and total carnitine levels, urine acylglycine specifically for suspected fatty acid oxidation disorder*
- Consult genetics specialist immediately
- Consider IV carnitine 25-100 mg/kg/day in 3 divided doses
- Avoid: salicylates, fat-binding/producing meds eg propofol, steroids, intralipids
- Admit for monitoring for recurrent hypoglycemia and confirmation of diagnosis
- Long-term will require low-fat, high-carbohydrate diet with frequent meals/snacks

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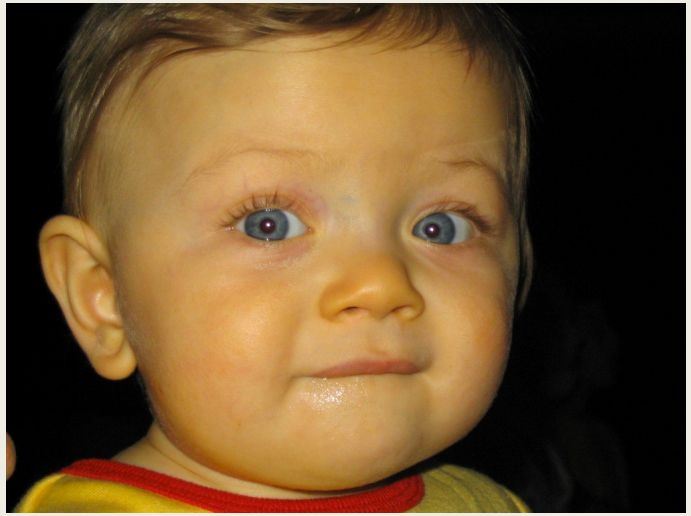

Carotenemia – suspect it

- Yellow skin from eating carotenoids (esp beta-carotene), in yellow/orange fruit and vegetables such as: carrots, sweet potatoes, pumpkin mangoes, apricots, melons
- No icterus, normal bilirubin level, normal LFTs
- Commonly present in second half of first year of life, after introduction of solid foods and beginning to wean from milk diet
- Can also get secondary carotenemia at any age from eg hyperlipidemia (binds carotenoids preventing excretion), liver disease / diabetes / hypothyroidism (prevents conversion of carotenoids to retinol), nephrotic syndrome (prevents excretion of carotenoids)

Source of this and previous picture: http://elkhuntersjournal.com/photorfu/carrots-turn-skin-orange

Carotenemia – diagnose and manage it

- Clinical diagnosis based on dietary history and physical exam
  - *Serum beta-carotene level elevated, but not routinely sent*
- Do not need to send serum bilirubin for confirmation if not icteric
  - *Mucous membranes will also not be yellow*
- Advise parents to decrease intake of high carotene foods and have follow up with primary physician for improvement
  - *Some green vegetables are also high in carotene*
- For more information: http://www.dermnetnz.org/topics/carotenaemia/ and https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2280429/pdf/canfamphys00155-0083.pdf

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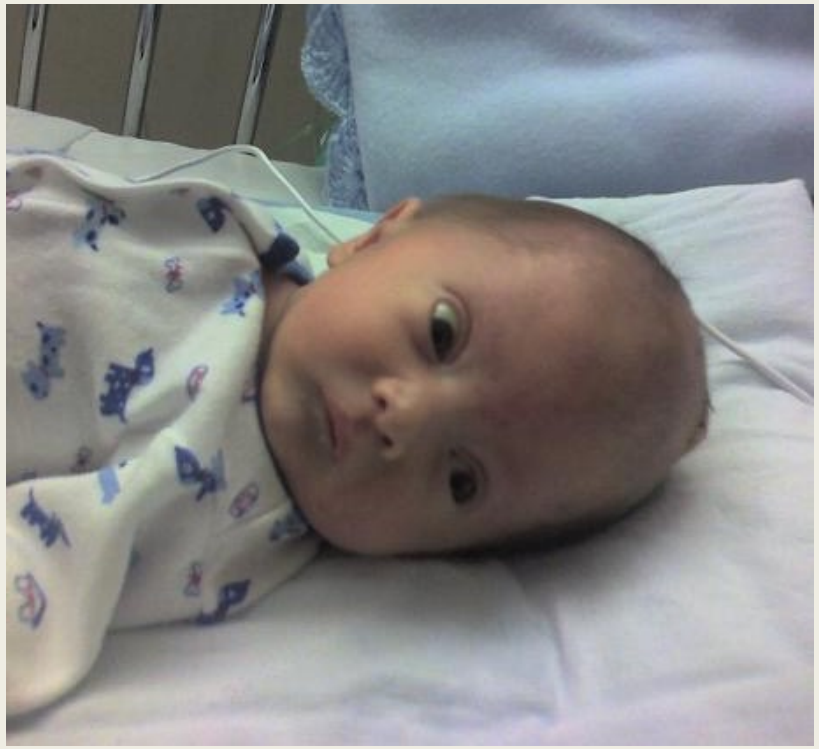
- Parent is brand new foster parent, has had baby for only 3 days, and is unable to give additional history on NICU problems or course
- VS temp 37.7, HR 140, RR 28, BP 75/40
- Baby is awake but quiet – per foster parent sleeps a lot, no nuchal rigidity, lungs clear, heart RRR, no murmur, abdomen benign, no rash, nonfocal neuro
- What do you check the head for?
  - *Palpable ventriculoperitoneal shunt, bulging anterior fontanelle, measure the head circumference*



https://oliversmiracle.files.wordpress.com

Hydrocephalus and/or VP shunt malfunction – suspect it

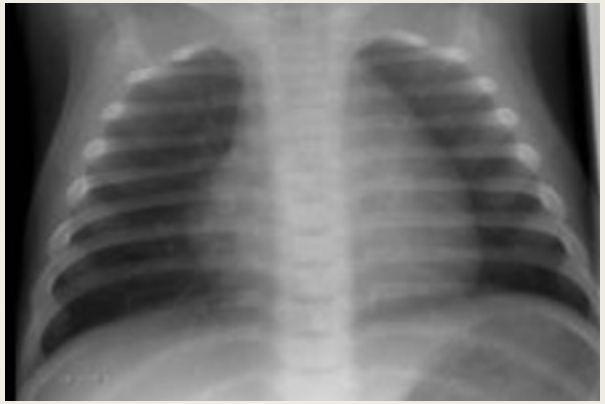
- Very low birth weight premature infants often have intraventricular hemorrhage and get VP shunts placed
  - *Parents may not give the history – palpate the head to feel the shunt*
- This infant is showing “setting sun sign” = rim of white sclera seen above irises due to increased ICP affecting cranial nerves
- Other signs of increased ICP: bulging anterior fontanelle, increased head circumference, vomiting, lethargy, headache, papilledema
- VP shunt + fever = consider shunt infection, especially if shunt placed within last 6 months

Hydrocephalus and/or VP shunt malfunction – diagnose and manage it

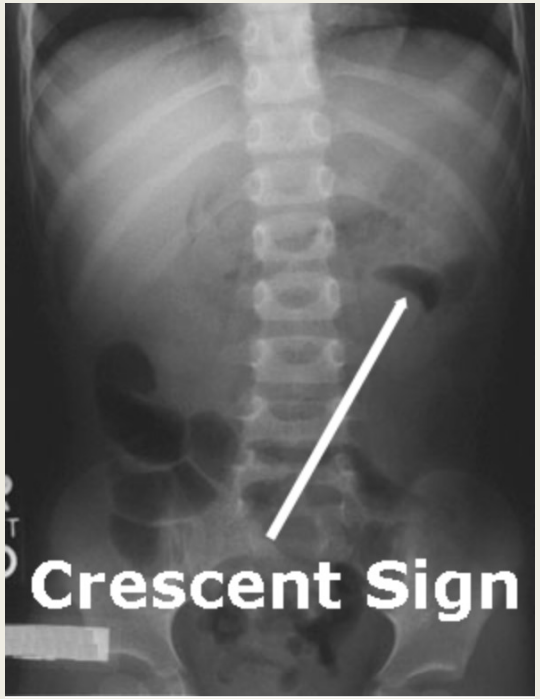
- Noncontrast CT head to diagnose increased ventricular size or hydrocephalus increased ICP
  - *For shunt malfunction, helpful to compare to baseline CT or MRI*
  - *Newer rapid MRI protocols to decrease number of CTs patients with VP shunts get over lifetime*
- Plain radiograph “shunt series” to check for continuity of shunt
  - *Some studies show 4-8% of patients with malfunction have normal CT but abnormal shunt series*
- Acutely manage any critically high ICP, consult Neurosurgeon ASAP
- For more info: http://dontforgetthebubbles.com/ventriculperitoneal-shunts/
- For critical increase in ICP: https://first10em.com/2015/04/14/vp-shunt-malfunction/

9 month old with altered mental status

- 9 month old ex-full term, brought in for 1 day of lethargy
- Patient was well until a few hours ago when he became unarousable
  - *It was not noted to be his nap time*
  - *Parents tried verbal and gentle physical stimulation*
  - *After about 10 minutes, he awoke again, although remained less active than usual*
  - *20 minutes later he had another episode of unresponsiveness*
- On exam, he is sleepy but not comatose, temp 37.6, HR 120, RR 28, BP 76/34, 02 sat 100%. Anterior fontanelle flat, lungs clear, heart RRR no murmur, perfusion adequate, abdomen soft, nondistended, nontender, no rash
- Labs unremarkable, head CT negative, CXR/KUB shown



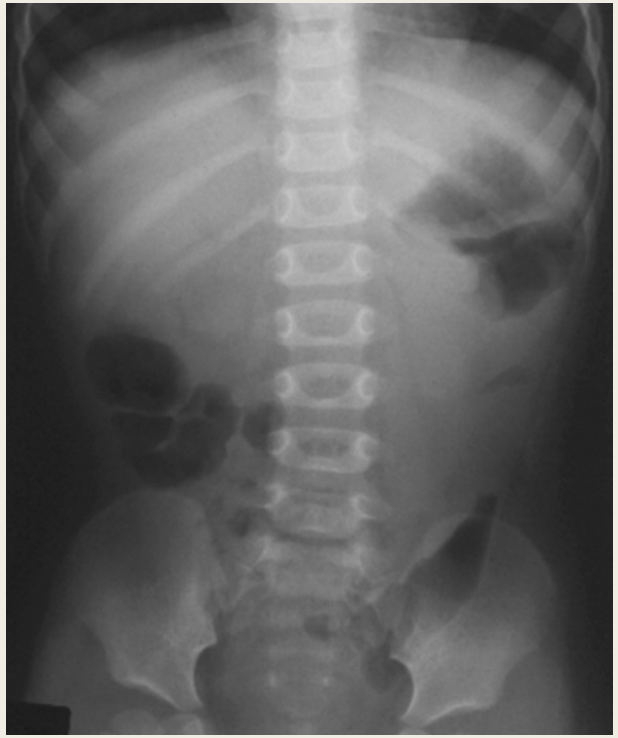
http://oftankonyv.reak.bme.hu/tiki-index.php?page=Pediatric+radiology

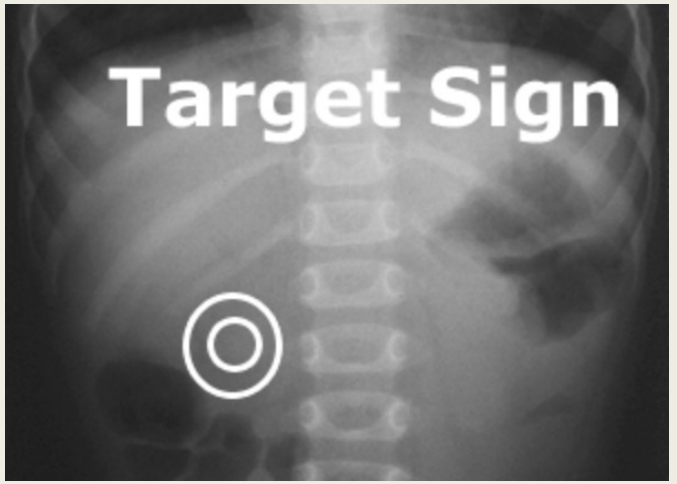


http://www.emed.ie/Paediatrics/Gastrointestinal/Intussusception.php

Intussusception – suspect it

- Majority 6-36 months old, 60% < 1 year old, 80-90% < 2 years old
- Classic presentation: colicky episodes of abdominal pain (cry & draw up legs toward belly), often 15-20 min apart, non-bilious vomiting, heme+ stool
  - *Kids can appear very normal in between episodes, don't discharge them too fast!*
  - *Classic "currant jelly" stool is a late finding*
- Initial presentation can be lethargy alone, with no abdominal pain, vomiting, or bloody stool initially
- Consider intussusception in the differential diagnosis of altered mental status in infants and rule it out before getting a CT head (if no other signs/symptoms worrisome for head trauma)
- Plain films may have target or crescent sign, paucity of gas in colon

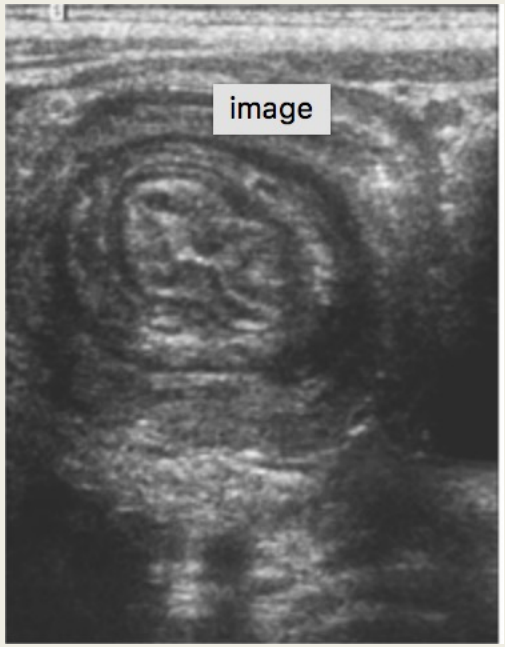




http://www.emed.ie/Paediatrics/Gastrointestinal/Intussusception.php

Intussusception – diagnose and manage it

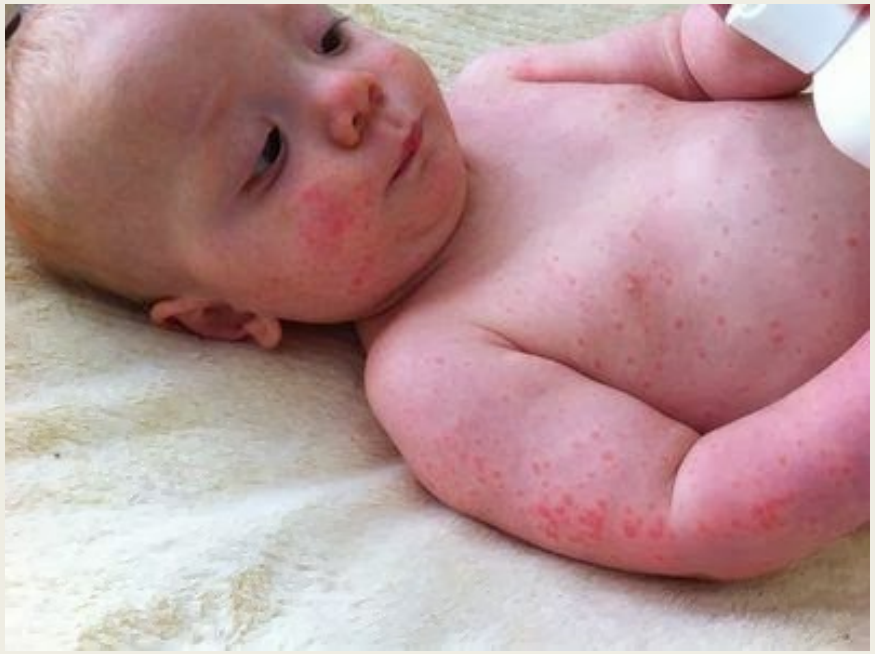
- Ultrasound is 97.9% sensitive for the diagnosis, and is preferred due to lack of ionizing radiation exposure
  - *POCUS ED bedside ultrasound has been performed with sensitivity of 85-90% with training*
- Most intussusceptions are ileocolic, and nonoperative reduction with air, saline, or contrast enema by a radiologist is 80-95% successful
  - *Pediatric surgeon should be available in case of perforation or lack of success*
- Children outside the 6-36 month age should be evaluated for a "lead point," (Meckel's, polyp, lymphoma, parasite, fecalith, hemangioma, etc)
- For more info: http://brownemblog.com/blog-1/2016/7/7/keep-your-eye-on-the-target-pocus-for-intussusception
- PED EM Morsels has many great morsels on intussusception: http://pedemmorsels.com/intussusception/ and http://pedemmorsels.com/intussusception-altered-mental-status/ and http://pedemmorsels.com/intussusception-discharge/
- SAEM Bedside ultrasound video lecture https://vimeo.com/37877537



http://radiology-information.blogspot.com/2013/02/ultrasound-images-of-intussusception.html

10 month old with rash after fever

- 10 mo old had 3 days of high fever
- Immunizations up to date
- Seen in ED on day 2, UA negative, RSV/Flu negative, discharged home
- Fever resolved, then broke out in rash
  - *Blanching pink macules and papules on face, trunk, extremities*
- Has been well appearing and nontoxic throughout illness, feeding well



www.healthcare-online.org

Viral exanthem – suspect it

- This patient's course classic for **roseola infantum**
- Typically occurs in 6mo to 2yo
- A few days of high fever; as fever comes down, rash breaks out
- Blanching pink macules and papules
- Well appearing and nontoxic throughout illness despite high fevers

- Original classification
- First disease: measles (rubeola)
- Second disease: scarlet fever
- Third disease: rubella
- Fourth disease: "Duke's disease" – no longer a distinct entity
- Fifth disease: erythema infectiosum (parvovirus B19 – slapped cheeks appearance)
- Sixth disease: roseola infantum

Viral exanthem – diagnose and manage it

- Clinical diagnosis initially
  - *Specific viruses with characteristic findings, eg measles, fifth disease*
  - *Many other viruses beyond the original classification cause a nonspecific viral exanthem (eg enterovirus)*
- For disease of public health concern, eg measles, consider serology
- Supportive care with rest, antipyretics, attention to fluid intake
- For more information: http://www.medscape.com/viewarticle/734882_1 and https://www.derm101.com/therapeutic/viral-exanthems-2/