Pediatric COMAT

Molly's study guide

Pediatric case files

Healthy children website

American board of pediatrics questions

Boards & Beyond

emma holliday video

Ellyn Satter Institute

Topic	%
Cardiology/Respiratory	18-25%
CNS – Behavior/Psychiatry	10-16%
Endocrine/Metabolism	4-8%
Gastrointestinal	8-14%
Genitourinary	6-10%
HEENT	6-10%
Hematology/Oncology/Lymphatics	6-10%
Musculoskeletal/OPP (Osteopathic Principles & Practice)	6-10%
Growth & Development	10-16%
Skin	6-10%

Topic	%
Diagnostic Technologies	15–25%
Health Promotion/Disease Prevention/Health Care Delivery	10–20%
History & Physical	35–50%
Management	10–20%
Scientific Mechanisms of Disease	5–10%

Preterm and postterm infants

- Corrected age= actual age- weeks premature (before 40)

Post-term	> 42 weeks	Macrosomia Placental insufficiency Umbilical cord compression Dysmaturity syndrome
Term	> 38 weeks	
Late preterm	34-37 weeks	
Preterm	< 28 weeks	**Hypothermia** (less fat, less weight) **Hypoglycemia** (underdeveloped liver) **Hypotension** (less PVR, low vascular resistance) **Hyperbilirubinemia** (high indirect)

		Hypocalcemia (fixes in 24 hours) Increased **mortality and morbidity** Increased risk of **neurocognitive problems**, growth impairment, respiratory function

- **Neonatal RDS/ respiratory distress syndrome**
  - Immature < 35 weeks → L:S ratio is low (amniocentesis, < 2:1)
  - Deficient in surfactant → decreased lung compliance, hypoxemia, increased pCO2
    - Poorly responsive to oxygen (lungs collapsed → intrapulmonary shunting)
  - Dx: CXR (diffuse ground glass)
  - Risk factors: premature, **DM** mother (decreased surfactant), C-section (reduced stress, cortisol, surfactant)
  - Prevention: give betamethasone → surfactant directly into lungs after birth
  - Complications: PDA (hypoxia keeps shunt open), bronchopulmonary dysplasia (O2 tox from ventilation)
- **Retinopathy of prematurity**
  - Underdeveloped retinal vessels → neovascularization → retinal detachment & blindness
  - Increased risk with high O2
  - Tx: VEGF inhibitors, laser therapy
- **Apnea of prematurity**
  - 2-3 days of life w/ Immature respiratory control center → pause in breathing for 20-30 seconds with desaturation
  - Desaturation and bradycardia
  - Tx: non-invasive CPAP, **Methylxanthine** therapy, theophylline (blocks adenosine receptors, inhibits respiratory drive, causes tachycardia)
- **Necrotizing enterocolitis**
  - Intestinal necrosis, obstruction of flow in terminal ileum → perforation
  - Associated with underdevelopment and Abx
  - Often in formula-fed babies who develop intolerance to eating
  - Dx: Xray, pneumatosis intestinalis (air in bowel wall) → CT
  - Tx: supportive, Abx, surgery
- **GERD**
  - Premature babies with irritability, vomiting, Failure to thrive
  - Dx: clinical
  - Tx: diet, positioning
- **Intraventricular hemorrhage**
  - Lateral ventricle hemorrhage due to germinal matrix immaturity, poor autoregulation and high vascularity
    - Grade 1 small, grade 4 large, hydrocephalus, white matter injury, cerebral palsy, intellectual impairment
  - Dx: head US
  - Tx: supportive
- **Immune system**

    - Low T and B cells → low immunity
    - Increased risk of fever, sepsis
        - Any fever in a baby is an EMERGENCY
- **Dysmaturity syndrome**
    - IUGR in post-term babies due to placental insufficiency and malnourishment
        - Long-thin extremities
        - Dry parchment skin
        - Peeling, loose skin, long nails
        - Wide-eyed look
        - decreased/ absent vernix
- **Meconium aspiration syndrome**
    - Post-term babies → respiratory distress due to persistent pulmonary hypertension of the newborn **IMMEDIATELY** after birth
    - Tachypnea, cyanosis
    - Tx: supportive, oxygenation, ventilation
- **Persistent pulmonary hypertension of newborn**
    - Persistent elevated PVR → right to left shunting across PDA
    - Increased risk with lung hypoplasia, meconium aspiration, infection
    - RDS and cyanosis, prominent S2
    - Tx: O2, ventilation, inhaled NO (reduce PVR, vasodilate)
        - Don't give NSAID if need to keep PDA open (esp if difference bw preductal and postductal o2 saturation)
- **Deformities**
    - Club foot → fixed, plantar flexed, adducted and internally rotated → serial molding and casts
    - Positional clubfoot
    - Amniotic bands → congenital malformations of digits and limbs “amputation”
    - Phocomelia → seal flippers limbs
- **Small for gestational age**
    - Low birth weight < 2500 g (5.5 lb) or 10%
    - Due to IUGR (smoking)
    - Increased risk of complications ~ preterm babies
        - Perinatal asphyxia → chronic hypoxia from small placenta
        - Polycythemia
- **Large for gestational age**
    - > 4000g (8.8lb) or 90%
    - Due to DM, large pre-pregnancy weight
    - Complications: shoulder dystocia, brachial plexus injury, clavicular fracture
- **Newborn hyperbilirubinemia (physiologic)**
    - Fetal RBC short lifespan, high turnover, high unconjugated due to immature liver enzymes, low intestinal flora which decrease breakdown
    - Peaks 2-4 days post labor around 8 mg/dL
    - Neonatal jaundice is > 2-3 mg/dL
        - Below umbilicus, eyes icteric= more severe

- Dx: bilirubinometer (light shines on skin)
  - Bhutani nomogram (low-high risk zones depend on bilirubin level)
- Tx: phototherapy (bilirubin isomerized to lumirubin)
- **Bilirubin induced neurologic dysfunction (BIND)**
  - Bili crosses BBB → neurotoxin → basal ganglia and nuclei → permanent damage
  - Lethargy and hypotonia→ coma, seizures
  - Opisthotonos and retrocollis (rarely see)- back and neck spasm= severe neurologic damage
- **Kernicterus**
  - Chronic bilirubin encephalopathy
    - Can cause cerebral palsy, hearing loss, gaze issues, dental hypoplasia
  - Yellow deposits in brain and basal ganglia → hypertonia, seizure, poor feeding, high-pitched cry
- **Indirect hyperbilirubinemia**
  - **Breast Milk jaundice**
    - Persistent BNH, due to beta-glucuronidase → high absorption of unconjugated bilirubin due to deconjugation, peaks ~ 2 weeks
    - Healthy baby and does not require treatment
  - **Breastfeeding jaundice/ lactation failure**
    - Poor lactation, low intake →more circulation of bili → jaundice in 1 week of life, hypovolemia and weight loss, dehydration
    - Poor latching and feeding
    - Tx: maintain hydration with frequent feedings, closely monitor 1-2 days (ensure urine output increased)
  - **Hemolysis**
    - First 24 hours of life
    - Erythroblastosis fetalis (rh-negative mother) IgM antibodies
  - **Rare causes**
    - Crigler-najjar
    - Congenital hypothyroidism
    - Galactosemia
    - Spherocytosis
    - Sepsis
- **Direct hyperbilirubinemia**
  - ALWAYS pathologic, biliary obstruction, atresia or liver disease
  - Asymptomatic jaundice, pale stools and dark urine
  - Next steps: US
  - Surgery: surgical hepatoportoenterostomy (kasai procedure), liver transplant
- **Newborn physical exam findings**
  - Crepitus at clavicles= **clavicular fracture** → no treatment needed

        - Funny shaped head, edema that crosses suture lines → **caput succedaneum**
        - Funny shaped head, fluctuance that does not cross structure lines → **cephalohematoma**
            - Tx: reassurance
    - **Fever**
        - If baby < 28 days has fever > 100.4 F= sepsis
        - Symptoms include irritability, poor feeding
        - Tests: CBC diff, blood culture, urine culture (use catheter), LP
        - Risk for neonatal sepsis: prematurity, chorioamnionitis, intrapartum fever, maternal leukocytosis, PROM > 18 hours, GBS +
        - Bugs: GBS, E coli, Listeria
        - Empiric: Ampicillin + gentamicin empiric, cefotaxime + ampicillin if meningitis suspected

- **High yield**
    - **Transient tachypnea of newborn**: C-section without labor → RDS and lung findings due to delayed resorption and clearance of pulmonary fluids (low activity of ENaC
    - **Neonatal polycythemia** → Hct > 65%, some tachypnea
    - **RDS**: preterm infants
    - **Persistent pulmonary HTN**: term infant, meconium-stained amniotic fluid
    - Congenital infections
        -

Key features of congenital infections*	
Toxoplasmosis	• Chorioretinitis • Hydrocephalus • Diffuse intracranial calcifications
Syphilis	• Rhinorrhea • Skeletal anomalies • Desquamating rash (palms/soles)
Rubella	• Cataracts • Heart defects (eg, PDA) • Sensorineural hearing loss
Cytomegalovirus	• Periventricular calcifications • Microcephaly • Sensorineural hearing loss
Herpes simplex virus	• Vesicular/ulcerative rash

- **Delivery**
    - Dry off & stimulate (cry/ breath)
    - Clear airways
    - Wrap in blankets
    - Skin to skin contact= warms and bonding
    - Interventions: **Vit K, erythromycin, HepB**
        - Erythromycin prevents gonococcal eye infection ONLY
            - Declined erythromycin → 3-5 days later gonorrhea
            - 5-14 days → chlamydia
        - Vit K deficiency bleeding (bacteria makes Vit K in colon) → prevent

hemorrhage
        - HepB vaccine in first 24 hours (can be passed from mother)
    - Umbilical cord
        - Clamped & cut at birth
        - Keep stump dry
        - Omphalitis: infection of stump → polymicrobial cellulitis → IV Abx
        - Umbilical granuloma: most common. Silver nitrate
- **Premature birth**
    - Increases risk of **intraventricular hemorrhage** (ruptured germinal matrix vessels) → get Head US (most are asymptomatic)
    - **Necrotizing enterocolitis**
        - Feeding intolerance, distension, apnea, temperature instability
    - Dysmorphic features
        - karyotype
    - Sepsis
        - Blood cultures if symptomatic
- **Neonatal resuscitation & disease**
    - **Bradycardia**
        - #1 cause Hypoxia
        - Primitive “diving reflex” (holding breath)
    - **Apnea/ gasping and HR < 100**
        - Next step: PEEP
        - Intubation, chest compression, epinephrine to umbilical vein
    - **Labored breathing/ cyanosis and HR > 100**
        - Next step: clear airway
        - Monitor pulse ox, give supplemental oxygen
    - **Transient tachypnea of newborn**
        - > 60 bpm, cyanosis, increased work of breathing (nasal flaring)
        - Slow clearance of fetal alveolar fluid/ pulmonary edema
        - Common with C-section w/o labor → lack of physiological stimulation to clear lungs
            - Benign, self-limited
            - Give PEEP, support. Rarely requires O2 > 40%
        - Cxr: fluid in interstitial spaces
    - **Neonatal hypoglycemia (transient)**
        - Maternal glucose lost without placenta → baby breaks down glycogen in first 2 hours
    - **Persistent hypoglycemia**
        - Preterm babies, growth restriction, large for gestational age, diabetic mothers (cannot produce insulin to regulate glucose)
        - Irritability, lethargy, rarely seizures
        - Tx: feedings
    - **Anemia of prematurity**
        - Preemie with low Hgb, due to impaired EPO production
        - Absent reticulocytosis
    - **Polycythemia of newborn**
        - Increased RBC mass (due to hypoxia in utero) Hct > 61% with splenomegaly → polycythemia = Hct > 65%
        - Common cause is delayed cord clamping
        - IUGR, placental insufficiency, preeclampsia, SGA, post-term babies >42 weeks

        - Symptoms rare, but can develop hyperviscosity, hypoglycemia, hyperbilirubinemia, lethargy
        - Tx: observe, hydrate, glucose, rarely partial exchange transfusion
    - **Neonatal sepsis**
        - Fever & irritability
        - Due to : chorioamnionitis, preterm delivery, PROM, fetal tachycardia, meconium stained amniotic fluid, APGAR < 6
            - GBS, listeria, enterococcus, E coli
        - Dx: blood culture
        - Tx: ampicillin and gentamicin
    - **Persistent pulmonary hypertension of Newborn**
        - In Utero: PVR high → O2 in lungs → PVR falls
        - High PVR after birth → shunting (PFO, PDA)→ hypoxemia
        - Respiratory distress and cyanosis → low APGAR
        - Common with meconium-stained amniotic fluid in term infants
        - CXR: normal → dx: ECHOcardiogram
        - Tx: supportive, 100% O2 (lowers PVR), vasodilators nitric oxide, sildenafil
        - High mortality
    - **Neonatal conjunctivitis (ophthalmia neonatorum)**

Day	Cause	Treatment
0-1	Chemical irritation from eye ointment Classically caused by silver nitrate (not used in US)	Self-limited
2-5	Gonococcal; gram-negative diplococci Purulent exudates, eyelid swelling	IM Ceftriaxone
5-14	Chlamydial Watery, mucopurulent discharge	Oral erythromycin
5-14*	HSV Serous (pale-yellow transparent) discharge	Acyclovir

        - Gonococcal → purulent, GNDC → Im ceftriaxone
        - Chlamydia → watery → oral erythromycin
        - HSV → serous → acyclovir
- **Nursery**
    - Screenings
        - Pulse Ox → hypoxemia, congenital heart disease
        - Blood spot test → congenital hypothyroidism, adrenal hyperplasia, PKU
        - Hearing before 2 months, then every 6 months-3 years for high risk kids
        - Metabolic screening in 2 weeks: CBC, Hgb electrophoresis
            - PKU= amino acid analysis, phenylalanine levels
            - Aldolase B= fructose intolerance
            - G1P uridyl transferase= galactosemia
        - Newborn screen for genetic and metabolic disorders
    - Feeding
        - Frequently feed to avoid hypoglycemia
            - Normal to lose weight after birth 10% in first few days, regain in 2 weeks
            - Infants double birth weight by 4 months
            - Triple weight by one year
        - **Breast Milk contents**
            - Lactose
            - Antimicrobial components (IgA= passive immunization)
                - Lactoferrin & lysozymes

                - Vit D if breast fed
                - Iron in formula fed
                - Benefits to babies= low risk of infection, reduced allergies, diabetes, obesity
                - Benefits to Mothers: decreased risk of breast and ovarian cancer, low risk of CVD, weight loss, longer anovulation
                    - Contraindications: herpetic lesions, HIV or HTLV, chemo/ radiation, drug or alcohol abuse, galactosemia in infant
            - **FPIES** (food protein-induced enterocolitis syndrome)
                - Food hypersensitivity → cows milk and soy, formula fed
                - Vomiting and diarrhea → dehydration
                - Tx: eliminate trigger, resolves by 3 years
            - **FPAP** (food protein-induced allergic proctocolitis)
                - Exclusively breast fed babies with hypersensitivity reaction
                - Mothers who drink cows milk or from formula
                - Infant appears well, blood-streaked loose stools +/- eczema
                - Tx: eliminate trigger
    - Monitoring
        - Glucose in high-risk
            - Large and small babies, diabetic mothers (underdeveloped to break down glycogen)
        - Bilirubin
            - Bilirubin induced neurologic dysfunction
            - Jaundice, transcutaneous bilirubin measurement, total serum bilirubin
        - Circumcision
            - Elective, reduces risk of penile cancer, UTIs, transmission of HIV/ HPV, HSV
            - Risks: bleeding/ infection, glans injury, urine leakage from urethrocutaneous fistulas
- **Newborn Care**
    - **Newborn infant:** suction fluids out of airways, warming
    - **Perinatal period:** 22nd week GA- 7th day after birth
    - **Postpartum period**: 6-8 weeks after birth
    - **Infant=** < 1 yo; newborn: < 28 days; normal gestation 37-42 weeks.
        - Full term= 39 weeks, early 37-38 weeks
        - preterm= 20-36 weeks
        - normal= 37 weeks
        - causes of growth restriction: infection, substance abuse, maternal medical conditions, placenta abnormalities, multiple gestations
    - **Diet**
        - breastfeed, formula, 400 IU Vitamin D
        - strictly breast fed —> increased risk of iron deficiency anemia and Vit D (rickets)
    - **Neonatal screening**
        - PKE and congenital hypothyroidism
        - hemoglobinopathies , SCD, galactosemia, inborn errors of metabolism
        - Persistent pulmonary hypertension of newborn
        - AFP
            - neural tube defects: defect in lamina, Spina bifida
            - prevented by taking folate

- **Infant of Diabetic mother**
- **Birth defects**
  - **Gastroschisis, omphalocele:** idiopathic, elevated AFP
- **Neonatal HSV infection**
- **Neonatal hyperbilirubinemia**
- **Sandiffers disease**
  - Neonatal GERD, arching back, eye deviations
  - Occur with feeding
  - Posturing increases with amplitude due to esophageal peristalsis
  - Tx: medical and behavioral management, reduce bolus feeds to 4oz/ 4 hour, PPI
- **Failure to thrive**
- **APGAR**
  - *Tells you info about the baby looks like at birth, how it tolerated labor, and how it responds to stimulation. NOT PREDICTIVE of anything. Does not direct therapy*
  - A= appearance/ Color
    - **Acrocyanotic = 1**
  - P= pulse (120-160)
  - G= grimace
    - **Grimace= 1**
    - **Crying= 2**
  - A= activity
  - R= respiratory (40-60)
  - Assessed at 1 and 5 minutes
    - 7-10 = good
      - Pink, high HR, cough/ cry with stimulation, moving, strong cry
    - 4-6= fair
    - 0-3= poor → oxygen and stimulation

Apgar Scoring System			
SIGN	**0**	**1**	**2**
Color	Blue or Pale	Acrocyanotic (pink trunk, blue hands/feet)	Completely Pink
Heart Rate	Absent	< 100 beats per minute	>100 beats per minute
Reflex Irritability	No response	Grimace	Crying or active withdrawal
Muscle Tone	Limp	Some flexion	Active motion
Respiration	Absent	Slow, irregular or weak cry	Good, strong cry

- **Physical growth**
  - Weight: initial loss in first few days, regained by 2 weeks
  - Birth Weight doubles by ~ 4months, triples by ~12 months, quadruples ~ 24 months
  - Annual weight gain ~ 5 lbs/ year (2-13 yo)
    - Inappropriate weight gain: poor intake, abuse, chronic vomiting, diarrhea, malabsorption, neoplasm, congenital disease

        - < 5th percentile= failure to thrive
        - > 95th percentile= rapid growth, sleep apnea, HTN, slipped capital femoral epiphysis, precocious puberty, skin infections, DM
    - Annual height
        - increased 50% at ~ 1 yo, doubles ~ 4 yo, triples ~ 13 yo
        - Average height gain is ~ 2 in/ year
        - Tall height= genetic, puberty, giagnism, hyperthyroid, klinefelter, marfan, obesity
        - Shorter stature= genetic, neglect, Turner, asthma, cystic fibrosis, hormone deficiency, glucocorticoid excess, skeletal dysplasia, neoplasm
- **well child visit**
    - 2 wk, 2 mo, 4, mo, 6 mo, 9 mo, 12 mo, 15 mo, 18 mo, 2 yr, 2.5 yr, 3 yr, 4 yr, 5 yr
    - growth and development, height, weight, head circumference
        - healthy weight 5-85 percentile
        - look for trends
        - failure to thrive < 5%
    - screenings for high-risk children: TB, lead, strabismus, lipids, cardiovascular disease
    - anticipatory guidance: education for patient and families
        - screen time < 1-2 hours/ day
        - accidents / injuries #1 cause of death in children < 1 yo
            - Rear-facing car seat until 2 yo and have reached manufacturer's maximum limit
    - Teenagers
        - Depression screening
- **Screenings**
    - **<u>Bright future guidelines:</u>**
        - **Iron deficiency** (screen using CBC ~ 1 yr)
            - Supplement breast milk ~ 4 months
            - iron -fortified formula sufficient
            - Risk factors: prematurity, cows milk (avoid until 12 months)
                - Cows milk causes inflammation in gut → iron loss
        - **Vit D deficiency**
            - Supplement into formula
        - **Autism**
            - 18-24 months
            - Modified checklist for autism in toddlers, revised with follow-up
        - **Hearing**
            - Screen at birth (congenital), older kids (acquired)
            - Screen > 4 yo using tone audiology, tympanometry
            - Abnormal screen → audiology referral
        - **Vision**
            - Starts at age 3
            - Examine for strabismus
        - **Lead Poisoning**
            - Dust from lead paint → neurocognitive impairment
            - Usually asymptomatic. Do a finger/ heel stick
            - Remove source of lead paint
        - **Hyperlipidemia**
            - 9-11yo → 17-21 yo
            - None 12-16 yo bc lipids change during puberty

        - **Oral Health**
            - Start brushing ~ 6 months
        - **Tobacco, Alcohol, Substance use**
            - Screen ~ 11 yo
            - CRAFT screen
                - CAR- DUI or drunk driver
                - Relax
                - Alone
                - Forget-
                - Friends- tell you to cut down
                - Trouble- for using drugs
                - > 2 score= alcohol abuse
        - **Depression**
            - Age 12: PHQ2
                - Little interest or pleasure in doing things
                - Feel down, depressed, hopeless
        - Poverty
- **Anticipatory Guidance**
    - **Normal growth**
        - Predictable course (as long as proper nutrition): weight, height, head circumference percentile
        - Full term babies lose 10% weight after birth, regained by 2 weeks
            - Double BW by 4 months
            - Triple BW by 1 year
            - Kids gain 4-5 lbs/ year from age 2- puberty
        - **Linear growth**: spurts and slowing (grow 2-4 in/ yr)
            - Familial short stature
            - Constitutional growth delay (takes time to grown, most common)
            - Constitutional delay of growth and puberty (CDGP)
                - Late adolescent growth spurt, delayed puberty, adult height normal
                - Bone age < chronological age
        - **Head growth=brain growth**
            - Watch trends
            - Microcephaly
                - Genetic disorders: abnormal face/ limbs, down syndrome, angelman syndrome, williams syndrome
                -

Congenital	Acquired
TORCH Infections Teratogens (ETOH) Trisomy 13, 18, 21	Meningitis Ischemic brain injury Metabolic disorders (hypothyroid)

            - **Macrocephaly**
                - Hydrocephalus > hemorrhage, mass lesions
                - Work-up: US
        - **Failure to thrive**
            - Falls off weight curve → height and head
            - Due to chronic medical disorders (cystic fibrosis); malnutrition
            - Social services
        - **Pediatric dehydration**
            - Body weight and vital symptoms

        - Quantify # wet diapers (urine output)
        - Tx: fluid replacement (Oral → IV) 20 mg/ kg
    - **Diet**
        - Feed on demand → 2-4 hours → start iron-fortified cereal ~ 6 months → whole milk ~ 12 months
        - Avoid juices, sweets
        - Breastfeeding= BEST
            - contraindication= HIV, HSV on breast, lithium, alcohol, galactosemia, PKU, chemotherapy
            - Breast Milk is whey dominant, more lactose, LCFA, less Fe
    - **Bowel movements + Urine**
        - 1st BM is meconium w/in 36 hours of life
        - 1st week= 4 stools/ day, # wet diapers= age in days
        - 3 months= 2-3 stools/ day, > 4 wet diapers/ day
        - 2 yo= 2/ day, start toilet train ~ 18 months
        - 4 yo= 1/ day, fully potty trained
    - **Sleep**
        - Sleep 18-20 hr/ day
        - Sleep thru night by 6 months
        - 1-2 naps/ day up to 4 yo
    - **Car Seats**
        - < 2: rear-facing
        - 2-4 yo: forward facing car seat
        - 4-8 yo: booster seat
        - 8-12 yo: back seat belt
    - **Injuries**
        - Leading cause of death: car injury, firearms, bicycle head injuries (wear helmet)
    - **SIDS (sudden infant death syndrome)**
        - < 1 yo without pathology, unexplained
        - Risk factors: stomach sleeping, smoking, young maternal age < 20, bed sharing
            - Avoid smoking, sleep supine, firm surface, no extra blankets
    - **BRUE** (brief resolved unexplained event)
        - Sudden cyanosis, pallor, irregular breathing
        - No link with SIDS and BRUE
        - Obtain H&P, reassurance
            - Low risk if < 2 months, full term, only 1 BRUE, < 1 min, no CPR, no concerning features

- **Immunization schedule**
    - 3 dose series: HepB, RV, DTaP, Hib, PCV13, IPV
    - 1 month: Hep B
    - 2 month: HepB, RV, DTaP, Hib, PCV13, IPV
    - 4 month: catch up from 2 month
    - 6 month: same as 2 month, start influenza vaccine yearly
    - 12 months: HepB, Hib, IPV, NNR, Varicella, Hep A
    - > 7 yo without known immunization status: Tdap
    - < 7 yo without known immunization: **DTap**

        - catch up MMR, VAR, HepA, HepB, polio
    - contraindications to vaccination: anaphylactic reaction or severe immunocompromised illness
    - Live vaccines contraindicated in immunosuppressed or pregnant: MMR, varicella, yellow fever, nasal influenza, oral rotavirus

Birth	Hep B
2 months 2b Dr. Hip	**6 vaccines:** Hep B (2nd dose, 1st at birth) DTap- acellular Rotavirus H influenza B Inactivated polio PCV (pneumococcal)
4 months Dr. Hip	**4 vaccines** DTaP- acellular Rotavirus H. influenza B Inactivated polio PCV
6 months B. Dr. Hipi	**7 months- receive 3rd dose of everything!** Hepatitis B (3rd dose) DTaP- acellular Rotavirus H. influenza B Inactivated polio PCV Influenza
12-15 months 1 very mad hipster	Varicella zoster (live vaccine only > 12 months) MMR (1st dose) Hepatitis A DTaP (4th dose at 15 months) Hib Inactivated polio PCV
4-6 yo Very DIM between 4-6 pm	Varicella zoster DTaP IPV MMR (2nd dose)

- **Milestones**
    - **Child development and milestones**
        - absence/ delay= developmental concerns
        - Persistent delays= mental retardation, genetic disorder, language/

hearing, child abuse, psych conditions

- **Primitive Reflexes**
  - Moro reflex and grasp reflex disappears by 6 months
  - Babinski reflex persists until 1-2 years

Table. Duration of Primitive Reflexes

Reflex	Duration
Palmer grasp	2-3 months postnatal
Rooting	Less prominent after 1 month postnatal
Moro	5-6 months postnatal
Tonic neck	6-7 months postnatal

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Age	milestones	Misc
2 months	Lifts head, Tracks objects past midline **Coos**, Smiles, Recognizes parents	Palmar reflex
4 months	Sit with support, Rooting reflex disappears Moro reflex disappears, Reaching across midline Orient to voice, Laughing, Enjoys looking around	
6 months	Palmar reflex disappears, Sits propped up on hands, Roll in both directions Transfer objects between hands, feeds self Raking grasp, **Babble**, Respond to names Stranger anxiety develops	Can use toothpaste breastfeeding with introduction to solids 1st Flu vaccine
9 months	Pull up to stand, Crawl and cruise Three finger pincer grasp, Holds bottle or cup Mama and dada, Wave bye, Separation anxiety, Play pat-a-cake	
1 year	Stands tall and takes first steps Throws a ball, Points to objects Babinski reflex disappears, Two-finger pincer grasp, follows One-step commands with gestures	Can see dentist Live vaccine= MMR
18 months	Climbing stairs, Running , Stack three blocks Eat with a spoon, Removes clothing, Ideas of possession “mine”, Pretend play	
2 years	Jumping, Copies a line, Stack 6 blocks Turn pages, 2 word phrases, 200 word vocabulary, Parallel play, Toilet training Rapprochement to caregiver	car seat rear facing until 2 yo
3 years	Walks up and down stairs with alternating feed Rides tricycle, 9 block tower, Copy a circle	

	Utensils, 3 word sentences, 300 word vocabulary, 75% speech understood Know gender and age	
4 years	Hop on one foot, Copy a square, Can use a fork Articulates 100% speech, Identify colors Cooperative play, Imaginary friends	Begin hearing and vision testing Strabismus ⇒ amblyopia ⇒ blindness
5 years	Skipping and walk backwards, Copies triangle Can tie shoes, dress and bathe, Print letters Can count to 10, 5 words sentences Develop friendships, Completed toilet training	Tie shoes, left and right= 6 years

- **Potty training**
    - Urinary continence= 5 years
    - Secondary continence if after 6 months of dry period
    - If potty trained and starts having incontinence= r/o UTI, constipation, diabetes
    - Tx of enuresis:
        - Behavioral → DDAVP or imipramine
    - Fecal continence= 4 years
        - Tx: disimpact, stool softeners, high fiber diet
        - Post-prandial toilet sitting
- **Crying**
    - **Colic**
        - Inconsolable crying > 3 hours/ day for > 3 days/ week in < 3 months old
        - May be due to gut immaturity and suboptimal feeding
        - Tx: reassurances & soothing techniques

Crying in young infants	
Diagnosis	**Key features**
Normal	• Intermittent, consolable, <3 hr/day
Colic	• ≥3 hr/day (usually evening), ≥3 days/week • Healthy infant age <3 months
Gastroesophageal reflux disease	• Frequent spit-up • Back-arching after feeding
Infection	• Acute otitis media: bulging tympanic membrane, ± fever • Meningitis: fever, lethargy, bulging fontanel • Septic arthritis: fever, limited extremity movement • UTI: fever, vomiting, poor feeding
Intussusception	• Episodic irritability with legs drawn to abdomen • ± Bilious emesis, bloody stools
Torsion	• Testicular swelling or abdominal distension (ovarian)
Trauma	• Hair tourniquet: hair accidentally wrapped around digit • Corneal abrasion: tearing, photophobia; + fluorescein test • Abuse/fracture: bruising, laceration, asymmetric movements

Adolescents

- **History**
  - H: home, habits
  - E: education, employment, exercise
  - A: Accidents, ambition, activities, abuse
  - D: drugs, diet depression
  - S: sex, suicide
- **Puberty and Tanner stages**
  - **Pubarche**
    - Pubic hair
    - Tanner 5: hair on inner thighs
  - **Thelarche**
    - Unilateral breast, tender mass posterior to nipple → first sign of puberty (~8yo)
    - Tanner 4: double mounds
    - Tanner 5: areola recedes
  - **Menarche**
    - Begins after thelarche
- **Abnormal growth**
  - “Late bloomer” = constitutional growth delay
  - Short kid from short family= familial short stature
  - Same bone age findings= precocious puberty, CAH, hyperthyroidism
  - Pathologic short stature= turner, craniopharyngioma, hypopituitarism
-

- **Screenings**
  - Depression
  - HIV, G&C
  - Substance use, safety
  - Dyslipidemia
  -

Routine adolescent screening	
Category	**Screening method***
Mental health	• Validated depression questionnaire
Sexual health	• Confidential discussion about sexual activity • Gonorrhea & chlamydia testing if sexually active • HIV testing (once at age <18)
Substance use	• Confidential discussion about exposure, use, abuse
Dyslipidemia	• Lipid panel once between age 17 & 21
Safety	• Inquiry about bullying • Inquiry about seatbelt & helmet use

Immunology

- **Hereditary angioedema**
  - C1 inhibitor → elevated bradykinin → swelling of face, bowel, urticaria
  - Triggered by stress/ trauma (dental procedure)
- **Hypersensitivity reaction**
  - Type 1: anaphylaxis
  - Type 2: hemolytic anemia IgG or IgM
  - Type 3: SLE
  - Type 4: TB test, poison ivy

Cardiology

- **High yield**
  - Holosystolic murmur= VSD, MR, TR
  - Heart defect with no murmur= TGA
  - Bipolar mother births kid with holosystolic murmur worse on inspiration (right sided)= ebstein anomaly, associated with WPW
  - Holosystolic murmur with LVH= tricuspid atresia → give PGE1 and surgery
  - #1 heart disease= VSD
  - Associated with DiGeorge= truncus arteriosus
- **Benign heart murmurs**
  - Physiologic murmur

- Most kids have a murmur (grades I-II systolic murmur), decrease intensity with decreased preload
- Asymptomatic, normal exam
- Next steps: reassurance

- **Congenital heart defects**
  - Acyanotic
    - **VSD**
      - Holosystolic murmur at LSB (L → R)
      - Next steps: Echocardiography
        - No symptoms → monitor, close by 1-2year
        - Surgery: failure to thrive, 6-12 months w/ pulmonary HTN, or wait till 2s.
        - A smaller defect= louder noise= better prognosis

Small	Large
Asymptomatic Loud, harsh holosystolic LLSB Serial echo Closes	Respiratory distress, poor feeding and growth (pulmonary overcirculation & high output LV failure) Cxr: cardiomegaly and increased pulmonary markings Tx: surgery, diuretics

    - **ASD**
      - Wide, fixed splitting of S2
      - Left to right shunt
      - Uncorrected → Eisenmenger syndrome and paradoxical embolism
    - **PDA**
      - Continuous “machine” flow murmur at subclavicular region
      - Peripheral pulses attenuated/ wide pulse pressure
      - Embryology: PDA shunt deO2 from pulmonary artery into descending aorta → birth causes increased O2 tension, decreased PG → closes PDA
        - Left to right shunt
      - Risk factors: congenital rubella, down syndrome, preterm
      - Tx: close PDA with indomethacin/ NSAID/ Cox inhibitor
        - Keep open with PGE1
    - **Cardiomyopathy**
      - Diabetic mothers
      - Glycogen & fat deposit in IV septum
      - Spontaneous regression by age 1
  - **Cyanotic (get an ECHO, cardioresurgery)**
    - Tetralogy of fallot
      - Cyanosis depending on degree of right ventricular outflow obstruction
      - Harsh systolic murmur from pulmonary stenosis
      - Tet spell → knee-chest positioning → increased SVR to reduce the shunting → increased venous return to heart

        - **Transposition of the vessels**
            - Cyanosis after birth
            - PDA also present
                - Give PGE inorder to maintain PDA
            - deO2 from right side to heart → left side O2 to lungs
            - Single S2, no murmurs
            - Egg on string appearance
        - **Truncus arteriosus**
- **Hypoplastic left heart syndrome**
    - Tachypnea, cyanosis, no murmur, single S2
    - Delayed presentation after birth when PDA closes
    - Tx: staged palliative care, heart transplant
- **HOCM**
    - Murmur better with increased preload, louder with valsalva
    - Tx: beta blocker and CCB
    - No heavy exercise
- **Coarctation of aorta**
    - Turner syndrome (low weight and height), webbed neck, streak ovaries, broad chest
    - Murmur loudest in left infraclavicular area
    - HTN in UE, LE claudication
    - Give IV PGE1 (bypass the stricture and get more blood to systemic circulation)
- **Congenital long QT syndrome**
    - Arrhythmia in kids → syncope
    - ECG findings

	Benign (physiologic) Murmur	Pathologic Murmur
Patient history	• Asymptomatic • Normal growth	• Infants → poor weight gain, feeding difficulties, respiratory symptoms • Older children → exercise intolerance, chest pain, syncope
Family history	—	• History of sudden cardiac death or congenital heart disease
Murmur description	• Early or midsystolic • Grade I-II intensity • Intensity ↓ with standing and Valsalva	• Holosystolic or diastolic murmurs • Grade ≥III systolic murmurs • Harsh • Intensity → with standing and Valsalva
Additional findings	• Normal examination	• Cyanosis • Other cardiac examination findings (eg, loud S2, gallops) • Decreased peripheral pulses • Signs of heart failure (eg, jugular venous distention, peripheral edema)
Management	• Reassurance	• ECG and echocardiography

Respiratory

- **Knee-Jerks**
    - Emergent needle decompression= **tension PTX**
    - Inhaled racemic epinephrine + oral corticosteroids= **severe croup**
    - IV antibiotics= **pneumonia**
    - NSAIDs= **pericarditis**
    - Neisseria meningitis= **lumbar puncture**
    - HIV testing= **HIV** (diffuse lymphadenopathy, rash, diarrhea)
    - Steeple sign, inspiratory stridor= **croup**
    - Thumbprint sign + drooling, tripod position = **epiglottitis**
    - Soft tissue swelling, toxic appearance, hot potato voice= **retropharyngeal abscess**
    - Maculopapular rash on palms & soles= **syphilis**
    - Calcifications, hydrocephalus, chorio= **toxo**
    - Cataracts, deafness, extramedullary hematopoiesis, blueberry muffin rash= **rubella**
    - Microcephaly, hydrocephalus, thrombocytopenia= **CMV**
    - Limb hypoplasia, cortical atrophy, scars= **congenital varicella**
    - B/L conjunctivitis with limbic sparing= **kawasaki**
    - Fever → maculopapular rash on trunk and arms/ legs= **roseola HHV6**
    - Low grade fever → lacy reticular rash on face= **5th disease, PVB19**

        - Bad in preggos and sickle cell (aplastic anemia), and thalassemia
    - Sore throat 1-2 weeks → Fine maculopapular rash, desquamating on chest that spreads out, strawberry tongue= **scarlet fever, GAS**
    - Cough runny nose, fever, gray spots in mouth= measles (paramyxovirus), Vit A
    - Swollen parotids, fever, HA= **mumps** (paramyxovirus) → orchitis
    - **Lyme disease** = bell palsy, meningitis, heart block
        - Tx: amoxicillin < 8, doxy > 8
    - Rocky mountain spotted fever= doxycycline. complications= gangrene

Common causes of neonatal respiratory distress			
Diagnosis	**Transient tachypnea of the newborn**	**Respiratory distress syndrome**	**Persistent pulmonary hypertension**
Pathophysiology	• Inadequate alveolar fluid clearance at birth	• Surfactant deficiency • Alveolar collapse & diffuse atelectasis	• High pulmonary vascular resistance • Right-to-left shunt
Clinical features	• Tachypnea shortly after birth • Resolves by day 2 of life	• Prematurity • Severe respiratory distress & cyanosis	• Tachypnea & severe cyanosis
Chest x-ray	• Bilateral, perihilar linear streaking • Fluid within interlobar fissures	• Diffuse, ground-glass appearance with low lung volumes • Air bronchograms	• Clear lungs with decreased pulmonary vascularity

- **Respiratory Distress**
    - Baby born with RDS, scaphoid abdomen= **diaphragmatic hernia**
        - Biggest concern? Pulmonary hypoplasia
        - Tx: place on ECMO 3-4 days, surgery, endotracheal intubation
    - RDS + excess drooling = **esophageal atresia, fistula**
        - Dx: feeding tube, xray to see it coiled in thorax
        - Look for VACTERL anomalies
        - Work-up: Echo, renal US
    - 1 week old baby turns cyanotic when feeding= **choanal atresia** (nose breather)
        - Look for CHARGE associated anomalies- coloboma, heart defects, retarded growth, GU anomalies, ear anomalies, deafness
    - Premie, dyspnea, nasal flaring, ground glass opacities= **respiratory distress**
        - Dx: L:S ratio < 2= RDS → give betamethasone, not enough surfactant
        - Tx: O2, nasal CPAP keep alveoli open
    - Infant born to diabetic mother, dyspnea and grunting= **TTN (transient tachypnea of newborn)**
        - Perihilar streaking (retained fluid)
        - < 2 hours after birth
        - Risk factor= c-section (fluid not removed)
        - Tx: give O2
    - Baby born with rupture of membrane that is green-brown, immediately after birth= **meconium aspiration syndrome**
        - Next steps: intubate & section before stimulation

        - Complication: pulmonary HTN, pneumonitis
- **Asthma**
    - Reversible airway disease with airflow obstruction and bronchospasm
        - Nocturnal cough or cough > 3 weeks
        - Wheezes
        - Seasonal symptoms with allergic rhinitis, conjunctivitis, eczema
        - PFTs: **reduced FEV1/ FVC*** most important
        - PE: wheezing, high-pitched, musical sound in lower airways
    - **Mild intermittent=** few symptoms/ week
    - **Mild persistent=** more symptoms/ week
    - **Moderate persistent=** daily symptoms
    - **Severe persistent**= everyday all day
    - **Acute asthma exacerbation**
        - Inhaled albuterol, ipratropium bromide, corticosteroids

Asthma Classifications				
Classification	**Symptoms**	**Nighttime Awakenings**	**FEV1**	**Limitations**
Mild intermittent	≤ 2 days/week	≤ 2 times/month	> 80%	None
Mild persistent	> 2 days/week, but not daily	3-4 times/month	> 80%	Minor
Moderate persistent	Daily symptoms	> 1 episode/week but not daily	60-80%	Some
Severe persistent	Throughout the day	Often 7 times/week	< 60%	Extremely limited

- **Cystic fibrosis**
    - Recurrent infections in children
    - Vit ADEK deficiency
    - Meconium ileus, prolapsed rectum
    - Do sweat chloride test
    - Tx: symptomatic, piperacillin, enzyme replacement, fluid replacement
        - Always cover for MRSA (vancomycin) and pseudomonas
- **Spontaneous pneumomediastinum**
    - Coughing paroxysms in tall, thin adult males
    - Acute onset chest pain, SOB, subQ emphysema
    - Get CXR
- **Noninfectious**
    - **Foreign body**
        - Normal in most cases, or interrupted bronchus sign
        - Common in kids 6 months-4 years
        - Decreased breath sounds, hyperinflation of affected side w/ mediastinal shift toward unaffected side
    - **OSA**
        - Adenotonsillar hypertrophy → snoring →> systemic hypertension & pulmonary hypertension
- **Infectious**
    - **High yield**

        - Echo= kawasaki → coronary aneurysm
        - Scarlet fever= penicillin
        - Strawberry tongue= scarlet fever, kawasaki
    - **Diphtheria**
        - Fatal infection sore throat, fever, cray pseudomembrane
        - Next steps: throat culture
    - **Strongyloidiasis**
        - Eosinophilic pulmonary disease
        - Larvae penetrate skin, swallowed, cause roaming urticaria and GI obstruction/ ileus
    - **Bronchopulmonary aspergillosis**
        - Structure airway disease (CF, asthma) → Th2 sensitization and allergic inflammation → aspergillus infection → high IgE, aspergillus skin test
        - Tx: systemic glucocorticoids, antifungals, bronchodilators
        - ~ CF bronchopneumonia except not resolved after Abx
    - **Croup**
        - Laryngotracheitis. Due to parainfluenza virus
        - Acute viral inflammation of larynx in kids 6 months - 3 years
        - 1-7 days prodromal URI → croup (inspiratory stridor), low grade fever, barking cough when crying, worse at night, hoarseness, mild dyspnea, drooling
        - Dx: none required
        - Tx: rest, cool air, dexamethasone
            - **Racemic epinephrine** (bronchodilation) for stridor
            - **Corticosteroids (dexamethasone)**
                - **One does in the ED only.**
    - **Epiglottitis**
        - Haemophilus influenzae
        - Rapid onset, high grade fever, tripod position, inspiratory stridor
        - Thumbprint sign
        - Lack of recommended immunizations (Hib)
        - Tx: **intubation** and Abx
    - **Pharyngitis**
        - Sore throat, painful swallowing
        - Can progress to scarlet fever (Strep pyogenes)
    - **Retropharyngeal abscess**
        - Muffled voice, soft tissue swelling in posterior pharynx
        - Toxic, high fever, drooling
        - Work-up: I&D, 3rd gen cephalosporin
        - Complication: mediastinitis
    - **Peritonsillar abscess**
        - Hot potato voice
        - Work-up: aspiration, culture
        - Tx: Abx, tonsillectomy if recurrent
    - **Neisseria meningitidis**
        - Early infection is nonspecific (fever, HA, vomit) → nonsuppurative pharyngitis
        - Rapid progression < 12 hours, severe myalgias, mottled skin/ pallor
        - Next steps: lumbar puncture
    - **Mumps**
        - myalgia, fatigue, fever —> parotitis, orchitis, meningitis, encephalitis

        - Paramyxovirus
        - Tx: VitA
    - **Measles (rubeola)**
        - cough, coryza, conjunctivitis, koplik spots
        - paramyxovirus
        - Unvaccinated MMR (no vaccine in immunocompromised)
        - Ill-appearing, cold symptoms that resolve → maculopapular rash from head to toe over 3 days (wear a N95)
        - Cephalocaudal rash → coalesces and darkens
        - High fever
        - Post-vaccine: live attenuated vaccine can cause self-limiting illness.
        - Dx: IgM Ab
        - Tx = vit A
    - **Rubella (german measles)**
        - PDA "harsh machine like murmur", blueberry muffin rash, suboccipital, posterior auricular LN, hepatosplenomegaly
        - Congenital = sensorineural hearing loss, cataracts/ absent red reflex, PDA
        - Kids: fever, **cephalocaudad spread** of maculopapular rash
            - Forchheumer spots (petechiae on soft palate)
        - Mother will have "no prenatal care" and infection in 1st trimester
        - Dx: serology IgM, viral culture
        - Prevention: live-attenuated rubella vaccine in mother and kids
            - Common in kids < 10 months (MMR given 12 months and 4 years)
    - **Roseola infantum**
        - HHV-6
        - High-grade fever > 4 days → febrile seizure → abrupt return to normal
        - Rose-pink Maculopapular rash on chest and abdomen after fever → spreads to arms
    - **Erythema infectiosum**
        - 5th disease, parvovirus B19
        - Slapped-cheek rash, low-grade fever and malaise
    - **RSV**
        - MOST COMMON cause of bronchiolitis in kids < 2 yo
        - Acute fever, rhinorrhea, cough, respiratory distress, wheezing
        - **Bronchiolitis**
            - RDS, nasal congestion, expiratory wheezes
            - Tx: supportive care, palivizumab in select infants
            - Complication: apnea, respiratory failure
    - **Varicella (chicken pox)**
        - itchy rash and generalized fluid-filled blisters "dewdrop"
        - Viral prodrome of HA, malaise, fever → rash in 24 hours from hairline down
        - Tx: supportive, hydration, pain control
            - Acyclovir in adults, immunocompromised, complicated disease
        - Congenital varicella syndrome: growth restriction, limb abnormalities, hypoplasia, cortical atrophy
    - **Influenza**
        - Acute URI with fever, cough, HA, myalgias
        - Varicella post-exposure prophylaxis
            - History of immunity → observation

        - No history of immunity to chickenpox → varicella vaccine w/in 10 days exposure
        - Immunocompromised + chickenpox → VZIG
- **Parainfluenza**
    - Cause of croup (laryngotracheobronchitis)
    - Barky cough with inspiratory stridor
- **Nontypeable haemophilus influenzae**
    - CAP in kids, acute fever, cough, tachypnea
    - Acute bacterial rhinosinusitis
- **Haemophilus influenzae**
    - Epiglottitis
    - drooling
- **Adenovirus**
    - Common, acute URI
    - Fever, pharyngitis, conjunctivitis, diarrhea
- **Pertussis**
    - Chronic whooping cough w/o fever, 1-2 week prodrome of mild cough, fever, malaise, increased sputum production→ vomiting
    - Facial petechiae or subconjunctival hemorrhages (intrathoracic pressure → capillary hemorrhage)
    - Clinical phases
        - 1-2 weeks: catarrhal mild cough and rhinitis
        - 2-6 weeks: paroxysmal cough with inspiratory whoop, posttussive emesis, syncope, apnea, cyanosis (infants)
    - Dx: household contact, leukocytosis with lymphocytosis
        - CXR normal
        - PCR (sensitive) and culture (specific)
    - Tx: empiric
    - Prevention: DTaP at 2, 4, 6, 15-18, 4-6, booster 11-12
        - Infants < 6 months can develop apnea → death
- **Strep pharyngitis**
    - Risk of acute rheumatic fever high in kids untreated, need to confirm a negative test with a throat culture
    - Centor score: age 3-14, tonsillar exudate, tender or swollen cervical LN, temp > 38, absence of cough
        - > 4: treat with penicillin
        - < 3: strep test
    - Viral? → treat symptoms
    - Bacterial? → rapid strep test → throat culture
        - Strep pharyngitis tx: oral penicillin or amoxicillin
- **Scarlet fever**
    - Strep pyogenes beta-hemolytic
    - Sandpaper rash begins in skin folds and spreads to trunk/ extremities
    - Cellulitis, pharyngitis, exudative tonsillitis, necrotizing fasciitis, glomerulonephritis, complication: rheumatic fever
    - Tx: oral penicillin
- **Rheumatic fever**
    - Group A strep infection/ sore throat/ fever → Autoimmune process → carditis, migratory polyarthritis, chorea (writhing hands), erythema marginatum, subQ nodules
    - Dx: Jones criteria, elevated CRP/ ESR

        - Causes mitral stenosis/ regurgitation
        - Staph aureus infections as a kid, associated with **strep pyogenes** due to antigenic mimicry
        - Tx: 10 day penicillin, prophylaxis benzathine penicillin G
    - **Acute bronchitis**
        - Viral respiratory illness, cough > 5 days - 3 weeks
        - Yellow-green sputum is not infection= sloughed off cells
        - If hx of asthma, give bronchodilators
        - Tx is usually supportive
    - **Bronchiolitis**
        - viral bronchiolitis: supportive therapy, hydration
    - **Kawasaki**
        - Fever > 5 days with conjunctivitis, mucositis, rash, edema, LN > 1.5 cm
        - Conjunctivitis, acute flaccid paralysis, aseptic meningitis
        - Rash, hand-foot and mouth maculopapular lesions, oral mucosal red ulcerations on a gray-yellow base. Strawberry tongue
        - Next step: ECHO
            - Lymphocytic myocarditis
        - **Tx: Aspirin** + monitor → IVIG → Corticosteroids → postpone vaccinations for 11 months
        - Acute phase: 5 days fever → conjunctivitis, strawberry tongue, rash, LN, hand and foot desquamation
        - Subacute: 2-8 weeks, thrombocytosis, elevated ESR, coronary aneurysm risk
        - Chronic: > 8 weeks, until ESR returns to normal
    - **Trypansoma cruzi**
        - Chagas disease → myopericarditis and achalasia
    - **GBS**
        - Prolonged rupture of membranes, hypothermia, sepsis in < 6 days of birth
        - Absence of prenatal care, no penicillin given
        - 24 hours of birth with SIRS, B/L crackles and pleural effusions
    - **Acute EBV**
        - (infectious mononucleosis)
        - Fever, LN, palatal petechiae, splenomegaly
        - Atypical lymphocytes (monospot not always accurate)
        - Complication: splenic rupture
            - Blood in abdomen, acute onset
    - **Parvovirus B19**
        - Erythema infectiosum
        - Prodrome (fever, rhinorrhea) → slapped cheek rash with lacy rash on body
    - **Coxsackie**
        - Hand, foot & mouth disease
        - Coxsackie A16
        - Non-pruritic exanthem on hands and soles, vesicular lesions in mouth
        - Highly contagious, outbreaks in daycare and preschool
        - Can cause myopericarditis
    - **Mycoplasma pneumonia**
        - Atypical pneumonia in school-aged kids
        - Non-specific URI, cold IgM hemolysis, meningoencephalitis, erythema multiforme, rash and mucositis (MIRM)

    - **Rickettsia rickettsii**
        - Rocky mountain spotted fever
        - Dog tick (dermacentor) → fever, HA, malaise, nausea → days later develop macular and petechial rash around wrist/ ankles → moves centrally
    - **Toxoplasmosis**
        - Cat feces
        - Growth restriction, hepatosplenomegaly, chorioretinitis, jaundice
        - Hydrocephalus, diffuse parenchymal intracranial calcifications, esp in basal ganglia
    - **Tuberculosis**
        - Risk factors: HIV, travel to endemic area, shelters, prison
        - Chronic cough, fever, weight loss, failure to thrive
        - Screen: PPD +, IFN-y release
        - Cxr: hilar LN, effusion, consolidation, cavitation
    - **Listeria**
        - Disseminated abscesses
- **Functional**
    - **Vascular ring**
        - Biphasic stridor, aortic arch around the trachea
        - Malformation of aortic arch
        - Stridor improves with neck extension
    - **Tracheomalacia ****
        - Weakness in trachea
        - Associated with prolonged intubation
    - **Laryngomalacia**
        - Most common cause of stridor in infancy
        - Soft cartilage in upper larynx that collapses on inspiration
        - Inspiratory stridor, worse with feeding/ crying
    - **Tracheoesophageal fistula (TEF)**
        - Drooling, choking, cyanosis due to spasms during feeding

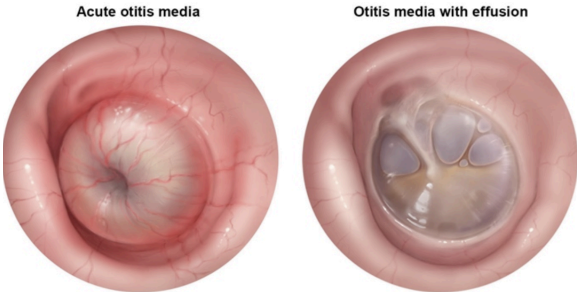
Differential Diagnoses for Asthma Based on Age/Characteristic Findings	
Diagnosis	**Characteristic Findings**
Bronchiolitis	Age < 24 mo. No atopy, not responsive to short-acting beta-2 agonists (SABA), context of fever and viral respiratory tract infection
Viral-induced wheeze	Any age but usually < 4 yr. Wheezing only with viral respiratory tract infections.
Bronchopulmonary dysplasia	Age < 24 mo. Symptoms since birth in premature infant.
Chronic aspiration/GERD	Any age. Chronic cough, especially after meals. GI symptoms.
Anxiety/panic attack	School-age or older. No wheezing, no improvement with SABA.
Vocal cord dysfunction	Adolescent. Acute onset of symptoms within minutes of exercise or exposure to irritants. No response to SABA. No symptoms during sleep. Hoarse voice.
Heart failure	Any age. Fever/viral myocarditis; missed congenital heart disease; failure to thrive; murmur, hepatomegaly, crackles.
Foreign body aspiration	Any age but usually < 4 yr. Acute onset of symptoms, unilateral findings, history of choking spell.

HEENT

- **Knee-jerks**
    - Dilated fundoscopic exam: secondary causes of strabismus, Rb
    - Tonometry: acute closure glaucoma
    - Visual evoked potential testing: optic neuritis
    - CT orbits: optic nerve injury
    - Gray Vesicles in oropharynx, no LAD: Herpangina (Coxsackie)
    - Clusters on anterior oral mucosa/ lips: HSV1
- **Conjunctivitis**
    - **Chemical conjunctivitis:** newborn with red, watery eyes (from silver nitrate)
    - **Gonococcal**: earlier presentation few days → IM 3rd gen cephalosporin
        - At birth give topical erythromycin
    - **Chlamydia**; later presentation, 5-14 days → oral erythromycin
        - Can lead to chlamydia pneumonia
    - HSV
    - Staph

Neonatal conjunctivitis			
Type	**Onset age**	**Findings**	**Treatment**
Chemical	<24 hr	• Mild conjunctival irritation & tearing after silver nitrate ophthalmic prophylaxis	Eye lubricant
Gonococcal	2-5 days	• Marked eyelid swelling • Profuse purulent discharge • Corneal edema/ulceration	Single IM dose of 3rd- generation cephalosporin
Chlamydial	5-14 days	• Mild eyelid swelling • Watery, serosanguineous, or mucopurulent eye discharge	Oral erythromycin

- **Retinoblastoma**
  - Rb gene, two hit hypothesis
  - Increased risk of osteosarcoma
- **Otitis externa**
  - Earache with erythema in canal
  - Water exposure, trauma or foreign materials
  - Micro: pseudomonas, stap aureus → ear culture
  - Tx: Abx (fluoroquinolone), topical glucocorticoid
- **Otitis media infections**
  - **Acute OM:**
    - Pus behind ™ , limited mobility on insufflation or air-fluid level
    - Most common cause: Haemophilus influenzae, strep pneumoniae
    - Tx: Abx amoxicillin
  - **OM w/ effusion:**
    - Poor ™ mobility, air fluid levels
    - Resolves and does not require treatment
    - 3 month f/u
    - Irrigation to remove drainage, lay on affected side → myringotomy
  - **Persistent or recurrent acute OM**
    - Additional Abx course → tympanostomy tube
  - **Otitis externa**
    - Red ear with pus
    - Tx: topical ciprofloxacin (pseudomonas)
    - Complications: malignant external otitis → invade facial bone → facial paralysis and vertigo
  - Complications: spread to temporal bone, thrombophlebitis, mastoiditis, temporal abscess
  - Interventions: antipyretics, analgesics, Abx (amoxicillin)



- **Acute cervical lymphadenitis**
  - Tender, red LN in kids < 5, due to gram positive bugs
  - Tx clindamycin (active against GP/ GN)
- **Head lice**
  - head-to-head contact, kids allowed to stay in school
  - Pediculus humanus capitis
  - Tx: permethrin (insecticide)
    - Malathion (for > 6 yo first line, or 2-5 yo second line), organophosphate
    - Benzyl alcohol: topical analgesic
    - Ivermectin: not for < 6 months
    - Lindane shampoo: neurotoxic, not for kids or pregnant women
  - Management: evaluate household members, wash clothes with hot water, send back to school once treatment initiated
- **Choanal atresia**
  - U/L = symptomatic in childhood
  - B/L= cyanosis worse with feeding, noisy breathing (stertor), CHARGE syndrome
    - Cannot pass a catheter through the nasopharynx
  - Tx: oral airway, surgical repair

Neurology

- **High-yield**
  - EEG → recurrent, unprovoked seizures, give levetiracetam
  - Lumbar puncture → meningitis
  - Periventricular calcifications + hydrocephalus → **toxoplasmosis**
  - Microcephaly + calcifications → congenital **syphilis**
  - Microcephaly, periventricular calcifications + ventriculomegaly= **CMV**
- **Headaches**
  - ~ migraines in adults, photophobia, phonophobia, N/V, autonomic symptoms
  - Preceding aura
  - Normal neurologic exam
  - Tx: NSAID, tylenol, Tripant, antiemetics (promethazine), ergots (dihydroergotamine)
- **Idiopathic intracranial hypertension**
  - Fat, fertile, femninine
  - If male, can be medication induced (retinoids)
  - Impaired CSF resorption & intracranial venous HTN. HA, N/V, visual changes (transient obscurations), pulsatile tinnitus, neck pain, papilledema

    - Work-up: MRI, MR venography
    - Tx: weight loss, bariatric surgery, carbonic anhydrase inhibitor
- **Meningitis**
    - Kids who aren't vaccinated
    - FEVER at < 2 week old is an emergency!
        - viral= high lymphocytes= group B coxsackievirus
        - Bacterial = GBS, Hx of PROM
            - Ampicillin, gentamicin, 3rd generation cephalosporin
                - Covers E coli, GBS and Listeria

Age	Empiric Medications
0–28 days	Ampicillin + cefotaxime or gentamicin + acyclovir; consider vancomycin if the infant is in septic shock
29–60 days	Ceftriaxone or cefotaxime + ampicillin + vancomycin; consider adding acyclovir if there is a vesicular rash, suggestive lab findings, or both
61–90 days	Ceftriaxone or cefotaxime + vancomycin

- **Seizures**
    - **Febrile seizure:** return to baseline, give tylenol and discharge home
- **Brachial plexus injury**
    - **Erb palsy: C5-6**
        - Waiter's tip: arm extended, internal rotated, adducted, forearm pronated
        - Refer is not better by 3-6 mo for neuroplasty
    - **Klumpke: C7-8, T1**
        - Supinated, wrist extended, MCPs hyperextended, interphalangeal digits flexed “give me money”
        - Horner syndrome seen
- **Complex febrile seizure**
- **Concussion**
- **Migraine without aura**
    - Unilateral pulsatile HA, photophobia, phonophobia, N/V
    - No work up needed
    - Triggers: sleep deprivation, menses
- **Myasthenia gravis**
- **Subdural hematoma**
- **Reye syndrome**
    - Ingestion of aspirin → hyperammonemia and encephalopathy
    - Toxic to liver in kids
- **Hydrocephalus**
    - Bulging anterior fontanelle, intractable vomiting, lethargy, irritable, papilledema (common in older kids once skull bones fused)
    - VP shunt increase risk of high ICP (shunt malfunction) → surgical intervention
    - Causes: hemorrhage (vit K deficiency- poor gut flora, immature liver, poor placental transfer); trisomy 13 (with other findings)

    - Work-up: brain MRI or CT
- **Neurodevelopmental defects**
    - **Myelomeningocele**: both meninges and spinal cord herniate
        - Strong association with chiari 2 malformations (inferior displacement of medulla & cerebellum through foramen magnum) → hydrocephalus "full fontanelle"
    - **Chiari I:** downward displacement of cerebellar tonsils through foramen magnum
        - Most common, asymptomatic, usually presents with headache/ pain with physical activity or valsalva
        - Associated with syringomyelia
    - **Chiari II:** herniation of cerebellar tonsils, vermis, medulla into foramen magnum → hydrocephalus
        - Associated with myelomeningocele
    - **Dandy walker malformation**: absent cerebellar vermis, dilated 4th ventricle
        - Hydrocephalus, bulging fontanelles, CN palsy, apneic events, poor feeding
    - **Anencephaly**: malformation of anterior neural tube
        - Absent forebrain and open calvarium, lethal
- **Neurocutaneous disorders**
    - **Sturge-Weber syndrome**
        - Facial port-wine stain, leptomeningeal capillary-venous malformation, glaucoma
        - Anterior chamber angle anomaly
- **Seizures**
    - Menkes disease

Behavior & Psychiatry

- **Normal behavior**
    - Meets milestones, socializes, appropriate emotional response
    - Normal for kids to have food preferences, can be picky eaters
- **Reactive attachment disorder**
    - History of neglect, abuse, inconsistent care → lack of response to comfort, lack social engagement, limited affect, irritability
    - Can have anxiety, aggression, hyperactivity, sleep and toilet difficulties
    - Tx: early intervention, stable environment, parenting and counseling
- **Disinhibited social engagement disorder**
    - ~ history to RAD, but opposite. Overfamiliarity, lack of boundaries
- **Autism spectrum disorder**
    - Repetitive behaviors, fixed interests, difficulty playing with others
- **ADHD**
    - > 6 years old, give stimulant= methylphenidate
    - For overactive kids < 6 yo, try behavioral therapy
    - DSM-5 criteria:
        - Inattention, hyperactive/ impulsivity that interferes with function/ development > 6 months

                - Vanderbilt assessment scale
            - Tx: methylphenidate
                - Non-controlled: atomoxetine, guanfacine
- **PTSD**
    - Recurrent nightmares, violent themes with aggressive play
    - Poor emotional regurgitation, dissociation, avoidance
    - Social withdrawal, difficult concentrating
    - Pervasive inattention and hyperactivity
- **Generalized anxiety disorder**
    - Excessive uncontrolled worry
    - Screen with GAD-7
    - Restless, fatigue, difficulty concentrating, irritability, sleep disturbances
    - Tx: SSRI
- **Conversion disorder**
    - Psychogenic pseudosyncope
    - Apparent LOC without impaired cerebral perfusion lasting minutes to hours
    - Absence of exam findings
    - Awareness of what happened
- **Cataplexy**
    - Emotional situation → loss of muscle tone, syncope
    - Brief < 2 min
- **Child abuse**
    - **Scald injuries:** symmetric, spares flexural creases, sharp line of demarcation, uniform burn depth, absence of burn in the distribution of splash marks
        - Zebra pattern
        - Burns on back and buttocks
        - Doughnut pattern (spare butt cheeks)
    - **Unintentional scald injuries** (kid hurts self)
        - Splash marks, nonuniform burn depth, poorly defined and asymmetric
    - Red flags
        - Inconsistent story that does not align with exam findings
        - Delay in seeking treatment
- **Substance abuse**
- **Self-injury**
    - Deliberate injury and no intent to die. Regulated distressing emotions, punish self
    - Associated with depression → increased risk of SI
    - PE: cutting burning, scratching in teens
    - Exception to confidentiality:
        - Suicidal or homocial dangerous behavior
        - Abuse
        - Neglect
    - Involve patient in disclosure to the family

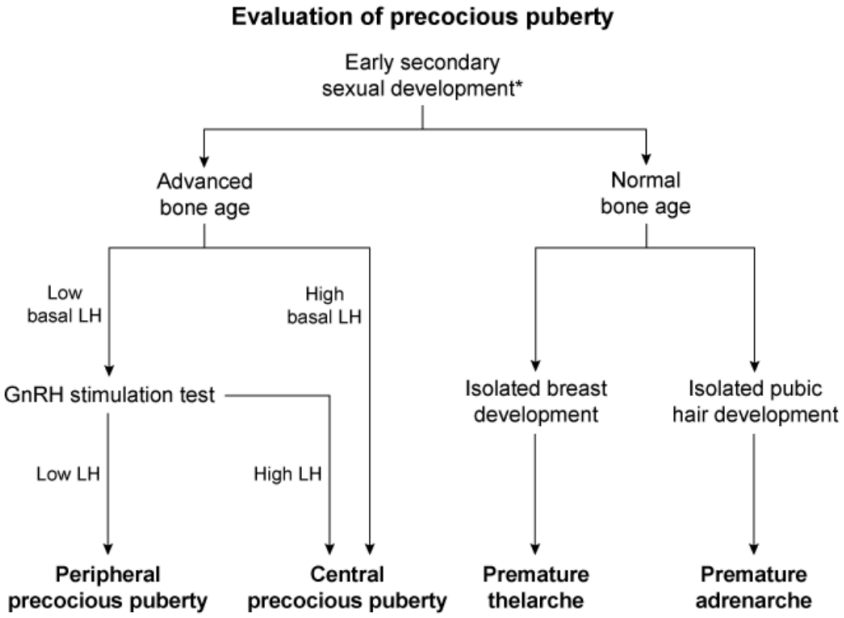
Endocrine

- **Next steps**
    - **MRI brain;** pituitary tumor in central precocious puberty= positive LH response to leuprolide

    - **Pelvic US**
    - **Adrenal US:** evaluate cause of peripheral precocious puberty (low LH, FSH)= negative LH response
    - **Dexamethasone suppression test:** cushing syndrome
    - **Karyotype:** delayed puberty (klinefelter, turner syndrome)
- **Phenylketonuria**
    - Deficient Phe hydroxylase (Ph does not cross placenta)
    - Causes athetosis, seizures, development delay, vomit in 1st few months
    - Fair hair, eyes, skin, MUSTY/ Mousy smell
    - Tx: Low Phe diet, breastfeeding contraindicated
- **Galactosemia**
    - Deficient G1p-UDP → accumulation in kidney, liver, brain
    - Causes direct hyperbilirubinemia, jaundice, low glucose, cataracts, seizures
    - Predisposed to E coli sepsis
    - Tx: no lactose, occurs at birth bc it crosses placenta
    - Breastfeeding contraindicated
- **Infants of diabetic mothers**
    - Control glucose in 1st trimester & take 4mg folate/ day
    - T1DM mothers > T2DM: Placental insufficiency/ IUGR, congenital heart disease, NTD, caudal regression syndrome, small left colon syndrome
    - Large for GA → shoulder dystocia, TTN
    - **Hypoglycemic** → maternal hyperglycemia and infant hyperinsulinemia → increased fetal fat & glycogen stores, increased fetal metabolic demand
        - Increased risk of seizures, check sugar and calcium
        - < 40: give milk, < 20: IV dextrose
    - **Hypocalcemia** → neonatal seizure, jittery
    - **Hypomagnesemia**
    - **Polycythemia** → big baby needs more O2 → increased EPO → renal/ splenic thrombosis
    - **Jaundice** → more RBCs to break down, risk of kernicterus
    - **RDS** → high insulin interferes with cortisol surge prior to birth that normally stimulates lung maturity. Check L:S ratio
    - Hypertrophic cardiomyopathy
- **Diabetic ketoacidosis**

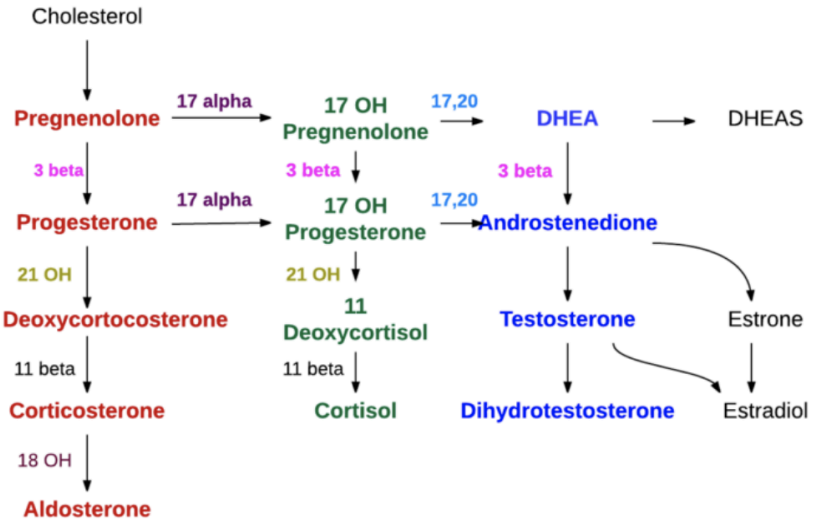
Management of Pediatric DKA	
1. General resuscitation	• Focus on stabilization of airway, breathing, and circulation/establishing intravenous access*
2. Fluid/electrolyte replacement	• Use of isotonic fluids (**normal saline** or lactated ringers) to correct underlying hypovolemia • As hyperglycemia contributes to pseudohyponatremia, sodium should be continuously monitored, and higher concentrations of sodium should be used in IV fluids if sodium levels do not improve • Patients with normal or low serum potassium require replacement and continued monitoring after ruling out renal dysfunction.
3. Insulin therapy	• Regular insulin should initially be administered as a continuous drip • Consider waiting to initiate insulin infusion until after serum potassium is known, thus preventing the critical worsening of hypokalemia • Dextrose should be added to the IV fluid infusion when serum glucose concentration decreases to 250 mg/dL to prevent overcorrection
4. Acidosis	• Ketoacidosis is resolved through decreased hepatic production of ketones, which is enhanced by the metabolism of insulin (given through the infusion) and improved rehydration • Lactic acidosis is resolved with improved rehydration
5. Resolution/prevention	• Once the acidosis is resolved, the anion gap has closed, and the patient is improving clinically, the diet can be reintroduced and the insulin infusion can be switched to subcutaneous injection, under the direction of an endocrinologist • Determine the cause of the acute DKA episode and work closely with the child and caregivers to provide diabetic education as needed to try to prevent repeat occurrences

- **Precocious puberty**
  - Central gonadotropin (high LH or FSH) → premature activation of HPG axis → breast development, hair growth, advanced bone age
  - Can be asymptomatic, even if arising from pituitary
  - Work-ip: leuprolide → US of ovaries and adrenals
  - Tx: GnRH agonist therapy



- **Growth hormone deficiency**
- **Congenital adrenal hyperplasia**
  - Common 21-beta-hydroxylase deficiency
  - Hyperkalemia, hypotension, cliteromegaly, low cortisol, low aldosterone, high androgens
  - Males will have normal genitalia

- Females are **virilized** (clitoromegaly, hypospadias, labioscrotal folds partially fused)
  - Normal uterus and ovaries
- Tx: hydrocortisone and fludrocortisone therapy
- **Non classic (late-onset) congenital adrenal hyperplasia:**
  - Partial 21-hydroxylase deficiency
    - Abnormal uterine bleeding
    - Dx: **elevated 17-OHP**, ACTH stimulation test
- **17-alpha-hydroxylase deficiency (rare)**
  - Primary amenorrhea, minimal body hair, absent sexual characteristics
  - Work-up: low 17-OHP, hypernatremia, hypokalemia, hypertension
  - Tx: spironolactone (aldosterone antagonist…too much aldosterone), glucocorticoid (cortisol deficiency)



- **5-alpha reductase deficiency**
  - Defective conversion of testosterone to DHP → males with internal genitalia and female external genitalia
  - Puberty → increased testosterone → cliteromegaly
- **Thyroid**
  - **Congenital hypothyroidism**
    - High TSH, low T4
    - Jaundice, poor feeding, hoarse cry
  - **Thyroid dysgenesis**
    - Asymptomatic, but can cause neurodevelopmental injury
    - Tx: levothyroxine
  - **Neonatal thyrotoxicosis**
    - **Transplacental TSH-ab**
    - Maternal graves disease → thyrotoxicosis, jittery, weight loss, tachycardia
      - Levothyroxine does not cross the placenta
    - Tx: methimazole, beta-blocker to prevent adverse neurologic effects, self-resolves as maternal Ab clears out
  - **Iodine deficiency**
    - Maternal poor nutrition → hypothyroidism in newborn
    - Rare in developed world

Gastrointestinal

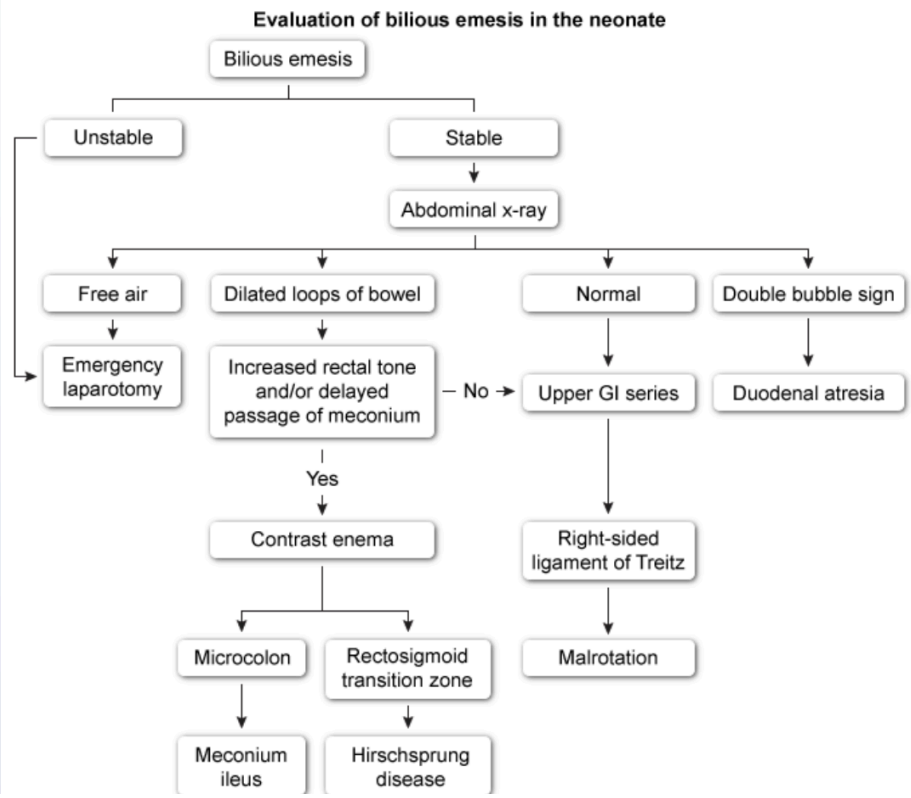
- **Next steps**
  - **Abdominal CT:** acute abdominal pain
  - **Abdominal Ultrasound:** intussusception (target sign)
  - **Barium enema**: treats intussusception
  - **Pyloric sphincter US:** pyloric stenosis ~ age 3-6 weeks
  - **Renal US**: tracheoesophageal fistula
  - **Abdominal xray**= intestinal obstruction, bilious emesis
    - Free air= pneumatosis= necrotizing enterocolitis
    - Dilated bowel → **contrast enema**
      - Microcolon= meconium ileus
      - RT zone= hirschsprung
  - **Rectal biopsy:** hirschsprung disease
  - **Stool guaiac**= milk protein induced allergic proctocolitis
  - **Stool culture:** pathogenic colitis with fever, diarrhea, pain
  - **laparotomy**= bowel perforation, clinical deterioration
  - **Nasogastric tube placement**: TEF
  - **T99 scan**: meckel's diverticulum (rule of 2's)
  - **Morphine**: neonatal abstinence syndrome, poor feeding, vomit, mother of opioid use disorder
  - **Poisonings**
  - Anion Gap Metabolic acidosis
    - Methanol
    - Uremia
    - DKA
    - Propylene glycol
    - **Iron** → N/V/D, hematemesis, radiopaque fragments
      - Tx: deferoxamine
    - Isoniazid
    - Lactic acid
    - Antifreeze
    - **Aspirin** → N/V, tinnitus
  - **Acetaminophen** → N/V
  - **Opioids**→ CNS depression
  - **Warfarin** → bleeding
- **High yield**
  - Big tongue + ear flap + big tongue + asymmetric extremities= **Beckwith wiedemann syndrome**
  - Big tongue + umbilical hernia= **hypothyroidism**
  - Defect LATERAL wall, no sac, + AFP= **gastroschisis**
    - Long term complication: short gut syndrome
  - Defect Midline wall, sac= **omphalocele**
    - Associated with edwards, patau, beckwith wiedmann (ear pits)
  - Defect midline, no sac= **umbilical hernia**
    - Associated with congenital hypothyroidism
    - Tx: none, only if persists 2-3 years

- Bilious vomiting in 3-6 week old infant + palpable “olive”= **pyloric stenosis**
  - Can cause hypochloremic, metabolic alkalosis
  - Tx: myotomy
- 2 week infant with bilious vomiting, polyhydramnios= **intestinal atresia/ annular pancreas**
  - Associated with down syndrome
- Double bubble= **duodenal atresia**
- 1 week old baby with bilious vomit, draws up legs, abdomen distended= **malrotation and volvulus**
  - Ladd's bands (peritoneum) can kink duodenum
  - Pathophys: no 270 degree rotation
- Newborn that does not pass meconium= meconium ileus, hirschsprung disease
  - Cystic fibrosis, gastrograffin enima is dx & tx
- Premie develops bloody diarrhea= **necrotizing enterocolitis**
  - Dx: pneumocystis intestinalis
  - Tx: NPO (bowel rest), TPM, Abx → resection of necrotic bowel
  - Risk factors: premature gut, introduce formula
- Baby with colicky abdominal pain, currant jelly poop with sausage shaped mass in RUQ= **intussusception**
  - Dx & tx: barium enema
- VACTERL

Birth Defects Related to the Gastrointestinal System			
Disease	**Clinical Features**	**Associations**	**Treatment**
Biliary atresia	• Bilious vomiting, dark urine, and acholic stools during the neonatal period • Poor feeding and weight gain	• Polysplenia • Congenital heart disease • Cytomegalovirus infection	• Surgical repair via Roux-en-Y hepatic porto-enterostomy (also known as the Kasai procedure)
Duodenal atresia	• Excessive bilious or non-bilious vomiting in the first 24–38 hours of life • Upper abdominal distention • "Double bubble" sign on x-ray	• Trisomy 21 • Congenital heart disease • Annular pancreas • Malrotation	• Nasogastric suction to relieve pressure • Surgical intervention of obstruction
Gastroschisis	• Full-thickness abdominal wall defect • Most commonly seen to the right of the umbilicus • No covering membrane	• Mesenteric ischemia • Growth restriction • Spontaneous preterm birth	• Immediate covering of the abdominal contents • Gastric decompression • Primary surgical closure
Hirschsprung disease	• Failure to pass meconium within the first 48 hours of life • Abdominal distention • Poor feeding and weight gain	• Trisomy 21 • Cystic fibrosis	• Surgical repair
Omphalocele	• Midline abdominal defect • Covered by the amnion and peritoneum	• Trisomy 13, 18, 21 • Beckwith-Wiedemann syndrome	• Immediate covering of the abdominal contents • Gastric decompression • Surgical repair

Pyloric stenosis	• Non-bilious projectile vomiting after feeds
	• "Olive-like" bulge on palpation of the upper abdomen
	• Poor weight gain
	• Positive family history
		• Metabolic derangements:
		  ◦ Hypokalemic
		  ◦ Hypochloremic
		  ◦ Metabolic alkalosis
			• First, metabolic derangements (if present) need to be corrected, followed by surgical repair

Tracheo-esophageal fistula	• Coughing/choking/cyanotic skin associated with feeding • Respiratory distress	• Aspiration • **VACTERL association**	• Corrective surgery to remove the fistula



- **Yellow baby**
  - < 1 week old, elevated bilirubin ~10= **physiologic jaundice** (liver not mature)
  - > 1 week, high bilirubin, dry mucous membranes= **breast feeding jaundice** (lack of breast milk) → retain meconium and reabsorb **unconjugated bili**
    - Hx: mothers milk hasn't come in
    - r/o hemolytic disease of newborn with **coombs test**
    - Admit to tx with phototherapy + breastfeed/supplement as needed
    - Recheck bilirubin every 4-6 hours
  - > 1 week old with high bilirubin, gaining weight and healthy= **breast milk jaundice** (glucuronidase and unconjugated bili)
  - Newborn with very high bilirubin= **pathologic jaundice** (if > 12 bili, direct > 2)
    - Next best test: Coombs test
      - If positive: Rh or ABO incompatibility
      - If negative: twin-twin transfusion, spherocytosis, G6PD
  - > 1 week old, pale stool, elevated LFTs and direct bilirubin= **biliary atresia** (bile ducts cannot drain bile, liver failure → needs surgery)
  - Direct hyperbilirubinemia= always rule out **sepsis**, galactosemia, hypothyroid, choledochal cyst
  - Inherited Indirect hyperbilirubinemia= **gilberts, crigler-najjar** (type 1 total deficiency)
  - Inherited Direct hyperbilirubinemia= **Dubin johnson** (black liver), **Rotor** syndrome
  - Complications
    - Indirect bili crosses BBB, deposits in BG and brainstem → **kernicterus** (if bili > 20)
  - Tx: phototherapy → ionizes unconjugated bilirubin, excreted
    - Double volume exchange transfusion if it doesn't work

- **Infections**
  - **Botulism**
    - Hypotonia, descending paralysis, ptosis
    - Honey or Dust (Clostridium botulinum spores)
    - **Dx: stool sample**
  - **Tetanus**
    - Trismus, spasms & hypertonicity
    - Caused by *clostridium tetani* (toxin tetanospasmin prevents inhibitor NT release in UMN and LM)
    - Signs of umbilical infection (opisthotonus)
    - Lock jaw (feeding difficulty)
    - Respiratory failure
    - Tx: penicillin, passive Ig
  - **Shigella**
    - White colonies, Maconkey agar, GNR with high virulence, oxidase negative, no H2S
    - Colonies grow on triple sugar iron TSI agar
    - Daycare centers
    - Motile, Replicates intracellular → shiga toxin inhibits 60S
    - Bloody diarrhea, hemolytic uremic syndrome (hemolysis, thrombocytopenia, renal failure)
      - Complications → renal vascular occlusion, AKI, thrombocytopenia, hemolytic anemia
- **Esophageal atresia**
  - **Tracheoesophageal fistula**
    - Defective division of foregut
    - Coughing and spitting up with feeding
    - Xray: enteric tube coiled in esophagus, cannot pass enteric tube
    - VACTERL screening: echo, renal US
      - Vertebral, anal, cardiac, tracheoesophageal, renal, limb defects
- **Intestinal malrotation**
- **Inflammatory bowel disease**
- **Rectal bleeding**
- **Nutritional disorders**
  - Rickets
    - Vot D deficiency → poor bone mineralization → bow legged
  - **Anorexia**
    - **Refeeding syndrome**: hypokalemia, hypomagnesemia, hypophosphatemia
      - Body replete with carbs and glucose, insulin released → uptake P, K, Mg into cells
      - P is depleted while making ATP
        - Can lead to arrhythmias, respiratory failure due to diaphragm weakness, muscle weakness
- Appendicitis
- Bacterial enteritis
- **Diarrhea**
  - Blood and mucous stool: Shigella, Entamoeba histolytica
  - non-bloody diarrhea: rotavirus, coxsackie virus
    - half-strength apple juice and food on demand
    - oral rehydration with low osmolality

    - Oily, foul-smelling after swimming: **giardia**
        - Contaminated water → disruption of epithelial junctions, malabsoption, weight loss, failure to thrive
        - Tx: metronidazole
    - **Clostridium difficile**
        - Watery stools, leukocytosis
        - Enterotoxin mediated
    - **Traveler's diarrhea**
        - short course Abx after trip
        - ETEC: watery diarrhea
            - self-limited
        - Entamoeba: bloody diarrhea → colitis with slimy stools
            - Dx: PCR assay
            - Tx: metronidazole
        -

Prolonged (≥2 weeks) travelers' diarrhea	
Pathogen	**Clinical features**
Entamoeba histolytica	• Bloody/mucoid diarrhea • Extraintestinal disease: liver abscess
Giardia	• Watery/oily, foul-smelling stools • Bloating, fat malabsorption, weight loss
Cryptosporidium or Cystoisospora	• Watery diarrhea in immunosuppressed patients
Cyclospora	• Watery diarrhea ± blood • Waxing/waning symptoms

- **Hirschsprung's disease**
    - Dilated bowel, aganglionic colon segment, can happen after birth —> functional intestinal obstruction
    - bilious vomiting, failure to pass meconium in 48 hours of life, abdominal distension, no stool in rectum
    - Contrast enema indicated
- **Pyloric stenosis**
    - First born male with projectile nonbilious emesis after feeding
    - Palpable olive shaped mass
- **Volvulus**
    - Bloating, bloody stools in first few days of life
    - No feeding intolerance
    - Dx: upper GI barium series
- **Intussusception**
    - Currant jelly stool
    - Minimal bloating, resolve with air contrast enema
    - Xray: leadpipe
- **Meckel's diverticulum**
    - Rule of 2's
    - Painless lower GI bleed, no fever
    - Dx: T99 scan to identify ectopic gastric mucosa
- **Food allergies**

IgE- & non–IgE-mediated food allergies				
	Example	**Age**	**Symptom onset**	**Clinical features**
IgE mediated	Anaphylaxis	Any	Immediate (<1 hr)	• Urticaria • Vomiting, wheezing • Angioedema, hypotension
Non–IgE mediated	Food protein–induced allergic proctocolitis	<6 months	Insidious	• Painless, bloody stools • Well appearing
	Food protein–induced enterocolitis syndrome	<12 months	Within hours	• Profuse vomiting, diarrhea (± blood), dehydration, lethargy • Ill appearing

- **Food protein induced allergic proctocolitis**
  - Self-limited condition, non-IgE mediated
  - Cows milk is triggered. Avoid from diet in kid and mother
  - Bloody stool in 1-4 weeks, no weight loss
-

Gastrointestinal Embryology	
Disorder	**Pathophysiology**
Annular pancreas	• Abnormal rotation of the ventral pancreatic bud → ring of pancreatic tissue encircles the 2nd portion of the duodenum
Congenital diaphragmatic hernia	• Defects in the pleuroperitoneal membrane → herniation of abdominal contents into the left hemithorax
Congenital umbilical hernia	• Incomplete closure of the umbilical ring
Duodenal atresia	• Failed recanalization of the small intestine
Gastroschisis	• Failed closure of lateral folds → extrusion of the abdominal contents through patent lateral abdominal folds
Hirschsprung disease	• Failed neural crest cell migration → lack of ganglionic cells in a distal segment of the colon
Hypertrophic pyloric stenosis	• Thickening of the pylorus → gastric outlet obstruction
Ileal and jejunal atresia	• Disruption of mesenteric vessels → ischemic necrosis → segmental bowel resorption
Indirect inguinal hernia	• Failed closure of the processus vaginalis • Hydrocele has an identical pathophysiology
Malrotation	• Incomplete rotation of the midgut in utero
Meckel diverticulum	• Persistence of the vitelline duct (omphalomesenteric duct)
Omphalocele	• Failed migration of the lateral walls → failure of extra embryonic gut to return to the abdominal cavity
Omphalomesenteric cyst	• Cystic dilation of the vitelline duct
Pancreas divisum	• Failed fusion of the ventral and dorsal parts of the pancreas

Genitourinary

- **Next steps**
  - **Estrogen cream** → labial adhesions
  - **Trichloroacetic acid** → condyloma acuminata
  - **Karyotype** → ambiguous genitalia or absent uterus in primary amenorrhea, Turner syndrome
  - **Antifungal cream** → candida
  - **Pelvic ultrasound** → primary amenorrhea
  - **Renal & bladder US**→ congenital anomalies
  - **IV fluid bolus**→ hypovolemia from prerenal disease
  - **Bladder catheterization** → urinary retention
  - **Voiding cystogram** → distal UTI if abnormalities seen on US
  - **CT abdomen/ pelvis** → mullerian duct abnormality
  - **Serum or urine B-hcg** → pregnancy
  - **Serum prolactin** → if FSH is low/ normal for hypothalamic-pituitary axis
  - **Urinalysis** → UTI (E coli >> GBS)
- **High-yield**
  - Newborn with no testes= inguinal canal → US

        - **cryptorchidism**= prune belly, failure of abdominal musculature
        - Tx: bring testicles down
        - Complications: testicular torsion
    - Urethral opening on ventral surface= **hypospadias**
        - Do not circumcise!
    - Newborn with ambiguous genitalia with low Na, high K, acidosis= **congenital adrenal hyperplasia**
        - Due to 21-alpha hydroxylase deficiency (AR)
        - Dx: 17-OHP before and after ACTH bolus
        - Tx: hydrocortisone and fludrocortisone (increase doses in times of stress)
    - Baby with anterior midline mass and does not pee= posterior urethral valve
        - Distended mass → catheterize first → surgery
- **Renal pathology**
    - **Tram-track splitting= alport syndrome**
        - Cant see, can't pee, can't hear a bee
        - Ab to type IV collagen, check audiology
    - Effacement of podocyte foot processes= **minimal change disease**
        - Proteinuria, swelling
    - Linear deposition of IgG along GBM= **Goodpasture syndrome**
        - Alveolar hemorrhage + hematuria
    - Mesangial deposition of IgA= **IgA nephropathy**
    - Mesangial and glomerular capillary deposition of C3 and IgG= **Poststreptococcal glomerulonephritis**
        - Check ASO titers
    - **Membranous nephropathy=** subepithelial deposits, proteinuria, diffuse granular pattern IgG and C3 along capillary loops
        - Check for malignancy, Hep B, Hep C, Drugs
    - **Bartter syndrome**
        - Defective Na/K/Cl cotransporter in thick ascending limb
            - Urine: high Ca, high K, high Na
            - Increased aldosterone, RAAS
            - Hypovolemia, polyuria
            - Metabolic alkalosis
            - Nephrolithiasis
        - Tx: spironolactone (inhibit RAAS)
    - Gitelman syndrome
        - Low urinary excretion of Ca, high urinary Mg
- **Primary amenorrhea**
    - Absence of menarche at > 15 yo in girls with secondary sexual characteristics
    - Or > 13 yo girls without secondary sexual characteristicsc
- **Pelvic inflammatory disease**
- **Acute poststreptococcal glomerulonephritis**
    - Streptolysin O
- **Posterior urethral valves**

- **Undescended testicle**
  - Cryptorchidism → Increased risk of testicular cancer (germ cell tumor) if not corrected
    - Few months old ⇒ monitor for testicular descent
    - > 6 months= orchiopexy
    - B/L nonpalpable testes⇒ karyotype analysis + electrolytes (CAH)
- **Testicular torsion**
  - Inguinal pain or acute abdomen
  - Tx: surgical correction
- **Primary Nocturnal Enuresis**
  - > 5 yo common in childhood boys; **Genetic** if > 1 parent affected in childhood, most commonly functional. Can be due to medical condition, psychological stressors, brain maturation delay.
    - **Primary enuresis:** not continent thru day
    - **Secondary enuresis:** continent but not now
  - Next steps: urinalysis
  - First line tx: reassurance, behavioral modifications → bed wetting alarm, desmopressin
  - Second line: desmopressin → imipramine
  - Proteinuria and daytime wetting= check serum creatinine (CKD, posterior valves)
  - **Medical conditions causing enuresis**

Etiology	Symptoms	Findings
Constipation*	• Infrequent & hard stools • Encopresis	• ± Palpable stool mass
Bladder dysfunction*	• Daytime incontinence • Weak stream, urgency, straining	• ± Recurrent urinary tract infections
Urinary tract infection	• Dysuria, urgency, frequency • Abdominal pain	• Positive urine culture
Chronic kidney disease	• Daytime incontinence • Weight loss, fatigue	• Hypertension • Proteinuria, hematuria
Diabetes mellitus	• Polyuria, polydipsia, polyphagia • Weight loss, fatigue	• Glucosuria
Diabetes insipidus	• Polyuria, polydipsia	• Low urine specific gravity
Obstructive sleep apnea	• Snoring • Hyperactivity, inattention	• Adenotonsillar hypertrophy

- **Renal pathology**
  - **Goodpasture:**
    - Ab against GBM → glomerulonephritis & hemoptysis
  - **PSGN**
    - Immune complexes against bacterial antigen within renal glomeruli
    - Strep pharyngitis or skin infection with strep or staph

Heme-Onc

- **High yield**
  - Cow's milk< 1yo= **iron deficiency anemia**
  - NRBCs= **severe hemolysis**
  - Low MCHC= **IDA and thalassemia**
  - High MCHC= **spherocytosis**
  - Abnormal hgb electrophoresis = **thalassemia**
  - High RDW= **IDA**
  - No tonsils, low B cells, no Ig= **bruton agammaglobulinemia**
  - Normal C cells, lower Igs= **combined variable immunodeficiency**
    - Increased risk of lymphoma
  - Recurrent URI, diarrhea= **selective IgA deficiency** (anaphylaxis to blood products with IgA)
  - Infant with seizures, truncus arteriosus, micrognathia= **DiGeorge syndrome** (microdeletion Ch22)
    - Increased risk of candida, viruses, PCP pneumonia
  - No thymus, no tonsils, severe lymphopenia= **SCID**
    - X linked. AR form is ADA deficiency
    - Tx: BMT
  - MRSA abscesses= **CGD** (catalase +, nitrotetrazolium)
  - Eczema, petechiae, ear infections= **wiskott aldrich**
    - Prolonged bleeding after circumcision, low IgM, high IgA and IgE
  - Unilateral LN/ cervical lymphadenitis= Staph/ strep, anaerobic, francisella, MAC, bartonella
  - B/L LN= viral (EBV, CMV)
  - Hemolytic anemia, jaundice, splenomegaly= **hereditary spherocytosis**
  - Adopted kid with bleeding in joint= **hemophilia A** (factor 8 deficiency), **hemophilia B** (factor 9 deficiency)
- **Physiologic anemia of infancy**
  - Increased tissue oxygen at birth → down regulated EPO
  - Normocytic anemia, low-normal reticulocytes
  - Hgb nadir at 2-3 months, appears as normocytic anemia
- **Acute lymphoblastic leukemia**
  - Most common malignancy in kids
  - Large cells with prominent nucleoli, rim of blue cytoplasm and vacuoles
  - Hypercellular bone marrow
  - Nonspecific fever, bleeding, infection, antalgic gait
- **Immune thrombocytopenia**
  - Viral infection → platelet autoantibodies → petechia, bleeding
  - Isolated thrombocytopenia < 100K
  - Kids: observe if only cutaneous, if bleeding give steroids, IVIG, Anti-D
- **Fanconia anemia**
  - BM failure in kids 6-9 yo.

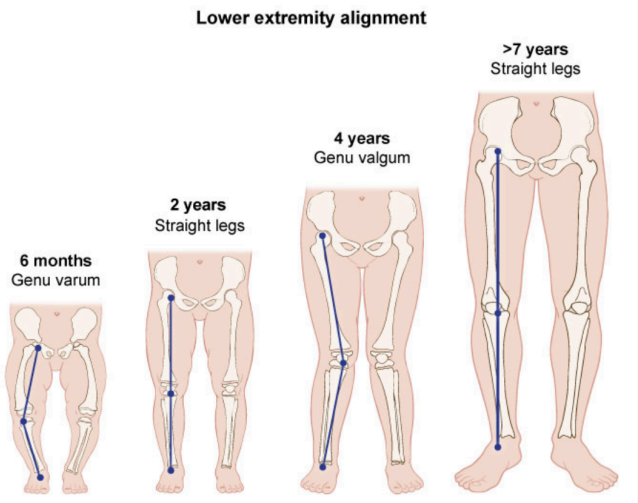
    - Short stature, hypopigmented skin, thumb abnormalities, microcephaly, hypogonadism
    - Moderate thrombocytopenia, macrocytic anemia
- **Anemia**
    - **Hemolytic anemia**
        - **Warm IgG:** most common → anemia, jaundice, splenomegaly
        - **Cold IgM:** mycoplasma, EBV → anemia, hemolysis
        - **Paroxysmal cold hemoglobinuria:** after viral illness, IgG on P antigen at colder temperatures → anemia, hemoglobinuria
        - **G6PD**: <u>males</u> with hemolytic anemia due to infection, triggers (fava beans, oxidizing agents)
        - ** typically symptomatic
        - **Hapten-induced:** drug coats RBCs → intravascular hemolysis → rapid decline in Hgb
            - Increased reticulocytes, indirect bilirubin, LDH
            - Decreased haptoglobin
            - + direct coombs test
            - Tx: stop drug, transfusion if severe, glucocorticoids
        - Hereditary spherocytosis: elevated MCHC, negative coombs, spherocytosis
    - **Thalassemia**
        - Hypochromic microcytic RBC and target cells

- **Sickle cell disease**
    - Inheritance: autosomal recessive
    - **Acute vaso-occlusive crisis**
        - Dactylitis (symmetric hands & feet)
        - Splenic autoinfarction
    - **Folate deficiency from chronic hemolysis**
        - Low reticulocytes bc BM not properly producing enough RBCs
    - **Hyperhemolytic crisis**
        - Severe, acute normocytic hemolytic anemia
        - Increased reticulocytosis
    - **Splenic sequestration**
        - Due to splenic vas-occlusion and RBC pooling → <u>large spleen,</u> abrupt anemia, increased reticulocyte countries. Jaundice
        - Young kids with prior autoinfarction of spleen
    - **Severe aplasia** of bone marrow
    - **Sepsis**
        - Strep pneumoniae >> H influenzae and N meningitidis
    - Tx: vaccinate against encapsulated organisms (strep pneumonia, H flu, Neisseria)
        - Prophylactic penicillin
        - Splenic sequestration: isotonic fluids, RBC transfusion, splenectomy

- **Neuroblastoma**

MSK

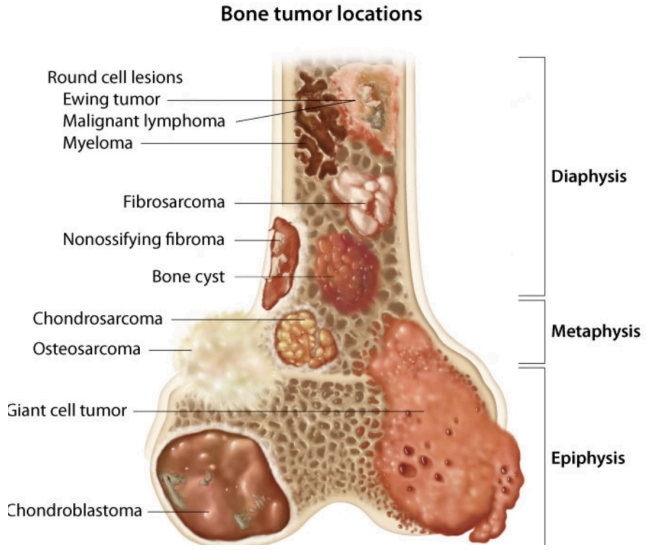
- **Next steps:**
  - **Leg x rays**: skeletal dysplasia (achondroplasia)
  - **Leg orthotics and physical therapy**: leg deformity, subluxation, contractures, weakness (foot drop)
  - **Surgical correction:** blount disease, pathologic bowlegs due to abnormal cartilage growth
  - **Vit D and calcium supplement:** bow legs + short stature + frontal bossing
  - Reassurance and observation
- **High-yield**
  - New onset ipsilateral limp in obese kid → **slipped capital femoral epiphysis**
  - Atraumatic limp in kid with impaired adduction and internal rotation → **avascular necrosis/ legg-calve-perthes disease,** age 3-12 yo
  - Pain and swelling of tibial tuberosity → **osgood-schlatter disease**
  - Erythema migrans (bullseye lesions) and monoarticular arthritis= lyme disease
  - Septic arthritis: effusion, high WBC, high CRP
  - Barlow and Ortolani test/ asymmetrical gluteal/inguinal fold= developmental dysplasia
  - Transient synovitis: effusion, age 3-8, follows viral illness
  -
- **Developmental Dysplasia of the Hip**
  - Barlow maneuver (posterior movement on the hip → CLUNK)
  - 0-4 weeks: repeat exam for spontaneous resolution
  - 4 weeks - 6 months: Pavlik harness
  - Age 6-18 months: abduction splinting, closed or open reduction → spica casting
- **Genu varum**
  - Bowlegs are physiologic until age 2
  - Kids walk around like bow-legged drunken sailors lol



- **Septic arthritis**
  - < 3 months= staph aureus, GBS, GNB

    - > 3 months= Staph aureus, Group A strep
    - Fever, pain in joint, elevated WBC, ESR, CRP
    - Tx: **joint aspiration** → cultures → IV Abx
    - Delay in treatment → necrosis, dislocation, length discrepancy
- **Oligoarticular juvenile idiopathic arthritis**
    - Kids with arthritis
    - May have rash, hepatosplenomegaly, lymphadenopathy, uveitis
    - Work-up: ANA and slip-lamp
    - Tx: Naproxen
- **Juvenile rheumatoid arthritis / Systemic-onset juvenile idiopathic arthritis**
    - Most common cause of chronic rheumatologic disease
    - Joint pain > 6 weeks, spiking fevers, rash on trunk/ extremities
    - Synovitis and arthritic joints
    - Tx: NSAID, aspirin
- **Scoliosis/ adolescent idiopathic scoliosis**
    - Assess lateral curvature (cobb > 10) on forward bend test
    - Work up: #1 xray spine
    - Cobb angles
        - 10-30: monitor q6 months, OMM and home exercises
        - > 30: bracing
        - > 40-50: surgical fixation
- **Development dysplasia of hip**
    - Hx of breech
    - Tx: 0-4 weeks repeat exam after 4 weeks → pavlik harness (4weeks- 6 months) → close reduction and spica casting (< 6 months) → open reduction (6-18 months)
- **SLE**
- **Henoch-schonlein purpura**
    - Due to IGs and complement in small blood vessels
    - URI → Palpable purpura in legs/ buttocks
        - Arthritis, arthralgia
        - Colicky abdominal pain
        - Renal disease: hematuria and proteinuria
- **Immune thrombocytopenic purpura**
    - Ab against platelet membrane glycoprotein, removed in spleen
    - Thrombocytopenia, petechia, mucosal bleeding
        - Bone marrow shows increased megakaryocytes (BM is not the issue)
    - Tx: glucocorticoids, IVIG, anti-D → splenectomy (if persistent bleeding and thrombocytopenia)
- **Slipped capital femoral epiphysis**
    - New onset limp in obese boy
    - Work up: xray of BOTH hips, look at Kleins line (between epiphysis and metaphysis)
    - Trendelenburg test (drop in contralateral side), atrophy on ipsilateral side
- **Nursemaid elbow**
    - Radial head subluxation MOST COMMON elbow injury
    - Axial traction on forearm → radial head slips through annular ligament
    - Tx: Forearm hyperpronation or supination/ flexion causes click
- **Dysplasia of hip**
    - Breech position, tight swaddling, family history
    - Red flags: Ortolani test, dislocated hip, limited abduction → refer to ortho

    - Signs: limb length discrepancy, asymmetric gluteal/ inguinal thigh creases
    - < 4 months= Hip US
    - > 4 months= Hip radiograph
- **Tumors**
    - **Osteosarcoma**
        - Tx: chemotherapy and limb-salvage
        - Codman triangle= periosteal elevation
        - Most common primary malignancy in kids
    - **Osteoid osteoma**
        - Benign tumor. Small round lucency on xray
    - **Giant cell tumor**
        - Soap bubble appearance
    - **Ewing sarcoma**
        - Knee, central lytic moth eaten appearance with extension into soft tissue
        - From neural origin: primitive neuroectodermal tumor of childhood
        - Onion skinning
        - Tx: radiation



Dermatology

- **Knee jerks**
    - Rash after no prenatal care= **syphilis**
    - Skin biopsy= **rocky mountain spotted fever**
    - Rash on palms & soles= **coxsackie, syphilis, Rickettsia**
    - Blue macule on back/ thigh= **mongolian spots** (melanocytes)
    - Pale pink vascular macules on neck or face, red with crying = salmon patch, **nevus simplex**
    - Firm white papules with keratin= **milia**, seen Day 1
    - 1-2 week old, papules= **neonatal acne**
    - Firm white papules on erythematous base, eosinophils= **erythema toxicum**
    - Demarcated, red papules= **strawberry hemangioma**
    - Alopecia with orange nodule skin on head= **nevus sebaceous** → remove before adolescence

    - Thick yellow/ white plaque= cradle cap/ **seborrheic dermatitis** → clean with shampoo
    - **Erythema infectiosum=** slapped cheek, parvovirus B19
    - Herald patch → scaly plaques**= pityriasis rosea**
    - 3-7 day prodrome/ high fever → eruption of blanching, pink papules**= roseola infantum**
    - Rash that spares nasolabial folds, on extensor surfaces and face**= atopic dermatitis**
    - Blue-gray patches**= congenital dermal melanocytes**
- **Infantile hemangioma**
    - Tx: oral propranolol
    - Appears after birth → proliferation → involulation
    - Cervicofacial distribution (beard) → laryngoscopy
    - Lumbosacral distribution → spinal US
    - > 5 cutaneous hemangiomas → liver US (high output heart failure)
- **Erythema toxicum**
    - Normal rash in newborns, reassurance
- Benign neonatal rashes
    -

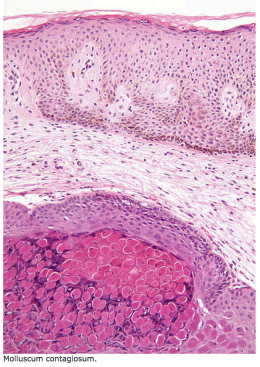
Benign neonatal rashes			
Diagnosis	**Onset**	**Clinical features**	**Management/resolution**
Erythema toxicum neonatorum	• Birth to age 3 days	• Pustules with erythematous base on trunk & proximal extremities	• Observation • Resolves within a week
Milia	• Birth	• Firm, white papules on face	• Observation • Resolves within a month
Miliaria rubra	• Any age, but not present at birth	• Erythematous, papular rash on occluded & intertriginous areas	• Avoid overheating (eg, cool environment, thin/cotton clothing) • If severe, topical corticosteroid
Neonatal pustular melanosis	• Birth	• Nonerythematous pustules → evolve into hyperpigmented macules with collarette of scale • Diffuse, may involve palms & soles	• Observation • Pustules resolve within days • Hyperpigmentation may last months
Neonatal cephalic pustulosis	• Around age 3 weeks	• Erythematous papules & pustules on face & scalp only	• Observation • Resolves in weeks to months • If severe, topical corticosteroid or ketoconazole

- **Animal bites**
    - Polymicrobial → pasteurella multocida
    - #1: amoxicillin-clavulanate
        - Penicillin allergy: moxifloxacin, clindamycin + ciprofloxacin
- **Diaper rash**

    - Candidiasis, beefy red rash in skin folds
    - Tx: topical antifungal cream (nystatin)
- **Contact dermatitis**
    - Tx: topical corticosteroids
- **Staph scalded skin syndrome**
    - Due to staph aureus exotoxin A ⇒ targets desmoglein 1 in epidermis
    - Febrile prodrome, tenderness, perioral radial fissuring, intertriginous sites, Nikolsky sign
    - Dx: clinical history (daycare), blood cultures not reliable
    - Tx: IV fluids, antipyretics
- **Steven johnson syndrome**
    - Due to medication reaction (carbamazepine), more common in adults
    - Erosions and crusts involve mouth, lips and eyes
- **Seborrheic dermatitis**
    - Cradle cap
    - Yellow greasy scales seen in folds with glistening, confluent, erythematous appearance
    - Tx: emollients, non medicated shampoos; topical antifungals or low-potency corticosteroids
- **Atopic dermatitis (eczema)**
    - History of atopy: asthma, allergic rhinitis
    - Due to mutation in filaggrin gene
    - Infant: EXTENSOR surfaces
    - Kids: FLEXOR surfaces
    - Tx: emollients, #1 topical steroids, beach baths, avoid allergens
        - #2: topical calcineurin inhibitors (pimecrolimus), crisborole
        - #3: phototherapy, MTX, cyclosporine
        - Infectious complication = impetigo (tx with topical mupirocin)
- **“Pimples”**
    - **Eryhtema toxicum neonatorum=** eosinophils in fluid
    -

Gram Stain Findings in Neonatal Eruptions	
Diagnosis	**Gram Stain Findings**
Bullous impetigo	• Many neutrophils • Gram-positive cocci in clusters
Erythema toxicum neonatorum	• Many eosinophils with bilobed nuclei • ± neutrophils • No bacteria
Miliaria rubra	• Many neutrophils • Occasional eosinophils • No bacteria
Transient neonatal pustular melanosis	• Many neutrophils • Rare eosinophils • No bacteria

- **Eczema herpaticum**

    - ~ HSV, painful vesicles and punched out erosions, hemorrhagic crusts
    - Arises from infection by coldsores
    - Tx: acyclovir
- **Impetigo**
    - Staph aureus #1, strep pyogenes #2
        - Bullous impetigo: staph Release exfoliative toxin A
            - Tx: dicloxacillin, penicillin
            - Tx of MRSA impetigo: clindamycin, doxycycline, SMX-TMP
        - Nonbullous impetigo: honey colored crust
            - Tx: mupirocin
        - Ecthyma: punched out ulcers with yellow crust and raised margins
- **Staph scalded skin syndrome**
    - Staph infection leading to bullae/ sloughing skin, perioral erythema, fever
    - No mucosal involvement
- **Bullous pemphigoid**
    - involves skin and mucous membranes, tense blisters. no signs of shock.
    - antibody to hemidesmosomes
- **Molloscum contagiousum**
    - Domed, umbilication papule due to poxvirus
    - Benign, reassurance resolves in a few months
    - 
Molluscum contagiosum.

- **Neurofibromatosis**
    - Cutaneous neurofibromas

Comparison of Acute Oral Lesions Presenting With Ulcers or Vesicles				
Disease	**Common Age**	**Common Location**	**Number of Lesions**	**Characteristics**
Herpangina	• < 5–7 years	• Oropharynx • Soft palate • Tonsils	• Multiple	• Viral • Small, yellow-gray vesicles that turn to ulcers after about 24 hours
Hand, foot, and mouth disease	• < 5–7 years	• Tongue • Palate • Buccal mucosa • Hands • Feet	• Multiple	• Viral • Small, yellow-gray vesicles associated with a papular/vesicular rash on the palms and soles
Traumatic ulcer	• Any age	• Tongue • Lip • Buccal mucosa	• Singular	• Self-limiting oral ulcers • Typically caused by unintentional biting or contact with a sharp object
Herpes zoster infection	• > 50 years	• Hard palate • Gingiva • Tongue	• Multiple	• Viral • Unilateral pain • Ulcer clustering pattern
Erythema multiforme	• 20–40 years	• Lips • Buccal mucosa • Tongue	• Multiple	• Viral • Large ulcerations with crusting and bleeding of the lips preceded by skin target lesions
Primary herpetic gingivostomatitis	• 2–3 years	• Gingival mucosa	• Multiple	• Viral • Fever, nausea, and gingivitis preceding painful yellow ulcers of the gingiva

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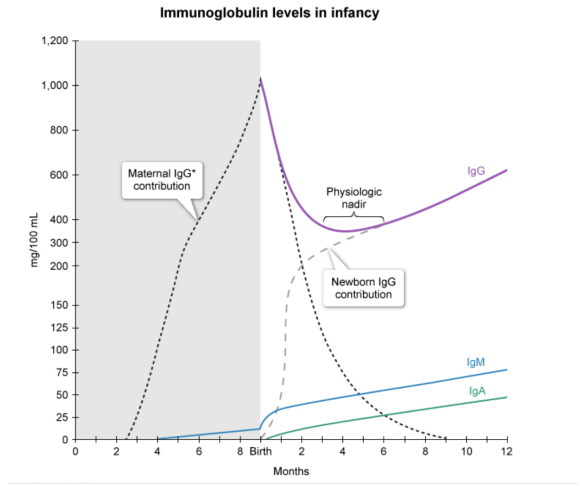
Genetic syndromes

- **High yield**
  - Large head, joint hypermobility, developmental delays= **Fragile X**
  - Girls with microcephaly and regression of milestones, MeCP2 gene= **Rett Syndrome**
  - Early onset dementia, epicanthal folds, upslanting palpebral fissures= **Down syndrome**
  - Aortic root disease, joint hypermobility= **marfan**
  - Muscle weakness, gross motor delay= **duchenne MD**
  - Fibrillin mutation= **marfan**
  - **achondroplasia**= FGFR3 gene mutation
  - Rocker bottom feet, microcephaly = **edwards syndrome** (trisomy 18)
  - Holoprosencephaly, severe mental retardation, microcephaly, cleft palate= **patau syndrom**e (trisomy 13)
  - Short stature girl with no breasts, high FSH= **turner**
    - Associated anomaly: coarctation of aorta, horseshoe kidney
    - Tx: give estrogen
  - Tall, lanky boy with gynecomastia, hypogonadism, female distribution of pubic

hair, wide hips= **klinefelters**
        - Increased risk of gonadal malignancy
    - Seizures, café au lait, AD= **NF**
    - Mandibular hypoplasia, glossoptosis, cleft palate soft= **pierre robin sequence**
    - Hypotonia, hypogonadism, hyperphagia, skin picking, voracious eater= **prader-willi**
    - Seizures, strabismus, social, episodic laughter, deletion of maternal Ch 15= **angelman**
    - Elfin facem friendly, empathy, verbal reasoning ability, deleted Ch 7= **Williams**
    - IUGR, hypertonia, limb malformation, self-injurious, hyperactive, long eyelashes= cornelia de lange
    - Microcephaly, smooth philtrum, thin upper lip= fetal alcohol syndrome
    - Most common cause of MR in boys, CGG repeats= Fragile X
    - AD, advanced paternal age, short palpebral fissures, white forelock, deafness= waardenburg syndrome
    - Cardiomyopathy, ataxia, loss of MVP= **Freidreichs ataxia**
    -
- **Osteogenesis imperfecta**
    - Type 1 collagen gene defect (COL1A1) → frequent fractures, blue sclera, conductive hearing loss, short stature, joint hypermobility
        - Type one= BONE
- **Cystinuria**
    - Impaired transport of cystine and dibasic amino acids
    - Recurrent kidney stones
    - + urinary cyanide-nitroprusside test
    - Hexagonal crystals
- **Trisomy 21**
    - Hypotonia, upward slanting palpebral fissures, bilateral single palmar creases, polyhydramnios
    - Double bubble sign → get abdominal x ray
        - Heart: VSD, endocardial cushion defects
        - GI: hirschsprung, intestinal atresia, imperforate anus, annular pancreas
        - Endocrine: hypothyroidism
        - MSK: AA instability (geet C-spine mri)
        - Neuro: alzheimer's (APP gene on Ch 21)
        - Cancer: ALL
    - Tx: surgical correction, supportive care, nutrition
- **Potter sequence**
    - oligohydramnios, pulmonary hypoplasia, limb deformities, flat facies, posterior urethral valves
    - “Suprapubic mass”= distended bladdeer
- **Turner syndrome**
    - Short, webbed neck, horseshoe kidney
    - partial/ total deletion of X chromosome
    - Congenital lymphedema due to lymphatic dysgenesis, non pitting edema
- **Fragile X syndrome**
    - FMR1 gene, x-linked dominant
    - Kid with long face, prominent chin and forehead, large head. Joint hypermobility
    - Speech and motor delays, ADHD
    - Normal life expectancy

- **Ataxia telangiectasias**
  - Low IgA, IgG → recurrent infections
  - Ataxia
  - Telangiectasis (ocular)
- **Fetal alcohol syndrome**
  - thing pithrum, camptodactyly (flexion of finger), flexion contractures, radioulnar synostosis, scoliosis spinal malformation
- **Cerebral palsy**
  - Nonprogressive motor dysfunction → abnormal tone, movement, development
  - Dx by age 2
  - Associated with periventricular leukomalacia
  - Risk factor: premature birth (most common), neonatal infection, seizures, congenital abnormalities
  - Spastic features: hypertonia, motor delay, commando crawling, club foot
- **Friedreich ataxia**
  - Cardiac failure, atrophy of medulla and dorsal columns in spinal cord, gait instability, scoliosis
  - Arrhythmia or HCOM, cardiomyopathy
  - Fritaxin gene mutation
  - Autosomal recessive disease
- **Myotonic dystrophy**
  - CTG repeat
  - Cognitive & behavioral changes over time
  - Cardiomyopathy, pharyngeal weakness, cataracts, balding, daytime sleepiness, muscular weakness in hands
- **Duchenne muscular dystrophy**
  - X-linked recessive mutation in dystrophin → reduced/ absent dystrophin protein in skeletal and cardiac muscle → progressive weakness
  - Toddler with delayed walking, walk on toes, B/L calf enlargement, Gower sign
  - Work-up: CK, echocardiogram
- **Kallman syndrome**
  - Delayed puberty and lack secondary sexual characteristics
  - Hypogonadotropic hypogonadism
- **Cerebral palsy**
  - Permanent, nonprogressive central motor dysfunction
- **Rett syndrome**
  - Normal development → Regression of motor and language milestones
  - Seizures? Head growth retardation
  - Wringing hand movements, gait abnormalities
- **Angelman syndrome**
  - UBE3A gene loss of function on chromosome 15
  - Maternal deletion
  - Excitable personality, elf like face, smiling
  - Epilepsy, intellectual disability
- **Prader willi syndrome**
  - Paternal deletion
- **Cystic fibrosis**
  - AR disorder with inspissated secretions in multiple organs → recurrent pneumonia, bronchiectasis,hypoxia, respiratory failure, clubbing
  - Risk of pseudomonas infection > staph with age
  - Meconium ileus

    - Recurrent sinopulmonary infections -> staph and pseudomonas
        - Tx: IV vancomycin
- **Beckwith-Wiedemann syndrome**
    - Omphalocele (GI contents covered with peritoneum through abdominal wall); macrosomia, macroglossia, hemihyperplasia, neuroblastoma/ nephroblastoma/ hepatoblastoma
    - Hemihypertrophy
    - Overgrowth syndromes
- **WAGR syndrome**
    - Wilms tumor, Aniridia (no iris), GU abnormalities, intellectual disability
    - Work-up: Abdominal US
- **Down syndrome**
    - Dysmorphic features
        - Epicanthal folds, upslanting palpebral fissures, low-set ears, short neck, flat face, furrowed tongue, hypoplastic incurved 5th finger, sandal-toe deformity, single transverse palmar crease, brushfield spots
    - Congenital umbilical hernia, duodenal atresia → bilious vomiting "double-bubble" sign
    - Atlanto-axial instability → spinal cord compression
    - Complications
        - ASD/ VSD
        - T1DM, hypothyroidism
        - Duodenal atresia, hirschsprung
        - Early onset alzheimer
        - AML, ALL
    - Tx: surgical repair for duodenal atresia
    - Next-steps: karyotype
- **Wiskott-aldrich syndrome**
    - X-linked recessive WAS protein gene mutation → impaired cytoskeleton change in WBC and platelet (SMALL platelets)
    - Eczema, small and low platelets, recurrent infections
- **Ataxia telangiectasia**
    - T cell deficiency with DNA repair defect
    - Progressive cerebellar dysfunction
- **SCID**
    - Adenosine deaminase deficiency, IL-2 receptor defect
    - Recurrent viral, fungal, bacterial infections with failure to thrive
    - Severe T cell deficiency, poor IL-7 driven T cell maturation in thymus
    - Severe B cell dysfunction as a result
    - Prophylaxis tx: valacyclovir
- **Digeorge syndrome**
    - 22q11.2 microdeletion
    - Hypocalcemia, cardiac defects, failure to thrive, recurrent infections
- **Bruton's agammaglobulinemia**
    - BTK gene mutation ⇒ impaired TRK → impaired B cell maturation
    - Recurrent sinopulmonary, GI infections > 3-6 months old
    - Chronic enteroviral infection/ encephalitis, absent lymphoid tissue
    - Decrease immune response to vaccines
    - Small lymphoid tissue
    - Tx: IVIG

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- **Chronic granulomatous disease**
  - NADPH oxidase deficiency → Impaired PMN oxidative burst
  - Catalase positive organisms (staph, serratia), FUGUS (nocardia), recurrent skin and pulmonary infections
  - Diffuse granulomas (GI and GU)
  - Dx: measure neutrophil superoxide, DHR flow cytometry abnormal, NBT (nitroblue tetrazolium)
    - DHR taken up by phagocytes, fluoresces green when oxidized (by NADPH oxidase) to rhodamine. CGD= negative fluorescence
  - Prophylactic tx: TMP-SMX, itraconazol, IFNy injections
- **Complement deficiency**
  - C1 complex deficiency: recurrent sinopulmonary infection, childhood SLE
  - C5-9: recurrent encapsulated bacterial infection (neisseria)
- **Peutz-Jeghers syndrome**
  - AD tumor suppressor gene mutation → unregulated tissue growth
    - Lip macules, pigmented macules
    - > 2 hamartomatous polyps
    - Cancer risk (GI, breast, genital)
  - Next step: genetic testing
  - Screen for anemia, Upper and lower endoscopy
- **Lysosomal storage diseases**

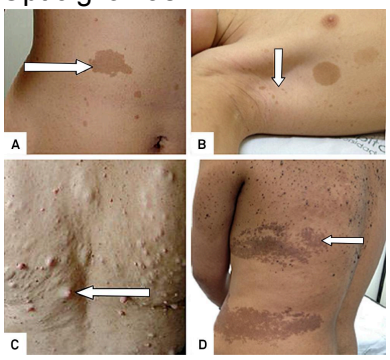
Disease	Deficiency	Features	Treatment
Gaucher disease	Glucocerebrosidase	Most common Fatigue, easy bruising, menorrhagia, decreased appetite, splenomegaly, neutropenia, thrombocytopenia Delayed puberty	Enzyme replacement imiglucerase
Fabry disease	Alpha-galactosidase A	X-linked. Neuropathic pain, proteinuria, HTN, angiokeratoma,	

		corneal verticillata	
Krabbe disease	Galactocerebrosidase	Early infancy with irritability, fevers, limb stiffness, seizures Fatal by 2 yo	
Tay-Sachs disease	Hexosaminidase A	6 month old with gangliosides in nerve cells → mental and physical decline Fatal HYPERREFLEXIA	Fatal
Niemann-Pick disease	Sphingomyelinase	Hepatosplenomegaly Ataxia, dysarthria, dystonia, dementia, seizures AREFLEXIA	

Niemann-Pick disease vs Tay-Sachs disease		
Diagnosis	**Niemann-Pick disease**	**Tay-Sachs disease**
Pathology	Sphingomyelinase deficiency	β-hexosaminidase A deficiency
Epidemiology	• Autosomal recessive inheritance • Ashkenazi Jewish heritage	
Onset	Age 2-6 months	
Clinical features	• Loss of motor milestones • Hypotonia • Feeding difficulties • Cherry-red macula • Hepatosplenomegaly • Areflexia	• Loss of motor milestones • Hypotonia • Feeding difficulties • Cherry-red macula • Hyperreflexia

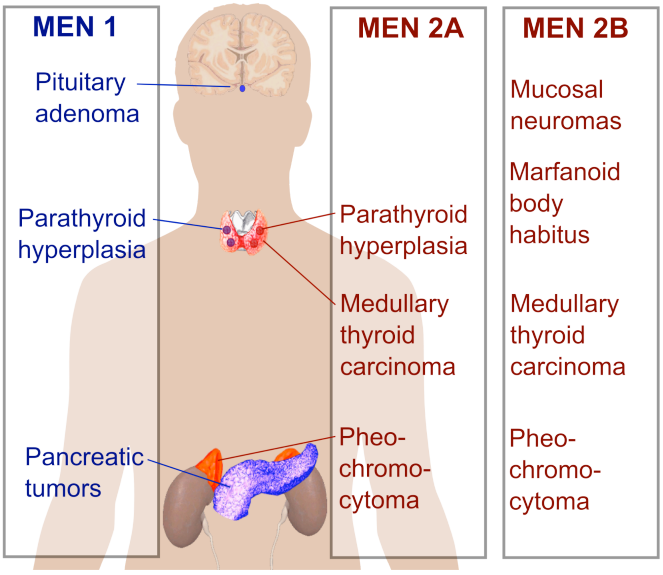
- **Fanconi anemia**
  - Bone marrow failure due to defective DNA repair
  - Short stature and anemia
  - Pancytopenia
  - Congenital malformations: hypoplastic thumbs and developmental delays
- **Neurofibromatosis**

NF1	NF2
AD Cafe-au-lait spots Clustered freckles Lisch nodules (iris hamartomas) Neurofibromas	bilateral vestibular schwannomas meningiomas ependymomas

Optic gliomas 	juvenile cataracts

- **Tuberous sclerosis**
  - Facial angiofibromas, hypopigmented macules “ash leaf”, shagreen patches (coarse plaque)
  - Hamartomas of various organs
  - Seizures
- **Von Hippel-lindau syndrome**
  - Hemangioblastoma, malignant tumors (RCC)
- **MEN syndromes**

MEN 1 Aka Wermer syndrome	**MEN 2A** Aka Sipple syndrome	**MEN 2B/ MEN 3?**
Pituitary adenoma PTH hyperplasia Pancreatic tumor	PTH hyperplasia Medullary thyroid carcinoma Pheochromocytoma	Mucosal neuromas Medullary thyroid carcinoma Pheochromocytoma Marfanoid body habitus



- **McCune-Albright syndrome**

- Fibrous dysplasia, cafe-au-lait macules, precocious puberty

	Congenital Umbilical Hernia	Gastroschisis	Omphalocele
Pathophysiology	Incomplete closure of the umbilical ring	Failed closure of the lateral folds → extra embryonic gut does not return to the abdominal cavity	
Risk factors	• Congenital hypothyroidism • Trisomy 21	• Not associated with chromosomal abnormalities	• Beckwith-Wiedemann syndrome • Trisomy 13 • Trisomy 18
Clinical features	• Soft, nontender bulge at the umbilicus • Protrusion with increased intraabdominal pressure • Typically reducible • Usually closes spontaneously	• Extrusion of abdominal contents, typically to the right of the umbilicus • Bowel is not covered by peritoneum or amnion	• Herniated abdominal contents are covered by peritoneum
			

Pharmacology

- **Antibiotics**
  - Animal bites: amoxicillin-clavulanate
  - MRSA skin infection: TMP-SMX
  - Acute sinusitis: ciprofloxacin
  - Infectious diarrhea: ciprofloxacin
  - Otitis media: cephalexin (1st gen), **amoxicillin**
  - Genitourinary infections: ampicillin
  - NSAID: kawasaki → IVIG = refractory kawasaki
  - meningitis= ceftriaxone
  - Retropharyngeal abscess= clindamycin
  - azithromycin= atypical pneumonia, pertussis, allergy to penicillin
- Skin
  - observation= molloscum
  - corticosteroids= atopic dermatitis/ eczema
  - Mupirocin= impetigo
  - permethrin= scabies
  - griseofulvin = tinea capitis
  - terbinafine= tinea corporis
  - cryotherapy= warts
- Airway meds
  - Inhaled albuterol= asthma exacerbation
  - Inhaled racemic epinephrine= croup with stridor
  - IM epinephrine= respiratory failure due to tracheal obstruction
  - dexamethasone= mild croup
  - Intranasal steroids= allergic rhinitis

- diphenhydramine= 2nd line for allergies

Birth to 24 months

Diet	Development	Physical Exam	Anticipatory Guidance				Immunizations & Tests
			Diet	Dental	Parenting	Safety	
0-1 Month Breast: 8-10xdaily 5-20 min/side Formula: Q2-4 hours 26 oz daily max Solids: None	Regards to face Equal movements Alerts to voice Raises head off table	Scalp/skin Heart murmur Femoral pulses Hip dysplasia Hydrocele Metatarsus adductus Newborn reflexes Jaundice Umbilicus	Vitamin D (thru 12m BF or until 30oz Form) No solids No honey or Karo syrup	Pacifier safety	Crying Colic Sleep patterns Day Care Temperature taking	Crib safety Sleep position Medical emergency Where to go Appropriate ER visit Car seat	Hep B at birth EPDS depression screen (thru 6m) Tdap and flu for close contacts
1-3.5 Months Breast: 6-10xdaily Formula: Q3-5 hours 32oz qd max Solids: None	Smiles Follows 180 degrees Vocalizes/Squeals Lifts head 90 degrees Grasps rattle	Scalp/skin Heart murmur Femoral pulses Hip dysplasia Testes descended Inguinal hernia Variance in muscle tone	OK to introduce solids when good head control No cow's milk	No bottle propping	Temperature taking Illness related phone calls Constipation	Falls from rolling Burns	<u>2 months</u> Pediarix #1 (DTaP, IPV, HepB) Hib #1 Prevnar #1 Rotarix #1
3.5-5.5 Months Breast: 6-10xdaily Formula: Q3-5 hours 32 oz daily max Solids: Early introduction ok	Smiles spontaneous Voluntary release Rolls over Turns to voice Good head control	Scalp/skin Middle ear Heart murmur Hip dysplasia Testes descended Hernia Teething Abn. Muscle tone	Foods to avoid: Honey Cow's milk No bottle propping	No night bottle Teething	Treatment of simple URI Sleep patterns Establish routines	Choking Falls/rolling	<u>4 months</u> Pediarix #2 (DTaP, IPV, HepB) Hib #2 Prevnar #2 Rotarix #2
5.5-8.5 Months Breast: 4-6xdaily Formula: 32 oz daily max Solids: Encourage mushy table foods daily for oral-motor control	Sits with support alone Bears weight Raking grasping Object transfer Imitates voice Feeds self cracker Works to obtain a toy	Scalp/skin Middle ear Teething Heart murmur Hip dysplasia Abn. Muscle tone Failure to reach devo milestones	Begin cup Table foods Iron rich foods for breast fed children	Tooth cleaning: Use rice grain sized piece of flouride toothpaste until 3 years First dental visit at 6-12 months Bottle	Separation anxiety Stranger anxiety Importance of routines	Safety proof house: stairs /poison Never leave alone Burns Electrical outlets Poison control	<u>6 months</u> Pediarix #3 (DTaP, IPV, HepB) Prevnar #3 Flu (in season)

				caries			
8.5-12 Months Breast: 6-10xdaily Formula: 32 oz daily max Solids: Table foods TID + snacks	Pulls to stand Cruises-walks Thumb-finger grasp Bangs cube Imitates sounds Mama/Dada Shy with strangers Pat-a-cake Peek-a-boo Waves bye	Scalp/skin Middle ear Teething Heart murmur Hip dysplasia Tibial torsion Failure to reach devo milestones Evidence of abuse (verbal or physical)	Whole milk at 1 year Cup Picky eating is normal Finger foods	No bottle at 1 year Parent continues to clean teeth as above	Limit setting Importance of consistency Night walking	Water safety Review safety-proofing house (poisons)	<u>12 months</u> MMR #1 Varivax #1 Hep A #1 Flu (in season) <u>Lab:</u> Lead & HCT at 12 months
12-18 Months Breast: 2-6 day Whole milk: With cup 24 oz daily max Solids: Table foods TID+ snacks	Walks alone by 18 months Pincher grasp Mama/dada specific 3-5 work vocabulary Indicates wants Responds to questions Knows 1 body part	Middle ear Teething/caries Heart murmur Testes descended Failure to reach devo milestones Evidence of abuse (verbal or physical)	Decreased appetite normal Picky eating is normal Table foods	Off bottle Cup	Normal “Ortho” conditions Consistency/ routines Appropriate discipline	Review safety-proofing house Lead exposure Drowning	<u>15 months</u> Hib #3 Prevnar #4 Flu (in season) <u>18 months</u> DTaP #4 Hep A#2 Flu (in season)
18-24 Months Breast: 2-4xdaily Whole milk: 24 oz daily max Solids: Table foods TID+ snacks	Helps with household tasks Uses spoon Scribbles Tower of 2-4 cubes Walks up steps Kicks ball Walks backwards Poison control (800) 222-1222	Speech evaluation Middle ear Teething/caries Heart murmur Testes descended Failure to reach devo milestones Evidence of abuse (verbal and physical)	Decreased appetite Picky eating is normal Avoid foods which are choking hazards	No bottles Floss as needed	Toilet training Time out Temper tantrums Stranger safety	Drowning Does not know safe from unsafe Supervision always Helmet use Front facing car seat at 24 months	<u>Two years</u> Any immunization or test as needed to complete a series if not previously given

Injury prevention in children	
Water	• Never leave child unattended around water • Fence all 4 sides of pool & install self-locking, self-latching gate • Use life jackets • Teach child to swim
Fire	• Install smoke detectors on every level of home • Test smoke detectors & change batteries regularly
Gun	• If present, store guns unloaded and locked • Store ammunition separately from guns
Home	• Lock medications & toxic household products out of reach • Remove dangling cords & cover power outlets • Install safety gates on stairs • Set water heater to maximum temperature of 49 C (120 F) • Mount furniture & TV to wall • Avoid choking hazards (eg, whole grapes, raw vegetables, small objects)

3 to 10 years

AGE	DEVELOPMENT	ANTICIPATORY GUIDANCE	IMMUNIZATIONS/TESTS
3 years	Gross Motor: Pedals tricycle, Alternate feet up stairs. Fine Motor: Copies circle Undress/ dress partially Language: 3 word sentences, Understands two step instruction/plurals/”2”/ prepositions, 75% of speech intelligible to stranger, Uses Pronouns Social: Group play, Knows age, name and gender, Imagination.	Nutrition: Allow pt to make some choices, Nutritious snacks and meals. Safety: Helmet, Water safety, Correct child restraint, Poison control, Sun screen, Pedestrian safety, Matches/ lighter control, Home and car no-smoking zone. Discipline: Consistence in discipline and expectation, timeout, immediate consequences, Do not allow hitting, biting Activity: TV < 1 hr per day (watch together and discuss) Talk with child about activities/ friends, read. Brush teeth with pea-sized toothpaste, discuss gender differences-use correct names for body parts, Show affection to child and in family	Catch up missed immunization Vision/ Hearing screen Dental visit (Fluoride if indicated) Yearly blood pressure Risk Factor evaluation for Lead/TB

4 years	Gross Motor: Hops, Jumps on one foot, Alternate feet down stairs Fine Motor: Draws person with 3 parts, Dress/ undress completely Language: Talks about daily activity, Uses past tense, 4-5 word sentences, may stutter, strangers understand 100%, Social: Gives first and last name, Can sing a song, Fantasy play	Nutrition: 3 meals and 2 snacks, Serve variety of healthy foods, Brush teeth twice a day, Limit sugar contact time. Safety: Injury prevention (establish and enforce strict rules for safety), Car seat until 40 lbs then booster seat, Water Safety, Sun Screen, Smoke free environment Discipline: Do not allow hitting, biting, Show how to handle anger, Parental role model. Activity: Teach about body, Good touch/ bad touch, Individual time with each child; Show interest in child's activity.	School entry immunizations: DTaP #5, IPV #4, MMR #2, Varivax #2, Vision / Hearing Track Ht, Wt, BMI Yearly dental exam (Fluoride if indicated) Yearly Blood Pressure Risk factor evaluation for Lead/TB
5 years	Gross Motor: Skips alternating feet, Jump low obstacles. Fine Motor: Copies triangle, Draw person with 5 – 7 parts, Prints name Language: Asks word meaning Social: Helps around the house, Follows rules.	Nutrition: As above, encourage healthy food choices. Safety: Dealing with strangers, Helmet use Discipline: Family rules, Time out, Impulse control, Discuss smart choices (drinking, drugs, and tobacco) Activity: Talk about school, Encourage talking about feelings, Prepared for school (Letters, numbers, colors) Parental role model	Complete School entry immunizations PPD (every 3 years) Vision / hearing screening Yearly dental exam Dental visit (Fluoride if indicated) Track Ht, Wt and BMI Yearly Blood Pressure Risk factor evaluation for Lead/TB
6-7 years	Gross Motor: Balances on each foot for 6 sec Fine Motor: Copies square Language: Defines 7 words Social: Helps around the house, Follows rules	Nutrition: As above Safety: Injury prevention (water, helmet use), teach smart choices. Booster until 4'9" (seat belt fits appropriately) Discipline: Peer activities, Discuss peer pressure and what to do, Bullies in school, Teach respect Activity: Limit TV, computer, video games, Read together, Encourage active past times (sports), Parental role model, setting reasonable parental expectations.	Immunizations up to date Vision / Hearing screening Yearly dental exam (Fluoride if indicated) Scoliosis screen Yearly blood pressure Risk factor evaluation for Lead/TB
8-10 years	Review school performance (<3rd grade: learning to read, 4th + grade: reading to learn)	Age appropriate discussing about sex, Talk about peer pressure and smart choices, Risk-taking behavior, Discuss pubertal changes (menses, "wet dreams", changing feelings, Teach good conflict resolution	Immunizations up to date Yearly blood pressure Track Ht, Wt, BMI Yearly dental exam (Fluoride if indicated)