



Updates to Newborn Management

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Disclosures

I have no financial or pharmaceutical affiliations to disclose.



Objectives

- Review common newborn diagnoses, evaluation and management in both the newborn nursery and outpatient setting
- Review AAFP updates and the evidence behind the management of common newborn conditions
- Review what conditions can be managed by primary care vs which should be referred to specialty care



Overview

- Abnormal Newborn Exam
 - Sacral Dimple, Red Reflex, Ear Pit/Tag, Hip Dysplasia, Cryptorchidism, Heart Murmur, Newborn Derm
- Common Outpatient Newborn Conditions
 - Hyperbilirubinemia, Reflux/GERD, Constipation, Failure to Thrive
- Supplementation/Nutrition
 - Vitamin D and Iron
- Care of Premature Infants

SORT Criteria

Strength of Recommendation	Definition
A	Consistent and good-quality patient-oriented evidence
B	Inconsistent or limited quality patient oriented evidence
C	Consensus, usual practice, expert opinion, disease-oriented evidence, or case series for studies of diagnosis, treatment, prevention, or screening

Summary: Neonatal SORT^{1,2}

- Screening for hypoglycemia should be performed in newborns who are LGA or SGA, newborns of mothers with DM or GDM, and late preterm infants 34-36.6wga. **C**
- Hearing should be evaluated in all newborns before one month of age, but preferably before discharge using auditory brainstem response. **C**
- Routine screening for congenital heart disease via pulse ox is recommended before discharge at 24 hours of life or later. Echo should be performed if the results are positive. **C**

Abnormalities on Newborn Exam²

■ Sacral Dimples

- Usually benign unless the following features are present
 - Deep, larger than 0.5cm, greater than 2.5cm from the anal verge, or association with other cutaneous markers such as hair
- With any of the above, US should be performed before three months of age to evaluate for spinal dysraphism. **Sort C**²

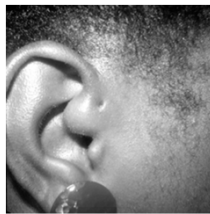


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Abnormalities on Newborn Exam¹

■ Preauricular Anomalies¹- tags, pits

- Newborns with preauricular skin lesions may be at increased risk of hearing impairment- **Sort C**
- The association with renal tract abnormalities has not been validated
- **Renal US** should be performed in newborns with isolated ear anomalies, only when they are associated with one or more of the following- other congenital malformations, teratogenic exposure, family hx of deafness, or maternal hx of GDM- **Sort C**



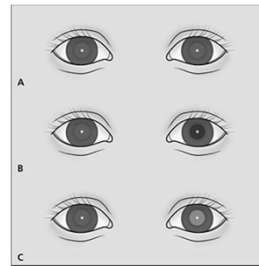
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Abnormalities on Newborn Exam¹

■ Absent Red Reflex

- Ddx – congenital cataracts, leukocoria, retinoblastoma
- Management → Refer to Pediatric Ophtho
- Regardless of red reflex test results, all newborns with a family hx of retinoblastoma, cataracts, glaucoma, or retinal abnormalities should be referred to an ophthalmologist – **Sort C**



Heart Murmurs^{1,17}

■ Physical Exam

- Vitals – 4 extremity BP, peripheral perfusion, characterization of the murmur, signs of CHF
- In infants, feeding difficulties may be the first sign of CHF

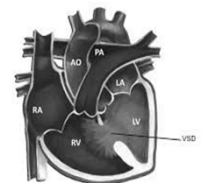
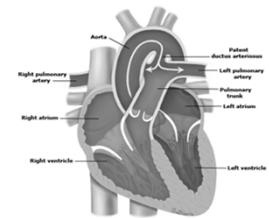
■ PDA

- At birth, the rise in systemic arterial oxygen tension and a decrease in circulating PGE₂ levels trigger ductal constriction
- Continuous machine like flow murmur

■ VSD

- One of the most common congenital heart lesions; 75% of small defects undergo spontaneous closure within the first two years of life
- Clinical presentation varies depending upon the size of the defect and may range from an isolated murmur to severe heart failure
- Small VSD → grade 2 to 3/6 harsh or blowing holosystolic murmur best heard at the left mid to lower sternal border

- Diagnosis made via Echocardiogram

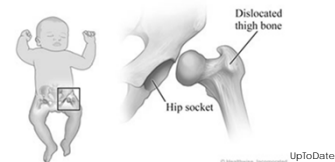


Heart Murmurs^{1,17}

- Structural heart disease is more likely when the murmur is holosystolic, diastolic, grade 3 or higher, associated with a systolic click, or increases in intensity with standing, and has a harsh quality. **Sort C**
- Family physicians should **order echocardiography or consider referral to a pediatric cardiologist for newborns with a heart murmur**, even if the child is asymptomatic, because of the higher prevalence of structural heart lesions in this population. **Sort B**
 - Roughly 1% of newborns have a heart murmur; up to 86% (31-86% CI) of affected infants have underlying structural heart disease
 - EKG and CXR rarely assist in the diagnosis

Developmental Dysplasia of the Hip^{18,24}

- An abnormality of the acetabulum or femoral head and their congruence ranging in severity from mild instability to frank dislocation
- Incidence of 1.6-28.5 per 1000 infants
- Whether treated or untreated, infants with DDH have a higher incidence of early-onset hip osteoarthritis in adulthood.
 - Incidence is lowest in those who receive early treatment
- Risk Factors
 - **Breech presentation in third trimester regardless of vaginal or cesarean delivery, Female Sex, Family hx of DDH**
 - First Gestation, Oligohydramnios, LGA, Metatarsus adductus, and torticollis
 - Even with normal exam “consider” US at 4-6 weeks of life with bolded risk factors above, using best clinical judgement per the AAP



Developmental Dysplasia of the Hip^{18,24}

- Conflicting evidence regarding screening
 - **USPSTF – Insufficient evidence** that screening for developmental dysplasia of the hip prevents adverse outcomes
 - **AAP** and Pediatric Orthopedic Society of North American recommend **screening with PE via Barlow and Ortolani maneuvers up to 3mo of age** and **targeted screening US** for infants with multiple risk factors regardless of physical exam findings
 - AAP also recommends performing a “focused PE of the hips” at routine health care visits until 12mo of age
- US should be considered for hip Abduction less than 60 degrees or a 20 degree difference in Abduction between hips.
- Plain XR is inappropriate for infants younger than 4-6mo because the neonatal hip is primarily cartilaginous and due to risk of radiation exposure

Developmental Dysplasia of the Hip^{18,24}

- Treatment:
 - For mild instability, watchful waiting with weekly exams until 6 weeks of life
 - Referral to Pediatric Ortho
 - Pavlik harness with splinting in Flexion and Abduction for 6-12 weeks.
 - Potentially increased risk of AVN of the femoral head – controversial and conflicting evidence per AAP who feel USPSTF over-noted the rates of AVN which led to their “I” recommendation



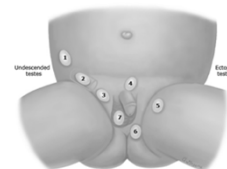
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Summary: Developmental Dysplasia of the Hip SORT^{18,24}

- **All infants should be screened for DDH with the Ortolani and Barlow maneuvers from birth up to three months of age. C**
- Infants from two months through 12 months of age should be screened for DDH with **assessment for limited hip abduction. C**
- **US should not be used for universal screening** for DDH. **C**
- **Girls born in breech position** should receive imaging to evaluate for hip dysplasia. Imaging should be considered in newborns with a **family history of developmental hip dysplasia** and in **newborn boys in the breech position. C**

Undescended Testes; Cryptorchidism⁷

- Affects 3-5% of term male infants at birth. Incidence reduced to 0.8% by 3mo of age
- Most common consequences if untreated
 - **Subfertility**
 - **Testicular Cancer**
 - Higher rates of **testicular torsion** and **inguinal hernias**
- Germ cell density has been shown to decrease over time, beginning as early as one year of age. For this reason orchiopexy is recommended as early as 6mo and should be completed before age 2
- Bilateral Non-palpable testes- should be considered a genetic female with congenital adrenal hyperplasia until proven otherwise
 - Workup: Karyotype, BMP, testosterone, LH, FSH, AMH, adrenal hormones
- Tx: Referral to Urology for orchiopexy.
 - Hormonal treatments with hCG or GnRH are controversial



Newborn Dermatology³

■ Erythema Toxicum Neonatorum

- Erythematous 2-3mm macules and papules that evolve into pustules on an erythematous base
- Unknown etiology; resolves within first few weeks of life without treatment



UpToDate

■ Acne Neonatorum

- Inflammatory papules and pustules usually limited to the face and scalp. Mean age of onset is 3 weeks.
- Results from stimulation of sebaceous glands from maternal androgens, though this is becoming more controversial.
- Tx: daily cleansing with soap and water. Can consider benzoyl peroxide or topical steroid to expedite clearance in severe cases.

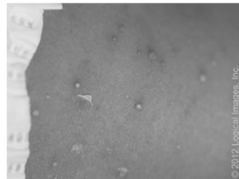


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Newborn Dermatology³

■ Transient Neonatal Pustular Melanosis

- Similar to erythema toxicum, but does not have surrounding erythema
- The papules rupture easily, leaving pigmented macules that fade over a course of several weeks
- No treatment necessary



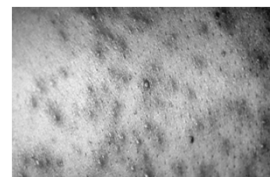
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■ Miliaria

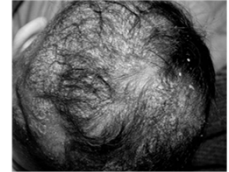
- White papules, caused by accumulation of sweat beneath eccrine ducts that are obstructed by keratin
- Rarely present at birth, but usually develop in first weeks of life with occlusive clothing
- No specific treatment needed
- Miliaria rubra- heat rash – obstructed sweat causes a localized inflammatory response



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Seborrheic Dermatitis, "Cradle Cap"³

- Erythematous rash, with scaling predominating in the scalp region
- Exact etiology unknown- some studies have implicated *Malassezia furfur* and hormonal fluctuations
- Age of onset and absence of pruritus help distinguish it from atopic dermatitis
- Usually self-limited process
- Conservative stepwise approach to treatment
 - Soft brush following shampooing; Vaseline or mineral oil to soften scaling
 - If not responding, tar containing shampoo is recommended. OTC Coal Tar
 - Ketoconazole shampoo/cream and topical steroids are another option
 - Meta-analysis comparing ketoconazole shampoo and steroids showed both to be effective, but ketoconazole was better at preventing recurrence
 - Selenium sulfide shampoos are thought to be safe but safety data in infants is lacking



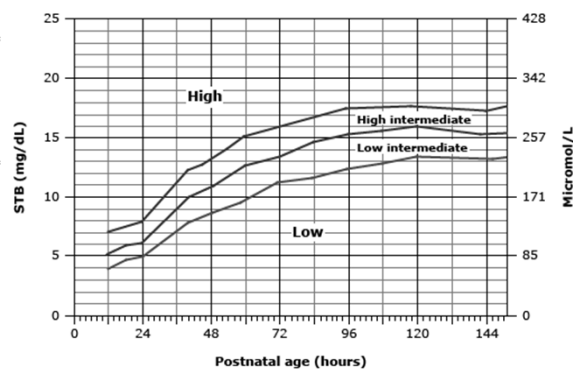
Summary: Newborn Dermatology SORT³

- Infants who appear sick and have vesiculopustular rashes should be tested for candida, viral, and bacterial infections. **C**
- **Acne neonatorum** usually resolves within four months without scarring. In severe cases 2.5% benzoyl peroxide can be used to hasten resolution. **C**
- **Miliaria rubra** (heat rash) responds to avoidance of overheating, removal of excess clothing, cool baths, and air conditioning. **C**
- Infantile **seborrheic dermatitis** usually responds to conservative treatment, including petrolatum, soft brushes, and tar containing shampoo. **C**
- **Resistant seborrheic dermatitis** can be treated with topical antifungals or mild corticosteroids. **B**
- Uncomplicated **hemangiomas** that are not near the eyes, lips, nose or perineum do not require treatment. **C**
- Infants with **port-wine stains** near the eye should be referred for glaucoma testing. **C**

Hyperbilirubinemia^{10,11}

- Neonatal jaundice is the most common cause of hospital readmission in the neonatal period
- Risk factors
 - Cephalohematoma, early gestational age, exclusive breastfeeding, isoimmune & hemolytic anemia, sepsis, SGA, sibling with a hx of neonatal jaundice
- Etiologies
 - ABO incompatibility, breastfeeding jaundice, breast milk jaundice, infection/sepsis, physiologic jaundice, polycythemia, G6PD deficiency, birth trauma
- Visual inspection is NOT an accurate method to determine bili levels and often misses severe hyperbilirubinemia

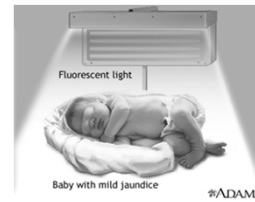
Hyperbilirubinemia^{10,11}



■ Universal Screening

- In 2009 the USPSTF and AAFP found insufficient evidence that screening improves outcomes (no evidence that phototherapy or exchange transfusion decreases the risk of bilirubin encephalopathy)
 - This recommendation has since been "inactivated"
- AAP does recommend universal screening with bili levels and targeted screening based on risk factors

Hyperbilirubinemia^{10,11}



- Symptoms of bilirubin encephalopathy- lethargy, high pitched cry, and poor feeding
 - Kernicterus: chronic, permanent clinical sequelae of bilirubin toxicity
 - Severe athetoid CP, paralysis of upward gaze, hearing loss & intellectual impairment
- Primary reason for treating jaundice is to prevent neurologic damage
- Treatment Options
 - Phototherapy- converts unconjugated bilirubin into bilirubin photoproducts that are excreted in the stool and urine.
 - Did not become widespread until the 1960s in the US
 - IVIG - treatment option for isoimmune hemolytic disease
 - Exchange transfusion: for TSB 25 or greater, or signs of acute bilirubin encephalopathy

Jaundice and Breastfeeding^{10,11}

- Breastfed infants are 3x more likely to have a bilirubin level greater than 12 mg/dL. Exact mechanism unknown but proposed etiologies: decreased caloric intake, inhibition of hepatic bilirubin excretion, and increased intestinal bilirubin reabsorption.
- Breastfeeding women whose infants have jaundice are at increased risk of early cessation of breastfeeding.
 - AAP recommends promoting breastfeeding for infants with jaundice, and increasing the frequency to 8-12 x a day.
 - Supplementation can be considered if the infant's intake is inadequate, weight loss is excessive, the infant appears dehydrated, or jaundice is severe.
 - Phototherapy should be interrupted for breastfeeding unless the infant's bilirubin levels are approaching those that require exchange transfusion.

Summary: Neonatal Hyperbilirubinemia SORT^{10,11}

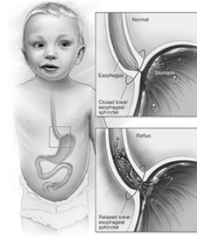
- **Phototherapy** decreases the incidence of severe hyperbilirubinemia in newborns. **C**
- Phototherapy decreases the need for exchange transfusion in newborns with severe hyperbilirubinemia. **B**
- **Interrupting breastfeeding** in an infant with jaundice decreases the chances of successful breastfeeding. **B**
- Physicians should **encourage optimal breastfeeding** (8-12 feedings per day) to decrease the incidence of hyperbilirubinemia. **C**

Gastroesophageal Reflux vs GERD^{13,23}

- **Gastroesophageal Reflux** – the passage of stomach contents into the esophagus with or without accompanied regurgitation and vomiting
 - Normal physiologic process more common in infants → transient relaxation of the lower esophageal sphincter independent of swallowing
 - Occurs in more than 50% of otherwise healthy infants
- **GERD** – reflux that causes troublesome symptoms or leads to medical complications
 - Vomiting associated with irritability, anorexia, feeding refusal, poor weight gain, dysphagia, arching of back with feeds, respiratory symptoms - choking & wheezing
- Sx/Si that require further evaluation: fever, FTT, bilious and projectile vomit, onset of vomit after 6mo, GI bleeding, persistent diarrhea, organomegaly, apnea or cyanosis with feeding

Gastroesophageal Reflux & GERD^{13,23}

- Dx is made by history and physical exam
 - Endoscopy, barium study and pH monitoring reserved for atypical symptoms or warning signs
- Treatment
 - Reflux resolves by 12 mo of age without treatment in most cases
 - **Behavioral Treatments:** body position changes while awake, lower volume and more frequent feedings, thickening agents (cereal), anti-regurgitation formula, hydrolyzed/amino acid formula and eliminating cows milk from mother's diet if breastfeeding.
 - Reasons to consider changing formula or eliminating cow's milk from diet
→ gross or occult blood in their stool, eczema, or a strong family hx of atopy
 - **H2 blocker-** reserved for cases where behavioral treatments have not worked, or in cases w/ feeding refusal and poor weight gain.
 - Recommended to be used for a 2-4 week trial



Summary: Gastroesophageal Reflux & GERD SORT^{13,23}

- The **diagnosis** of gastroesophageal reflux and GERD should be based primarily on **history and physical examination** findings; other diagnostic tests have not shown superior accuracy. **C**
- **Conservative treatments are the first-line strategies** for most infants with reflux and GERD. **C**
- A trial of hydrolyzed or amino acid formula in formula fed infants, or maternal dietary modification in breastfed infants is warranted when reflux is presumed to be caused by an **allergy to cow's milk protein**. **C**
- **Histamine receptor antagonists** are an option for acid suppression therapy in infants and children with GERD. **B**
- **Proton pump inhibitors** are reasonable treatment options for GERD in older children and adolescents, but their **use in infants is questionable** because of a lack in proven effectiveness. **B**
- Choosing Wisely Campaign
 - **Avoid using acid blockers for physiologic gastroesophageal reflux that is effortless, painless and not affecting growth. Do not use medication in the "happy spitter".**

Constipation^{14,22}

- Definitions
 - A delay or difficulty in defecation, present for two or more weeks, sufficient to cause significant distress to the parent
 - < 2 BM per week, painful defecation, or passage of large/hard stools that requires excessive straining
- Acute constipation that develops in infants beyond the neonatal period is typically triggered by dietary changes, such as the transition to solids, and is likely to respond to dietary interventions.
- Bowel Movement Norms
 - 90-95% of newborns pass meconium by 24 hours of age.
 - During the first three months of life, the frequency of bowel movements is influenced by the mode of feeding and the type of formula.



Constipation^{14,22}

- While rare, more serious underlying organic causes of constipation are usually diagnosed in infancy

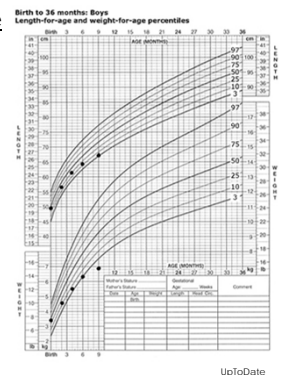
Warning Sign/Symptom	Suggested Diagnosis
Passage of Meconium >48hr after delivery, FTT, fever, bloody diarrhea, bilious vomiting, tight anal sphincter	Hirschsprung's Disease
Abdominal Distention, bilious vomiting, ileus	Pseudo-obstruction
Decrease in LE reflexes or muscular tone, absence of anal wink, pilonidal dimple or hair tuft	Spinal cord abnormalities: tethered cord, spinal cord tumor, myelomeningocele
Fatigue, cold intolerance, bradycardia, poor growth	Hypothyroidism
Polyuria, Polydipsia	Diabetes Insipidus
Delayed Meconium passage, rash, FTT, fever, recurrent pneumonia	Cystic Fibrosis
Abnormal position or appearance of anus	Congenital anorectal malformation: imperforate anus, anal stenosis

Constipation^{14,22}

- Constipation in infants is usually functional and the result of stool retention
 - Stool retention → dilates rectum and decreases rectal tone → larger and often painful BM which are decreased in number
- Treatment of functional constipation
 - **Disimpaction**
 - <1yr old- can consider **glycerin suppositories** or **rectal stimulation with a lubricated rectal thermometer**. Avoid frequent use to prevent tolerance.
 - No randomized controlled studies have compared methods of disimpaction.
 - **Maintenance meds- Sorbitol containing juices, Lactulose, Polyethylene Glycol**
 - <4 mo old → 1-2 oz of diluted prune juice or Lactulose (1mg/kg/day)
 - Polyethylene glycol not recommended until >6mo of age
 - Avoid stimulant laxatives in infants such as mineral oils, enemas and magnesium
 - After 6mo of age, goal of 5g of fiber per day- pureed veggies, fruits, and fiber containing cereals
 - Behavioral treatment is recommended as an adjunct to medical therapy in children with functional constipation. **Sort A**

Failure to Thrive^{15,16}

- FTT: a state of undernutrition due to inadequate caloric intake, inadequate caloric absorption, or excessive caloric expenditure
- Definitions
 - **weight** for age that falls **below the 5th percentile** on multiple occasions or weight deceleration that **crosses two major percentile lines on a growth chart**. Use of any single indicator has a low PPV
 - Weight is affected first, then length and head circumference
- 5-10% weight loss may occur in the term infant during the first seven days of life.
 - Insensible losses range from 30-60cc/kg/day in healthy term infants.
- Most cases of FTT involve inadequate caloric intake caused by behavioral or psychosocial issues.
- Severe, prolonged malnutrition can negatively affect a child's future growth and cognitive development. Unclear whether short term FTT with recovery has long term consequences.



Failure to Thrive: DDx^{15,16}

Inadequate Caloric Intake	Inadequate Caloric Absorption	Excessive Caloric Expenditure
Breastfeeding Problems	Food Allergy	Thyroid Disease
Improper Formula Prep	Malabsorption	Chronic Immunodeficiency
GERD	GI atresia/Malformation	Chronic Pulmonary Dz
Caregiver Depression	Inborn Error of Metabolism	Congenital Heart Dz
Lack of Food Availability	Pyloric Stenosis	Malignancy
Cleft Lip/Palate		

- Risk factors for Failure to Thrive
 - **Poverty** is the greatest single risk factor for FTT in developed countries
 - Congenital anomalies, developmental delay, SGA < 2500g, poor oral health, prematurity
 - Disordered feeding techniques, family stressors, IPV, PPD, substance abuse

Failure to Thrive: Workup/Red Flags^{15,16}

- The most important part of outpatient evaluation of FTT is obtaining an accurate account of a child's eating habits and caloric intake.
- **Routine laboratory testing identifies a cause of FTT in less than 1% of children and is not generally recommended**
 - No standard set of lab tests is recommended
 - "Reasonable" initial labs include CBC, UA, CMP, TSH, only if failing to gain weight despite adequate caloric intake
- Red Flags that indicate specific workup
 - **Cardiac findings** to suggest congenital heart disease- murmur, edema, JVD → Echo
 - **Developmental Delay, Dysmorphic** features-> genetic evaluation
 - **Organomegaly/lymphadenopathy/Recurrent infections**
 - CBC, CMP, Hepatitis serology, HIV, TB skin testing, Ig and Complement levels
 - **Recurrent vomiting, diarrhea, or dehydration**- CMP, stool studies

Failure to Thrive: Management^{15,16}

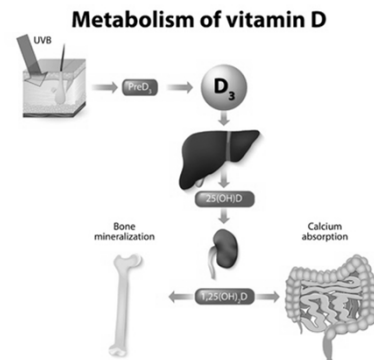
- Reasons to Admit
 - Failure of outpatient management
 - Suspicion of abuse or neglect, or severe psychosocial impairment of the caregiver
 - Need to precisely document nutritional intake
 - Severe malnutrition/dehydration
 - Concern for underlying medical etiology/red flags on history or exam
- Treatment
 - Guidance for catch-up growth: Nutritional counseling with increasing breastfeeding and fortifying formula if necessary
 - Consider home nursing visits for weight checks
 - Appetite stimulants (Cyproheptadine, & Megace) are helpful for certain populations (CF, CKD, Cancer) but not recommended for most cases of FTT

Summary: FTT SORT Criteria^{15,16}

- Valid **weight measurements over time**, rather than a single point, are required for the recognition of failure to thrive. **C**
- An accurate, **detailed account of a child's eating habits, caloric intake, and parent-child interactions** should be obtained as a key step in determining the etiology of FTT. **C**
- Routine **laboratory testing and hospitalization are rarely indicated** in the assessment and management of failure to thrive. **C**
- Hospitalization should be considered if a child is less than 70% of predicted weight for length, fails to improve with outpatient management, suspicion for abuse/neglect, or severe impairment of caregiver is evident. **C**
- **Multidisciplinary interventions**, including home nursing visits, should be considered to improve weight gain, parent-child relationships, and cognitive development of children with FTT. **A**

Vitamin D^{12,21}

- Vitamin D- fat soluble hormone necessary for Ca absorption and utilization
- Growth failure and Rickets are known consequences of Vitamin D Deficiency
 - Low Vitamin D levels stimulate PTH which leads to Ca mobilization from bone and bone resorption → over time leads to Rickets
- Risk factors for Vitamin D Deficiency in Children
 - Anticonvulsant medications, fat malabsorption, darker skin pigmentation, exclusive breastfeeding, insufficient sunlight exposure, low maternal Vit D levels



Vitamin D Supplementation^{12,21}

- There is no set level of 25 (OH) Vit D to confirm vitamin D deficiency in infants, children, & adolescents
- In 2011, The Institute of Medicine increased the Vit D RDA recommendations, which were endorsed by the AAP
- **Infants ingesting less than 1L (33.8 oz) of formula per day, as well as all breastfed or partially breastfed infants, should receive 400 IU of supplemental Vitamin D daily. Sort C**
 - Based on expert opinion and recent clinical trials measuring biomarkers of vitamin D status; No RCTs have yet been done
 - Prospective studies focusing on patient oriented outcomes rather than biomarkers are needed to understand full clinical impact of Vit D supplementation

Iron Deficiency²⁰

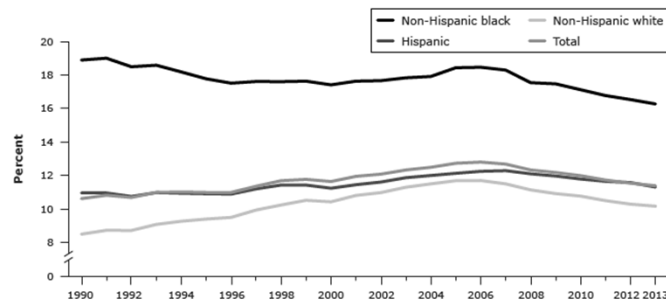
- Among children in the developing world, iron is the most common single nutrient deficiency, with prevalence of 4% at 6mo of age and 12% at 12mo
- Definition: Per WHO, Hg concentration 2SD below mean Hgb concentration for normal population. Male and female at 12mo Hgb <11.0
- Correlation between Iron Deficiency and neurodevelopmental issues, but no study has proven causality due to many confounding variables
- AAP Recommendations
 - **Universal screening for anemia should be performed at approximately 12 months** of age with determination of Hgb concentration
 - If Hgb <11.0, then further evaluation for IDA is required with checking iron studies to confirm diagnosis
 - For mild anemia Hgb 10-11, an alternative acceptable method is to supplement iron and f/u for 1g/dl increase in Hgb after 1 month of treatment

Iron Supplementation²⁰

- Preterm Infant- require 2mg/kg/day through 12mo of age
 - The majority of iron present in a newborn is obtained during the third trimester of pregnancy
 - Formula fed- ensure formula is iron fortified
 - Breastfeeding- require iron supplementation 2mg/kg/day starting by 1mo of age and continued until eating complementary foods to supply this iron requirement
- Term Infant
 - All term infants have sufficient iron for at least first 4 months of life
 - Formula feeding- no need for iron supplementation
 - Exclusively Breastfeeding or >50% of milk is breastmilk → **1mg/kg/day of iron supplementation is recommended at 4mo** either via iron supplements, iron fortified cereals, or solid foods.
 - Example: 50th percentile wt at 5mo is 7kg. Exclusively breastfeeding needs 7mg of elemental iron/day
 - Baby rice and oat cereal: 1.2-1.8mg iron per tbsp.
 - 1 jar of baby food veggies: 0.7 to 1.8mg per jar
 - Baby food meats: 0.5-1.0mg per jar
 - Meat and vegetables should be introduced early given their higher iron content

Care of Premature Infants⁹

- Preterm births comprise 12% of all US births, and are responsible for 1/3 of all infant deaths. Significant racial disparities exist in regards to preterm birth
- Maternal Risk factors for preterm labor: infection, anemia, preeclampsia/eclampsia, DM, substance abuse, obesity, multiple gestation



Summary: Care for Premature Infants-SORT⁹

- Enriched formula is often continued after NICU discharge to avoid extrauterine growth restriction and to promote catch up growth, however this is not supported by evidence. Nutrient fortified breast milk/enriched formula should be considered if weight falls below the 10th percentile for corrected age. **C**
- Standardized screening for neurodevelopmental delay should be used in premature infants **at nine, 18, and 24 to 30 months of age.** **C**
- Screening for iron deficiency anemia in preterm infants should occur at **4mo** and **9-12mo** of age. **C**
 - **Iron supplementation** is recommended for **breastfed infants 2mg/kg/day** through 12 months of age or until complementary foods provide a sufficient amount of iron. **C**
- Immunoprophylaxis with palivizumab (Synagis) is recommended in the first year of life during the RSV season for all infants born before 29 weeks gestation and infants born between 29 and 32wga who have chronic lung disease to decrease the risk of hospitalization. **B**

Take Home Points

- Given the high incidence of structural heart disease in newborns, family physicians should obtain an echocardiogram or consider referral to a pediatric cardiologist for all newborns with a heart murmur.
- Newborn examinations should include screening for DDH, with consideration for screening US for infants at high risk – breech, female, family hx of DDH.
- A thorough and accurate dietary history is essential to determine etiology, management and treatment of failure to thrive.
- Conservative behavioral treatments for both reflux and constipation are first line in the absence of red flag signs or symptoms.
- 400 IU Vitamin D supplementation for all newborns, including formula fed infants is recommended until taking 33oz of formula per day.
- Ensure adequate nutritional assessment to determine if supplemental iron is needed, especially in preterm infants and breastfed patients at 4mo of life.

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Questions?

