Newborn Care for Family Practice

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Neonatal Jaundice

• Bilirubin metabolism:
  • Product of heme breakdown
  • Bilirubin transported to liver while bound to albumin, unbound, taken up by hepatocytes, conjugated into more water-soluble form (via UGT enzyme), then excreted in bile
  • Conjugated bilirubin broken down by intestinal bacteria
  • Any process that increases bilirubin production or decreases clearance will lead to jaundice
• Infants naturally have higher level of bilirubin production due to higher hematocrit and shorter RBC lifespan
Neonatal Jaundice

Causes:
- Increased production of bilirubin
  - Increased turnover
  - Vegetating, cephalohematoma
  - Hemolysis: process such as ABO incompatibility, hereditary spherocytosis, maternal antibodies, G6PD deficiency
- Decreased clearance
  - Liver: contains site of adult LT enzyme levels at 7 days old, does not reach adult levels until 14 days old
  - Breastfeeding: decreased interhepatic circulation
  - Breast milk: contains enzyme which inhibits bilirubin conjugation
  - Gilbert's Syndrome, Crigler-Najjar Syndrome

Neonatal Jaundice

Non-pathologic Jaundice
- Appears more than 24 hours old, peaks age 3-5 days
- Can be exacerbated by breastfeeding
- Breast milk: appears 10-14 days of life and may take weeks to resolve

Pathologic Jaundice/Severe Hyperbilirubinemia
- Jaundice less than 24 hours of age or more than 7 days of age
- Total serum bilirubin more than 50% percentile
- Rate of rise more than 0.2 mg/dL, per hour
- Direct (Conjugated) Hyperbilirubinemia: Always pathologic
  - Direct bilirubin greater than 2, or more than 20% of total
  - These infants need referral to RIC D!

Neonatal Jaundice

Risk factors for hyperbilirubinemia:
- Jaundice in first 24 hours
- ABO incompatibility or hemolytic disease with known positive Coombs
- Exclusive breastfeeding, especially breast milk
- Gestational age 35+ weeks
- Early feeding
- Prior 1st day with phototherapy
- Cephalohematoma or bruising

Neurotoxicity Risk Factors (Presence of one or more increases the Risk):
- Hemolytic Disease
- G6PD deficiency
- Anemia
- Lethargy
- Seizures
- Temperature Instability
- Albumin less than 3.5 g/dL measured)
Neonatal Jaundice

- Prevention:
  - All newborns should be screened for jaundice in first 24 hours of life—serum or transcutaneous bilirubin
  - Physical examination by nursing staff at least every 8 hours
  - Monitor breastfeeding closely, weigh daily, assess output
  - All mothers have blood typing performed, all those who are Rh negative have blood type and Coombs performed on infant
  - Standard infant blood type for Rh negative is up for debate
  - Close follow-up after discharge for infants with risk factors
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Neonatal Jaundice - Treatment
- May screen with transcutaneous bilirubin, but if in treatment range confirm with serum bilirubin
- Direct bilirubin needs to be measured at least once
- Assess gestational age and risk factors and start phototherapy accordingly
  - May provide home phototherapy at least 2 mg/dL below those or greater, but DO NOT use home phototherapy in any infant with risk factors
  - Nil per os
- Duration of therapy depends on actual serum level and presence of risk factors
- Consider supplement with expressed breast milk OR formula if breastfeeding poorly
  - Do not stop breastfeeding
- Treatment of breast milk jaundice
- Exchange transfusion - check nomogram, discuss with/transfer to NICU if in range
  - Early possibility for hemolysis, cholestasis, but done in NICU

Neonatal Jaundice - Untreated
- Untreated severe hyperbilirubinemia can lead to kernicterus, or acute bilirubin encephalopathy
  - Bilirubin is highly toxic substance that can cross blood-brain barrier
  - Symptoms include lethargy, decreased feeding, hypotonia or hypertonia, a high-pitched cry, asymmetric torticollis, opisthotonus, jittery neonate, and even death
  - Progresses quickly to chronic bilirubin encephalopathy
    - Reduction of bilirubin in this state will not reverse the sequela
      - Movement disorders - ataxia, cerebral palsy and dystonia
      - Sleep disturbance - sleep apnea, naso-orbital and naso-pharyngeal obstruction
      - Gastrointestinal impairment - vomiting, constipation, and/orMic with hypotonia
      - Dental enamel hypoplasia
      - Gastroesophageal reflux

Newborn Feeding & Growth
Newborn Feeding

- Choice between breastmilk and formula feeding is a pressured choice now more than ever
  - Role of social media
  - Physician should be mindful of benefits of breastfeeding and supportive of decision to do so, but also be prepared to monitor these infants closely for potential problems
- Choice of formula

Newborn Feeding – What’s Normal

- Breastfed babies feed 8-12 times in a 24-hour period
  - Maximally milk usually sometime 2-4 hours after delivery
  - Babies should gain no more than 3 ounces between feeds, until back to birth weight and a good pattern of growth has been established
  - Cluster feeding
- Bottle-fed babies usually feed about 2-4 ounces every 2-4 hours by the end of 1 month
  - Stooling
    - Babies (especially breastfed) may stool 6-8 times per day, may only stool once per week
    - As long as stool is not hard or pellet-like, the baby is not constipated
    - Any color of rainbow as long as it’s not white, red, or black

Newborn Feeding – What’s Normal

- Spit-up is NORMAL!
  - Spit-up is a normal problem, not a baby problem
  - May be anywhere from mouthful to forceful
  - Happy spitters – if the baby is happy and gaining weight appropriately, nothing needs to be done!
- Growth
  - Weight gain after birth is expected – up to 10%
  - Babies gain an average of 1/2 ounce to an ounce per day (25 to 33g per day)
  - Generally speaking, should be back to birth weight by about 2 weeks of age
  - May be longer for breastfed or large babies
  - Breastfed babies especially may require weight checks every 2-3 days in the first week or more
Newborn Feeding - Troubleshooting

- Breastfeeding isn’t going well
  - Latch issues
  - Sleepy baby
  - Premature baby
  - Work with lactation consultant
  - Giving a maximum amount of breast milk
  - Alternatives to exclusive breastfeeding

- Baby is losing weight
  - Up to 10% can be normal for breastfed babies, but start paying attention around 7-14 days
  - Supplementing
    - Enfamil or Enfalok formula
    - Amount and method
    - Get help from another support person if needed

Newborn Feeding - Troubleshooting

- Baby isn’t gaining weight
  - Check rate of growth from lowest weight
  - Thorough history of feeding times and duration, how many times per day
  - Weight and adjusted weight
  - If bottle feeding, make sure to ask how much per day and how they are mixing formula
  - Calculate more in milk/day - breastfed usually require about 70-80 kcal/kg/day to grow
  - Supplement
  - Consider lab evaluation/admission for failure to thrive

Newborn Feeding - Troubleshooting

- Vomiting
  - Thorough history, ask about fussiness with feeds, arching of back, check weight gain, color/consistency of stools
  - When bladders need further evaluation:
    - Fussiness (fear)
    - Projectile vomiting
    - Fussiness with feedings or reflux
  - Happy Spitters - Reflux precautions, make sure not overfeeding
  - When to change formula:
    - Milk protein intolerance
  - When to start meds:
    - Extreme fussiness or poor weight gain/feeding aversion
    - Ranitidine 15 mg/kg/24 h divided BID
Newborn Feeding - Troubleshooting

- Stooling problems
  - The baby is probably normal
  - Normal stooling patterns of infants
  - Gas
  - Grunting/mild crying/tummy red with stools
  - Infants with true constipation in the neonatal period should have a Peds GI evaluation to check for underlying disorders
  - Blood in Stool
    - Stooling history (true constipation?)
    - Milk Protein Intolerance

Neonatal Fever

- Updated Clinical Pathways from many institutions such as CHOP
- Febrile infant: fever 100.4 or greater, rectal/axillary
- 0-8 days old
  - Send to ED or direct admit to hospital
  - CBC, blood culture, cath UA and urine culture, LP with CSF for Gram stain and culture, WBC with differential, protein and glucose
  - Consider HSV as pathogen if:
    - Infant between 0-2 days
    - Infant more than 22 days AND:
      - Congenital, structural, metabolic status, seizures, hepatitis, brown HSV infection at delivery, vesiculo rash
    - Start ampicillin, cefotaxime, viro-acyclovir at meningitic doses
Neonatal Fever

- Infant 24-96 days:
  - CBC, blood culture, cath UA and urine culture
  - Low risk for meningitis:
    - 3-7 weeks of age
    - X-ray chest/NFL
    - Fever/leukopenia
    - Not receiving antibiotics before 3 days of birth
    - APGAR ≤5 at 5 min
    - Temperature ≥38°C
    - Leukocyte count ≥15,000/mm³
    - CSF: MNC ≤5 per mm³
    - CSF Glucose > 50 mg/dL
  - Low risk: no antibiotics, may follow with PICP or admit for observation
  - If less than 8 weeks of age, has lower risk for bacteremia and meningitis but slightly higher risk for UTI
  - High Risk: perform LP, admit and start cefotaxime

Questions?