HYPERBILIRUBINEMIA

Jaundice is the result of nonsoluble byproducts of RBC breakdown. The “extra” bilirubin is seen in the skin and the baby looks yellow. The insoluble form needs to be converted to water-soluble form that can be excreted in the baby’s urine and stool.

Jaundice starts in face, progresses to chest, trunk, and extremities. Sixty percent of newborns have jaundice in the first week of life and very few term newborns have serious underlying pathology

The first 72 hours of the baby’s life are the most important time to be aware of hyperbilirubinemia.

Bilirubin levels need to be monitored to prevent kernicterus and bilirubin encelephopathy. (Kernicterus originally was the term for the staining of the brainstem nuclei and cerebellum, the term "kernicterus" has come to be used interchangeably with both the acute and chronic findings of bilirubin encephalopathy. Bilirubin encephalopathy describes the clinical central nervous system findings caused by bilirubin toxicity to the basal ganglia and various brainstem nuclei.)

Bilirubin level can be estimated by the extent of the jaundice:

- Face (5 mg/dl)
- Mid-abdomen (15 mg/dl)
- Soles of feet (20 mg/dl)
- Estimates should be confirmed with transcutaneous bilirubin (TCB) measurements
- If the transcutaneous bilirubin is less than 15, there is a good correlation with serum bilirubin levels
- Transcutaneous bilirubin levels are inaccurate once phototherapy is started, so it is most useful to check a serum bilirubin level at the start of phototherapy so that the level can be accurately followed.

All infants should be accessed for the risk factors of neonatal jaundice:

- All pregnant women should be tested for ABO and Rh (D) blood types and have a serum screen for unusual isoimmune antibodies

- If a mother has not had prenatal blood grouping or is Rh-negative, a direct antibody test (or Coombs' test), blood type, and an Rh (D) type on the infant's (cord) blood are strongly recommended

- If the maternal blood is group O, Rh-positive, it is an option to test the cord blood for the infant's blood type and direct antibody test, but it is not required provided that there is appropriate surveillance, risk assessment before discharge, and follow-up.

- **ALL BABIES UNDER 24 HOURS OLD WITH JAUNDICE MUST HAVE A TCB OR SERUM BILIRUBIN.**

Laboratory Eval of the Jaundiced Infant of 35 or More Weeks' Gestation

Indications	Assessments
Jaundice in first 24 h	Measure TcB and/or TSB
Jaundice appears excessive for infant's age	Measure TcB and/or TSB
Infant receiving phototherapy or TSB rising rapidly (i.e., crossing percentiles [Fig 2]) and unexplained by history and physical examination	Blood type and Coombs' test, if not obtained with cord blood Complete blood count and smear Measure direct or conjugated bilirubin It is an option to perform reticulocyte count, G6PD, and $ETCO_c$, if available Repeat TSB in 4–24 h depending on infant's age and TSB level
Indications	Assessments
TSB concentration approaching	Perform reticulocyte count, G6PD,

exchange levels or not responding to phototherapy	albumin, $ETCO_c$, if available
Elevated direct (or conjugated) bilirubin level	Do urinalysis and urine culture. Evaluate for sepsis if indicated by history and physical examination
Jaundice present at or beyond age 3 weeks, or sick infant	Total and direct (or conjugated) bilirubin level If direct bilirubin elevated, evaluate for causes of cholestasis Check results of newborn thyroid and galactosemia screen, and evaluate infant for signs or symptoms of hypothyroidism

Breastfeeding the jaundiced neonate:

- Poor caloric intake and/or dehydration associated with inadequate breastfeeding may contribute to the development of hyperbilirubinemia.
- Increasing the frequency of breastfeedings decreases the likelihood of subsequent significant hyperbilirubinemia in breastfed infants.
- Providing appropriate support and advice to breastfeeding mothers increases the likelihood that breastfeeding will be successful.
- Encourage continued breastfeeding.

- DO NOT ENCOURAGE BREASTFEEDING CESSATION, EVEN TEMPORARILY!

PHOTOTHERAPY

Use www.bilitool.com and the graphs shown on next few pages to determine need for phototherapy.

1. First determine risk category for the newborn
2. Then look on next graph for bilirubin level requiring phototherapy for that risk category.

The guidelines refer to the use of intensive phototherapy which should be used when the TSB exceeds the line indicated for each category.

"Intensive phototherapy" implies irradiance in the blue-green spectrum (wavelengths of approximately 430–490 nm) of at least 30 μW/cm^2 per nm (measured at the infant's skin directly below the center of the phototherapy unit) and delivered to as much of the infant's surface area as possible.

Note that irradiance measured below the center of the light source is much greater than that measured at the periphery. Measurements should be made with a radiometer specified by the manufacturer of the phototherapy system.

Neonates can be treated with 1 bank of lights, 2 banks of lights, or even 2 banks of light with a bili blanket.

Risk stratification for both levels to start phototherapy and for planning d/c follow up is determined by the following risk factors:

Major Risk factors:

- Predischarge TSB or TcB level in the high-risk zone
- Jaundice observed in the first 24 h
- Blood group incompatibility with positive direct antiglobulin test, other known hemolytic disease (e.g., G6PD deficiency)
- Gestational age 35–36 wk
- Previous sibling received phototherapy
- Cephalohematoma or significant bruising
- Exclusive breastfeeding, particularly if nursing is not going well and weight loss is excessive
- East Asian race

Minor risk factors

- Predischarge TSB or TcB level in the high intermediate-risk zone
- Gestational age 37–38 wk
- Jaundice observed before discharge
- Previous sibling with jaundice
- Macrosomic infant of a diabetic mother
- Maternal age < 25
- Male gender
- **Decreased risk** (these factors are associated with decreased risk of significant jaundice, listed in order of decreasing importance)
- TSB or TcB level in the low-risk zone
- Gestational age 41 wk
- Exclusive bottle feeding
- Black race
- Discharge from hospital after 72 h

Hospital discharge:

☑ Patient education - be sure parents understand jaundice and when to bring the baby in.

☑ Any babies that fall into a high risk group, having breastfeeding problems, or is a breastfed baby of a primigravida should have a PHN follow up.

☑ The AAP recommends all babies discharged at 24 hours old should be seen by 72 hours old, discharged at 48 hrs, be seen by 96 hours old, and within 72 hour if discharged 120 hours old.

☑ Arrange clinic nurse visit if baby needs to come in for a bilirubin check (Mon-Sat). Sundays can be checked by newborn nursery.

☑ The follow-up assessment should include the infant's weight and percent change from birth weight, adequacy of intake, the pattern of voiding and stooling, and the presence or absence of jaundice. Clinical judgment should be used to determine the need for a bilirubin measurement. If there is any doubt about the degree of jaundice, the TSB or TcB level should be measured. (If undergoing phototherapy, needs a serum bilirubin)

☑ Document your plan on EPIC the day of discharge. Include baby's birth weight and discharge weight, bili level, feeding pattern, alertness, and follow up plan.

REFERENCES:

www.AAP.org
Pediatrics 2004 "Management of Hyperbilirubinemia in the Newborn Infant 35+ weeks "