Indian Academy of Pediatrics (IAP)

STANDARD TREATMENT GUIDELINES 2022

Neonatal Jaundice

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Neonatal Jaundice

79

Introduction

Physiological Jaundice

- ☑ Neonatal jaundice is common, occurring in 60% in term and 80% in preterm infants.
- ☑ Appears after 24 hours of life, decreases after 5–6 days, and undetectable after 14 days.
- ☑ Maximum values seldom exceed 15 mg/dL.

Severe Jaundice—Hyperbilirubinemia

- ☑ Any jaundice visible in first 24 hours of life
- ☑ Yellow staining of palms and soles or deep yellow appearance (measure bilirubin values using transcutaneous bilirubinometer or laboratory testing of serum sample, when in doubt)
- ☑ Bilirubin values >95 centile for gestation/weight/age in hours, evaluated on standard charts like the American Academy of Pediatrics (AAP) or National Institute for health and Care Excellence (NICE), UK) charts
- ☑ Warning signs of encephalopathy such as poor feeding and lethargy

☑ Before discharge 24-72 hrs from birth

All babies must be evaluated clinically for bilirubin levels while in hospital and before discharge; and confirmed objectively when in doubt, by a transcutaneous bilirubinometer or serum bilirubin plotted on hour specific nomograms.

Kramer's Criteria is helpful in clinical assessment of the severity of the jaundice. The clinical assessment requires natural light (can be faulty in hospital lighting). It also depends on experience of personnel and subjectivity of assessment) **(Fig. 1)**.

Visual Assessment by Kramer Criteria		
1.	Face	4–8 mg/dL
2.	Upper trunk	5–12 mg/dL
3.	Lower trunk and thighs	8–16 mg/dL
4.	Arms and lower legs	11–18 mg/dL
5.	Palms and soles	>15 mg/dL

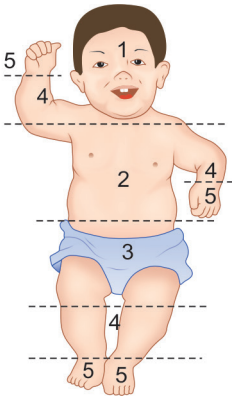


Fig. 1: Kramer's criteria.

Use the hour-specific nomogram to evaluate risk before discharge from birth admission. Babies with values in high-risk zone must be re-evaluated within 24 hours **(Fig. 2)**.

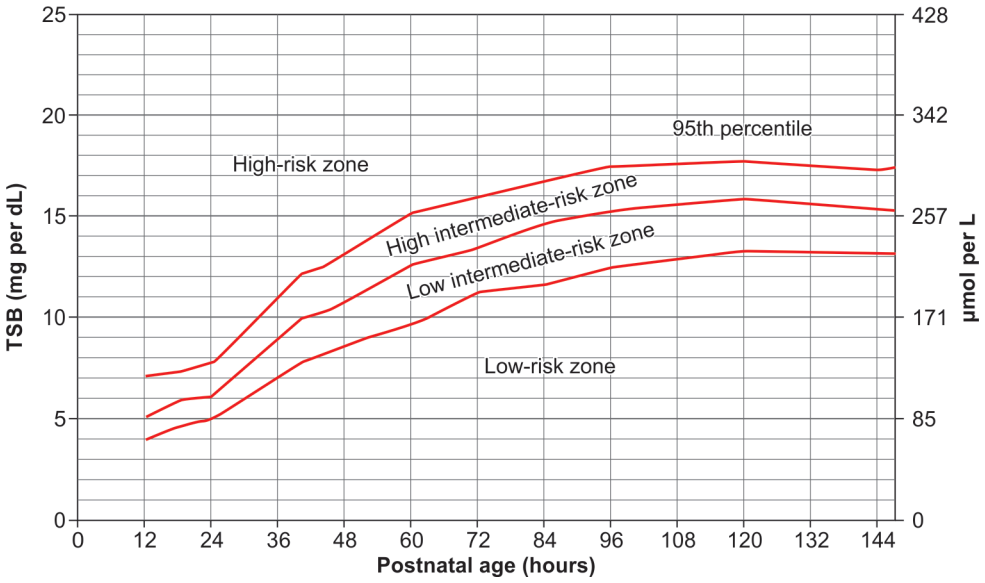


Fig. 2: Hour-specific nomogram. (TSB: total serum bilirubin)

Source: American Academy of Pediatrics Subcommittee on Hyperbilirubinemia. Management of hyperbilirubinemia in the newborn infant 35 or more weeks of gestation. Pediatrics. 2004;114(1):297-316.

☑ After discharge (until day 5–6 of life) from hospital

- All babies reviewed within 48 hours and babies with higher risk within 24 hours of discharge for yellow staining of palms and soles or deep yellow appearance (measure values using transcutaneous Bilirubinometer or laboratory testing of serum sample, when in doubt, use specific charts such as AAP or NICE charts to evaluate need for treatment).
- Look for lactation problems (excess weight loss and delayed transition of stool to yellow color), infrequent stool, and urine.
- Exclude early signs of encephalopathy (poor feeding and lethargy)

Close follow-up (within 24 hours of discharge) is warranted in risk groups **(Box 1)**.

BOX 1: Risk groups: Need close attention.

- ☑ Mother Rh-negative or O group
- ☑ Gestation of baby <38 completed weeks
- ☑ Lactation not established
- ☑ Predischarge bilirubin in high-risk zone (transcutaneous bilirubin >13 mg/dL)
- ☑ Cephalohematoma
- ☑ Previous baby with jaundice
- ☑ Glucose-6-phosphate dehydrogenase (G6PD) deficiency

History

- ☑ Gestational age and postnatal age (in hours)
- ☑ Birth weight and current weight
- ☑ Mode and adequacy of feeding
- ☑ Urine color and number of wet nappies
- ☑ Passage of meconium and color of stool
- ☑ Activity and behavior during sleep/waking up
- ☑ Any abnormal cry or body movements
- ☑ Any bleeding/bruising
- ☑ Mother's blood group and baby's blood group
- ☑ Previous baby with severe neonatal jaundice

Evaluation of a Baby with Hyperbilirubinemia

Examination

Feature of acute bilirubin encephalopathy (hypotonia and hypertonia, lethargy, high-pitched cry, poor suck, irritability, seizure, and opisthotonos posture)

Investigations

- ☑ Total serum bilirubin (TSB)
- ☑ Mother and baby's blood group (collect cord blood/venous sample immediately after birth, if mother's blood group is Rh-ve)
- ☑ *Suspected hemolysis*: Complete blood count, reticulocyte count, peripheral blood smear, and direct Coombs' test
- ☑ *In areas of high prevalence*: Screen for glucose-6-phosphate dehydrogenase (G6PD) deficiency
- ☑ *For prolonged jaundice**: Total and direct bilirubin, thyroid function test, urine reducing substances, and culture. Ultrasound abdomen to exclude biliary atresia.

**Prolonged jaundice:* Visibly detectable jaundice beyond 2 weeks of age in a term and beyond 3 weeks of age in a preterm infant. Ask for pale stool or yellow urine, check for adequacy of weight gain. Do total and direct bilirubin test.

Management

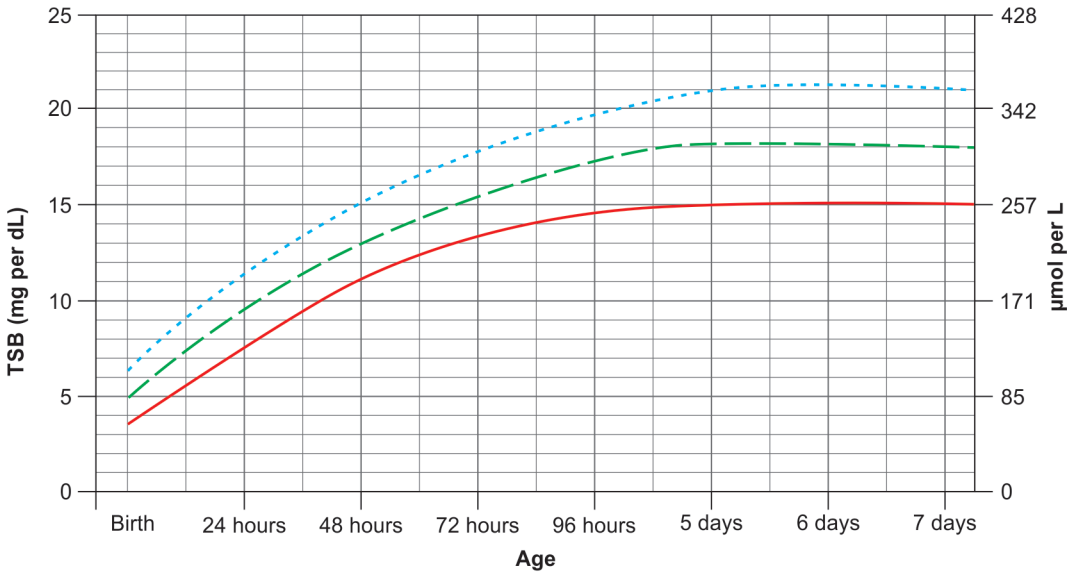
Hyperbilirubinemia is a potentially treatable condition. It may cause long-term neuro-developmental impairment, if not treated timely and appropriately.

Prevention

Early initiation and frequent breastfeeding and/or early use of mother's own milk (MOM) in neonatal intensive care unit (NICU).

Reducing the level of serum bilirubin by intensive phototherapy and/or exchange transfusion.

Phototherapy is a noninvasive, cost effective, safe, and easy to use method; it is available at all levels of neonatal healthcare. It should be started (after sending TSB) when jaundice appears within 24 hours and/or involving palm and soles; and if TSB is in range of phototherapy as per AAP or NICE charts. Stop phototherapy, if serum bilirubin level is 2–3 mg/dL lower than the phototherapy range **(Fig. 3)**.



- Use TSB. Do not subtract direct reacting or conjugated bilirubin
- Risk factors include isoimmune hemolytic disease, glucose-6-phosphate dehydrogenase deficiency, asphyxia, significant lethargy, temperature instability, sepsis, acidosis, or albumin <3.0 g per dL (30 g per L, if measured).
- For well infants delivered at 35 to 3T⅙ weeks' gestation, TSB levels for intervention can be adjusted around the medium-risk line. Intervention at lower TSB levels is an option for infants delivered closer to 35 weeks' gestation, and at higher TSB levels for those delivered closer to 37⅙ weeks.
- Conventional phototherapy in the hospital or at home is an option for infants with TSB levels 2 to 3 mg per dL (35 to 50 mmol per L) less than those shown, but home phototherapy should not be used in any infant with risk factors.

Fig. 3: Guidelines for phototherapy in hospitalized infants delivered at 35 or more weeks' gestation. (TSB: total serum bilirubin)

Source: American Academy of Pediatrics Subcommittee on Hyperbilirubinemia. Management of hyperbilirubinemia in the newborn infant 35 or more weeks of gestation. Pediatrics. 2004;114(1):297-316.

Optimizing phototherapy:

- ☑ Use blue light and appropriate intensity of phototherapy (>30 μW/cm^2 per nm)
  - Light-emitting diode (LED) and compact fluorescent lamps (CFL) most often deliver the required intensity for a long duration. A periodic check of the intensity must be done to ensure efficacy (once in 6 months).
- ☑ Place phototherapy as close to baby as possible without causing hyperthermia
- ☑ Expose maximum area of body
- ☑ Ensure optimal breastfeeding and stool output

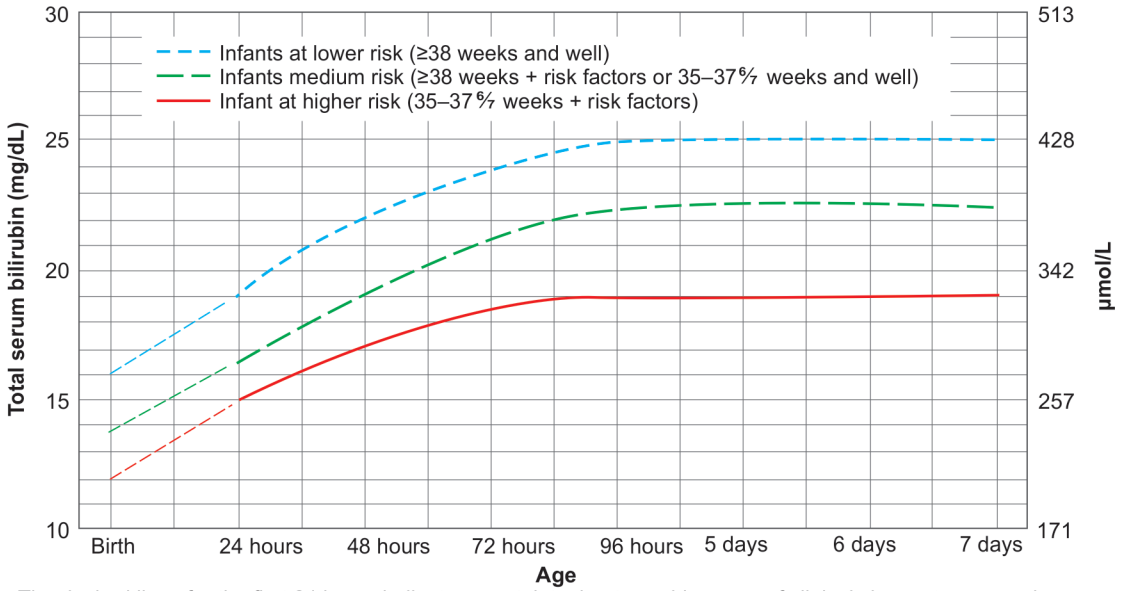
Indications for referral for potential exchange transfusion:

- ☑ Hyperbilirubinemia (as per AAP or NICE charts) not responding to intense phototherapy
- ☑ Any signs of early encephalopathy (poor feeding/lethargy) in babies with hyperbilirubinemia
- ☑ Babies with hyperbilirubinemia noted within 24 hours of life, preterm babies, and previous child requiring exchange transfusion or sick babies (sepsis) with hyperbilirubinemia are at risk of developing bilirubin associated neurologic damage at values less than that indicated on standard chart. They must be referred early to centers with facilities for exchange transfusion.

Exchange transfusion is a rapid, invasive, and effective method to reduce serum bilirubin. It is a specialized procedure, performed where facilities and skills are available. If facilities are not available, refer the baby along with mother's blood sample (if mother is not accompanying) **(Fig. 4)**.

Types of blood used for exchange transfusion:

- ☑ Blood being used must be crossmatched with mother's blood.
- ☑ *For Rh-isoimmunization*: O-negative packed cells suspended in AB plasma or O-negative whole blood or Rh-negative baby's ABO group after crossmatch.
- ☑ *For ABO isoimmunization*: O group (Rh-compatible) packed cell suspended in AB plasma or O group whole blood (Rh-compatible with baby) after crossmatch.
- ☑ In other situation, baby's blood group should be used.



- The dashed lines for the first 24 hours indicate uncertainty due to a wide range of clinical circumstances and a range of responses to phototherapy.
- Immediate exchange transfusion is recommended if infant shows signs of acute bilirubin encephalopathy (hypertonia, arching, retrocollis, opisthotonos, fever, high-pitched cry) or if TSB is ≥5 mg/dL (85 µmol/L) above these lines
- Risk factors—isoimmune hemolytic disease, G6PD deficiency, asphyxia, significant lethargy, temperature instability, sepsis, acidosis.
- Measure serum albumin and calculate B/A ratio
- Use total bilirubin. Do not subtract direct reacting or conjugated bilirubin
- If infant is well and 35–37⁶⁄₇ week (median risk) can individualize TSB levels for exchange based on actual gestational age.

Fig. 4: Guidelines for exchange transfusion in infants 35 or more weeks' gestation.

Source: American Academy of Pediatrics Subcommittee on Hyperbilirubinemia. Management of hyperbilirubinemia in the newborn infant 35 or more weeks of gestation. Pediatrics. 2004;114(1):297-316.

Follow-up and Long-term Neurodevelopmental Outcome

Babies who had hyperbilirubinemia must be followed up periodically using development-screening tools until school age. The assessments should include early language milestones. Babies who had signs of encephalopathy or required exchange transfusion must have a hearing evaluation for sensorineural hearing impairment by brainstem-evoked audiometry before 6 months age.

Further Reading

- ☑ American Academy of Pediatrics Subcommittee on Hyperbilirubinemia. Management of hyperbilirubinemia in the newborn infant 35 or more weeks of gestation. Pediatrics. 2004;114(1):297-316.
- ☑ Bhutani V, Gourley GR, Adler S, Kreamer B, Dalman C, Johnson LH. Noninvasive measurement of total serum bilirubin in a multiracial predischarge newborn population to assess the risk of severe hyperbilirubinemia. Pediatrics. 2000;106(2):E17.
- ☑ Bhutani VK, Stark AR, Lazzeroni LC, Poland R, Gourley GR, Kazmierczak S, et al. Predischarge screening for severe neonatal hyperbilirubinemia identifies infants who need phototherapy. J Pediatr. 2013;162(3):477-82.
- ☑ Keren R, Luan X, Friedman S, Saddlemire S, Cnaan A, Bhutani VK. A comparison of alternative risk-assessment strategies for predicting significant neonatal hyperbilirubinemia in term and near-term infants. Pediatrics. 2008;121(1):e170-9.
- ☑ Ministry of Health and Family Welfare. Facility Based Newborn Care (FBNC) Training: Operational Guidelines. Government of India: Ministry of Health and Family Welfare; 2014.
- ☑ Newman TB, Liljestrand P, Jeremy RJ, Ferriero DM, Wu YW, Hudes ES, et al. Outcomes among newborns with total serum bilirubin levels of 25 mg per deciliter or more. N Engl J Med. 2006;354(18):1889-900.