Management of Hyperbilirubinemia in the Newborn Infant 35 or More Weeks of Gestation

Prevention

- The ACOG recommends that pregnant women be tested to determine their ABO blood group and Rh(D) type and an antibody screen test

- If maternal AS positive or unknown: infant should have a direct antiglobulin test (DAT) and blood type

Suboptimal intake hyperbilirubinemia

- Breastfeeding fewer than 8 times per day has been associated with higher TSB concentrations

- Low milk and low caloric intake contribute to decreased stool frequency and increased enterohepatic circulation of bilirubin

Breast Milk Jaundice

- hyperbilirubinemia that persists with adequate human milk intake and weight gain

- can last up to 3 months, is almost always nonpathologic and not associated with direct or conjugated hyperbilirubinemia

Risk Factors

- Lower gestational age
- Jaundice in the first 24 h after birth
- Predischarge TCB or TSB concentration close to the phototherapy threshold
- Hemolysis from any cause
- Phototherapy before discharge
- Parent or sibling requiring phototherapy or exchange transfusion
- Family history or genetic ancestry suggestive of inherited red blood cell disorders, including G6PD deficiency
- Exclusive breastfeeding with suboptimal intake
- Scalp hematoma or significant bruising
- Down syndrome
- Macrosomic infant of a diabetic mother

Assessment of jaundice in post natal nursery

- All infants should be visually assessed for jaundice at least every 12 hours following delivery until discharge

- TSB or TCB should be measured as soon as possible for infants noted to be jaundiced <24 hours after birth

- The TCB or TSB should be measured between 24 and 48 hours after birth or before discharge if that occurs earlier

- TSB should be measured if the TCB exceeds or is within 3 mg/dl of the phototherapy treatment threshold or if the TCB ≥15 mg/dl

- A rapid rate of increase (0.3 mg/dl per hour in the first 24 hours or 0.2 mg/dl per hour thereafter) suggests hemolysis. In this case, perform a DAT if not previously done

G6PD deficiency

- Newborns who receive phototherapy before hospital discharge
- readmission and retreatment after initial hospital discharge
- Severe hyperbilirubinemia or atypical development of hyperbilirubinemia such as elevated TSB in a formula-fed infant or late-onset jaundice
- An infant with G6PD deficiency can develop a sudden and extreme increase in TSB that may be hard to anticipate or prevent

Decisions to initiate phototherapy or escalate care

- Gestational Age
- Hour-specific Tsb
- Presence Of Risk Factors For Bilirubin Neurotoxicity

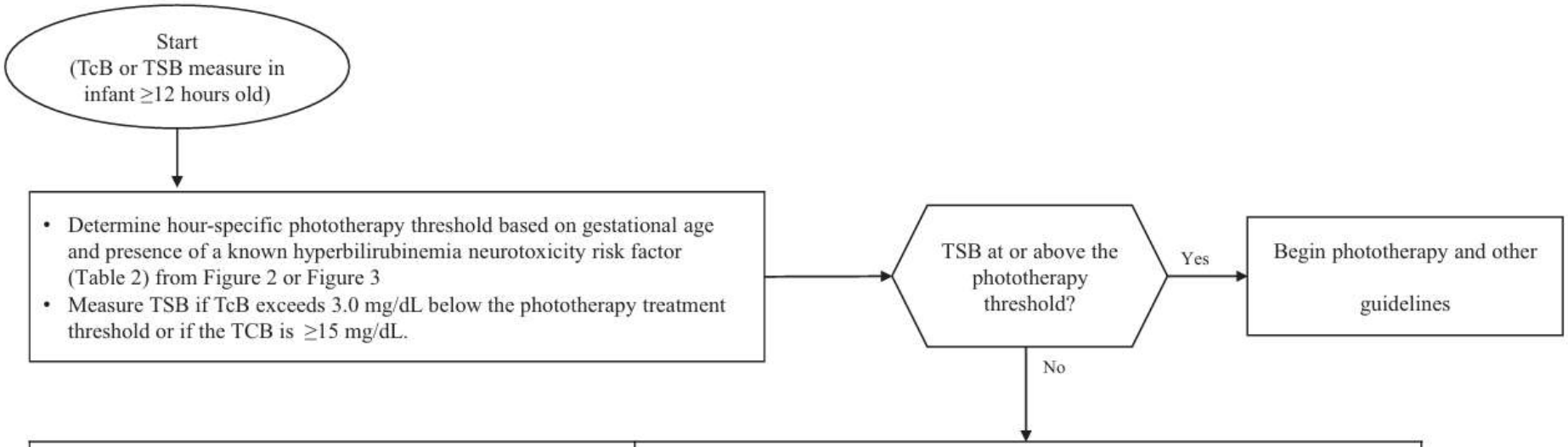
Hyperbilirubinemia Neurotoxicity Risk Factors

- Gestational age <38 wk and this risk increases with the degree of prematurity
- Albumin <3.0 g/dL
- Isoimmune hemolytic disease, G6PD deficiency, or other hemolytic conditions
- Sepsis
- Significant clinical instability in the previous 24 h

Infants with TSB concentrations below the phototherapy threshold

- Among infants with TSB concentrations below the phototherapy threshold, the potential need for future phototherapy or escalation of care increases the closer the TSB is to the phototherapy threshold.

follow-up for infants who have not received phototherapy



Phototherapy threshold minus TcB or TSB measure		Discharge Recommendations
0.1–1.9 mg/dL	Age <24 hours	Delay discharge, consider phototherapy, measure TSB in 4 to 8 hours
	Age≥24 hours	Measure TSB in 4 to 24 hours[a] Options: • Delay discharge and consider phototherapy • Discharge with home phototherapy if all considerations in the guideline are met • Discharge without phototherapy but with close follow-up
2.0–3.4 mg/dL	Regardless of age or discharge time	TSB or TcB in 4 to 24 hours[a]
3.5–5.4 mg/dL	Regardless of age or discharge time	TSB or TcB in 1– 2 days
5.5–6.9 mg/dL	Discharging <72 hours	Follow-up within 2 days; TcB or TSB according to clinical judgment[b]
	Discharging ≥72 hours	Clinical judgment[b]
≥7.0 mg/dL	Discharging <72 hours	Follow-up within 3 days; TcB or TSB according to clinical judgment[b]
	Discharging ≥72 hours	Clinical judgment[b]

Evaluating elevated Direct-Reacting or Conjugated Bilirubin

- For breastfed infants who are still jaundiced at 3 to 4 weeks of age, and for formula-fed infants who are still jaundiced at 2 weeks of age
- the total and direct reacting bilirubin concentration should be measured to identify possible pathologic cholestasis.
- When prolonged jaundice occurs: clinicians should also review the newborn screening results (galactosemia, hypothyroidism, tyrosinemia) can lead to persistent jaundice

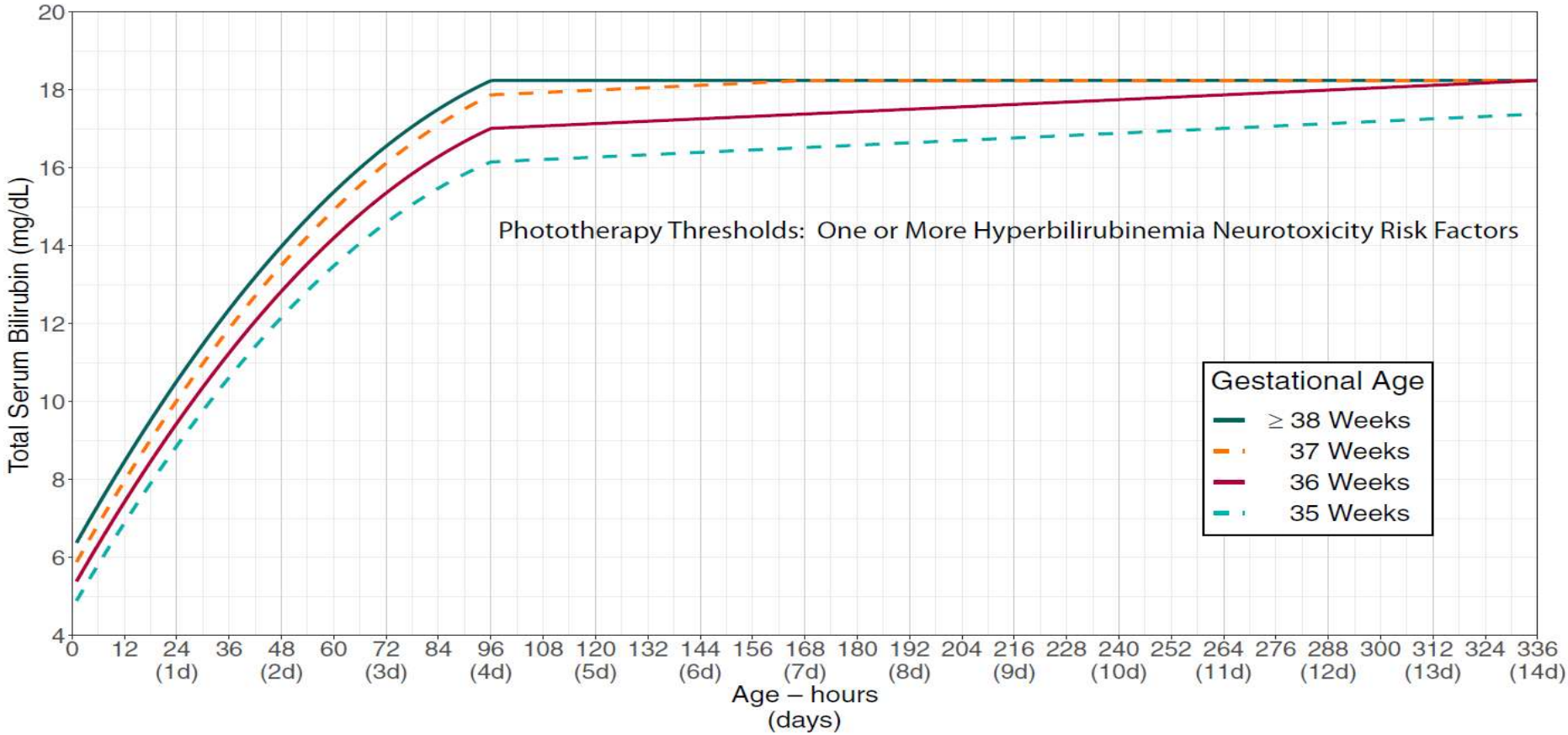
Evaluating elevated Direct-Reacting or Conjugated Bilirubin

- A direct serum bilirubin concentration >1.0 mg/dl has been used for conjugated bilirubin
- Because the prevalence of biliary atresia is low, nearly all (> 99%) infants who have a single elevation of the direct bilirubin concentration do not have biliary atresia
- A repeat measurement within a few days to 2 weeks

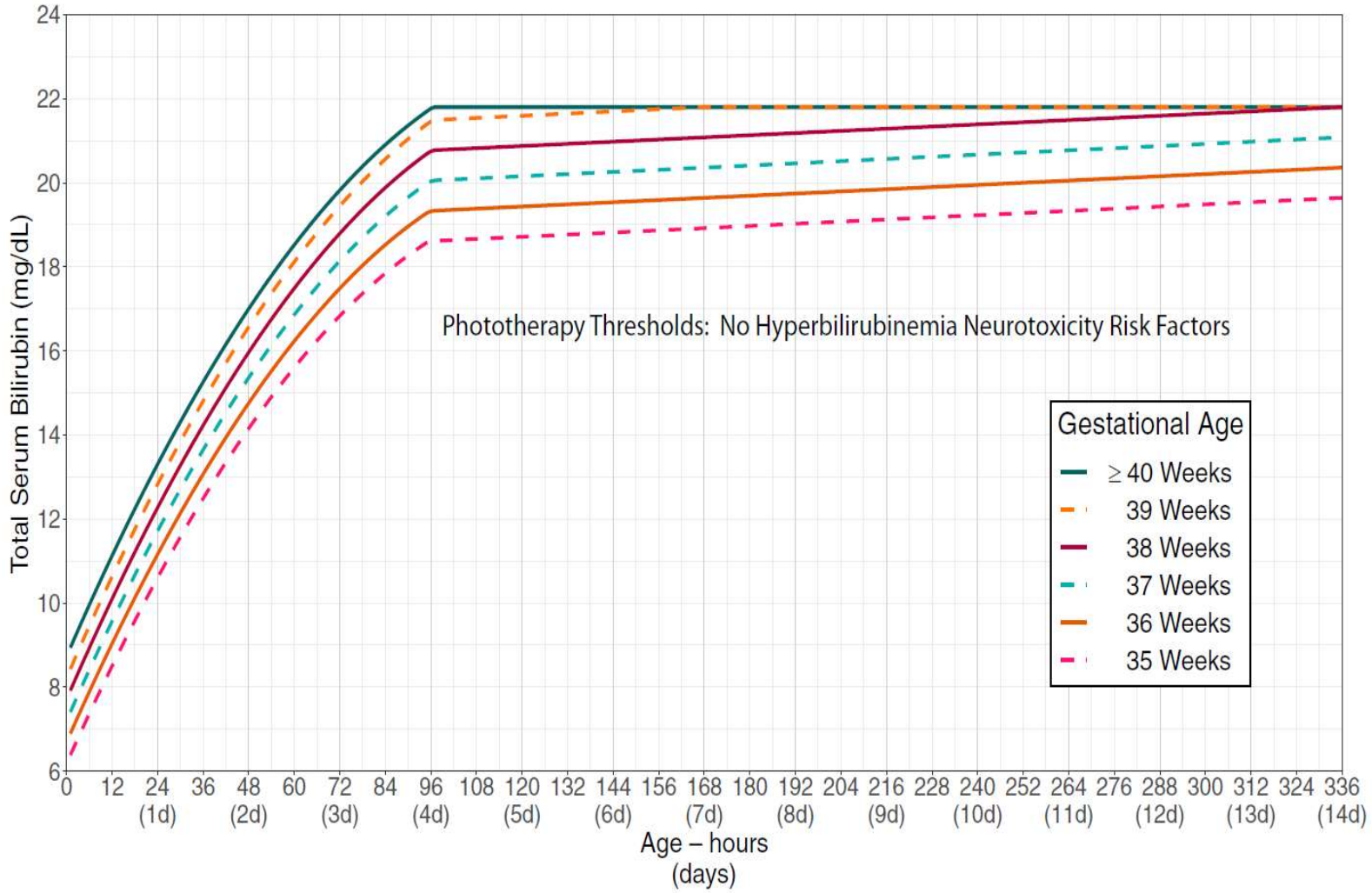
Treatment of hyperbilirubinemia

- Recommended phototherapy thresholds are far below those at which overt acute bilirubin neurotoxicity or kernicterus occurs and there is some evidence that phototherapy may lead to a small increase in the risk of subsequent childhood epilepsy

Phototherapy curve



Phototherapy curve



Home phototherapy

- Gestational age ≥38 weeks ≥48 hours old
- Clinically well with adequate feeding
- No known hyperbilirubinemia neurotoxicity risk factors
- No previous phototherapy
- TSB concentration no more than 1 mg/dl above the phototherapy treatment threshold
- An LED-based phototherapy device will be available in the home without delay
- TSB can be measured daily

Home phototherapy

- Home phototherapy should not be used if there is any question about the quality of the home phototherapy device
- the ability to have the device delivered to the home rapidly, concerns about the family's ability to use the device, or concerns about the ability to measure bilirubin concentrations daily
- start home phototherapy at a lower threshold (eg, 2 mg/dL below the phototherapy threshold) to reduce the readmission risk

Escalation of care

- The escalation-of-care threshold is 2 mg/dl below the exchange transfusion threshold
- refers to the intensive care that some infants with elevated or rapidly increasing bilirubin concentrations need to prevent the need for an exchange transfusion and possibly prevent kernicterus

Escalation of care

- For infants requiring escalation of care, blood should be sent for total and direct reacting serum bilirubin, a complete blood count, serum albumin, serum chemistries, and type and crossmatch.
- Infants requiring escalation of care should receive intravenous hydration and emergent intensive phototherapy

IVIG

- Intravenous immune globulin (IVIG; 0.5 to 1 g/kg) over 2 hours may be provided to infants with isoimmune hemolytic disease (ie, positive DAT) whose TSB reaches or exceeds escalation of care threshold. The dose can be repeated in 12 hours

IVIG

- The effectiveness of IVIG to prevent the need for an exchange transfusion is unclear
- Factors that should be considered include response to phototherapy, TSB rate of increase, and the challenge of providing a timely exchange transfusion

Discontinuing Phototherapy

- when the TSB has decreased by at least 2 mg/dL below the hour-specific threshold at the initiation of phototherapy

- A longer period of phototherapy is an option if there are risk factors for rebound hyperbilirubinemia

  gestational age <38 weeks

  age <48 hours at the start of Phototherapy

  hemolytic disease

Rebound hyperbilirubinemia

- TSB concentration that reaches the phototherapy threshold for the infant's age within 72 to 96 hours of discontinuing phototherapy

Follow-up after phototherapy

Infants who exceeded the phototherapy threshold during the birth hospitalization and

(1)received phototherapy before 48 hours of age

(2) had a positive DAT

(3) had known or suspected hemolytic disease

should have TSB measured 6 to12 hours after phototherapy

discontinuation and a repeat bilirubin measured on the day after phototherapy discontinuation

- High-risk infants (phototherapy <48h, DAT+, hemolysis)

  Check bilirubin 6–12 h after stopping phototherapy

  Check again the next day

- Other infants treated during birth hospitalization

  Check bilirubin the day after stopping phototherapy

- Infants readmitted after having phototherapy previously

  Check bilirubin the day after phototherapy

- Infants who exceeded threshold after discharge or had home phototherapy

  Repeat bilirubin in 1–2 days

  Clinical follow-up in 1–2 days to decide on testing

Thank you
for your attention