Hyperbilirubinemia
Web Conference
August 10, 2017

https://zoom.us/j/332745345
Dial: +1 646 558 8656 (US Toll) or +1 408 638 0968 (US Toll)
Meeting ID: 332 745 345
Introductions
Objectives

- Identify newborns risk factors for hyperbilirubinemia
- Describe evidence-based practice (EBP) to prevent kernicterus
- Determine risk level for hyperbilirubinemia using a nomogram
Risk Factors for Hyperbilirubinemia
<table>
<thead>
<tr>
<th>Major risk factors</th>
<th>Minor risk factors</th>
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</thead>
<tbody>
<tr>
<td>Predischarge TSB or TcB level in the high-risk zone (Fig 2)^{25,31}</td>
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<td>Blood group incompatibility with positive direct antiglobulin test, other known hemolytic disease (eg, G6PD deficiency), elevated ETCo_{2}</td>
<td>Jaundice observed before discharge^{40}</td>
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<td>Gestational age 35–36 wk^{39,40}</td>
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<td>Exclusive breastfeeding, particularly if nursing is not going well and weight loss is excessive^{39,40}</td>
<td>Male gender^{39,40}</td>
</tr>
<tr>
<td>East Asian race^{39,*}</td>
<td>Decreased risk (these factors are associated with decreased risk of significant jaundice, listed in order of decreasing importance)</td>
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<tr>
<td></td>
<td>TSB or TcB level in the low-risk zone (Fig 2)^{25,31}</td>
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<td>Discharge from hospital after 72 h^{40,44}</td>
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* Race as defined by mother’s description.
TABLE 1  Important Risk Factors for Severe Hyperbilirubinemia

- Predischarge TSB or TcB measurement in the high-risk or high-intermediate-risk zone
- Lower gestational age
- Exclusive breastfeeding, particularly if nursing is not going well and weight loss is excessive
- Jaundice observed in the first 24 h
- Isoimmune or other hemolytic disease (e.g., G6PD deficiency)
- Previous sibling with jaundice
- Cephalohematoma or significant bruising
- East Asian race

TABLE 2  Hyperbilirubinemia Neurotoxicity Risk Factors

- Isoimmune hemolytic disease
- G6PD deficiency
- Asphyxia
- Sepsis
- Acidosis
- Albumin <3.0 mg/dL
FIGURE 2
Nomogram for designation of risk in 2840 well newborns at ≥36 weeks' gestational age with birth weight of ≥2000 g or ≥35 weeks' gestational age and birthweight of ≥2500 g based on the hour-specific serum bilirubin values. (Reproduced with permission from Bhutani VK, Johnson L, Sivieri EM. Pediatrics. 1999;103(1):6–14.)

www.bilitool.org
TSB or TcB if any jaundice noted visually (AAP, Keren)

- If no visible jaundice, unlikely to develop hyperbilirubinemia
- Visual assessment not accurate for determining severity of hyperbilirubinemia


• All newborns will have a prn bilirubin order (TSB or TCB) to be initiated at the nurse’s discretion NANN, 2010).

- Use hour-specific nomogram to interpret bili (Maisels 2009, AAP 2004)


EBP

• Universal predischarge bilirubin screening-TSB or TcB (Maisels)

  Considerations for Timing of TcB/TSH
  LOS varies
  Risk of omission
  Coordinate with newborn screen

• Use of clinical risk factors and predischarge bili to predict risk of hyperbilirubinemia (Maisels)

Written and verbal info to parents at discharge explaining jaundice and need to monitor for (AAP, 2004)

EBP

Recommendations for Management and Follow-up
Recommendations for Management and Follow-up

**FIGURE 3**
Algorithm providing recommendations for management and follow-up according to predischarge bilirubin measurements, gestation, and risk factors for subsequent hyperbilirubinemia.

- Provide lactation evaluation and support for all breastfeeding mothers.
- Recommendation for timing of repeat TSB measurement depends on age at measurement and how far the TSB level is above the 95th percentile (Fig 2). Higher and earlier initial TSB levels require an earlier repeat TSB measurement.
- Perform standard clinical evaluation at all follow-up visits.
- For evaluation of jaundice see 2004 AAP guideline.¹
- Table 3.² Fig 2.³ Fig 1.⁴ In hospital or as outpatient.⁵ Follow-up recommendations can be modified according to level of risk for hyperbilirubinemia; depending on the circumstances in infants at low risk, later follow-up can be considered.
Guidelines for phototherapy in hospitalized infants of 35 or more weeks' gestation

* Use total bilirubin. Do not subtract direct reacting or conjugated bilirubin.
* Risk factors = isoimmune hemolytic disease, G6PD deficiency, asphyxia, significant lethargy, temperature instability, sepsis, acidosis, or albumin < 3.0g/dL (if measured)
* For well infants 35-37 6/7 wk can adjust TSB levels for intervention around the medium risk line. It is an option to intervene at lower TSB levels for infants closer to 35 wks and at higher TSB levels for those closer to 37 6/7 wk.
* It is an option to provide conventional phototherapy in hospital or at home at TSB levels 2-3 mg/dL (35-50mmol/L) below those shown but home phototherapy should not be used in any infant with risk factors.

Subcommittee on Hyperbilirubinemia, Pediatrics 2004;114:297-316
SUMMARY

• TSB or TcB if any jaundice noted visually (AAP, Keren) to be initiated by the nurse (NANN 2010)

• Use of clinical risk factors and predischarge bili to predict risk of hyperbilirubinemia (Maisels)

• Universal predischarge bilirubin screening-TSB or TcB(Maisels)

• Use hour-specific nomogram to interpret bili (Maisels 2009, AAP 2004)

• Written and verbal info to parents at discharge explaining jaundice and need to monitor for (AAP 2004)

• Follow up post discharge per algorithm (Maisels 2009)
Case #1

G1P0, 36 5/7 weeks gestation, Hispanic, PROM, AB pos, SVD after 20 hour labor with oxytocin. Apgars 7 & 9, formula feeding, Universal bili screen at 24h with newborn screen was 10.6 (TSB)

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<tr>
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<tr>
<td>Hispanic</td>
</tr>
<tr>
<td>PROM</td>
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<tr>
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**TABLE 2. Risk Factors for Development of Severe Hyperbilirubinemia in Infants of 35 or More Weeks’ Gestation (in Approximate Order of Importance)**

- Major risk factors
  - Predischarge TSB or TcB level in the high-risk zone (Fig 2)\(^{25,31}\)
  - Jaundice observed in the first 24 h\(^{30}\)
  - Blood group incompatibility with positive direct antiglobulin test, other known hemolytic disease (eg, G6PD deficiency), elevated ETCO\(_{2}\)
  - Gestational age 35–36 wk\(^{39,40}\)
  - Previous sibling received phototherapy\(^{40,41}\)
  - Cephalohematoma or significant bruising\(^{39}\)
  - Exclusive breastfeeding, particularly if nursing is not going well and weight loss is excessive\(^{39,40}\)
  - East Asian race\(^{39*}\)

- Minor risk factors
  - Predischarge TSB or TcB level in the high intermediate-risk zone\(^{25,31}\)
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  - Maternal age ≥25 y\(^{39}\)
  - Male gender\(^{39,40}\)

- 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 (Fig 2)\(^{25,31}\)
  - Gestational age ≥41 wk\(^{39}\)
  - Exclusive bottle feeding\(^{39,40}\)
  - Black race\(^{38*}\)
  - Discharge from hospital after 72 h\(^{40,44}\)

\(^{*}\) Race as defined by mother’s description.
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**TABLE 2** Hyperbilirubinemia Neurotoxicity Risk Factors

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G1P0
36 5/7 weeks gestation
Hispanic
PROM
Apgars 7 & 9
AB pos
SVD after 20 hour labor with oxytocin
Formula feeding
Universal bili screen at 24h with newborn screen was 10.6 (TSB)
Follow up bili at 48 hours was 18
Case #2

G4P3, 39 weeks gestation, Caucasian, SVD after 2 hour labor, Opos, Apgars 9 & 9, breastfeeding.
TABLE 2. Risk Factors for Development of Severe Hyperbilirubinemia in Infants of 35 or More Weeks’ Gestation (in Approximate Order of Importance)

Major risk factors
- Predischarge TSB or TcB level in the high-risk zone (Fig 2)²⁵,³¹
- Jaundice observed in the first 24 h³⁰
- Blood group incompatibility with positive direct antiglobulin test, other known hemolytic disease (eg, G6PD deficiency), elevated ETCO₂
- Gestational age 35–36 wk³⁹,⁴⁰
- Previous sibling received phototherapy⁴⁰,⁴¹
- Cephalohematoma or significant bruising³⁹
- Exclusive breastfeeding, particularly if nursing is not going well and weight loss is excessive³⁹,⁴⁰
- East Asian race³⁹*

Minor risk factors
- Predischarge TSB or TcB level in the high intermediate-risk zone²⁵,³¹
- Gestational age 37–38 wk³⁹,⁴⁰
- Jaundice observed before discharge⁴⁰
- Previous sibling with jaundice⁴⁰,⁴¹
- Macrosomic infant of a diabetic mother⁴²,⁴³
- Maternal age ≥25 y³⁹
- Male gender³⁹,⁴⁰
- 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 (Fig 2)²⁵,³¹
  - Gestational age ≥41 wk³⁹
  - Exclusive bottle feeding³⁹,⁴⁰
  - Black race³⁸*
  - Discharge from hospital after 72 h⁴⁰,⁴⁴

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G4P3
39 weeks gestation
Caucasian
SVD after 2 hour labor
O pos
Apgars 9 & 9
Breastfeeding well

NO BILI CHECKED, SEE PROVIDER 1 WK
ER visit 48 hours after discharge (72 hours of life) for poor feeding – PE Jaundiced

- Use total bilirubin. Do not subtract direct reacting or conjugated bilirubin.
- Risk factors = isoimmune hemolytic disease, G6PD deficiency, asphyxia, significant lethargy, temperature instability, sepsis, acidosis, or albumin < 3.0g/dL (if measured)
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SHARING