AMBULATORY GUIDELINE

Hyperbilirubinemia in infants ≤ 14 days age

Children's MINNESOTA

Aim: Facilitate evaluation and management of hyperbilirubinemia in newborns.

Infant ≤ 14 days old, presents with concerns for jaundice.

May also have sleepiness, poor feeding, or dehydration

Intake:
- Obtain naked weight
- Place infant in a room (with bili blanket if available)

Does the clinic have a transcutaneous bilirubin device?

Yes

Is the transcutaneous bilirubin within 3 mg/dL of the phototherapy threshold?

Use Pedi-Tool ((2022 Bili on peditools.org)) and pages 4-7 to assess need for phototherapy

Yes

Obtain STAT serum bilirubin

No

No further bilirubin testing indicated at this visit.

Continue clinic visit, off-guideline

No

Provider Assessment — Key factors:
- Pregnancy/delivery complications gestational age, date +time of birth, hours of age, blood type (maternal, patient), feeding status, weight loss %, hydration status, PCP established?
- Consider risk factors for development of severe hyperbilirubinemia (See note 1)
- Consider hyperbilirubinemia neurotoxicity risk factors (See note 2)

Obtain serum bilirubin if concern for jaundice and not already obtained.

Is the patient's serum bilirubin above the threshold for phototherapy?

Or within 2-3 mg/dl and with poor feeding

No

Discharge to home unless other indications for admission
- Arrange follow-up as appropriate
- Discuss feeding with caregivers

Yes

Does the patient have any of the following?
- Serum bilirubin above or within 2 g/dl of the threshold for exchange transfusion
- Direct hyperbilirubinemia > 20% TSB
- Signs of acute bilirubin encephalopathy

No

Transfer to Children's MN for admission:

(home bili blanket update*)
- **Consider direct admission (866-755-2121)**
- **May admit to hospitalist service.** Consider NICU consult if high suspicion for or lab evidence of hemolysis (e.g., DAT+)

Yes

STAT consultation with NICU *(866-755-2121)* to plan for NICU direct admission.

Exclusion guidelines:
- Current or reported fever (use febrile infant guideline)
- Ill-appearing
- Less than 35 weeks gestation

*Due to lack of reimbursement, bili blankets are infrequently carried by external DME vendors. Children's MN has not found any external vendors who carry bili blankets and therefore no access to any vendor other than Adapt Health's 's service, only if there is an Allina connection (e.g., MRN) for the mom or affected newborn. Recommendation for patients for whom bili blanket may have been considered previously: evaluate patients for jaundice in clinics and if needed, send to ED and hospital for admission if mom does not have an Allina MRN. Call Adapt Health for mothers who do have an Allina MRN.

ED/Inpatient GUIDELINE

Hyperbilirubinemia in infants ≤ 14 days age

Children's MINNESOTA

Aim: Facilitate evaluation and management of hyperbilirubinemia in newborns.

Infant ≤ 14 days old, presents with concerns for jaundice.

May also have sleepiness, poor feeding, or dehydration

→

Triage:
- Obtain naked weight
- Assign level 2/emergent/yellow
- Place infant in a room with bili blanket

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Provider Assessment — Key factors:
- Pregnancy/delivery complications gestational age, date +time of birth, hours of age, blood type (maternal, patient), feeding status, weight loss %, hydration status, PCP established?
- Consider risk factors for development of severe hyperbilirubinemia (See note 1)
- Consider hyperbilirubinemia neurotoxicity risk factors (See note 2)

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Obtain labs:
- Bilirubin total/direct
- Newborn type and screen, DAT
- CBC (for hemolysis/polycythemia)
- Consider BMP for dehydration
- Consider albumin level (neurotoxicity risk factor)

Use Pedi-Tool (2022 Bili on peditools.org) and pages 4-7 to assess need for phototherapy

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Is the patient's serum bilirubin above the threshold for phototherapy?
Or within 2-3 mg/dl and with poor feeding and significant dehydration

No →

Discharge to home unless other indications for admission
- Arrange appropriate PCP follow-up
- Discuss feeding with caregivers

Yes →

Does the patient have any of the following?
- Serum bilirubin above or within 2 g/dl of the threshold for exchange transfusion
- Direct hyperbilirubinemia > 20% TSB
- Signs of acute bilirubin encephalopathy

No →

Admit Patient
(home bili-blankets are not currently available as of 1/2023)

May admit to hospitalist service. Consider NICU consult if high suspicion for or lab evidence of hemolysis (e.g., DAT+).

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Hospital Management Basics
- Initiate intensive phototherapy (double or triple bank therapy, with bili-blanket if available)
- Limit time outside of lights (may feed but back under lights afterwards)
- Place PIV and provide fluids if signs of dehydration with poor feeding
- Support oral feedings, lactation consult
- Recheck serum bilirubin ~ Q12 hr until at least 2 mg/dL below the hour-specific threshold used to initiate phototherapy, not current hour-of-life threshold. A longer period of phototherapy is an option if there are risk factors for rebound hyperbilirubinemia (e.g., gestational age <38 weeks, age <48 hours at the start of phototherapy, hemolytic disease).
- Repeating a bilirubin (e.g., for "rebound") is not recommended until 12-24 hours after stopping phototherapy and it is not routinely recommended to keep infants hospitalized to obtain prior to discharge.

Yes →

STAT consultation with NICU to plan for NICU admission
- Initiate intensive phototherapy if awaiting transfer to NICU
- Place PIV and administer fluid bolus
- STAT labs: CMP, type and crossmatch. If not already obtained get total and direct bili, CBC w/ diff.

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Further management off-guideline

Exclusion guidelines:
- Current or reported fever (use febrile infant guideline)
- Ill-appearing
- Less than 35 weeks gestation

HYPERBILIRUBINEMIA IN NEWBORN INFANTS: NOTES

(Infants ≤ 14 days old)

Note 1. Major risk factors for development of severe hyperbilirubinemia (per AAP 2021 guideline):

- Lower gestational age (ie, risk increases with each additional week less than 40 wk)
- Jaundice in the first 24 h after birth
- Pre-discharge (birth hospitalization) transcutaneous bilirubin (TcB) or total serum bilirubin (TSB) concentration close to the phototherapy threshold
- Hemolysis from any cause, if known or suspected based on a rapid rate of increase in the TSB or TcB of>0.3 mg/dL per hour in the first 24 h or>0.2 mg/dL per hour thereafter.
- Phototherapy before discharge from birth hospitalization
- Parent or sibling requiring phototherapy or exchange transfusion
- Family history or genetic ancestry suggestive of inherited red blood cell disorders, including glucose-6-phosphate dehydrogenase (G6PD) deficiency
- Exclusive breastfeeding with suboptimal intake
- Scalp hematoma or significant bruising
- Trisomy 21
- Macrosomic infant of a diabetic mother

Note 2. 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 (ie, positive direct antiglobulin test), G6PD deficiency, or other hemolytic conditions
- Sepsis
- Significant clinical instability in the previous 24 h

Note 3. G-6-PD information

- Glucose-6-phosphate dehydrogenase (G6PD) deficiency, an X-linked recessive enzymopathy that decreases protection against oxidative stress, is one of the most important causes of hyperbilirubinemia leading to kernicterus in the US and across the globe.
- Most affected infants will not have a positive family history.
- Even after what appears to be an acute hemolytic event, there may be little or no laboratory evidence of hemolysis
  - If G6PD deficiency is strongly suspected but the measurement of G6PD activity is normal or close to normal, the G6PD activity should be measured at least 3 months later.
- There are clinical events that should raise suspicion about the presence of G6PD deficiency.
  - Newborn infants with G6PD deficiency are more likely to receive phototherapy before hospital discharge probably because of both increased bilirubin production and decreased conjugation and have a greater risk of readmission and retreatment.
  - Severe hyperbilirubinemia or atypical development of hyperbilirubinemia, such as elevated TSB in a formula-fed infant or late-onset jaundice, should raise the possibility of G6PD deficiency.

REFERENCES

- Kemper AR, Newman TB, Slaughter JL, Maisels MJ, Watchko JF, Downs SM, Grout RW, Bundy DG, Stark AR, Bogen DL, Holmes AV, Feldman-Winter LB, Bhutani VK, Brown SR, Maradiaga Panayotti GM, Okechukwu K, Rappo PD, Russell TL. Clinical Practice Guideline Revision: Management of Hyperbilirubinemia in the Newborn Infant 35 or More Weeks of Gestation. Pediatrics. 2022 Sep 1;150(3):e2022058859. doi: 10.1542/peds.2022-058859. PMID: 35927462.
- Slaughter JL, Kemper AR, Newman TB. Technical Report: Diagnosis and Management of Hyperbilirubinemia in the Newborn Infant 35 or More Weeks of Gestation. Pediatrics. 2022 Sep 1;150(3):e2022058865. doi: 10.1542/peds.2022-058865. PMID: 35927519.
- (2022) Hyperbilirubinemia management guidelines (peditools.org)

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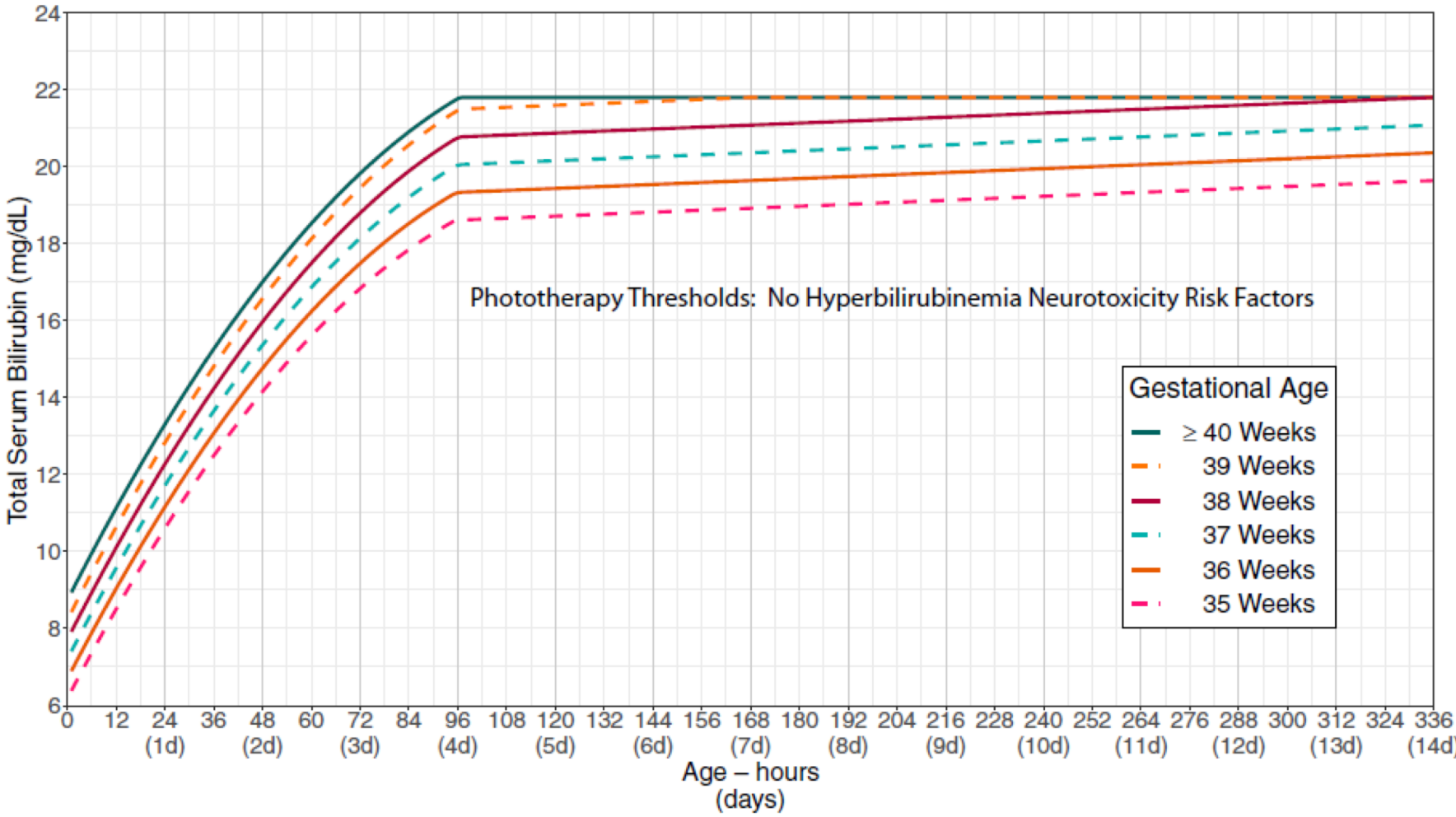
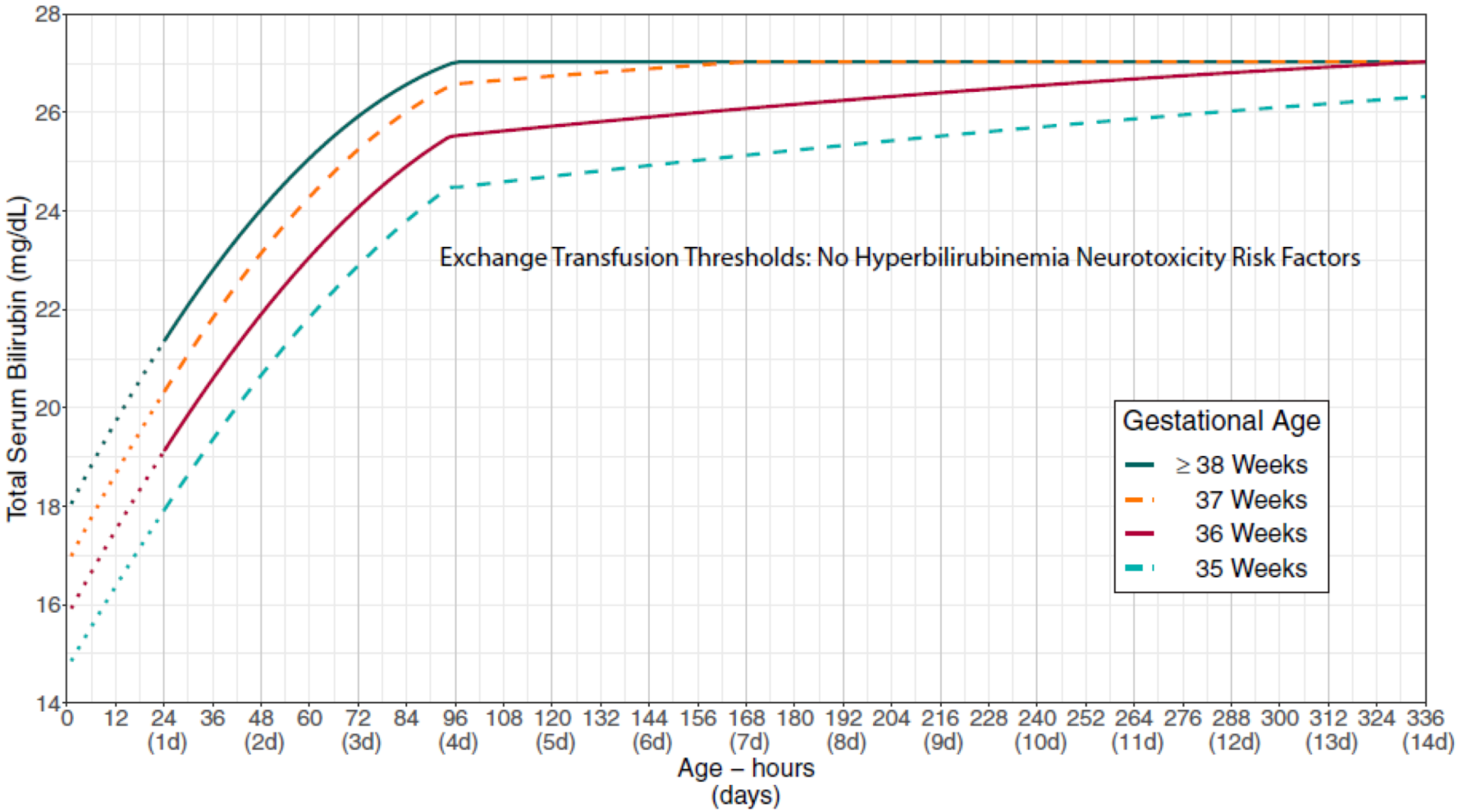
Phototherapy thresholds with no neurotoxicity risk factors



Per AAP 2021 Guideline: Phototherapy thresholds by gestational age and age in hours for infants with no recognized hyperbilirubinemia neurotoxicity risk factors other than gestational age. These thresholds are based on expert opinion rather than strong evidence on when the potential benefits of phototherapy exceed its potential harms. Use total serum bilirubin concentrations; do not subtract direct-reacting or conjugated bilirubin from the total serum bilirubin. In rare cases of severe hyperbilirubinemia in which the direct-reacting or conjugated bilirubin exceeds 50% of the TSB, consult an expert. Note that infants <24 hours old with a TSB at or above the phototherapy threshold are likely to have a hemolytic process and should be evaluated for hemolytic disease as described in recommendation 14. Hyperbilirubinemia neurotoxicity risk factors include gestational age <38 weeks; albumin <3.0 g/dL; isoimmune hemolytic disease, glucose-6-phosphate dehydrogenase (G6PD) deficiency, or other hemolytic conditions; sepsis; or any significant clinical instability in the previous 24 hours.

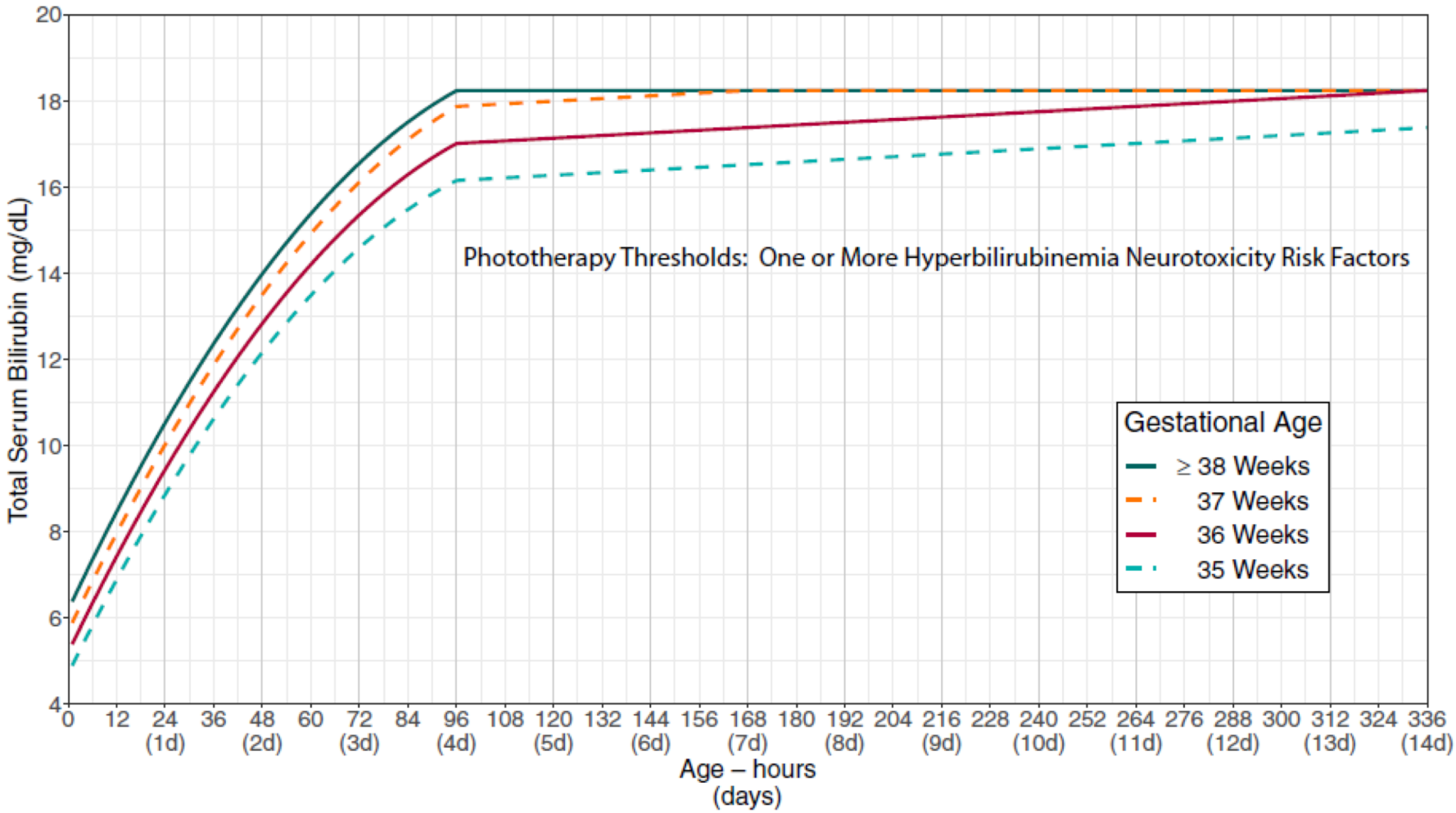
Exchange transfusion thresholds with no neurotoxicity risk factors



Per AAP 2021 Guideline: Exchange transfusion thresholds by gestational age for infants with no recognized hyperbilirubinemia neurotoxicity risk factors other than gestational age.

These thresholds are based on expert opinion rather than strong evidence on when the potential benefits of escalation of care exceed its potential harms. The stippled lines for the first 24 hours indicate uncertainty because of the wide range of clinical circumstances and responses to intensive phototherapy. Use total serum bilirubin concentrations; do not subtract direct bilirubin from the total serum bilirubin. In rare cases of severe hyperbilirubinemia in which the direct-reacting or conjugated bilirubin exceeds 50% of the TSB, consult an expert. Hyperbilirubinemia neurotoxicity risk factors include albumin <3.0 g/dL; isoimmune hemolytic disease, glucose-6-phosphate dehydrogenase (G6PD) deficiency, or other hemolytic conditions; sepsis; or any significant clinical instability in the previous 24 hours.

Phototherapy thresholds with one or more neurotoxicity risk factors



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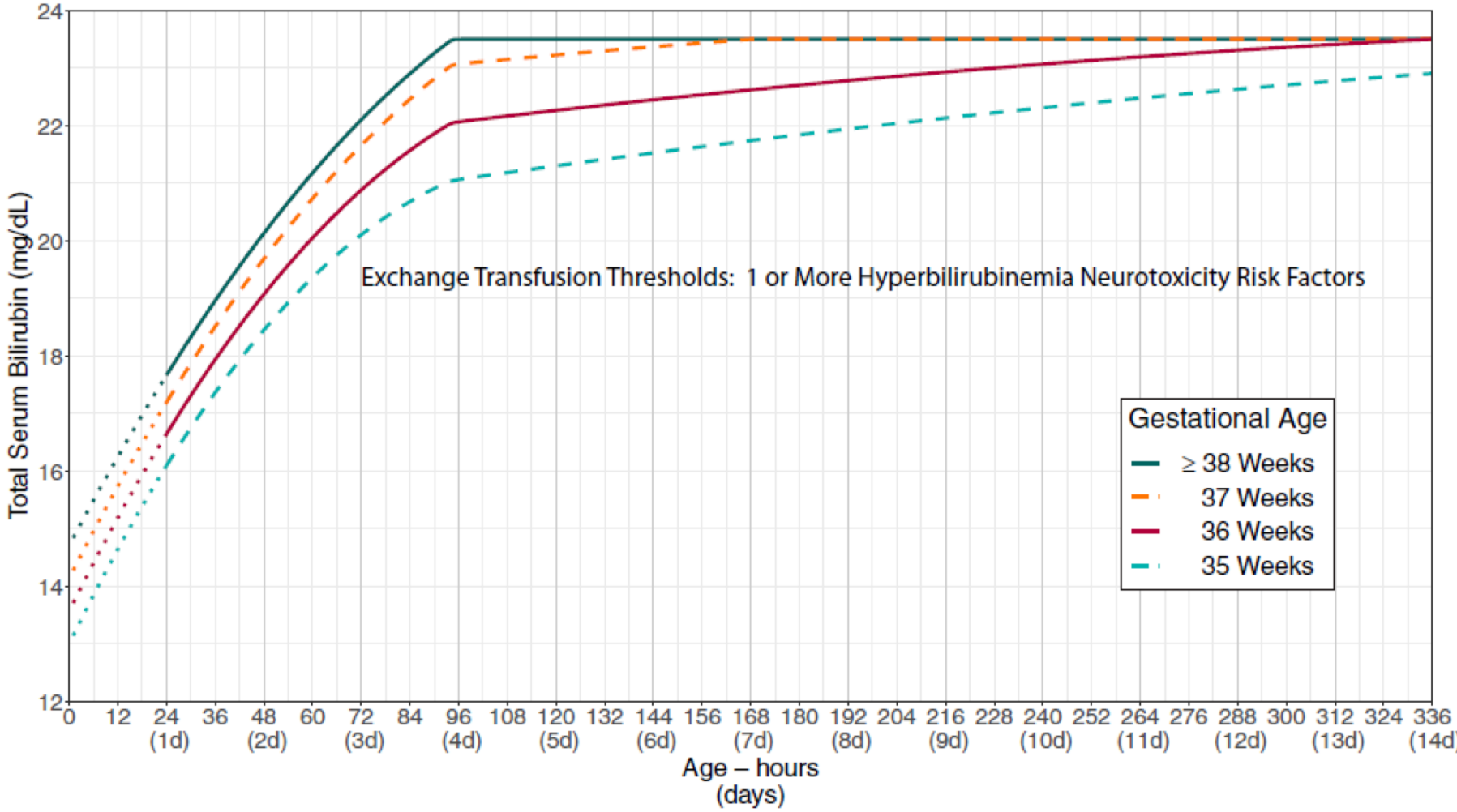
Exchange transfusion thresholds with one or more neurotoxicity risk factors



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