

TITLE			
MANAGEMENT OF NEONATAL HYPERBILIRUBINEMIA IN THE CHILDREN'S EMERGENCY DEPARTMENT			
AUTHORIZED BY: Children's Hospital Emergency Department	APPROVED BY: Professional Advisory Committee	APPROVAL DATE: September 24, 2021	PAGE <i>1 of 9</i>

1.0 PURPOSE AND INTENT

- 1.1 To provide direction in the management of infants with hyperbilirubinemia in Children's Hospital Emergency Department (ED). These guidelines apply to Children's Hospital Emergency Department Physicians and Nurses.
- 1.2 To provide a rapid non-invasive method of obtaining neonatal bilirubin levels.
- 1.3 To have clear clinical pathways to follow to help guide the care and assessment of neonates presenting with jaundice.
- 1.4 The target population for this guideline is infants >35 weeks GA presenting to the Children's Hospital Emergency Department for the assessment of jaundice or found to have jaundice upon assessment by the Children's Emergency nurse or physician in the first 2 weeks of life.

2.0 DEFINITIONS

- 2.1 **Hyperbilirubinemia in the newborn:** Excess serum bilirubin in the newborn due either to overproduction of bilirubin, as in excessive destruction of erythrocytes, or to reduction in glucuronide conjugation in the liver. If a high level of bilirubinemia is left untreated, kernicterus may occur as a result of free unconjugated bilirubin entering the brain tissue and causing neurotoxic damage.
- 2.2 **Standard Phototherapy:** Light therapy with a single light source that can deliver a minimum of 30 $\mu\text{W}/\text{cm}^2/\text{nm}$. (Note: In the current Canadian Paediatric Society (CPS) guidelines this is referred to as intensive phototherapy).
- 2.3 **Transcutaneous bilirubin (TcB) meter:** A handheld meter that provides an estimate of circulating bilirubin through calculations which measure the difference between bilirubin in the skin and subcutaneous tissue while minimizing the impact of melanin (skin color) on the transcutaneous assessment. The result is expressed as the "TcB" The measurement range is **0 to 340 $\mu\text{mol}/\text{L}$** . An average of three measurements is used. For meter operation see the Standard Operating Procedures for Draeger Jaundice Meter.

- 2.4 **Total Serum Bilirubin (TSB):** Total amount of bilirubin in the blood determined by sending a blood sample to the laboratory.
- 2.5 **Direct Bilirubin (DBIL):** In the liver, bilirubin is conjugated with glucuronic acid by glucuronyltransferase, making it soluble in water. The conjugated version is also often called “direct” bilirubin. Elevation in conjugated (direct) bilirubin level is pathologic. Prompt evaluation is necessary for neonatal cholestasis including biliary atresia.
- 2.6 **Direct Antiglobulin Test (DAT):** A blood sample that may be used to diagnose hemolytic disease of the newborn due to incompatibility between the blood type of a mother and neonate.
- 2.7 **Home Phototherapy Program:** a Winnipeg Regional Health Authority program run with the Children’s Hospital Emergency Department and the community Public Health nurses that allows for the safe provision of phototherapy in the home for neonates with uncomplicated neonatal hyperbilirubinemia.

3.0 GUIDELINES

3.1 Initial Assessment and Screening

- 3.1.1 All infants within the first two weeks of life presenting to the Children’s Hospital Emergency Department with jaundice are screened for hyperbilirubinemia with a TcB meter
- 3.1.2 The Children’s Hospital ED triage nurse triages and assesses the infant as per Canadian Triage and Acuity Scale (CTAS) protocols. All infants less than 7 days of age who present with a chief entrance complaint of jaundice are triaged as a CTAS 2 and brought immediately to a treatment space. Infants greater than 7 days of age who present with jaundice are triaged according to CTAS guidelines.
- 3.1.3 Obtain a naked weight on the infant and calculate the total percentage weight loss.
- 3.1.3.1 Total percentage weight loss (%) =
$$\frac{\text{(present weight – birth weight)}}{\text{birth weight}} \times 100$$
- 3.1.4 Obtain a TcB reading using the Draeger Jaundice Meter as per the Standard Operating Procedure. Use the infant’s forehead as the primary site for TcB reading unless extensively bruised and discolored; use the infant’s sternum as a secondary site if required.
- 3.1.5 If the infant has received phototherapy or an exchange transfusion within the last 24 hours, then they are NOT ELIGIBLE for a TcB reading and

need to have serum bloodwork drawn as per standard protocol.

- 3.1.6 If TcB reading appears inconsistent with clinical assessment, use clinical judgment to request care provider assessment.
- 3.1.7 When the TcB meter display shows “_ _ _”, the estimated bilirubin exceeds 340 $\mu\text{mol/L}$. Record such results as > 340 and notify care provider immediately. Start the infant on standard phototherapy while awaiting physician assessment and further laboratory testing.
- 3.1.8 Error with the Draeger TcB meter can be as much as 50 $\mu\text{mol/L}$ and therefore if adding 50 $\mu\text{mol/L}$ to the TcB reading results in a value above age-appropriate (hours specific) treatment threshold for phototherapy, standard jaundice bloodwork **MUST** be obtained.
- 3.1.9 Standard jaundice bloodwork includes a total and direct bilirubin and Direct Antigen Testing (DAT).
- 3.1.10 A DAT may already have been done on the infant and if result is available, this does not need to be redrawn
- 3.1.11 For infants born at 35 weeks gestational age or higher, plot TcB reading plus 50 $\mu\text{mol/L}$ on phototherapy graph according to age in hours (see appendix A). Determine next steps based on the following:
 - 3.1.11.1 **Infants <38 weeks gestational age at medium or higher risk AND plotted value above age-appropriate (hours specific) treatment threshold:** Nurse will notify Children’s Emergency physician and document TcB reading. Infant will be assessed by a Children’s Emergency physician to determine need for further diagnostics/treatment in addition to the standard jaundice bloodwork. Start the neonate on standard phototherapy while awaiting lab results.
 - 3.1.11.2 **Infants >38 weeks gestational age at lower risk AND plots above age appropriate (hour specific) treatment threshold. This includes infants with NO signs of dehydration AND less than 10% weight loss from birth:** The nurse will draw serum bloodwork immediately for total and direct bilirubin and Direct Antigen Testing. Start the infant on standard phototherapy while awaiting lab results. Notify Children’s Emergency Physician and chart TcB reading.
 - 3.1.11.3 **Infants whose plotted value is below any of the phototherapy thresholds:** The nurse will document TcB reading. Infant to be assessed by Children’s Emergency physician.

Refer to Appendix B: HSC Children's Emergency algorithm for TcB testing and interpretation of values

Ensure that all information regarding TcB and TSB levels is communicated appropriately to the most responsible care provider.

3.2 Management by the Children's Emergency Physician

- 3.2.1 The Children's Hospital ED physician uses the Children's Hospital Emergency Management of Hyperbilirubinemia Standard Orders to help guide treatment decisions.
- 3.2.2 Additional blood work should be considered if there are concerns of dehydration and/or hemolytic anemia, including a CBC, reticulocyte count, serum electrolytes (Na, K, Cl), glucose, CO₂, urea, creatinine, capillary blood glucose, capillary blood gas, and qualitative G6PD.
- 3.2.3 Base all decisions regarding bilirubin therapy (phototherapy, admission to hospital, neonatologist referral) only on TSB results.
- 3.2.4 If the level is below the age-appropriate (hour specific) treatment threshold, and the decision is made by the Children's Hospital ED physician that treatment is not necessary, appropriate follow-up will be determined.
- 3.2.5 If the infant has TSB levels above the age-appropriate treatment threshold, and they meet all other home phototherapy criteria, they may be eligible for the Home Phototherapy Program. The decision to treat the infant is made by the Children's Hospital ED physician based on age-appropriate treatment criteria and guidelines (see Appendix C).
- 3.2.6 All infants with TSB levels above the age-appropriate treatment threshold who do not meet criteria for the Home Phototherapy Program, including those that reside outside of Winnipeg will be admitted to hospital as per standard admission protocols.
- 3.2.7 Consider consultation to Neonatology for infants who:
 - Fail to respond to standard phototherapy (bilirubin continues to rise or does not decrease)
 - Are approaching exchange transfusion levels
 - Have a documented bilirubin level greater than 400 µmol/L
 - Rapid rise in bilirubin (greater than 75-100 µmol/L in 24 hours)

3.3 Referral to the Home Phototherapy Program by the Children's Hospital ED

3.3.1 The Children's Hospital ED nurse:

- 3.3.1.1 Explains the care of an infant with jaundice by showing the family the instructional Home Phototherapy video and giving the family

the Home Phototherapy Pamphlet and the Canadian Paediatric Society *Jaundice in Newborns* parent information sheet.

- 3.3.1.2 Obtains written consent for treatment and places it on the infant's chart. If the parent does not consent to Home Phototherapy, the neonate is admitted to hospital for treatment.
- 3.3.1.3 Applies the fiber optic phototherapy unit to the neonate and instructs the family on the care and use of the fiber optic phototherapy unit. If there are any isolation concerns, provide a disposable bag for storage of all phototherapy equipment.
- 3.3.1.4 Collects personal information from the family (address and phone number) and enters it into the Home Phototherapy equipment log, along with the KN number for the phototherapy device.
- 3.3.1.5 Documents the initiation of treatment.
- 3.3.1.6 Completes the referral to Public Health
 - 3.3.1.6.1 On weekdays between 0800-1600, the ED nurse faxes the referral form to Public Health Central Intake at 204-940-2635 and files the original form on the chart.
 - 3.3.1.6.2 On weekends, statutory holidays and after hours on weekdays the ED nurse faxes the referral to Public Health After-Hours at 204-940-2227 and Public Health Central Intake at 204-940-2635 for the public health nurse to arrange to monitor the neonate and files the original form on the chart.
 - 3.3.1.6.3 Notify Public Health of any isolation or potential risk of communicable disease exposure on the referral form.

3.4 Providing breastfeeding education and support

- 3.4.1 If same day breastfeeding support is required weekdays during regular working hours (0830 -1630), the ED nurse will endeavor to assist the family as able and may also direct the family to contact the BFHL (breastfeeding hotline), their midwife or public health nurse as needed for additional support. The midwife / and or public health nurse will be available to provide breastfeeding support for clients in their care during regular working hours. The ED nurse will also indicate that the family needs same day breastfeeding support on the Public Health referral form.
- 3.4.2 If same day breastfeeding support is required on weekends or stats during regular working hours (0900-1700), the ED nurse will complete the Home Phototherapy Referral form as soon as it is identified that the baby fits the criteria and is a candidate for the Home Phototherapy Program and will fax the referral form Public Health Central Intake at 204-940-2635 and to PHCC (Provincial Health Calls Centre) at 204-940-2227.

4.0 DOCUMENTATION

- 4.1 Document the initial assessment of the patient in the Assessment Emergency – Nursing.
- 4.2 The Children’s Emergency RN documents the TcB reading in $\mu\text{mol/L}$ in either the triage document or the Vital Signs Flowsheet. When documenting the TcB result, **DO NOT** add an additional 50. Record the number from the TcB meter.
- 4.3 Document any actions taken as a result of the TcB level in the Vital Signs Flowsheet.

5.0 REFERENCES

- 5.0 Canadian Paediatric Society (2018). Guidelines for detection, management, and prevention of hyperbilirubinemia in term and late preterm newborn neonates. Retrieved from <https://www.cps.ca/documents/position/hyperbilirubinemia-newborn>
- 5.1 Winnipeg Regional Health Authority (2018). Neonatal Clinical Practice Guideline: *HSC – Jaundice and Hyperbilirubinemia in the Newborn: Assessment and Management*. Policy 80.275.752
- 5.2 Winnipeg Regional Health Authority (2019). Clinical Practice Guideline: *Management of hyperbilirubinemia in the combined hospital – Community Home Phototherapy Program*.

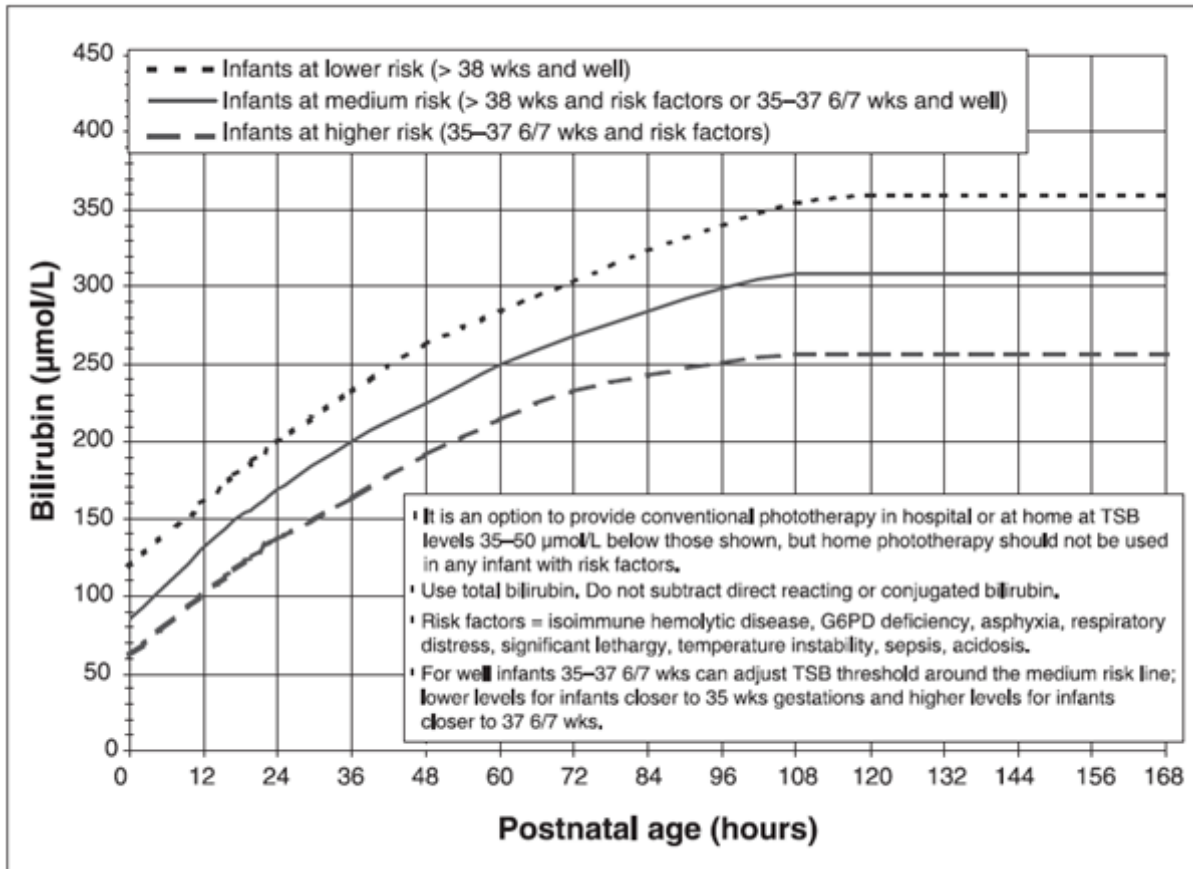
6.0 PRIMARY AUTHORS

- 6.1 Nurse Educators– Children’s Emergency, Child Health Program
- 6.2 Medical Director- Children’s Emergency, Child Health Program

APPENDIX A: GUIDELINES FOR TOTAL SERUM BILIRUBIN VALUES FOR PHOTOTHERAPY

Note: For Infants on home phototherapy, follow the TOP line (lower risk, ≥ 38 weeks and well).

If levels are higher than the home phototherapy range, or if the above criteria are not met, the Neonate must be admitted for phototherapy.



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Appendix B: HSC Children's Emergency algorithm for TcB testing and interpretation of values

Infant presents to Children's ED for assessment of jaundice, or triage nurse notes that infant is jaundiced on assessment

The infant has received phototherapy or an exchange transfusion within the past 24 hours

The infant has not received phototherapy or an exchange transfusion within the past 24 hours

Not eligible for TcB reading. Draw bloodwork as ordered by the physician.

Complete TcB reading using Draeger Jaundice Meter. Plot value plus 50µmol/L on phototherapy threshold graph (Appendix A) on all patients born at 35 weeks gestational age or higher.

Infants ≤38 weeks gestational age at higher OR medium Risk infant AND plotted value above age-appropriate (hour specific) treatment threshold.

RN to notify physician of TcB result. Physician to assess patient and determine need for further diagnostics/treatment in addition to standard jaundice bloodwork

Initiate standard phototherapy while waiting for test results.

Infants ≥38 weeks gestational age at lower risk AND plots above age appropriate (hour specific) treatment threshold. This includes infants with NO signs of dehydration AND ≤10% weight loss from birth.

RN to draw standard jaundice bloodwork and notify physician of TcB results. Initiate standard phototherapy while waiting for test results and physician to assess.

Below phototherapy range.

Infant requires assessment by physician prior to discharge. Decision to perform further diagnostics as per physician preference.

Standard jaundice bloodwork

- Total and Direct bilirubin
- Direct Antigen Testing

Additional bloodwork (consider if concerns for dehydration or hemolytic anemia)

- CBC, reticulocyte count
- Serum electrolytes (Na, K, Cl), glucose, CO₂, urea, creatinine
- Capillary blood glucose
- Capillary blood gas
- Qualitative G6PD

APPENDIX C: Criteria for Home Phototherapy

- Infant was ≥ 38 weeks gestation at birth
- Age is ≥ 48 hours of initiation of phototherapy
- No co-existing indication for hospitalization, (cardiac defect, Down Syndrome, neurologic or metabolic disorder)
- No evidence of dehydration (not $> 10\%$ below birth weight)
- Bilirubin is within range
- Passing urine and stool
- Coombs test must be NEGATIVE
- Winnipeg Health Region resident (temporary or permanent, includes infants staying with family or in a boarding home or hotel during the phototherapy period)

Acceptable Bilirubin Range for **HOME PHOTOTHERAPY**

Age in Hours	Total Serum Bilirubin Level for Home Phototherapy ($\mu\text{moles/L}$)
≥ 48 hours	260-310
≥ 72 hours	300-350
≥ 96 hours	330-380

Serum bilirubin values are based on Canadian Pediatric Society statement: **APPROACH TO THE MANAGEMENT OF HYPERBILIRUBINEMIA IN TERM NEWBORN INFANTS**. Infants are **not eligible** for Home Phototherapy when serum bilirubin levels exceed age-appropriate levels for the initiation of phototherapy by ≥ 50 $\mu\text{mol/L}$ or if they are Coombs positive. Jaundiced Infants with risk factors that have resolved (e.g., asphyxia) and are ≥ 48 hours of age may be candidates for Home Phototherapy provided all inclusion criteria are met.