Neonatal Jaundice/ Suspected Hyperbilirubinemia Clinical Pathway

March 2022

Outcomes/Goals	1. Identify and initiate prompt treatment of infants less than 14 days with jaundice/ suspected hyperbilirubinemia according to Northern California Neonatal Consortium (NCNC) guidelines 2. Support a team-oriented approach to efficient and timely evaluation and work-up
Inclusion Criteria	Infants > 35 weeks gestation who present with concern for jaundice
Exclusion Criteria	Infants greater than 14 days of life
NURSE documentation	Chief complaint. Skin assessment. Cap refill. History of feedings including breast or bottle fed, stool history, level of consciousness/alertness. Birth history including birth weight, hydration status
INTERVENTIONS Initiate on arrival	ESI Triage Level II Full set of vitals, naked weight Evaluate for dehydration Initiate lab draws – do not delay labs for difficult IV placement. May send capillary sample after failed venous attempt x 2 Utilize infant warmer as needed for temperature regulation. If hypothermia < 36.0°C, notify LIP and refer to **ED PED: Fever/Sepsis <29 Days Clinical Pathway**
DIAGNOSTICS	**Initial:** Heel stick total, indirect, and direct serum bilirubin if patients well appearing, not significantly dehydrated **Ill appearing or pathologic jaundice (including direct hyperbilirubinemia, TSB > phototherapy threshold, jaundice within 1st 24 hours of life):** Blood type and screen, Complete blood count, Direct Coombs, CMP, G6PD screen if patient is male and is from an ethnic region at risk for the disease (Afro-Caribbean, West Africa, India, Pakistan, Bangladesh, East African Asian, Cyprus, Iran, Lebanon, China, Italy) **Obtain rule-out sepsis labs as appropriate (ED PED: Fever/Sepsis <29 Days Clinical Pathway)**
PHYSICIAN (LIP)	
Fluids (if indicated)	Normal Saline Bolus of 10ml/ kg if weight loss >10% since birth or clinical evidence of dehydration. If significantly dehydrated and will require admission, start maintenance fluids with D10 1/2NS + 20KCl if potassium within normal limits.
Review lab results	Review Figure 1 to determine need for phototherapy; initiate in ED if patient needs admission Review Figure 2 to determine need for exchange transfusion For both, determine patient's age in hours, gestational age at birth, and incorporate neurotoxicity risk factors (see below).
ADMISSION	<u>For patients who do not require ICU:</u> If followed by family medicine or Virgina Garcia, admit to family medicine. If patient requires only phototherapy and/or rehydration, admit to MBU. Page MBU attending to discuss location of placement. If NICU or L and D, sign out to NICU resident. If 9N, sign-out to hospitalist resident. If suspected infection or co-morbidities, admit to pediatric hospital medicine. If resources permit, initiate phototherapy in the emergency department prior to admission/transfer. <u>For patients who require ICU:</u> Admit to NICU if bed available, PICU if NICU cannot accommodate ***For patients requiring exchange transfusion, consult a neonatologist emergently***.
Risk Factors	Evaluate for modifiable risk factors • Sepsis or suspected sepsis (sufficient to be currently on antibiotics) • Acidosis (BE ≤ −8 meq/L or pCO2 > 50 mmHg within the last 24 hr) • Albumin < 3.0 mg/dL • Any clinical instability • Isoimmune hemolytic disease, G6PD deficiency, or other hemolytic disease

Clinical Pathway Decision Making Process
Neonatal Jaundice/ Suspected Hyperbilirubinemia
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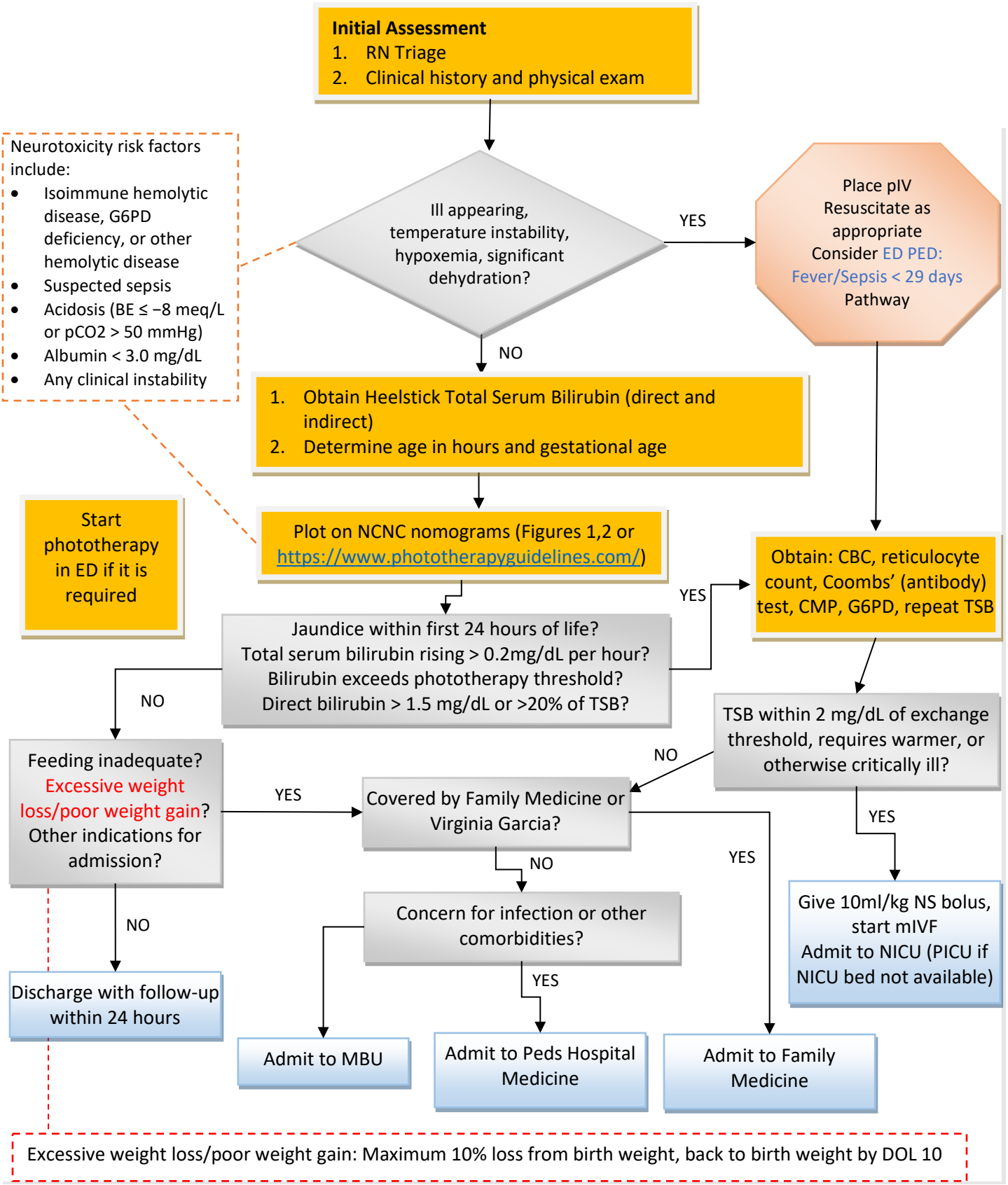


Neonatal Jaundice/ Suspected Hyperbilirubinemia Rationale and Data

Goals of Clinical Pathway

1. Identification and treatment of infants less than 14 days with jaundice/ suspected hyperbilirubinemia according to NCNC guidelines
2. Create a standardized team-oriented approach to efficient and timely evaluation and work-up
3. Create a standardized admission criteria for neonates with hyperbilirubinemia

Lab Test	Rationale
Total Serum Bilirubin (TSB)	The AAP (2004) suggests measurement of total, direct, and indirect bilirubin levels as appropriate, and if direct bilirubin is less than 1.5, then one may use total bilirubin. Indirect bilirubin levels measure "free" or unconjugated bilirubin and direct bilirubin levels measure conjugated bilirubin.
Blood Type	Obtain if blood type not readily available/known.
Coomb's Test	The direct and indirect Coomb's tests detect antibodies against RBCs seen in ABO/Rh incompatibility that may cause hemolytic anemia.
Reticulocyte count	A reticulocyte count may be useful if the infant is anemic to measure RBC production by the bone marrow.
G6PD	Deficiency common in Mediterranean and Middle Eastern regions that may cause hemolysis
CBC and Albumin	Complete blood count with differential, along with albumin (to aid in assessment of unbound bilirubin), blood culture, urinalysis, and peripheral smear to rule out infection and hemolysis may be warranted.

Test Results

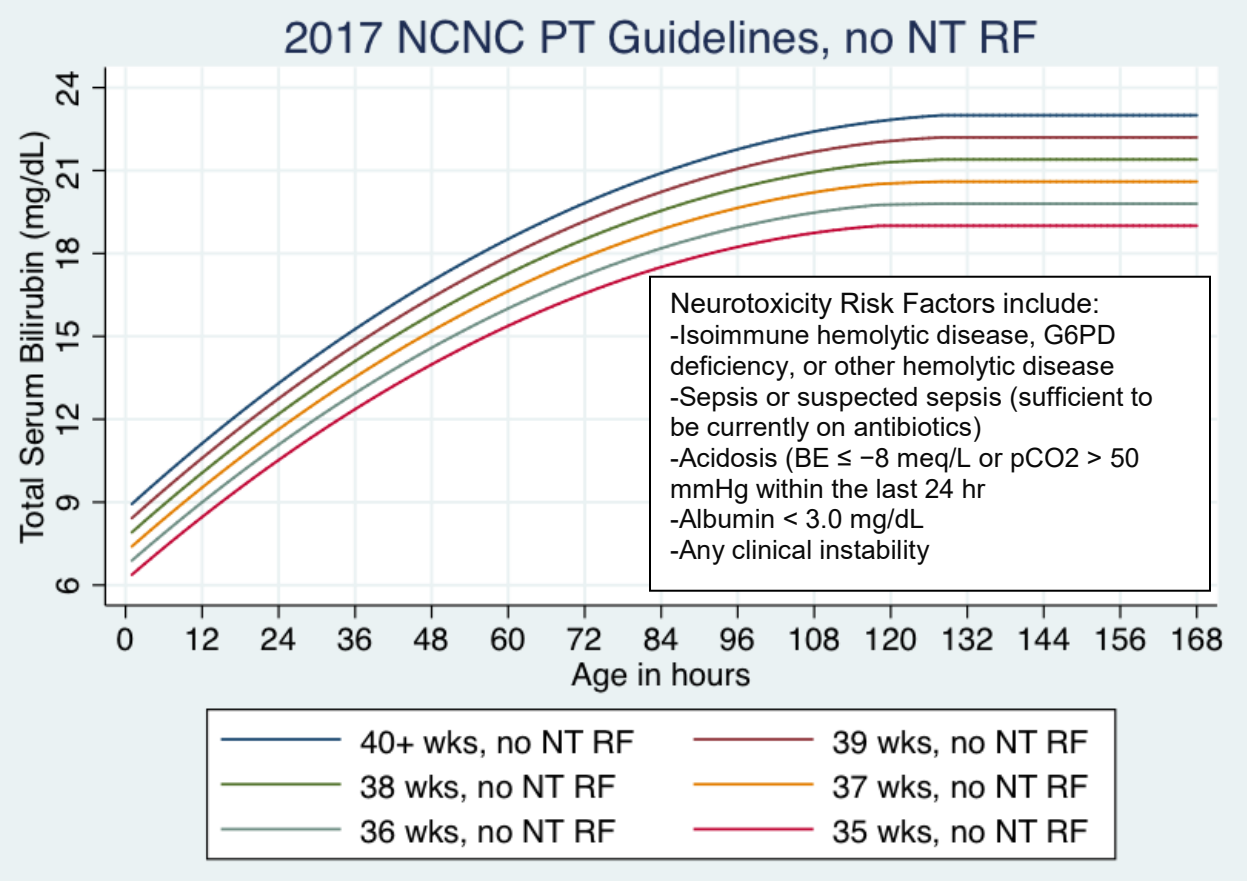
- Elevated serum indirect bilirubin with normal reticulocyte count and negative Coomb's test is associated with physiologic, breast milk jaundice, or familial nonhemolytic jaundice.
- Elevated serum indirect bilirubin with increased reticulocyte count is indicative of increased hemolysis seen with ABO/Rh incompatibility and RBC abnormalities.
- Elevation of both direct and indirect bilirubin with a negative Coomb's test and normal reticulocyte count is indicative of hepatitis, metabolic or obstructive biliary disorders, or sepsis.

Diagnostic and Treatment Techniques	Use and Accuracy/ Effectiveness
Bilirubin	
Capillary TSB (Heel Stick)	May be used to initiate treatment, use of venous sample to 'confirm' results not recommended. Can have a high hemolysis rate.
Venous TSB	Gold standard for measuring TSB
Treatment	
Fiberoptic "Bili" Blanket	Less effective than intensive phototherapy. May be an option for low risk outpatients.
Phototherapy	Must avoid interruptions of greater than 30 minutes at a time to ensure effectiveness. The Northern California Neonatal Consortium guidelines are an alternative to the AAP guidelines; these guidelines are less conservative and are predicated on newer data demonstrating possible increases in epilepsy, malignancy associated with phototherapy, and high NNT to prevent 1 case of kernicterus.
Exchange Transfusion	Recommended if remains jaundiced with signs of acute bilirubin encephalopathy (hypertonia, arching, opisthotonos, fever, high-pitched cry), even if TSB is reduced.

References:

- Maisels, M.J., et al., Management of hyperbilirubinemia in the newborn infant 35 or more weeks of gestation. Pediatrics, 2004. 114(1).
- Newman, T.B., et al., Numbers needed to treat with phototherapy according to American Academy of Pediatrics guidelines. Pediatrics, 2009. 123(5).
- Frazier, A.L., M. Krailo, and J. Poynter, Can Big Data Shed Light on the Origins of Pediatric Cancer? Pediatrics, 2016. 137(6).
- Newman, T.B., et al., Childhood seizures after phototherapy. Pediatrics, 2018. 142(4).

Figure 1. NCNC Phototherapy Guidelines



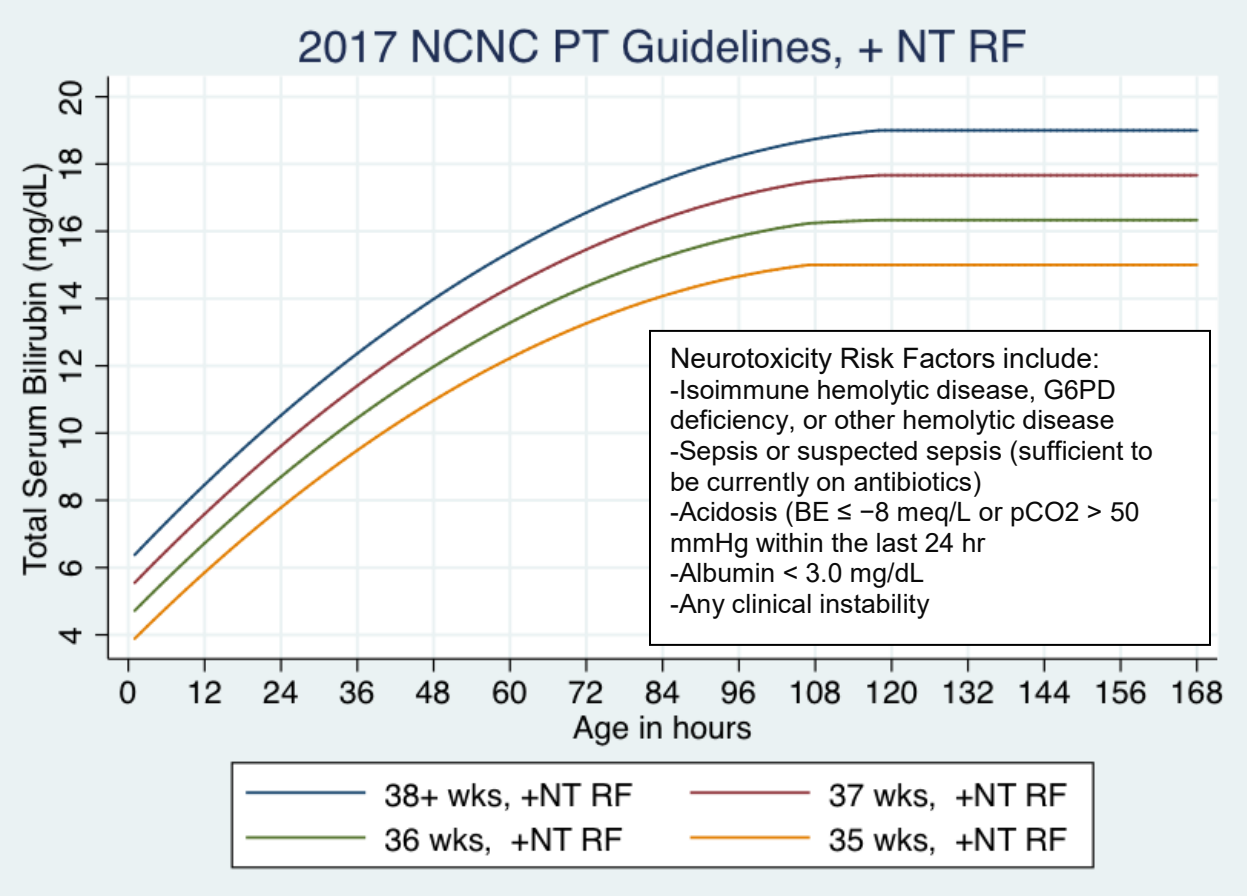
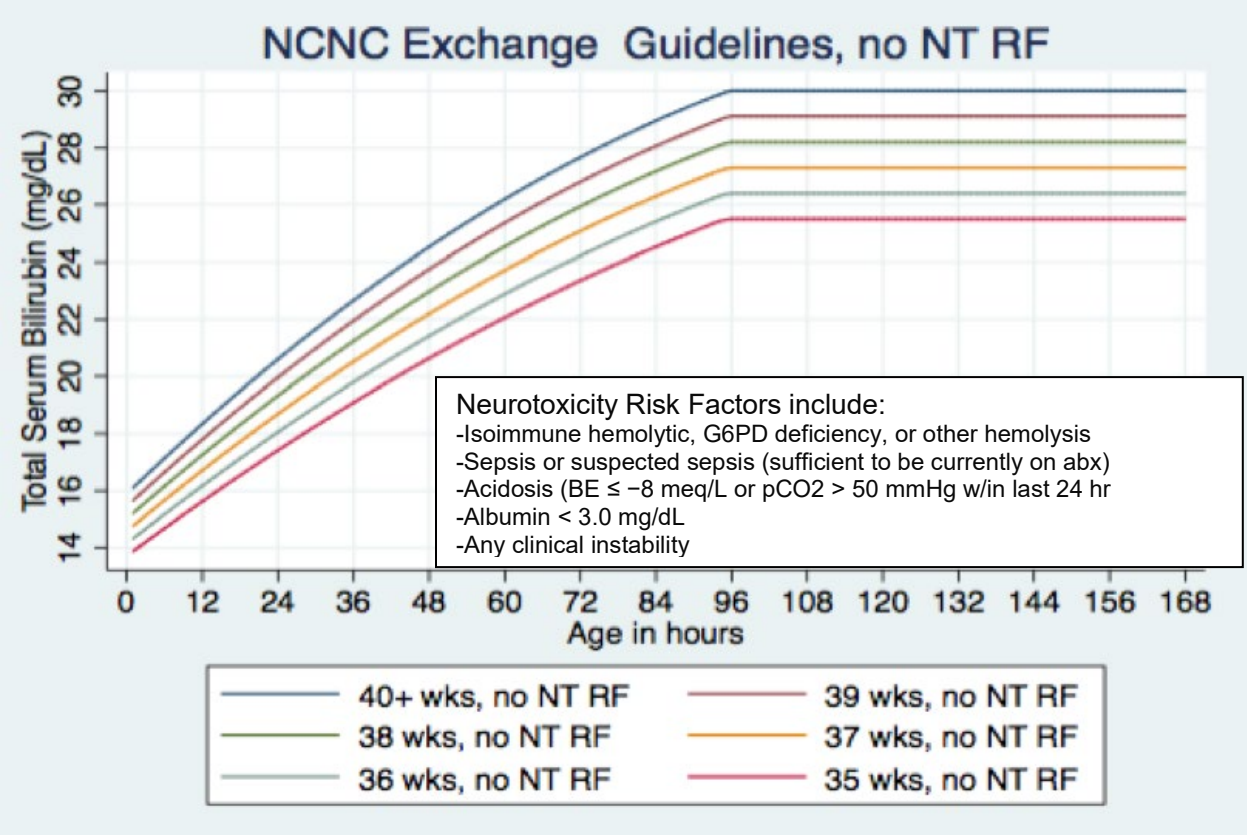
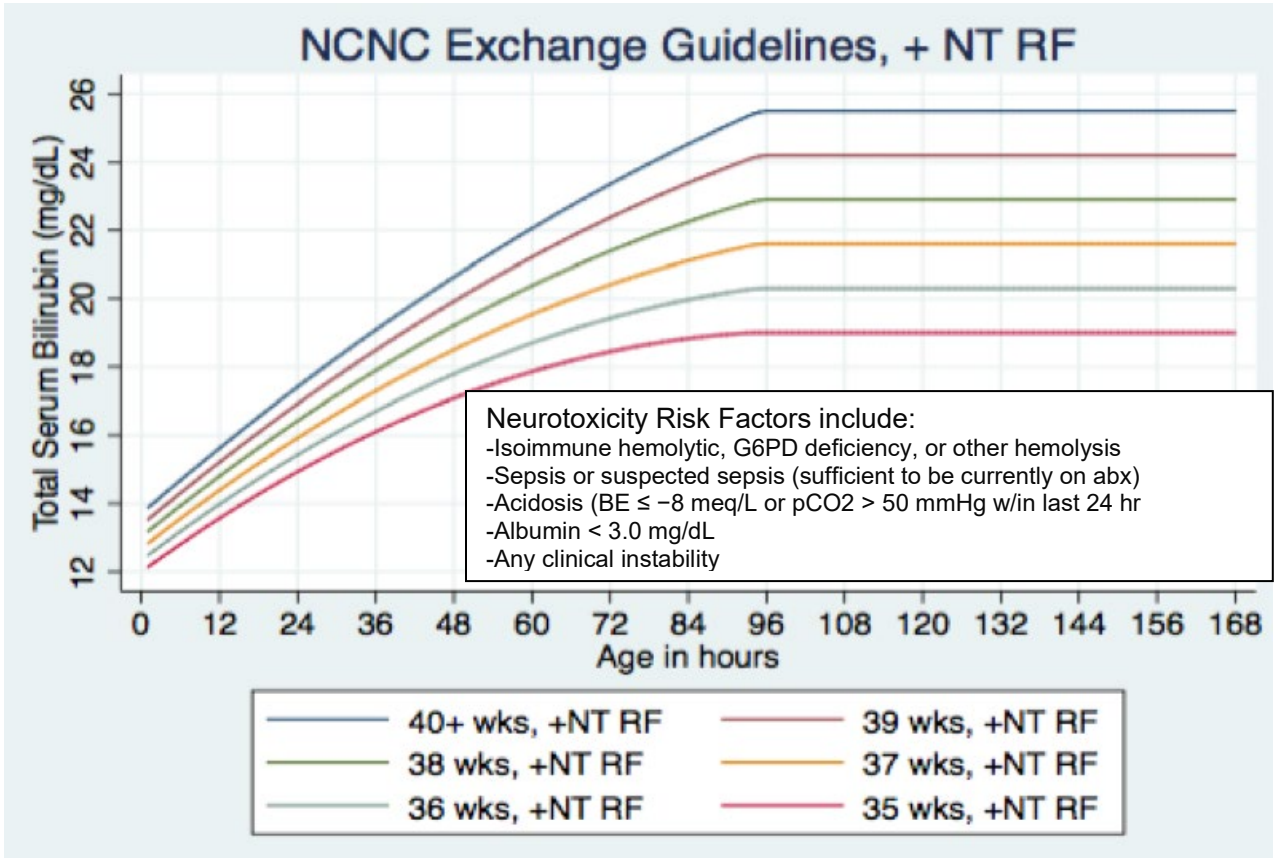


Figure 2. NCNC Exchange Guidelines





Nursing considerations	**NeoBlue**
Measure light intensity:	• When light is initially positioned over infant (12 inches above infant torso). Low: $12\mu W/cm^2$/nm High: $30\mu W/cm^2$/nm
Vital Signs	• RR, HR at least every 4 hours • Assess and record Temperature every 30 minutes until stable, then every 2 hours x2
Assessments **Hourly rounding to assure eye shields are in place- parents can help with this.**	At least every 4 hours: • Intake and Output • Remove eye shield and assess eyes for drainage or irritation • Eye shield can be removed for feedings. • Complete assessment every 8 hours.