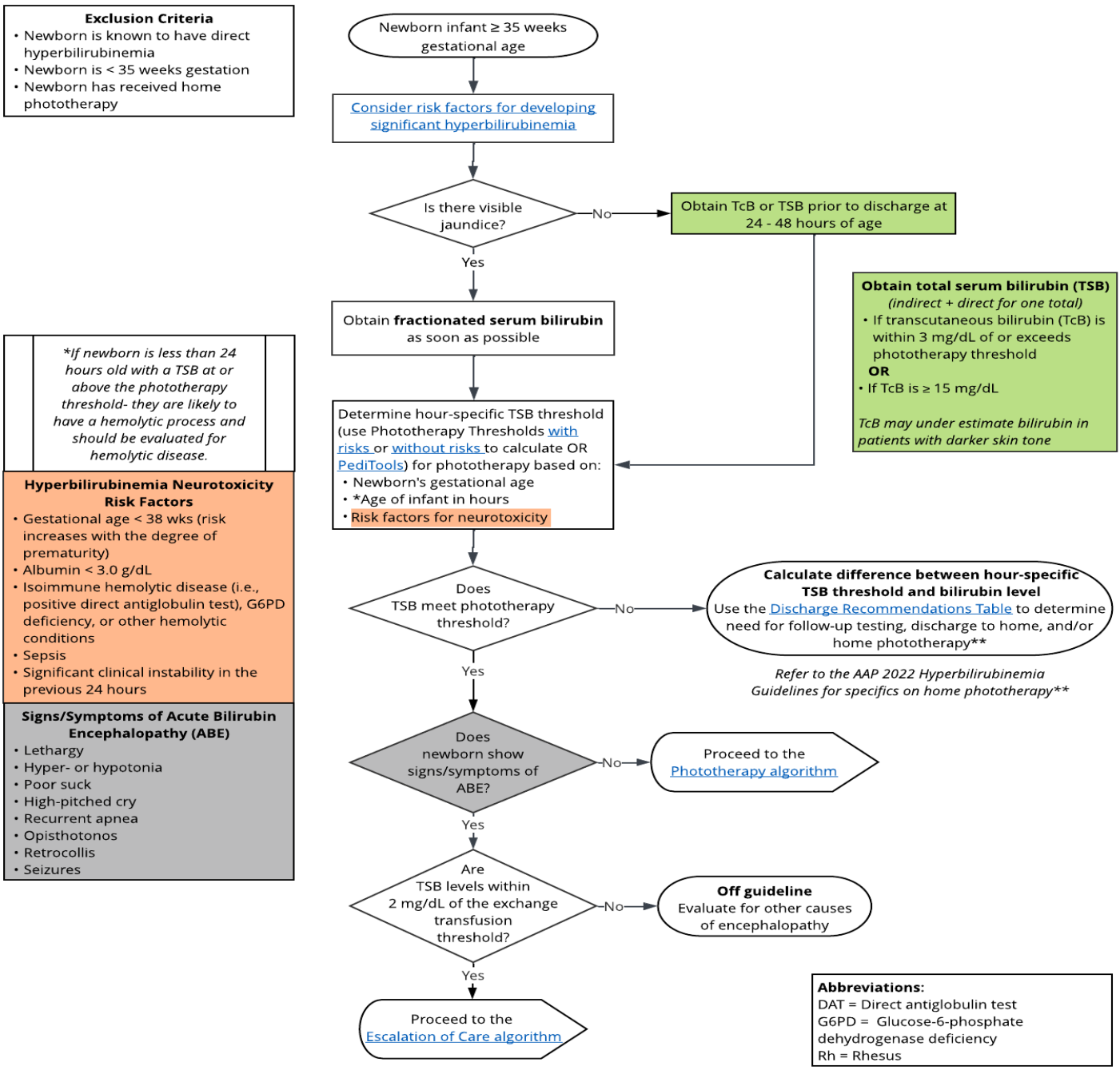
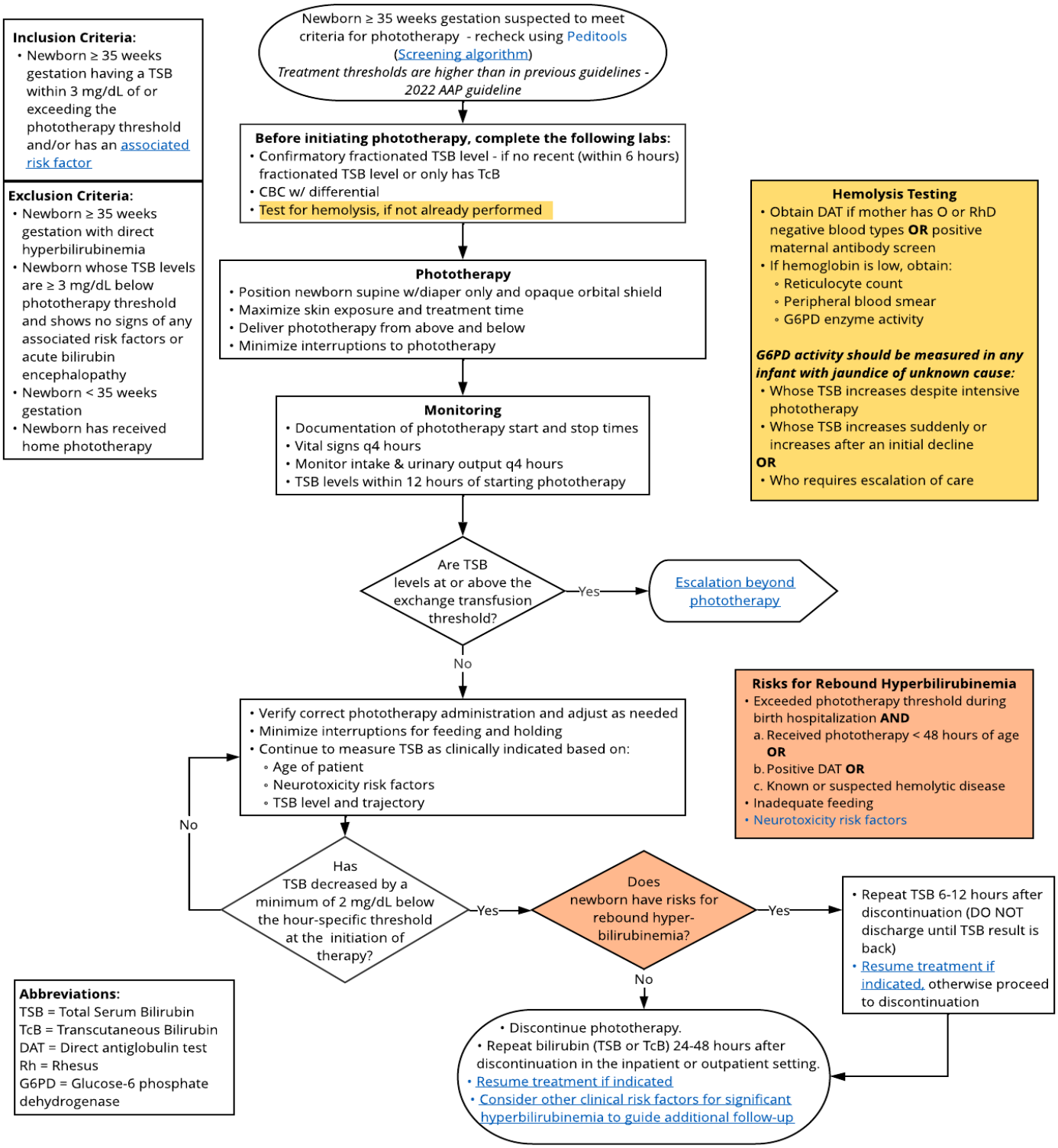
Hyperbilirubinemia
Clinical Pathway Synopsis

Hyperbilirubinemia – Screening Algorithm



** These clinical pathways do not establish a standard of care to be followed in every case. It is recognized that each case is different, and those individuals involved in providing health care are expected to use their judgment in determining what is in the best interests of the patient based on the circumstances existing at the time. It is impossible to anticipate all possible situations that may exist and to prepare a clinical pathway for each. Accordingly, these clinical pathways should guide care with the understanding that departures from them may be required at times.*

Hyperbilirubinemia – Phototherapy Algorithm



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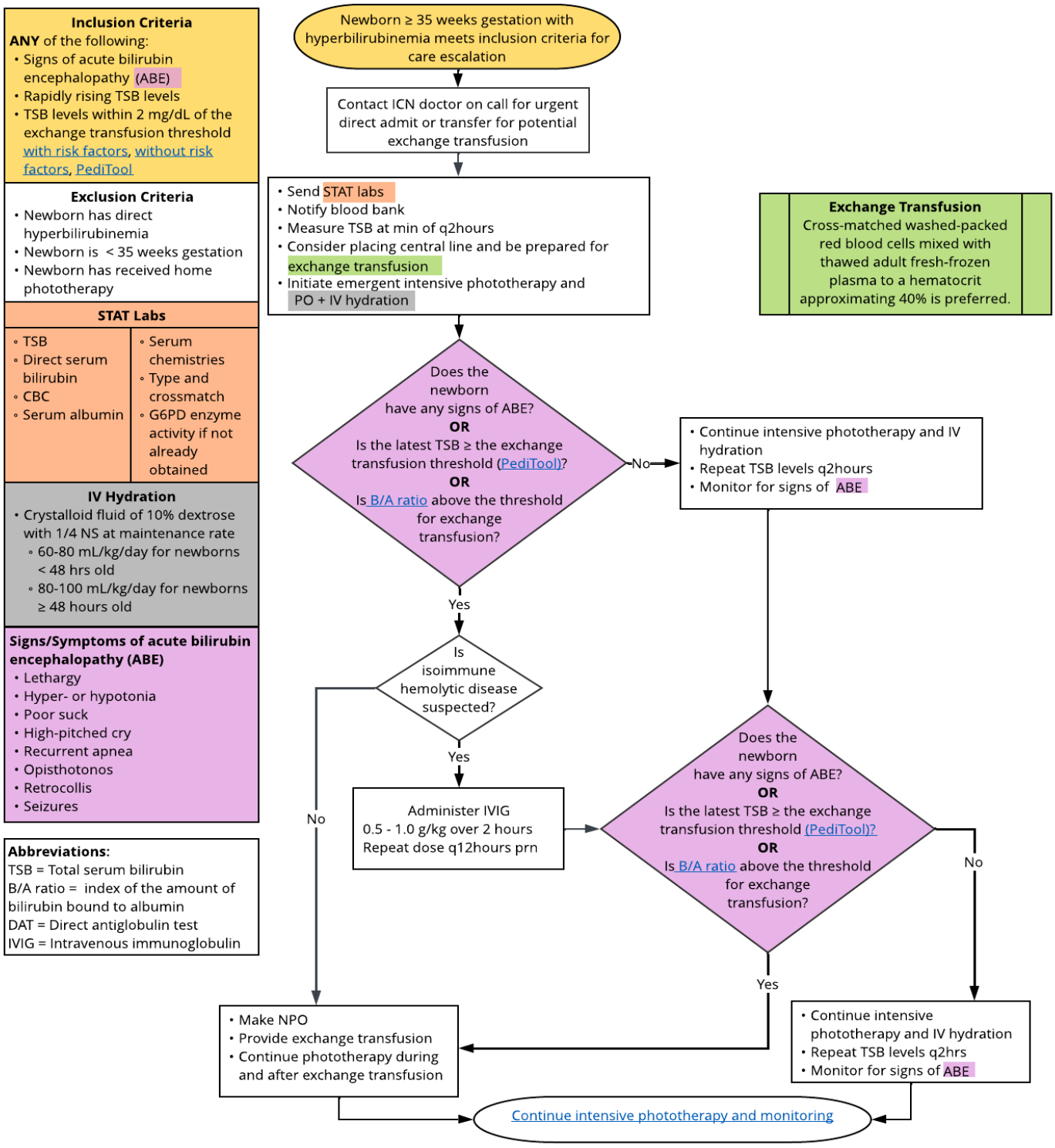
Hyperbilirubinemia – Escalation of Care Algorithm



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Objective of Clinical Pathway

To provide care standards for the newborn patient ≥ 35 weeks gestational age and guide the provider on screening, risk assessment, monitoring, and treatment of newborns at risk of developing hyperbilirubinemia.

Epidemiology

Hyperbilirubinemia is among the most prevalent conditions in term or late pre-term neonates, with 60%-80% of these neonates developing jaundice in their first week after birth (Ansong-Assoku et al., 2022). Newborn jaundice is often benign and the result of the immature liver's decreased ability to clear bilirubin (Burke et al., 2009; Young Infants Clinical Signs Study Group, 2008). Providers caring for newborns must intentionally monitor and provide appropriate interventions to address the 8%-11% of these newborns who will develop severe hyperbilirubinemia, as severe hyperbilirubinemia can lead to more serious conditions such as acute bilirubin encephalopathy and kernicterus (Maisels, et al., 2004).

Due to the prevalence and potential complexities of hyperbilirubinemia, the Hyperbilirubinemia Clinical Pathway Committee developed this pathway to guide providers through the identification, evaluation, and treatment of neonates with indirect hyperbilirubinemia.

Target Users

- Neonatologists
- Newborn nursery providers
- Hospitalists
- Primary care pediatricians
- Emergency Medicine providers
- Advanced Practice Nurses
- Residents and fellows

Target Population

Inclusion Criteria- Screening

- All newborns ≥ 35 weeks gestational age.
- Early screening will be completed on those newborns ≥ 35 weeks gestational age that meet one of the following criteria:
    - Positive direct antiglobulin test (DAT will be obtained automatically when the mother has type O blood or is Rh negative)
    - Newborn has an onset of visible jaundice within the first 24 hours after birth
    - The newborn has a first-degree relative with a heritable hemolytic disease (i.e., G6PD deficiency or hereditary spherocytosis)

Exclusion Criteria- Screening

- Newborn known to have direct hyperbilirubinemia
- Newborn is < 35 weeks gestation
- Newborn has received home phototherapy

Inclusion Criteria- Phototherapy

- Newborns ≥ 35 weeks gestational age having a total serum bilirubin (TSB is the total of both direct and indirect serum bilirubin levels) within 3 mg/dL of or exceeding the phototherapy threshold and/or have associated risk factors.
- Neurotoxicity risk factors include – gestational age < 38 weeks (risk increases with the degree of prematurity), albumin < 3.0 g/dL, isoimmune hemolytic disease, sepsis, or significant clinical instability in the previous 24 hours. Newborns ≥ 35 weeks gestational age having total serum bilirubin < 2mg/dL below the phototherapy threshold and demonstrate clinical risk factors for progressive hyperbilirubinemia
    - Progressive hyperbilirubinemia risk factors include – early onset of jaundice (within the first 24 hours after birth), rapidly rising bilirubin levels, significant bruising or cephalohematoma, or Rh incompatibility

Exclusion Criteria- Phototherapy

- Newborn TSB levels are ≥ 3mg/dL below the phototherapy threshold and show no signs of any associated risk factors or acute bilirubin encephalopathy.
- Newborn has received home phototherapy.

Inclusion Criteria – Escalation of Care

- Newborn ≥ 35 weeks gestational age having any of the following:
  - Signs of acute bilirubin encephalopathy (ABE)
  - Rapidly rising TSB levels
  - TSB levels within 2 mg/dL below the exchange transfusion threshold

Exclusion Criteria- Escalation of Care

- Newborn has direct hyperbilirubinemia
- Newborn is < 35 weeks gestation
- Newborn receiving home phototherapy

AGREE II

The hyperbilirubinemia national guideline that provided guidance to the Hyperbilirubinemia Clinical Pathway Committee (Kemper et al., 2022). See Table 1 for AGREE II.

Table 1

AGREE II[a] Summary for the American Academy of Pediatrics (Kemper et al., 2022) Clinical Practice Guideline

Domain	Percent Agreement	Percent Justification^
Scope and purpose	97%	The aim of the guideline, the clinical questions posed, and target populations **were** identified.
Stakeholder involvement	96%	The guideline **was developed** by the appropriate stakeholders and represents the views of its intended users.
Rigor of development	72%	The process used to gather and synthesize the evidence, the methods to formulate the recommendations and to update the guidelines **were** explicitly stated. The guideline developers **did not** clearly state strengths and limitations of the body of evidence.
Clarity and presentation	99%	The guideline recommendations **are** clear, unambiguous, and easily identified; in addition, different management options are presented.
Applicability	75%	Barriers and facilitators to implementation, strategies to improve utilization and resource implications **were addressed** in the guideline.
Editorial independence	100%	The recommendations **were not** biased with competing interests. It is **unclear** if the recommendations were biased by competing interests.
Overall guideline assessment	97%	
See Practice Recommendations		

Note: Four EBP Scholars completed the AGREE II on this guideline.

^Percentage justification is an interpretation based on the Children's Mercy EBP Department standards.

Practice Recommendations

Please refer to the American Academy of Pediatrics Clinical Practice Guidelines on the Management of Hyperbilirubinemia in Infants 35 or More Weeks Gestation (Kemper et al., 2022) for full practice recommendations, evaluation, and treatment recommendations.

Additional Questions Posed by the Clinical Pathway Committee

No additional clinical questions were posed for this review.

Recommendation Specific for Children's Mercy

Children's Mercy adopted the majority of the practice recommendations made by the American Academy of Pediatrics Guidelines on the Management of Hyperbilirubinemia in Infants 35 or More Weeks Gestation (Kemper et al., 2022). Variations/additions include:

- Providers are to obtain a fractionated serum bilirubin (direct and indirect provided separately) as soon as possible once a newborn ≥ 35 weeks of gestational age with indirect hyperbilirubinemia has visible jaundice. Fractionated serum bilirubin should also be obtained for any newborn meeting the criteria for treatment.

Measures
- Utilization of the Hyperbilirubinemia Clinical Pathway
- Utilization of the Hyperbilirubinemia-associated power plans
- Rate of readmission for hyperbilirubinemia

Value Implications

The following improvements may increase value by reducing healthcare costs and non-monetary costs (e.g., missed school/work, loss of wages, stress) for patients and families and reducing costs and resource utilization for healthcare facilities.
- Decreased risk of over- or undertreatment with phototherapy
- Decreased rate of admissions for those newborns who do not meet criteria for treatment based on the updated AAP guideline.
- Decreased unwarranted variation in care

Potential Organizational Barriers and Facilitators

Potential Barriers
- Variability of an acceptable level of risk among providers
- Challenges with follow-up faced by some families

Potential Facilitators
- Collaborative engagement across care continuum settings during clinical pathway development
- Anticipated high rate of use of the clinical pathway
- Standardized order set for the Emergency Department, Hospital Medicine, and Intensive Neonatal Care
- All newborns ≥ 35 weeks gestational age are screened as the standard of care, increasing equity of care

Diversity/Equity/Inclusion

Our aim is to provide equitable care. These issues were discussed with the Committee, reviewed in the literature, and discussed before making any practice recommendations.

Power Plans
- Hyperbilirubinemia
- ICN Hyperbilirubinemia

Associated Policies
- Exchange Transfusion Procedure (Neonatal) (2023)
- Hyperbilirubinemia Testing Standing Order (2023)
- Safe Sleep Practices for Hospitalized Infants (2021)
- Transcutaneous Bilirubinometer Procedure for Newborn Jaundice Assessment (2022)
- Transcutaneous Bilirubinometer (TcB) Newborn Jaundice Assessment Standing Order (2022)

Education Materials
- Available via Children's Mercy electronic medical records for depart instructions:
  - Search for jaundice or hyperbilirubinemia to find 'Hyperbilirubinemia, Indirect, Age < 3months'
- Available via the Children's Mercy public website and can be accessed by internal and external providers as well as caregivers:
  - https://kidshealth.org/ChildrensMercy/en/ - direct parents or caregivers to this website and there they will find a search area to look up information on jaundice

Clinical Pathway Preparation

This product was prepared by the Evidence Based Practice (EBP) Department in collaboration with the Hyperbilirubinemia Clinical Pathway Committee, composed of content experts at Children's Mercy Kansas City. The development of this product supports the Quality Excellence and Safety Division's initiative to promote care standardization that is evidenced by measured outcomes. If a conflict of interest is identified, the conflict will be disclosed next to the committee member's name.

Hyperbilirubinemia Clinical Pathway Committee Members and Representation

- Kristie Marble, DO, FAAP | Hospital Medicine | Committee Chair
- Giang Nguyen, MD, FAAP | Hospital Medicine | Committee Member
- Deborah Holland, MD | Hospital Medicine | Committee Member
- Dena Hubbard, MD, FAAP | ICN| Committee Member
- Sian Best, MD | Hospital Medicine | Committee Member
- Megan Collins, MD, MPH | Hospital Medicine | Committee Member

EBP Committee Members

- Kathleen Berg, MD, FAAP | Hospitalist, Evidence Based Practice
- Andrea Melanson, OTD, OTR/L | Evidence Based Practice

Clinical Pathway Development Funding

The development of this pathway was underwritten by the following departments/divisions: Hospital Medicine, Neonatal Intensive Care Department, and Evidence Based Practice.

Conflict of Interest

The contributors to the Hyperbilirubinemia Clinical Pathway have no conflicts of interest to disclose related to the subject matter or materials discussed.

Approval Process

- This product was reviewed and approved by the Hyperbilirubinemia Clinical Pathway Committee, Content Expert Departments/Divisions, and the EBP Department, after which the Medical Executive Committee approved them.
- Products are reviewed and updated as necessary every three years within the EBP Department at CMKC. Content expert teams are involved with every review and update.

Approval Requested

Department/Unit	Date Approved
Hospital Medicine	July 2023
Intensive Care Nursery	August 2023
Evidence Based Practice	July 2023

Version History

Date	Comments
August 2023	Version one – development of algorithms, synopsis, and power plans

Date for Next Review:

- August 2026

Implementation & Follow-Up

- Once approved, the pathway was presented to appropriate care teams and implemented. Care measurements will be assessed and shared with appropriate care teams to determine if changes need to occur.
- Order sets/power plans consistent with recommendations were created or updated for each care setting.
- Education was provided to all stakeholders:
  - Nursing units where the hyperbilirubinemia clinical pathway is utilized
  - Departments of Neonatology and Hospital Medicine
  - Providers from Neonatology, Hospital Medicine, and the Emergency Department
  - Resident physicians
- Additional institution-wide announcements were made via email, the hospital website, and relevant huddles.
- Metrics will be assessed and shared with appropriate care teams to determine if changes need to occur.

Disclaimer

When evidence is lacking or inconclusive, options in care are provided in the supporting documents and the power plan(s) that accompany the clinical pathway.

These clinical pathways do not establish a standard of care to be followed in every case. It is recognized that each case is different, and those individuals involved in providing health care are expected to use their judgment in determining what is in the best interests of the patient based on the circumstances existing at the time.

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