Protocol #14
Jaundice in a Breastfed Baby

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*Jaundice is a yellowish discoloration of the skin and whites of the eyes (sclera). It is a sign of elevated levels of bilirubin in the blood (hyperbilirubinemia) caused by the breakdown of red blood cells. Physiologic jaundice occurs as part of the normal physiologic changes after birth. In the breastfed baby this process may be prolonged to 3 weeks or longer. Breastfeeding can and should continue. When there are breastfeeding difficulties or inadequate breast milk intake, it may be known as "starvation" jaundice (Gartner, 2001). Pathologic Jaundice is due to underlying medical conditions (*see General Principles*).*

Observation and Assessment

Physiologic Jaundice (Normal)	Pathologic Jaundice (Abnormal)
Assess the baby for: • Elevated bilirubin levels that normally develop between 2–5 days after birth, peaking on the third to fifth day of life. • Prolonged physiologic jaundice; elevated bilirubin levels rise or continue after the first week of life and peak between 10–21 days after birth. • Yellowing of the sclera, mucous membranes and/or skin, progressing from the head to the upper body. • Yellow urine. • Difficulty arousing for feeds, not showing obvious early feeding cues. • Sleepiness during breastfeeding. • Hydration status. • Effective breastfeeding and adequate weight gain. • Delay in passing of meconium.	***Assess the baby for:*** • Elevated bilirubin levels that are usually evident at birth or develop within 1–2 days after birth. • Bilirubin levels rising rapidly at 8.5 µmol/L (0.5 mg/dL) or more per hour (Lawrence, 2011). • Yellowing of the sclera, mucous membranes and/or skin, progressing from the head to the extremities. • Brown urine. • Difficulty arousing for feeds, not showing obvious early feeding cues. • Sleepiness during breastfeeding. • Delay in passing of meconium. • Abdominal distension. • Ineffective breastfeeding and inadequate weight gain. • A medical condition that: ° increases the breakdown of red blood cells, e.g., Rh or ABO blood incompatibility, Coombs +ve. ° interferes with the liver's ability to process bilirubin, e.g., galactosemia, hypothyroidism, or ° increases the reabsorption of bilirubin by the bowels, e.g., gastrointestinal obstruction.

Adapted from Biancuzzo, 2003; Mohrbacher, 2010; Lauwers, 2011; Lawrence, 2011; Riordan, 2010.

Possible Contributing Factors or Causes

Physiologic Jaundice (Normal)

- The normal breakdown of red blood cells (hemolysis) after birth.
- The normal high levels of bilirubin in the meconium are reabsorbed by the intestines into the blood.
- The newborn's immature liver has a limited capacity to process the high levels of bilirubin that normally accumulate after birth.

Pathologic Jaundice (Abnormal)

Assess the baby for a possible medical condition that:

- Increases the breakdown of red blood cells (hemolysis), e.g., Rh or ABO incompatibility.
- Interferes with the liver's ability to conjugate bilirubin, e.g., G6PD deficiency, galactosemia, hypothyroidism.
- Increases the reabsorption of bilirubin by the intestines, e.g., gastrointestinal obstruction.

Factors that may be associated with hyperbilirubinemia in either physiologic or pathologic jaundice:

- Delayed initiation of breastfeeding.
- Infrequent breastfeedings.
- Inadequate intake of breast milk.
- Supplementation with water or sugar water.
- Mother's breast milk taking longer than usual to come in (i.e., delayed Lactogenesis II).
- Medical conditions, e.g., dehydration, sepsis.
- Prematurity.
- Low birth weight.
- Ethnicity.
- Birth interventions, trauma, pain, and stress.
- Urinary tract infection.

Suggestions

1. Assess whether the baby may have physiologic or pathologic jaundice (see *General Principles*). The baby will need to be assessed by a primary health care provider to rule out any medical condition, e.g., Rh or ABO blood incompatibilities, G6PD deficiency, galactosemia, hypothyroidism, gastrointestinal obstruction.

2. Reassure and encourage the mother to continue to exclusively breastfeed unless medically contraindicated, e.g., presence of galactosemia (*Protocol #17: Indications for Supplementation or Cessation of Breastfeeding*).

3. Reassure the mother that most healthy full-term babies recover from jaundice with no short- or long-term health effects.

4. Provide the mother with suggestions to help decrease the baby's bilirubin levels.

Encourage the mother to:

- Breastfeed frequently:
  - 8 times or more per day with no more than one 4–5 hour sleep period in 24 hours, including at least once overnight, until the jaundice is cleared.
  - The baby may need to be awakened to breastfeed if the baby is lethargic or sleeping for long periods.
- Understand that early feeding cues may be masked or diminished when a baby is jaundiced.
- Understand that she may need to anticipate possible breastfeeding opportunities when the baby is more easily aroused, based on the normal gastric emptying time of 90 minutes together with infant sleep cycles.
- Use effective positioning and latching practices (*Protocol #2: Positioning and Latching*).
- Ensure that the baby is sucking and swallowing effectively, transferring breast milk throughout the duration of each breastfeeding (*Protocol #3: Signs of Effective Breastfeeding*).
- Increase the amount of higher fat breast milk the baby receives by finishing the first breast before changing breasts. The higher fat breast milk will promote faster excretion of bilirubin in the stools.
- Allow the baby to breastfeed on the first breast until he is no longer actively sucking and swallowing. Then offer the second breast if the baby is interested.
- Use breast compressions to help increase effective sucking and swallowing and increase the amount of higher fat breast milk the baby receives (see *Protocol #5: Engorgement* for a description of

breast compressions).

- Use techniques to wake a sleepy baby, e.g., dress baby in a diaper only to promote skin-to-skin contact, gently massage the baby's back, feet or hands, gently sit the baby up, talk to the baby, change the baby's diaper, or change position.
- Ensure that the baby has adequate urine and stool output and is gaining weight appropriately (*Protocol #3: Signs of Effective Breastfeeding*).
- Discontinue any use of medications by the mother or baby that may increase the risk of kernicterus (brain damage), e.g., aspirin and other salicylates, and certain sulpha drugs.
- Avoid supplementing with water or sugar water, as this does not promote stooling.
- If the baby is assessed to need supplementation, first offer expressed breast milk (EBM). If EBM is not available, refer to *Protocol #17: Indications for Supplementation or Cessation of Breastfeeding* for discussion of appropriate alternatives.

If the baby is unable to breastfeed effectively, encourage the mother to:

- Express both breasts after each time that the baby is unable to breastfeed effectively. If breastfeeding is stopped for any length of time, encourage the mother to express each breast regularly to maintain her breast milk supply. Generally, this should be at least 8 times a day, with a minimum of 1 overnight expression, to mimic the normal feeding pattern (*Protocol #19: Expressing and Storing Breast Milk*).
- Feed the baby with EBM using an alternative feeding method, e.g., cup, spoon, syringe, finger feeding, or lactation aid on the breast (*Protocol #18: Alternative Feeding Methods*). Using a lactation aid on the breast is recommended first over the other alternative feeding methods if the baby is able to latch onto the breast. This method allows the baby to remain on the breast and provides the breasts with stimulation. If EBM is not available, refer to *Protocol #17: Indications for Supplementation or Cessation of Breastfeeding* for discussion of appropriate alternatives.
- Avoid supplementing with water or sugar water, as this does not support stooling.
- If phototherapy is required, the baby's hydration status will need to be closely monitored. Phototherapy may place the baby at risk for dehydration due to increased water loss through the stool and skin.
- Seek further assessment and follow-up from a breastfeeding clinic or breastfeeding expert as soon as possible.

General Principles

Jaundice is a symptom of hyperbilirubinemia–increased levels of unconjugated (indirect) fat-soluble bilirubin in the blood that deposits in the skin, muscles, and mucous membranes. Bilirubin is a yellow pigment that is a byproduct of the breakdown of red blood cells by the liver. The immature newborn liver may be unable to conjugate the large number of red blood cells that break down immediately after birth. The bilirubin must be eliminated in the stool or it will be readily reabsorbed in the intestine (Lawrence, 2011).

This yellowing of the skin is known as jaundice or icterus. It progresses in a cephalo-caudal pattern from the head to the trunk then to the extremities. As it may be less visible in darker pigmented skin, blanching of the skin may promote visibility.

Jaundice becomes visible in the sclera (eye) when the bilirubin level reaches about 5 mg/dL. As jaundice continues down the body the bilirubin level increases progressively. Jaundice from the head to the shoulders corresponds to bilirubin levels of approximately 5–7 mg/dL. Between the shoulders to the umbilicus, levels range between 7–10 mg/dL. Between the umbilicus to the knees, levels range between 10–12 mg/dL. Below the knees bilirubin levels are greater than 15 mg/dL (Kramer, 1969 in Lauwers, 2011).

The significance of the level of bilirubin must be considered in relation to many factors: the gestational age of the baby (< 37 weeks), the birth weight of the baby (< 2500 gm), the baby's age at the onset of jaundice, whether the baby is healthy or has a medical condition, i.e., acidosis, anoxia, asphyxia, hypothermia, hypoglycemia, or infection (Lawrence, 2011 and CPS, 2011).

Bilirubin levels are screened using non-invasive methods such as transcutaneous bilirubinometers or "flash" to determine the need for more invasive diagnostic tests to evaluate serum blood levels.

While more than half of all newborns will develop jaundice within the first week of life (Gartner, 2010), most cases of jaundice in the healthy full-term baby

are part of a normal physiological condition that will resolve within a few days or weeks with no phototherapy treatment required.

Birth interventions, trauma, pain, and stress may delay or interfere with frequent breastfeeding or be associated with increased bleeding, e.g., caesarean birth, bruising from forceps or vacuum delivery, shoulder dystocia, cephalhematoma, internal bleeding.

In recent years there have been changes in the clinical assessment and management of baby hyperbilirubinemia. A less aggressive approach to treatment has been followed since Newman and Maisels reported a low risk of toxicity for healthy term newborns with physiologic jaundice (Newman et al., 1992). There was an understanding that lower levels of physiologic jaundice could be managed by increased breastfeeding without phototherapy. Shorter hospital stays and higher breastfeeding rates have led to a re-examination of the significance of clinical jaundice (CPS, 2011).

Bilirubin levels often peak post-discharge. In the first week, the clinical significance of jaundice is evaluated relative to risk factors such as baby age by hour, weight, gestational age, sepsis, need for resuscitation, and hemolysis. In addition, the significance of successful establishment of breastfeeding is recognized. More frequent breastfeeding during the first few days has been associated with lower bilirubin levels (Clarke et al., 2003).

Extreme hyperbilirubinemia may result in permanent brain damage, known as bilirubin encephalopathy or kernicterus.

Supplementation with water interferes with mechanisms to prevent and decrease jaundice. Supplements interfere with the successful establishment of breastfeeding that is limiting the intake of colostrum and breast milk important for enhancing stool output (de Carvarlho in Biancuzzo, 2003). Water and dextrose water supplements have been associated with increased bilirubin levels in term breastfed babies (Nicoll in Lawrence, 2011).

The evidence is inconclusive to support direct exposure to sunlight for the treatment of jaundice. The Australian Medical Association found no controlled trials comparing exposure to sunlight against either no treatment or exposure to artificial light and suggests that the use of sunlight may be based on anecdotal reports (Johnson et al., 2003). Moreover, the promotion of sunlight is contradictory to other public messages for parents to limit sun exposure (Harrison et al., 2002). Maisels advises that sunlight will lower serum bilirubin level, but the practical difficulties involved in safely exposing a naked newborn to the sun either inside or outside (and avoiding sunburn) preclude the use of sunlight as a reliable therapeutic tool (Maisels et al., 2008).

Mothers may perceive any jaundice as a serious medical problem and prematurely discontinue breastfeeding. They may feel guilty and believe that their breastfeeding caused the jaundice (Hannon et al., 2001). It is important to assess the maternal interpretation of information as well as to reinforce the importance of frequent breastfeeding to help resolve physiologic jaundice.

There are two major categories of jaundice: Physiologic (normal) or pathologic (abnormal).

Physiologic Jaundice (Normal)

- Physiologic jaundice usually develops between 2–5 days after birth, peaking on the third to fifth day of life.
- Bilirubin levels range between 104–291 μmol (7–17 mg/dL) (Dennery et al., 2001).
- It is caused by a combination of 3 factors:
    - the normal breakdown of excess red blood cells (hemolysis) after birth.
    - the normal high levels of bilirubin (in the meconium), which is reabsorbed by the intestines into the blood, and
    - the newborn's immature liver which has a limited capacity to process the high levels of bilirubin after birth.
- The normal lysis may be exaggerated following birth trauma.
- In most cases, physiologic jaundice is a normal clinical condition in the healthy full-term baby that usually resolves in a few days or weeks when the baby's liver matures and eventually processes the excess bilirubin.
- Phototherapy treatment is usually not required in cases of physiologic jaundice unless the bilirubin levels become exaggerated due to breastfeeding difficulties and inadequate intake of breast milk (*Protocol #1: The Initiation of Breastfeeding*).

- Physiologic jaundice is more prevalent and may appear later among babies whose ethnic background is Chinese, Japanese, Korean, or Native American (Lawrence, 2011, Brown et al., 2011).
- Physiologic jaundice that appears or continues after the first week of life in conjunction with appropriate weight gain was previously referred to as "late onset" or "breast milk jaundice". Physiologic jaundice that is prolonged beyond the first week of life is now recognized as a normal extension of physiologic jaundice in the healthy full-term baby who is breastfed.
- One third of all breastfed babies are clinically jaundiced in the third week (Gartner, 2010). Prolonged physiologic jaundice will peak between 10–21 days after birth and may last for up to 3 months. Any pathological cause of jaundice will need to be ruled out. The breastfed baby with prolonged physiologic jaundice will be breastfeeding and gaining weight well and is generally healthy. Phototherapy treatment is usually not required in cases of prolonged physiologic jaundice. Breastfeeding can and should continue whether the baby is treated or not.
- Offering support for early and frequent breastfeeding is the preferred approach.

Pathologic Jaundice (Abnormal)

- Pathologic jaundice is usually evident at birth or develops within 1–2 days after birth with high or rapidly rising bilirubin levels at a rate of 8.5 µmol/L (0.5 mg/dL) or more per hour (Lawrence, 2011).
- It is caused by a medical condition that:
  - Increases the breakdown of red blood cells (hemolysis), e.g., Rh or ABO blood incompatibility, alloimmunity or antibody mediated hemolysis (+ve direct Coombs test).
  - Interferes with the liver's ability to process bilirubin, e.g. G6PD, galactosemia, hypothyroidism, or
  - Increases the reabsorption of bilirubin in the intestines, e.g., gastrointestinal obstruction.
- Pathologic jaundice may need immediate medical treatment, including possible exchange transfusion. The baby will also need to be treated for the underlying medical condition causing the jaundice.
- Breastfeeding can and should continue during treatment, with the rare exception of galactosemia, for which the baby will need to be placed on a lactose-free artificial baby milk. Galactosemia is an inherited metabolic disorder that results in the inability to metabolize lactose.

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