

## DEFINITION

- The skin has turned a yellow color
- At higher bilirubin levels, the whites of the eyes also turn yellow
- Covers jaundice in newborn to age 3 months (90 days)
- Included: Home phototherapy questions are also covered

## TRIAGE ASSESSMENT QUESTIONS

### Call EMS 911 Now

Unresponsive and can't be awakened

*R/O: sepsis*

Signs of shock (very weak, limp, not moving, gray skin, etc.)

Sounds like a life-threatening emergency to the triager

### See More Appropriate Protocol

Age more than 3 months (90 days)

*Go to Protocol: Jaundice - Child or Teenager (Pediatric)*

### Go to ED Now

Age < 12 weeks with fever 100.4° F (38.0° C) or higher rectally

*R/O: sepsis, UTI*

### Go to ED/UCC Now (or to Office With PCP Approval)

Newborn < 4 weeks starts to act sick or abnormal in any way (e.g., decrease in activity)

*R/O: sepsis*

Low temperature < 96.8° F (36.0° C) rectally that doesn't respond to warming

*R/O: sepsis*

Baby sounds very sick or weak to triager

*R/O: sepsis*

### Go to Office Now

Feeding poorly (e.g., little interest, poor suck, doesn't finish)

Signs of dehydration (very dry mouth, sunken fontanelle, no urine in 8 hours)

Whites of the eye (sclera) have turned yellow

*Reason: bilirubin level probably over 15*

Skin looks deep yellow or orange or legs are jaundiced

*R/O: high bilirubin level*

Jaundice worse than when last seen

### Callback by PCP Within 1 Hour

Caller requesting bilirubin lab results

### See in Office Today

Jaundice spreads to abdomen (belly)

HIGH-RISK baby for severe jaundice (preterm < 37 weeks or ABO or Rh problem or cephalohematoma or sib needed bili-lights or Asian race, etc.)

Began during the first 24 hours of life

*R/O: hemolytic jaundice*

Mother concerned the baby is not getting enough breastmilk

*R/O: elevated bilirubin due to poor milk intake*

Good-sized yellow, seedy stools per day are < 3 (Exception: breastfed and before 5 days of life)

*R/O: elevated bilirubin due to poor milk intake*

Day 2 to 4 of life and no stool in over 24 hours and breastfed

Wet diapers per day are < 6 (Exception: 3 wet diapers/day can be normal before 5 days of life if breastfed)

*R/O: elevated bilirubin due to poor milk intake*

Day 2 to 4 of life and no urine in over 8 hours

Discharged before 48 hours of life and 4 or more days old and hasn't been examined since discharge

*Reason: AAP recommends re-check*

Caller is concerned about the degree of jaundice

### See in Office Within 3 Days

Jaundice begins or reappears after 7 days old

*Reason: not physiological jaundice*

Stools (BMs) are white, pale yellow or light gray

*R/O: neonatal hepatitis, biliary atresia*

Jaundice is not gone after 14 days old

*R/O: breastmilk jaundice, liver disease, UTI*

Triager thinks child needs to be seen for non-urgent problem

Caller wants child seen for non-urgent problem

## Home Care

Mild jaundice of newborn

Home phototherapy, questions about

## Home Care Advice

### Mild Jaundice Treatment

- 1. Reassurance and Education - Mild Newborn Jaundice:**
  - Jaundice means the skin has turned yellow.
  - Bilirubin is the pigment that turns the skin yellow.
  - Bilirubin comes from the normal breakdown of old red blood cells.
  - The liver normally gets rid of bilirubin. But at birth, the liver may be immature.
  - Half of babies have some jaundice. Usually, it is mild and doesn't need any treatment.
  - The first place for jaundice to appear is on the face.
  - Jaundice that only involves the face is harmless.
  - The level of bilirubin that is harmful is around 20. Reaching a level this high is rare.
  - High levels need to be treated with bili-lights. That's why your doctor checks your baby's bilirubin levels until it becomes low.
- 2. Bottle Feed More Often:**
  - If bottle fed, increase the frequency of feedings.
  - Try for an interval of every 2 to 3 hours during the day.
- 3. Breastfeed More Often:**
  - If breastfed, increase the frequency of feedings.
  - Nurse your baby every 1½ to 2 hours during the day.
  - Don't let your baby sleep more than 4 hours at night without a feeding.
  - Goal: at least 10 feedings every 24 hours.
- 4. Infrequent Stools Means Your Baby Needs More Milk:**
  - Breastmilk and formula help carry bilirubin out of the body. Therefore, good feedings are important for bringing down the bilirubin level.
  - In the first month, keep track of how many stools are passed daily. The number of stools reflects how much milk your baby is getting.
  - If your baby is 5 days or older, he should have at least 3 stools daily. If stooling less than that, it usually means your baby needs more to eat.
  - Try to increase the number and amount of feedings per day.
  - If you are having any trouble with breastfeeding, consult a lactation expert. Also, schedule a weight check.
  - Caution: Stimulating the anus to increase the release of stools is not helpful for reducing the bilirubin level.
- 5. Expected Course:**
  - Physiological jaundice peaks on day 4 or 5 and then gradually disappears over 1-2 weeks.
- 6. Judging Jaundice:**
  - Jaundice starts on the face and moves downward. Try to determine where it stops.
  - View your baby unclothed in natural light near a window.
  - Press on the yellow skin with a finger to remove the normal skin tone.
  - Then try to assess if the skin is yellow before the pink color returns.
  - Move down the body, doing the same. Try to assess where the yellow color stops.
  - Jaundice that only involves the face is harmless.

- As it involves the chest, the level is going up.
- If it involves the whites of the eyes, abdomen, or legs, the bilirubin level needs to be checked.

7. **Call Back If:**

- Jaundice becomes worse
- Eyes, belly or legs become yellow
- Feeding poorly or weak suck
- Baby starts to act sick or abnormal
- Jaundice not gone by day 14

### Home Phototherapy Questions

1. **Bili-blanket - How it works:**

- A bili-blanket is a type of phototherapy that can be used at home. It must be prescribed by your baby's doctor. The light emitted from the blanket helps to breakdown the bilirubin in the skin. The blanket is connected to a machine by a cable. The machine is then plugged into a wall outlet.
- Safety: The bili-blanket system uses pure light energy so no electricity or heat is generated near your baby. The newborn can't see the light, so no eye patches are necessary.

2. **Bili-blanket - How to put it on:**

- The fiberoptic blanket is inserted into a soft cover so it doesn't irritate the baby's skin.
- It emits light from one side only. The bright side is placed directly on the baby's skin and wraps the torso area.
- You can put the baby's clothes over the bili-blanket and swaddle with a regular blanket to keep the newborn warm.

3. **Bili-blanket - When to Wear it:**

- The blanket should be left on when holding, feeding, or sleeping.
- The only time it's necessary to remove it and turn it off is during bathing.
- In fact, the blanket should be worn as much as possible to be effective.

4. **Alternate Disposition - Call the Home Health Agency:**

- These babies are usually followed by a home health agency. The home health nurse can assess your baby in the home and provide education. They usually require daily bilirubin tests and weights.
- If you have questions about medical equipment being used in your home, the home health agency may be able to answer them over the phone as well.

5. **Call Back If:**

- Jaundice becomes worse
- Feeding poorly or weak suck
- Your baby starts to act sick or abnormal

## FIRST AID

N/A

## BACKGROUND INFORMATION

### Recognizing Jaundice

Sometimes callers aren't certain if the newborn's skin is jaundiced. The color of the sclera is essential in assessing children with darkly pigmented skin. If the sclera are white, the bilirubin level is not worrisome. If the sclera are yellow, the level may be above 15 ml/dL and it needs to be checked.

### Bilirubin Level Severity By Parent's Report of Location

- The following rating scale is one factor used for phone assessment in this guideline.
- **Mild** jaundice: Face only. Don't need to be seen.
- **Moderate** jaundice: Trunk involved (chest and/or abdomen). If the caller thinks the jaundice is worse than when last checked, these newborns need to be brought in for a level.
- **Severe** jaundice: Legs involved or entire body surface. Newborns with severe jaundice all need to be referred in for a bilirubin level now. The bilirubin level is high if the whites of the eyes (sclera) turn yellow.
- These zones of jaundice probably relate to differences in capillary perfusion and skin temperature.

### **Bilirubin Measurement**

- *Total serum bilirubin (TSB)*: This is a blood test. It is still considered the "gold standard" and true measurement of the bilirubin. It is done to determine whether babies need phototherapy or not.
- *Transcutaneous bilirubin (TcB)*: This is a non-invasive way to estimate the bilirubin level. A bilirubinometer is placed on the skin and measures the amount of bilirubin present in the extravascular tissue. It is not a substitute for TSB, but it can be used for screening to provide an estimate of the TSB value. If a baby is felt to be at risk for developing clinically significant hyperbilirubinemia, a TSB should be done. The TcB level is not reliable in babies who have received phototherapy.

### **Causes of Jaundice**

#### **Physiological Jaundice** (50% of newborns)

- Onset 2 to 3 days of age
- Peaks day 4 to 5, then improves
- Disappears 1 to 2 weeks of age

#### **Breastfeeding or Suboptimal Intake Jaundice** (5 to 10% of breast-fed newborns)

- Due to inadequate intake of breastmilk
- Pattern similar to physiological type
- Also causes poor weight gain

#### **Breastmilk Jaundice** (10% of breast-fed newborns)

- Due to substance in breastmilk which blocks removal of bilirubin
- Also called prolonged unconjugated hyperbilirubinemia jaundice.
- Onset 4 to 7 days of age
- Lasts 3 to 12 weeks
- Breastmilk intake and weight gain are normal
- Not harmful

#### **Rh and ABO Blood Group Incompatibility**

- Onset during first 24 hours of life
- Can reach harmful levels

#### **Liver Disease** (rare)

- White or pale stools suggest biliary atresia or other obstructive liver disease as the cause of the jaundice.

#### **Normal Prolonged Jaundice in Breastfed Babies**

- Also called prolonged unconjugated hyperbilirubinemia jaundice.

- At 3 weeks of age, 43% of breastfed newborns have a bilirubin level over 5 mg/dL, and 34% were clinically jaundiced.
- At 4 weeks of age, 34% of breastfed newborns have a bilirubin level over 5 mg/dL, and 21% were clinically jaundiced.
- This new data should help with reassuring mothers and HCPs that this is normal and usually babies don't require any lab tests.
- Reference: Maisels et al, Pediatrics 2014

### **Scleral Icterus: a Marker for Significant Bilirubin**

- A 2013 study from University of Pittsburgh Department of Pediatrics (Azzuqa, et al) found that scleral icterus detected by the parent or HCP is a marker for bilirubin levels above 15 mg/dL.
- This finding warrants a bilirubin test.
- None of the newborns with bilirubin levels of 10-15 mg/dL had scleral icterus.

### **Risk Factors for Severe Jaundice**

- Onset within first 24 hours of life
- Blood type incompatibility (Mother is type O or Rh negative)
- Preterm: Gestational age less than 37 weeks (Preterms are 5 times more likely to have bilirubin levels over 12 than 40 week newborns)
- Sibling required phototherapy
- Bruising from birth trauma (e.g., cephalohematoma)
- Breastfeeding, especially if firstborn and feeding not going well. Newborns discharged on Thursday or Friday are at highest risk, because they need to be seen on the weekend for a recheck of their jaundice (and sometimes that is overlooked).
- Asian race: Bilirubin levels over 12 occur in 23% of Asian babies, 12% of whites and 4% of African-Americans
- Recent phototherapy
- Caller mentions last bilirubin level was in "high-risk" zone

### **Kernicterus Prevention**

- Kernicterus (bilirubin encephalopathy) is the most serious complication of high bilirubin levels
- Early symptoms are lethargy, hypotonia, poor suck and high-pitched cry
- The US kernicterus registry reported 61 cases in term and near-term healthy newborns in 8 years (Johnson 2002). Currently over 120 cases (2007).
- Bilirubin levels 22-48; 31% idiopathic, 31% G6PD, 10% hematomas
- Breastfed: 59 of 61 (increased risk for dehydration and malnutrition) (97%)
- Sequelae over 90% at 18 mo (cerebral palsy, developmental delays, hearing loss)
- Lapses in follow-up care: Only 28% were given an early follow-up appointment within 2-3 days of discharge. (AAP Practice Parameter 1994 and 2004 recommends any newborn discharged before 48 hours needs a check-up within 2-3 days of discharge for jaundice, feeding behavior, weight, hydration, etc.)
- Errors in telephone care: Mothers who phoned their doctor's office for jaundice, drowsiness, poor feeding, etc. received repeated reassurance rather than being seen

### **Biliary Atresia and Other Cholestatic Etiologies: Detection**

- Current standard of care: HCPs order direct and indirect bilirubin lab tests on any baby who is still jaundiced at 2 weeks of age
- Direct (conjugated) bilirubin level is Abnormal if greater than 1.0 mg/dl
- Evaluation: referral to pediatric liver specialist
- Stools: Many of these babies also have pale, clay-colored stools

## Expert Reviewer

- Elizabeth Thilo, MD; Neonatologist; Children's Hospital Colorado, Aurora, Colorado
- The author is extremely grateful for this critical review.

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