Hyperbilirubinemia: A Regional Guideline for Screening, Testing, Treatment

October 31, 2012

Background

- Strategic planning meeting of CMNRP and its committees
- Multiple tables identified jaundice as a problem/priority
- Opportunity to get out of silos and address a common concern

Developed by CMNRP’s Jaundice Working Group

October 2012

Jaundice working group struck
- Representation from these committees:
  - Quality & Performance Management
  - Interprofessional Education & Research
  - Integrated Operations & Resources

- Brainstormed current “issues” around the table

OVER 30 ISSUES IDENTIFIED!

Key opportunities

- Bhutani nomogram not being used consistently
- Site specific requirements on timing of testing
- Inconsistent application of graphs and curves
- High numbers of repeat tests, staffing burden

What we’ve done

- Developed a regional screening guideline
  – Using current evidence and best practice
- Developed a toolkit for implementation and dissemination
- Planned indicators to track success
Next steps

- Regional rollout
  - CMNRP Conference in May
  - Series of videoconferences
  - Archived presentations, powerpoint with voice over
  - CMNRP website
  - Annual visits
- And then tackle the harder stuff....

Goal

To provide consistency in screening, testing and treatment of infants 35+0 weeks gestation and above for hyperbilirubinemia

Objectives

- To ensure universal screening and appropriate repeat testing of newborns for hyperbilirubinemia
- To utilize health care resources responsibly through timely discharge, appropriate outpatient follow-up, minimization of preventable readmission and avoidance of over-testing
- To prevent cases of bilirubin encephalopathy

Indications

Population

Inclusion
- Infants born at 35+0 weeks gestation or more in a hospital within the Champlain and South East LHINs

Exclusion
- Infants born from pregnancies with known iso-immunization
- Infants clinically requiring testing based on signs & symptoms (see caveat)

Caveat

- This is a screening procedure for well infants who do not appear overtly jaundiced
- Any infant appearing clinically jaundiced, particularly prior to 24 hours of age, should be assessed by a health care provider and have a serum bilirubin measured as clinically appropriate

Procedure

Step 1: Draw a serum bilirubin for analysis when doing the newborn screen
Step 2: Note infant’s age in hours at time of testing and gestational age at birth
Step 3: Plot bilirubin results on Hour-Specific Bilirubin Nomogram (Figure 1) to assign Bilirubin Risk Zone

Figure 1

Hour-Specific Bilirubin Nomogram

Procedure

Step 4: Determine presence or absence of the following risk factors for severe hyperbilirubinemia:
- Isoimmune or other hemolytic disease (G6PD deficiency, hereditary spherocytosis)
- Previous sibling with jaundice requiring treatment
- Cephalohematoma or significant bruising
- Exclusively breastfeeding if not well established or weight loss over 10%
- East Asian race or Black race

Procedure

Step 5:
- Consider:
  - Infant’s gestational age (GA) at birth
  - Presence or absence of risk factors above
- Follow Algorithm path A, B or C (Figure 2) to determine whether to assess for phototherapy and timing of repeat testing or clinical follow up
- Use Bilirubin Risk Zone from Step 3

Procedure

Step 6: If evaluation for phototherapy is indicated, plot serum bilirubin on Guidelines for Intensive Phototherapy (Figure 3)
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Step 6 details
- Use total bilirubin. Do not subtract direct or conjugated bilirubin
- Risk factors for bilirubin encephalopathy to consider when determining which line to follow as cutoff for treatment include:
  - Isoimmune hemolytic disease, G6PD deficiency
  - Asphyxia
  - Current and significant lethargy
  - Unresolved temperature instability
  - Sepsis currently being treated
  - Ongoing acidosis
  - Albumin <30g/L

Reminder
- Exclusive Breastfeeding DOES NOT affect treatment line
- Other factors from step 4 not listed in bullets above DO NOT affect treatment line

Figure 3
Guidelines for Intensive Phototherapy for Infants 35 weeks or more gestation

Procedure
Step 7:
If phototherapy is required, begin with high intensity of at least 30µW/cm²/nm and expose maximal surface of baby to phototherapy
- Maintain phototherapy whenever possible during feeds and other care (biliblanket)
- Interruptions to phototherapy should be limited to 20 minutes every 3 hours

Intensive Phototherapy
(irradiance ≥30µW/cm²/nm)
- Previously referred to as 'High Intensity Phototherapy Treatment'

Standard Phototherapy
(irradiance ~ 10µW/cm²/nm)
- Previously referred to as 'Low Intensity Phototherapy Treatment'
Why the new guidelines?

CASE STUDY

36 weeks gestation
- vacuum assisted
- birth weight 2900 grams
- "bruising of head"
- intention to solely breastfeed

Case Study

Case Study

Day 2
- Assessed by FP – no investigations

Day 4 @ 0600
- Not eating & lethargic
- Telephone to FP’s office
- Appointment given for early afternoon
FP appointment @ 1315:
- Jaundiced, unusual position of head

Case Study

14:10 - ED Triage Assessment:
- Lethargic, asleep
- ↓ feeding, not latching
- Slightly jaundiced newborn
- Diaper dry

14:30 - Assessment by MD:
- Total Serum Bilirubin (TSB) ordered, IV, referral to Pediatrics

Case Study

16:30 - TSB 444 µmol/l
19:20 - Lumbar Puncture (opisthotonos)
21:35 - Transferred to ward
21:50 - High intensity phototherapy
- 2 lights on infant
22:20 - TSB 482 µmol/l
23:10 - High intensity phototherapy
- 3 lights around infant

Procedure

Step 8: If phototherapy is not required, schedule next bilirubin check, if necessary, as per Figure 2
Step 9: If baby is otherwise ready for discharge, and Figure 2 indicates a repeat test or clinical assessment in 24 hours or longer, discharge home with follow up as per Figure 2
Step 10: If repeat screening is indicated as per Figure 2, as an inpatient or outpatient, repeat above procedure from Step 2

Case Study

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- Lethargic, asleep
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Case Study

Sequelae
- Seizures, hearing loss, dental dysplasia
- MRI - consistent with kernicterus
- Chronic bilirubin encephalopathy (choreo-athetoid cerebral palsy)

Experts’ Criticisms
1. No TSB in hospital prior to discharge
2. No TSB by FP on follow-up app’t
3. FP advice/timing of assessment
4. FP communication with ED
5. Delay in getting TSB in ED (14:30 → 16:20)
6. No referral to Neonatology
7. Inappropriate admitting service
8. Delay in initiating phototherapy

Prevention is Key
- Encourage breastfeeding 8-12 or more times a day for the first several days after birth
- Before discharge, assess all newborns according to established nursery protocol, for risk of developing severe hyperbilirubinemia (include TSB levels plotted on nomogram)
- Provide instructions to parents regarding how to monitor and identify jaundice and what to do
- Follow up after discharge with primary care provider is essential

Applying New Screening Guidelines

Scenario #1
Female infant born @ 36+5 weeks
- Prolonged 2nd stage - vacuum extraction
- Cephalohematoma noted at birth, otherwise normal exam
- Noted to be jaundiced @ 36 hrs of age
- TSB sent with newborn screening
- TSB = 230 µmol/l

Step 1–4
- Step 1.2: age 36 hrs @ time of TSB
- GA 36+5 Wks
- Step 3: TSB = 230µmol/l
- Step 4: risk factors include cephalohematoma
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Step 5-6

Choose Path A as GA is > 35<sup>-1</sup> < 37<sup>-6</sup> AND has a risk factor of cephalohematoma
- Step 5 – Hour specific graph (step 3) indicates the infant is in the High zone
- Step 6 – Risk factors for bilirubin encephalopathy: none

Further Management

- Start high intensity phototherapy
- Monitoring of bilirubin per physician orders
- Decrease to low intensity phototherapy when ordered
- Monitor for rebound after phototherapy discontinued

Scenario # 2

- Male infant BW - 3400g born @ 37+2 weeks
- 24 year old G2P1 with an uncomplicated pregnancy
- Maternal Blood type A Rh-positive
- Breastfeeding exclusively, well established
- Jaundice was noted at 34 hours of age and TSB sent
  - Total serum bilirubin = 128 µmol/l

Step 1 – 4

Step 1, 2
- age 34 hrs @ time of TSB
- GA 37<sup>-2</sup> weeks

Step 3
- TSB = 128 µmol/l

Step 4
- no risk factors

Choose Path B as GA is > 35<sup>-0</sup> < 37<sup>-6</sup>
- Step 3 – Put the infant in the low-intermediate zone
- Step 4 – No risk factors from list

Step 7

- TSB 230 µmol/l
- @ 36h of age
- well
- infant requires high intensity phototherapy
- Step 8-9 not applicable
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Step 8-9

- Do not need to evaluate for phototherapy
- Step 8 – Follow-up will be within 2 days
- Step 9 – Infant is ready for discharge so D/C home with follow up within 2 days

Scenario #3

- Male infant BW - 3700g born @ 39 weeks
- 24 year old G4P3 with an uncomplicated pregnancy, precipitous delivery, small amount of bruising on face
- Maternal Blood type A Rh-positive
- Breastfeeding exclusively, well established
- Jaundice was noted at 24 hours of age and TSB sent
- Total serum bilirubin = 148 µmol/l

Step 1 – 4

- Step 1-2: age 24 hrs @ time of TSB, GA 39 weeks
- Step 3: TSB = 148 µmol/l
- Step 4: no risk factors

Step 5 - 6

- Choose Path C as GA is > 38 weeks
- Step 3 – Put the infant in the high zone
- Step 6 – No risk factors from list

Step 6

- TSB 148 µmol/l @ 24 hrs of age
- 39 weeks
- Infant does not require phototherapy
- Step 7 not applicable

Step 8 - 10

- Infant was not placed under phototherapy (step 6) but requires TSB follow up in 4 – 24 hours.
- Step 9 – D/C may be delayed to repeat TSB or schedule for return visit.
- Step 10 – TSB will be repeated in 4-24 hrs, based on MD order.
- Once repeat TSB obtained, follow guideline starting at Step 2.
Goals of the new Guidelines

1. Ensure that there is universal screening for hyperbilirubinemia
2. Systematic assessment of risk factors is completed
3. Ensure appropriate repeat testing for hyperbilirubinemia while avoiding over testing
4. Utilize healthcare resources appropriately through avoidance of over testing, timely discharge appropriate outpatient follow-up and minimization of preventable readmission
5. Prevent any cases of bilirubin encephalopathy

References

Canadian Paediatric Society. (FN2007-02) Guidelines for detection, management and prevention of hyperbilirubinemia in term and late preterm newborn infants (35 or more weeks’ gestation). Paediatric Child Health 12 (Supp B May/June) 1B-12B.