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INSIDE THIS ISSUE

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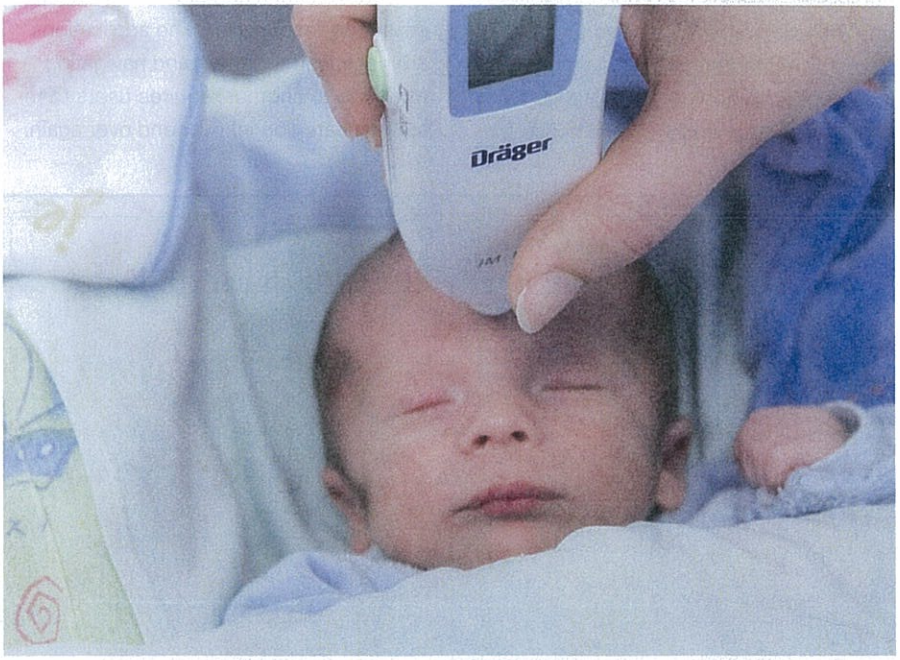
Program helps in early identification and treatment of **neonatal hyperbilirubinemia**

There are about 15,500 births per year in Calgary, and early discharge of mothers and babies is the norm: 25 per cent of women who have had vaginal births are discharged within 24 hours of delivery; an additional 60 per cent are discharged between 24 and 48 hours after delivery. Sixty-six per cent of women who have had caesarean sections are discharged within 72 hours after the birth. Early discharge has the potential to interrupt monitoring of the newborn, thereby possibly delaying the identification and treatment of hyperbilirubinemia.

According to the Canadian Paediatric Society, hyperbilirubinemia occurs in about 60 per cent of newborns of greater than 35 weeks' gestation. Although this condition is usually benign, approximately two per cent of term newborns develop severe hyperbilirubinemia, with even smaller numbers developing critical hyperbilirubinemia. However, critical hyperbilirubinemia can cause long-term neurological impairment (kernicterus).

In June 2007, the Alberta Health Services Calgary Health Region, in collaboration with Calgary Laboratory Services and the Division of Community Paediatrics, introduced the Newborn Jaundice Screening Program, a multidisciplinary approach to early identification, management and treatment of significant neonatal hyperbilirubinemia and prevention of kernicterus. The program ensures systematic assessment of all newborns, before hospital discharge, for risk of hyperbilirubinemia; it meets, and in some areas surpasses, the recommendations in the Canadian Paediatric Society's *Guidelines for Detection, Management and Prevention of Hyperbilirubinemia in Term and Late Preterm Newborn Infants (35 or more weeks' gestation)* (2007).

The initial transcutaneous bilirubinometer screen is done in an acute care postpartum site after the newborn is 12 hours old or just prior to discharge, whichever occurs first. Monitoring through repeat transcutaneous bilirubin (TcB) measurements continues after discharge during routine postpartum contacts with a public health nurse (PHN) at home or in the Postpartum Community Services (PPCS) clinic. Followup is prioritized according to the newborn's age, TcB readings and risk factors.



COURTESY OF DRAEGER MEDICAL CANADA INC.

The newborn is tested with the JM-103 Transcutaneous Jaundice Meter (TJM), which safely and accurately assesses the level of jaundice through use of dual wavelength fibre-optic technology. The testing procedure is quick, painless and reduces the need for blood tests. Properly calibrated and validated meters provide reliable readings that are then plotted on a TcB nomogram, which was developed by the medical lead of the screening program. The nomogram illustrates trends that will identify a newborn who requires total serum bilirubin (TSB) measurements or additional TcB followup. The nomogram is faxed to PPCS with the Notice of Birth when the newborn is discharged. High early readings in newborns who may otherwise appear clinically well lead to phototherapy being initiated prior to discharge, avoiding a potentially much sicker newborn being readmitted at a later date.

PPCS followup involves an hour-long meeting of the family and the PHN. The session consists of a TcB reading, counselling regarding newborn feeding (especially breastfeeding support) and education about newborn jaundice. Clients with complex breastfeeding problems also have access to support from an International Board Certified Lactation Consultant.

The PHN plots subsequent readings on the nomogram and monitors the trend in the TcB value over time. The PHN may decide additional TcB testing, feeding support or a TSB measurement is needed. Using guidelines developed by the American Academy of Pediatrics, the PHN works in collaboration with pediatricians at one of the acute care sites to determine whether further followup or direct hospital admission for phototherapy is indicated. The PHN continues to monitor the baby until the TcB readings no longer indicate potential risk for hyperbilirubinemia and, if phototherapy was initiated, post discharge until the newborn is clinically well and feeding well.

Physicians who are concerned about jaundice in newborns they see in their offices are encouraged to refer them to PPCS for a TcB measurement to reduce or eliminate any unnecessary invasive procedures. A TcB result that indicates the need for a TSB is communicated back to the newborn's physician.

Program planning is carried out by a steering committee composed of medical (pediatrics), nursing and laboratory representatives; the laboratory focuses on quality control and validating the meters, nursing focuses on direct patient care, and the medical lead updates the nomogram and directs medical issues. A part-time program coordinator troubleshoots various clinical scenarios and, in some cases, acts as a liaison between members of the multidisciplinary team. She developed and maintains processes and materials for data collection and provides program information for staff, clients and other health-care services.

Calgary Laboratory Services plays a critical role in quality assurance processes for the TJM. A lab technologist, who works for the program part time, monitors the reliability of the devices. She developed and implemented a self-learning module for staff that use the meters. Competencies are monitored regularly by the nursing educators of the various staffing groups, in collaboration with the program coordinator.

PROGRAM IMPACT

The program coordinator reviewed critical TSB results (defined as > 300 µmol/L) between 2007 (Jan. 10 to Aug. 2) and 2008 (Feb. 28 to Sept. 4):

- The average number of critical TSBs per week in the 2007 data was 47 (range 28-62). In the 2008 data, the average number per week was 15 (range 3-31).
- The highest TSB concentration in the 2007 data was 644. In the 2008 data, the highest concentration was 462.

Since the program began, the number of readmissions of newborns for phototherapy has dropped by 18 per cent, from 164 per year prior to the program to 134, despite an increase of five to six per cent in the number of births over the same period. Acute care staff report that those who are admitted have a shorter length of stay, presumably because newborns needing treatment have been identified early on with TSB concentrations at the lower limits of the range requiring phototherapy. The result is a positive impact on newborn health and a cost saving for the health-care system.

Results of an end-user survey of acute care and public health nurses indicated the benefits of the program:

- 100 per cent of respondents said that the TcB meter was easy to use
- 88 per cent of respondents said that the TcB meter is reliable as a screening device for hyperbilirubinemia
- 95 per cent of respondents expressed overall satisfaction with the TcB meter
- 96 per cent of respondents believed that parents appreciate that the newborns are not being "poked" unnecessarily

Although the increased number of public health visits to monitor TcB readings has added to workloads, staff report that the additional contacts have provided opportunities for clients to receive much-needed additional breastfeeding support. The program steering committee, and in particular the medical lead, have been responsive to workload issues by streamlining processes and fine-tuning the nomogram to minimize unnecessary followup contacts. A full cost analysis of the program will be completed by the two-year anniversary date.

Newborns and their families in the Calgary area have benefited tremendously from the Newborn Jaundice Screening Program. Another positive component is the collaboration between nurses in acute care and community health and between nursing, laboratory and medical staff, resulting in a seamless and highly effective program. ■

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