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Risk assessment and follow-up are the keys to preventing severe hyperbilirubinemia

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In July 2004, the American Academy of Pediatrics Subcommittee on Hyperbilirubinemia published its clinical practice guideline on the management of hyperbilirubinemia in the newborn infant 35 or more weeks of gestation.[1] Although addressed primarily to a North American audience, this guideline has been accessed electronically more often than almost any other publication in Pediatrics and the key elements have been implemented in virtually every corner of the globe. The purpose of the guideline was to help the clinician implement the basic tools of identification, surveillance, and follow-up of the jaundiced newborn in order to reduce the risk of severe hyperbilirubinemia, and the guideline recommended the implementation of 10 key elements to achieve this objective.[1] If I had to identify two of the recommendations listed as the most important in achieving this goal, I would select those that call for a systematic risk assessment on every infant before discharge from the nursery and the provision of appropriate follow-up based on the time of discharge and this risk assessment.

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In this edition of Jornal de Pediatria, Punaro et al.[2] evaluate the outcome of a program, instituted at a public teaching hospital, that included a systematic risk assessment and follow-up of a population of late preterm infants. Recognizing that these infants are at most risk for hyperbilirubinemia, the investigators followed a cohort of infants from 35 0/7 to 37 6/7 weeks of gestation and identified how many subsequently returned with a total serum bilirubin (TSB) level of > 18 mg/dL.

In addition to obtaining a transcutaneous bilirubin (TcB) measurement on those who appeared jaundiced, all newborns had a TcB and/or TSB measurement on the morning of discharge (consistent with recent recommendations).[3] The timing of follow-up was determined by the predischarge TSB or TcB measurement. Because all of these infants were in a single gestational age category, as defined in the recent consensus-based expert review,[3] and information on the hour-specific TSB/TcB level was available, the only additional predictor variables that might have been taken into account were the presence or absence of other hyperbilirubinemia risk factors.[3] The risk factors that are part of the suggested algorithm for management include 1) exclusive breastfeeding, particularly if not going well, or excess weight loss > 8-10% of birth weight, 2) presence of hemolytic disease, 3) history of a previous sibling with jaundice, 4) cephalhematoma or bruising and, 5) East Asian race.[3]

As 93% of the infants in this study were exclusively breastfed, this could not be used as a risk factor or a predictor variable. Nevertheless, greater weight loss between birth and the first follow-up visit (presumably a reflection of less efficient breastfeeding) was the only independent predictor

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of readmission for phototherapy with a relative risk of 1.16 (confidence interval: 1.04-1.17).

For follow-up, the protocol required infants with TSB levels > 95th percentile to be seen within 24 hours but there was no requirement for a TSB to be performed at that time. Those with TSB levels between the 75th and 95th percentiles were seen within 48 hours and those below the 75th percentile within 48-72 hours. The study population was restricted to those who were followed in an outpatient clinic established for the follow-up of jaundiced newborns. Infants were discharged at about age 65 hours.

Of 445 newborns, 50 required phototherapy prior to discharge and an additional 74 following discharge. Thus, the total number receiving phototherapy was 124/445 (28%), a remarkably high incidence. In a recent study of a Greek population of similar gestational age, where the AAP guidelines[1] were used, only 8.5% of infants required phototherapy[4] although fewer of those infants (43%) were exclusively breastfed.

It is not surprising that infants whose TSB levels were above the 40th percentile were at a greater risk for requiring phototherapy, but the positive predictive value of a predischarge TSB above the 40th percentile is only 24%, which means that 76% of such infants did not subsequently require phototherapy. Conversely, the negative predictive value of a predischarge TSB level below the 40th percentile was 97%, suggesting that these infants require less intensive follow-up. It is important to note, however, that 3% of those with predischarge TSB levels < 40th percentile nevertheless developed TSB levels > 18 mg/dL, indicating that these infants still require appropriate follow-up and this is similar to our own experience.[5]

In spite of a rigorous risk assessment and follow-up protocol, three infants returned with postdischarge TSB levels between 25-30 mg/dL. In one infant the predischarge TSB level was above the 95th percentile and in another between the 75th-95th percentiles. According to the most recent algorithm,[3] it is recommended that infants of this gestational age, with predischarge TSB levels above the 75th percentile, should have a repeat TSB measured within 4-24 hours. As the authors note, if this had been done, these infants might have been identified earlier and received phototherapy before the TSB reached dangerous levels. One infant was G6PD deficient – a reminder of the difficulty we still have in identifying those G6PD infants who will develop severe hyperbilirubinemia.[6]

Punaro et al.[2] have demonstrated clearly that risk assessment prior to discharge, using the predischarge TSB or TcB as the main predictor, followed by a rigorous postdischarge follow-up program, will be successful in preventing extreme hyperbilirubinemia in the majority of infants, even those of gestational ages from 35 to 37 6/7 weeks. Their observed association between weight loss and hyperbilirubinemia also reminds us that ensuring effective breastfeeding during the hospital stay and following discharge is fundamental to our goal of decreasing the incidence of severe hyperbilirubinemia.[7,8] The logical next step for their program would be the addition of other risk factors to the predischarge assessment[3] and the implementation of a more structured follow-up.[3] This would add another level of assessment and surveillance and should be even more effective in preventing severe hyperbilirubinemia.

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