

Can I Stop Phototherapy for This Baby?

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The American Academy of Pediatrics (AAP) consensus-based guidelines for the initiation of phototherapy^{1,2} have been universally adopted in the United States and even applied in other countries,^{3,4} whereas several countries have developed their own phototherapy guidelines.⁵⁻⁸ Substantially less guidance, however, has been provided on when to stop birth hospitalization phototherapy to avoid retreatment. In fact, the AAP Subcommittee on Hyperbilirubinemia has acknowledged that there is no standard for discontinuation.² Evidence-based answers to this common clinical question are now provided by Chang et al⁹ in this issue of *Pediatrics*.

From 105 808 neonates born at ≥ 35 weeks' gestation at 1 of 17 Kaiser Permanente Northern California hospitals between 2012 and 2014, Chang et al⁹ identified a cohort of 7048 newborns treated with phototherapy. The objective of the study was to identify predictors of "rebound," defined as a return to treatment threshold levels within 72 hours of discontinuation of a neonate's first round of phototherapy treatment. These data were then used to create a score that could predict the probability of rebound and help clinicians decide when to discontinue phototherapy. The rich electronic dataset available to the researchers included a number of key variables, including gestational age, sex, birth weight, feeding type, direct antiglobulin test results, and details regarding the initiation, course, and termination of phototherapy. Total serum and direct bilirubin data were also included.

With 4.6% of the sample experiencing a return to treatment threshold after cessation of phototherapy, Chang et al⁹ identified multiple significant predictors of rebound hyperbilirubinemia, including Asian race and exclusive breastfeeding, but their parsimonious prediction score was formulated using only 3 variables: gestational age, age at phototherapy initiation, and "relative" total serum bilirubin (level at cessation minus the AAP phototherapy threshold). Specifically, a gestational age of < 38 weeks and higher relative serum bilirubin were associated with an increased likelihood of rebound hyperbilirubinemia, whereas older age at phototherapy initiation was protective. These observations are consistent with those of other studies,^{10,11} and the fact that infants with hemolytic disease-associated hyperbilirubinemia are much more likely to both require early phototherapy and experience a rebound. The prediction score calculated from these variables generated thresholds where rebound hyperbilirubinemia was highly unlikely, something that can easily be included in the clinical care of such neonates. Importantly, use of this score could have resulted in a 1-day shorter hospital stay for roughly one-third of those treated with phototherapy, something that would be desirable for all stakeholders.

Numerous previous studies have analyzed the bilirubin rebound after phototherapy,¹⁰⁻¹⁵ but none have approached the sample size studied by Chang et al.⁹ In addition, comparisons with these studies are difficult because of differences in the populations studied, the bilirubin

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levels chosen for phototherapy termination, and the criteria used to define rebound. In some institutions, about half of the infants receiving phototherapy for the first time are those who are readmitted,¹⁰ a population in whom the primary cause for hyperbilirubinemia is much less likely to be active hemolysis and in whom the risk of rebound is much lower.¹⁰ In the Chang et al study,⁹ 62% of infants received their phototherapy during their birth hospitalization. Because of the strong association between older age and less rebound, we assume that many of the older infants were those readmitted for their first course of phototherapy, although the authors do not specifically address this issue.

This prediction rule for rebound hyperbilirubinemia comes at a time when innovation around well newborn care has been increasing, providing evidence-based and guideline-based tools to improve patient care. After publication of the Bhutani nomogram for neonatal hyperbilirubinemia,¹⁶ Web-based tools, such as Bilitool (www.bilitool.org), became routinely used in daily clinical care. More recently, the Newborn Sepsis calculator^{17,18} (<https://neonatalsepsiscalculator.kaiserpermanente.org/>) and Newborn Weight Tool^{19,20} (www.newbornweight.org) have helped clinicians adapt evidence on sepsis risk and newborn weight loss into mobile platforms that can inform clinical care in real-time. The formula used in the new prediction rule for rebound hyperbilirubinemia is simple and easy to use, and has similar potential to influence clinical care for those newborns receiving phototherapy.

ABBREVIATION

AAP: American Academy of Pediatrics

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