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Hospital Readmission among Late Preterm Infants: New Insights and Remaining Questions

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Late preterm infants (LPI), born at 34 to 36 6/7 weeks' gestation, account for the majority of preterm births (73%) in the United States[1]. Given their physiologic immaturity, LPI are at increased risk of respiratory distress, hyperbilirubinemia, hypoglycemia, and other complications in the neonatal period and are at increased risk of hospital readmission in the first month of life.[2] As Amsalu and colleagues describe in this month's issue of *Hospital Pediatrics*,[3] identification of a predictive model to differentiate late preterm infants at higher risk of complications would help inform tailored discharge plans and prevent readmissions.

The authors conducted a large retrospective cohort study of almost 3 million infants, 172,902 of whom were born late preterm from 2011 to 2017, across the state of California. They used descriptive statistics and Chi square tests to characterize the timing and precipitators of hospital readmissions among late preterm infants. The Mann-Kendall trend test was used to assess temporal trends, and multivariable logistic regression was used to estimate adjusted odds ratios for jaundice-specific and all cause readmission, with reverse stepwise selection to simplify the variables in the model. Model performance was evaluated by estimating the c-statistic.

Odds of readmission among late preterm infants were over twice that of term infants (OR 2.28 [95% CI 2.23–2.33]). Readmission rate varied by gestational age with 35-week infants having the highest rate (6.5%) followed by 34- or 36-week infants (5.7%). Reasons for readmission included jaundice (52%), infections (13%), and respiratory complications (4%). An increase in both all-cause and jaundice-specific readmission among late preterm infants between 2011 to 2017 was identified. In the adjusted model, factors associated with greater odds of readmission included assisted vaginal birth, maternal age ≥34 years, chorioamnionitis, diabetes, and primiparity.

This study had significant strengths. For one, the large sample size with administrative data from the California Office of Statewide Health Planning and Development, allowed for examination of multiple potential predictors at once. Likewise, the study population was diverse and the variables were from administrative records and not self-report.

However, this study also had multiple limitations inherent to research relying on administrative data, and the final predictive model of neonatal readmission demonstrated

poor discriminatory ability (c-statistic 0.573 [95% CI: 0.567–0.579]). This is likely due to missing key clinical information relevant to readmission risk including feeding and weight loss status, bilirubin screening, and treatments during birth hospitalization. Given that hyperbilirubinemia was a key indication for readmission in this cohort, the lack of data on bilirubin testing and phototherapy use is particularly salient. At least two recent studies have suggested that among late preterm and term newborns, simple models comprised only of gestational age, total serum bilirubin level, and the AAP phototherapy threshold for age may be highly predictive[4,5] of readmission. Because infants admitted to a neonatal intensive care unit (NICU) were excluded from the current study, selection bias is also a potential limitation due to variability in NICU admission practices across hospitals[6,7].

Results of the current study underscore the continued vulnerability of late preterm infants, particularly in the setting of pregnancy complications including maternal diabetes, chorioamnionitis, and instrumentation at delivery. Hospital-level practices related to caring for these subgroups, including specialized care pathways, approaches and resources for lactation, and level of nursing support, are unmeasurable in administrative data, but would potentially inform key areas of intervention and future research in improving newborn care.

A particularly notable finding of the current study is the increasing temporal trend for readmission risk among late preterm infants. The authors suggest that previous policy interventions such as those aimed at prolonging minimum hospital stays and standardizing hyperbilirubinemia screening have fallen short of their desired effect. However, it is also possible that an increased awareness of potential risks for late preterm infants has led to more intensive outpatient surveillance and a reduced clinical threshold for readmission. As the authors allude, newborn readmission is a tricky outcome because its relationship to healthcare quality depends on the extent to which families have trust in and access to the health care system.

The next steps in research for late preterm newborns involve prospective, intervention-based studies. A large sample of newborns would be required to detect a clinically meaningful decrease in readmission risk, potentially using a QI collaborative or other multicenter approach.[8] This would allow multiple birth hospitals assess their practices and policies for phototherapy, NICU admission, lactation support, discharge planning, etc., identify opportunities to standardize or improve care, and measure patient-level outcomes. Such a study would be ideal for implementation in the Better Outcomes through Research for Newborns (BORN) network, which represents >400,000 births annually (10% of all US births) and has already demonstrated care of the late preterm infant to be a research topic of high priority.[9]

In conclusion, LPIs remain an important population of focus. It remains difficult to identify actionable interventions based on secondary analysis of administrative data. Given the challenges in developing a predictive model from the variables available in administrative datasets, a focus on hospital-level approaches is needed to help optimize care for late preterm infants.

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