Early Pulse Oximetry Data Improves Prediction of Death and Adverse Outcomes in a Two-Center Cohort of Very Low Birth Weight Infants

Background: We previously showed, in a single-center study, that early heart rate (HR) characteristics predicted later adverse outcomes in very low birth weight (VLBW) infants. We sought to improve predictive models by adding oxygenation data and testing in a second neonatal intensive care unit (NICU).

Methods: HR and oxygen saturation (SpO_2) from the first 12 hours and first 7 days after birth were analyzed for 778 VLBW infants at two NICUs. Using multivariate logistic regression, clinical predictive scores were developed for death, severe intraventricular hemorrhage (sIVH), bronchopulmonary dysplasia (BPD), treated retinopathy of prematurity (tROP), late-onset septicemia (LOS), and necrotizing enterocolitis (NEC). Ten HR-SpO_2 measures were analyzed, with first 12 hours data used for predicting death or sIVH and first 7 days for the other outcomes. HR-SpO_2 models were combined with clinical models to develop a pulse oximetry predictive score (POPS). Net reclassification improvement (NRI) compared performance of POPS with the clinical predictive score.

Results: Models using clinical or pulse oximetry variables alone performed well for each outcome. POPS performed better than clinical variables for predicting death, sIVH, and BPD (NRI > 0.5, $p < 0.01$), but not tROP, LOS, or NEC.

Conclusion: Analysis of early HR-SpO_2 characteristics adds to clinical risk factors to predict later adverse outcomes in VLBW infants.