

# Development and Evaluation of Risk Prediction Models for Retinopathy of Prematurity Using Postnatal Weight Gain

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## Abstract

Retinopathy of Prematurity (ROP) is a leading cause of childhood blindness. Infants with birth weight (BW) <1501 gm or gestational age (GA)<32 wks receive stressful, resource-intensive, serial diagnostic eye exams, but these criteria have low predictive value for severe ROP. Slower than expected increases in serum hormone IGF1 are associated with higher ROP risk. Postnatal weight gain (a good IGF1 surrogate) can be used to improve prediction, but how to best incorporate such longitudinal, repeated, weekly or daily measures into a prediction model is unclear. We developed two models that use weight gain in distinct ways. One uses BW, GA, and the preceding week's weight gain to predict risk of severe ROP on a weekly basis until risk is above an alarm level, indicating a need for exams. The second adapts a method used by Lofqvist et al. to calculate cumulative deviations of weekly weights from an expected growth curve of infants without ROP; deviation above an alarm level triggers secondary BW and GA screening criteria. We compared the two approaches based on sensitivity, specificity, reduction in eye exams, and time from alarm to ROP, using data from a multicenter clinical trial.

*Keywords:* Predictive model; Longitudinal measures; Retinopathy of prematurity; Neonatology; Ophthalmology.

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