

CLINICAL PREDICTIVE MODELING IN CHILDREN

Benjamin D, DeLong E, Duke University Clinical Research, Durham, United States, Steinbach W, Cotten C, Duke University Pediatrics, Durham, United States, Walsh T, National Cancer Institute, Bethesda, MD, United States, Durham, United States, Clark R, Pediatrix Medical Group, Inc.

Background: Neonatal candidemia is difficult to diagnose and often fatal. Empirical antifungal therapy is associated with improved survival in neonates and patients with fever and neutropenia. Although guidelines for empirical therapy exist for patients with fever and neutropenia, these do not exist for neonates.

Design: Multi-center retrospective cohort study of neonatal intensive care unit patients (N=6,172). We evaluated all blood cultures (N=21,233) from neonates older than day of life 3 with birthweight \leq 1250 grams, and performed multivariable conditional logistic regression of risk factors for candidemia. From the regression modeling coefficients, we developed a candidemia score.

Results: In multivariable modeling, thrombocytopenia [Odds Ratio (OR)=3.56; 95% Confidence Interval (CI) 2.68, 4.74] and cephalosporin or carbapenem use in the seven days prior to obtaining the blood culture (OR=1.77; 95%CI=1.33,2.29) were risk factors for subsequent candidemia. Children 25-27 weeks estimated gestational age [OR=2.02; 95%CI=1.52,3.05] and children born <25 weeks (OR=4.15, 95%CI 3.12,6.29) were at higher risk of developing candidemia than children born \geq 28 weeks. Children with a candidemia score \geq 2 points were classified as having a "positive" candidemia score. The candidemia score had a sensitivity of 85% and specificity of 47%.

Conclusions: We developed a clinical predictive model for neonatal candidemia with high sensitivity and reasonable specificity for candidemia. Based on our model, when a physician obtains a blood culture, all neonates <25 weeks estimated gestational age and all neonates who have thrombocytopenia at the time of blood culture should receive empirical antifungal therapy. Additionally, if a physician obtains a blood culture from a child 25-27 weeks estimated gestational age that is not thrombocytopenic but has a history of third generation cephalosporin or carbapenem exposure in the seven days prior to the blood culture, the neonate should receive empirical antifungal therapy.