

Clinical Evidence Series

The perfusion index histograms predict patent ductus arteriosus requiring treatment in preterm infants



What's different

Perfusion index histograms provide a continuous, time-distribution assessment of systemic perfusion, capturing dynamic hemodynamic variability that is not apparent from isolated PI values.



Interpretation

Increased variability in PI (alternating low and high values) was associated with hsPDA requiring treatment, suggesting that trend-based perfusion monitoring may enable earlier identification of clinically significant shunts.



Key takeaways

Distinct PI histogram patterns predicted treatment-requiring PDA with 77% sensitivity and 96% specificity (AUC 0.88).



Background

- Patent ductus arteriosus (PDA) is common in preterm infants and can significantly impact systemic perfusion and clinical outcomes
- Identification of hemodynamically significant PDA (hsPDA) typically relies on echocardiography, which may not be continuously available and requires specialized expertise
- Perfusion index (PI), derived from pulse oximetry and, when assessed as histograms over time, may capture dynamic hemodynamic changes more effectively than isolated measurements



Study design and methods

- Prospective observational study including 34 preterm infants ≤ 29 weeks' gestation undergoing evaluation for PDA
- Continuous monitoring of PI using pulse oximetry, with daily histogram analysis across three phases: before treatment, during treatment, and after PDA closure
- Histogram findings based on time spent in different PI ranges were correlated with echocardiographic evidence of hsPDA and clinical treatment decisions



Objectives

Assess the utility of PI histogram patterns to identify preterm infants at risk for PDA requiring intervention.



Results



Perfusion pattern:

Infants with hsPDA showed greater time at low PI (<0.4) and high PI (>2) before treatment



Dynamic instability:

Alternating periods of low and high PI reflect fluctuating shunt physiology in hsPDA



Threshold performance:

PI <0.4 for $>10\%$ of time plus PI >2 for $>8\%$ predicted treatment-requiring PDA with 77% sensitivity and 96% specificity (AUC 0.88)