

Clinical Evidence Series

Oxygen saturation histograms predict nasal continuous positive airway pressure-weaning success in preterm infants



What's different

Histogram monitoring provides a quantitative, time-distribution view of oxygen saturation, allowing clinicians to assess respiratory status using pattern-based oxygenation data rather than single measurements or indirect clinical markers.



Interpretation

Higher time spent at elevated oxygen saturations (>95%) was associated with successful CPAP weaning, suggesting that histogram-based oxygenation patterns may offer a more predictive marker of weaning readiness than traditional criteria.



Key takeaways

Time spent with oxygen saturations >95% predicted CPAP weaning success



Background

- Determining readiness for CPAP weaning in preterm infants remains challenging leading to high failure rates
- Conventional indicators (e.g., FiO_2 requirements, apnea frequency) may not reliably predict weaning success
- Oxygen saturation histograms provide a quantitative view of oxygenation patterns over time, offering a potential tool to improve weaning decisions



Study design and methods

- Prospective observational case-control study in a NICU setting including 36 preterm infants ≤ 30 weeks' gestation
- Compared infants who successfully remained off CPAP versus those requiring reinstitution within 7 days
- Oxygen saturation histograms were collected from bedside monitors in the 24 hours prior to CPAP discontinuation



Objectives

Evaluate the ability of histogram-derived oxygen saturation patterns to identify CPAP weaning readiness.



Results



Oxygenation patterns:

Infants successfully weaned from CPAP spent more time with higher oxygen saturations, particularly in the 95-97% (32% vs. 19%) and 97-100% (21% vs. 6%) ranges ($p < 0.0001$)



Predictive performance:

Time spent with saturations >95% independently predicted success (OR 1.046 per 1% increase)



Threshold performance:

Spending $\geq 31.6\%$ of time with oxygen saturation >95% predicted weaning success with 75% sensitivity and 75% specificity (AUC 0.79)