PHILIPS

Clinical Evidence Series

Pulse Oximetry Histogram Profiles Before and After Red Blood Cell Transfusion in Very Preterm Infants: A Prospective Observational Cohort

What's different

Continuous pulse oximetry histograms can quantify cumulative oxygen exposure before and after transfusion, including time spent in hypoxemia, target-range oxygenation, and hyperoxemia.

Interpretation

RBC transfusion did not produce a consistent improvement in oxygenation stability as measured by SpO_2 histograms. Higher-risk infants, particularly those with BPD and birth weight <1000 grams, demonstrated persistent oxygenation instability following transfusion.

Key takeaways

SpO_2 histograms may help identify preterm infants who remain at risk for hypoxemia and hyperoxemia after transfusion.

Background

- Oxygenation instability is common in very preterm infants and has been associated with adverse outcomes including bronchopulmonary dysplasia (BPD) and retinopathy of prematurity (ROP)
- RBC transfusion is frequently used to treat anemia of prematurity, but its impact on oxygenation stability remains unclear
- SpO_2 histograms provide a practical method for quantifying cumulative exposure to hypoxemia, normoxemia, and hyperoxemia using standard bedside monitoring supported by training

Objectives

Assess changes in SpO_2 histogram profiles following RBC transfusion and evaluate differences among clinically relevant subgroups

Study design and methods

- Prospective observational cohort study conducted in a single-center NICU in Türkiye
- 33 infants born <32 weeks gestation received a standardized RBC transfusion (15 mL/kg).
- Continuous SpO_2 histograms were analyzed 24 h before transfusion and 24, 48, and 72 h after transfusion

Results

Hematologic response: Hemoglobin increased from 8.6 to 11.7 g/dL and hematocrit increased from 25.6% to 35.8%, confirming effective correction of anemia.

Oxygenation stability: Histogram changes were modest and not statistically significant. Normoxemia increased numerically while hypoxemia decreased numerically after transfusion.

High-risk infants: Infants with BPD had greater hypoxemia and hyperoxemia exposure than infants without BPD ($p = 0.023$ and 0.037) and infants <1000g demonstrated persistently higher hypoxemia throughout follow-up ($p = 0.046$).

Çolak, N., Konak, M., & Uygun, S. S. (2026). Pulse Oximetry Histogram Profiles Before and After Red Blood Cell Transfusion in Very Preterm Infants: A Prospective Observational Cohort. Children, 13(2), 167. https://doi.org/10.3390/children13020167