

Clinical Evidence Series

Oxygenation instability assessed by oxygen saturation histograms during supine vs prone position in very low birthweight infants receiving noninvasive respiratory support



What's different

SpO₂ histograms provide a quantitative assessment of oxygenation stability over time, allowing clinicians to evaluate physiological responses to intervention (e.g., positioning) beyond single-value SpO₂ readings.



Interpretation

Prone positioning was associated with reduced oxygenation instability and less hypoxemia, suggesting that body position can influence oxygenation patterns, while histogram monitoring permits objective identification of these effects.



Key takeaways

Oxygenation instability was lower in prone vs. supine position (29% vs. 59% unstable histograms) with reduced hypoxemia and increased time at higher oxygen saturations.



Background

- Preterm infants on noninvasive respiratory support frequently experience oxygenation instability, which may not be fully captured by intermittent SpO₂ monitoring
- Maintaining target oxygen saturation ranges is challenging but critical to reducing risks such as retinopathy of prematurity and bronchopulmonary dysplasia



Study design and methods

- Prospective crossover study in the NICU setting including 23 VLBW infants receiving noninvasive respiratory support
- Each infant served as their own control across alternating prone and supine positions
- Oxygenation stability assessed using SpO₂ histograms from bedside monitors, including classification of stable vs unstable patterns and time spent in saturation ranges



Objectives

Evaluate oxygenation stability using SpO₂ histograms in VLBW infants during prone versus supine positioning.



Results



Oxygenation stability: Unstable histograms were more common in supine vs. prone position (59% vs. 29%, $p = 0.02$)



Hypoxemia exposure: Time spent in lower saturation ranges increased in supine position (SpO₂ <80% and <90%, $p < 0.001$)



Higher saturation range: Time spent with SpO₂ >94% was greater in prone position compared to supine position



Position effect: Switching from supine to prone reduced instability, while prone to supine increased instability ($p = 0.02$)

Miller-Barmak A, Riskin A, Hochwald O, Haddad J, Dinur G, Vortman R, Kugelman A, Borenstein-Levin L. Oxygenation instability assessed by oxygen saturation histograms during supine vs prone position in very low birthweight infants receiving noninvasive respiratory support. J Pediatr. 2020;226:123-128. doi:10.1016/j.jpeds.2020.06.066.