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Oxygen Saturation Policy in the NICU

Oxygen is a drug and oxygen toxicity can have significant adverse effects in preterm infants including bronchopulmonary dysplasia (BPD) and retinopathy of prematurity (ROP). Each NICU should have a policy for targeting oxygen saturation in neonates and implementation of such guidelines has shown reduction in the incidence of severe ROP.[1]

Evidence on oxygen saturation targeting

Five major randomized controlled trials, the SUPPORT Study, the Benefits of Oxygen Saturation Targeting (BOOST II) trial and the Canadian Oxygen Trial (COT) compared two SpO_2 target ranges—low (85–89%) vs. high (91–95%)—involving around 5000 preterm neonates of <28 weeks of gestation. The results have been pooled in a meta-analysis called the NEOPROM[2] project which showed no significant difference between the lower and higher SpO_2 target range on the primary composite outcome of death or major disability at a corrected age of 18–24 months. However, neonates randomized to the lower SpO_2 target range had a higher risk of death and necrotizing enterocolitis, but a lower risk of retinopathy of prematurity. This study suggests that an SpO_2 target range of 91–95% may be safer compared to 85–89% in extremely preterm infants due to a higher risk of death associated with the lower range.

IMPLICATIONS FOR PRACTICE

- The National Neonatology forum (NNF) clinical practice guidelines (CPG) recommend an oxygen saturation target of 91–95% in all neonates (both 34 weeks and >34 weeks of gestational age) requiring respiratory support.[3]
- The NNF-CPG also recommends a similar oxygen saturation target (91–95%) for preterm neonates with evolving or established BPD and requiring respiratory support.
- Oxygen therapy should always be administered based on pulse oximeter based continuous SpO_2 monitoring.

- The alarm limits should be set no more than 1 or 2% above or below the chosen target range and should always be 'on'. The upper alarm limit should always be 95% and it can be increased to 100% if the neonate is on 21% FiO_2 on respiratory support to decrease alarm fatigue.[4]
- The alarm delay should not be longer than 20 sec to ensure that significant events are not missed.
- Small incremental changes (1–5%) in FiO_2 are preferred to avoid fluctuations in SpO_2 unless oxygen saturation is below 70% or associated with apnea or bradycardia.
- Routine preoxygenation (up to 100%) for procedures such as endotracheal suction, venous cannulation, or other painful procedures should be avoided.
- When hypoxia or hyperoxia is indicated by the monitor, respond to the neonate first and the monitor next. The evaluation should include:
  - Ascertaining if there is bradycardia, apnea, or cyanosis by a clinical examination, which may warrant immediate intervention.
  - Assessing air-way patency and clear secretions, if any.
  - Ensuring if the pulse oximeter probe is attached correctly and there are no motion artifacts.
  - Adjusting the FiO_2 in small incremental steps to achieve the target saturation and
  - Addressing the underlying disease problem.
- Discuss the percentage time spent within and outside the target SpO_2 range if oxygen saturation histograms are downloadable from pulse oximeters and the frequency of desaturations over the preceding 24-hour period with the healthcare providers during daily rounds.
- Quality improvement initiatives targeting caregiver education, implementation of guidelines for oxygen administration and targeting, bedside availability of histograms, and event review during rounds can result in better oxygen saturation targeting and improved clinical outcomes.[4]

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