Section 11

Therapeutic modalities

47. Oxygen saturation policy
48. Fluid and electrolyte management
49. Invasive mechanical ventilation
50. Continuous positive airway pressure (CPAP)
51. Nasal intermittent positive pressure ventilation (NIPPV)
52. Heated humidified high flow nasal cannula
53. Other oxygen delivery systems
54. Kangaroo mother care
55. Surfactant replacement therapy
56. Parenteral nutrition
57. Blood component therapy
58. Developmental supportive care
59. Pain assessment and management
60. Umbilical cord blood banking

47 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]

What is the evidence on oxygen saturation targeting?

Five major randomized controlled trials, including the (NICHD) SUPPORT Study, the Benefits of Oxygen Saturation Targeting (BOOST II) trial, which covered the UK, Australia and New Zealand, and the Canadian Oxygen Trial (COT) compared two SpO_2 target ranges – low (85–89%) vs. high (91–95%) – in a large number of infants <28 weeks of gestation. The results have been pooled in a meta-analysis (NEOPROM[2]). In total, 4,911 infants with a mean gestation of 26 weeks and mean birth weight of 850 grams were enrolled. The meta-analysis concluded that low SpO_2 target is associated with higher mortality (RR 1.18; 95% CI 1.04–1.34) and higher risk of NEC (RR 1.25; 95% CI1.05–1.49) but lower risk of ROP (RR 0.74; 95% CI 0.59–0.92).

Implications for practice[3]:

1. Aim should be to avoid both hypoxia and hyperoxia
2. Oxygen therapy should be administered based on SpO_2 monitoring
3. Target SpO_2 in preterm neonates between 90% and 95%
4. Alarm limits should be set no more than 1% or 2% above or below the chosen target range and should always be 'on'
5. Alarm delay should not be longer than 20 sec, to ensure that significant events are not missed

Change FiO_2 only in small increments of 1% to 3% to avoid fluctuations in SpO_2. A neonate with history of desaturations with handling or procedures and one with significant desaturation (SpO_2 < 70%) may require greater increments of 5% to 10%.

Fig. 47.1 and Fig. 47.2 depict a step-by-step action plan for a neonate who demonstrates high and low oxygen saturations on pulse oximeter, respectively.

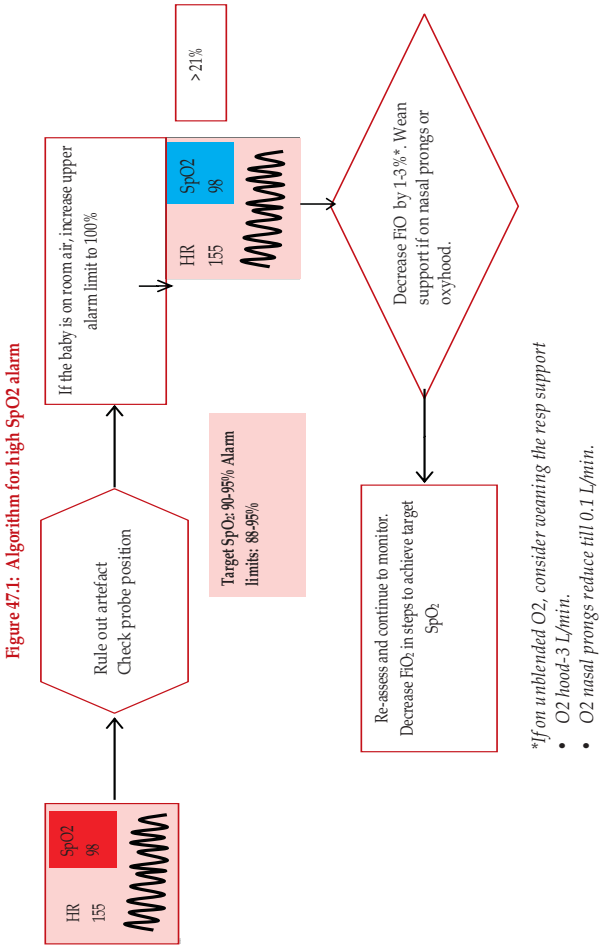
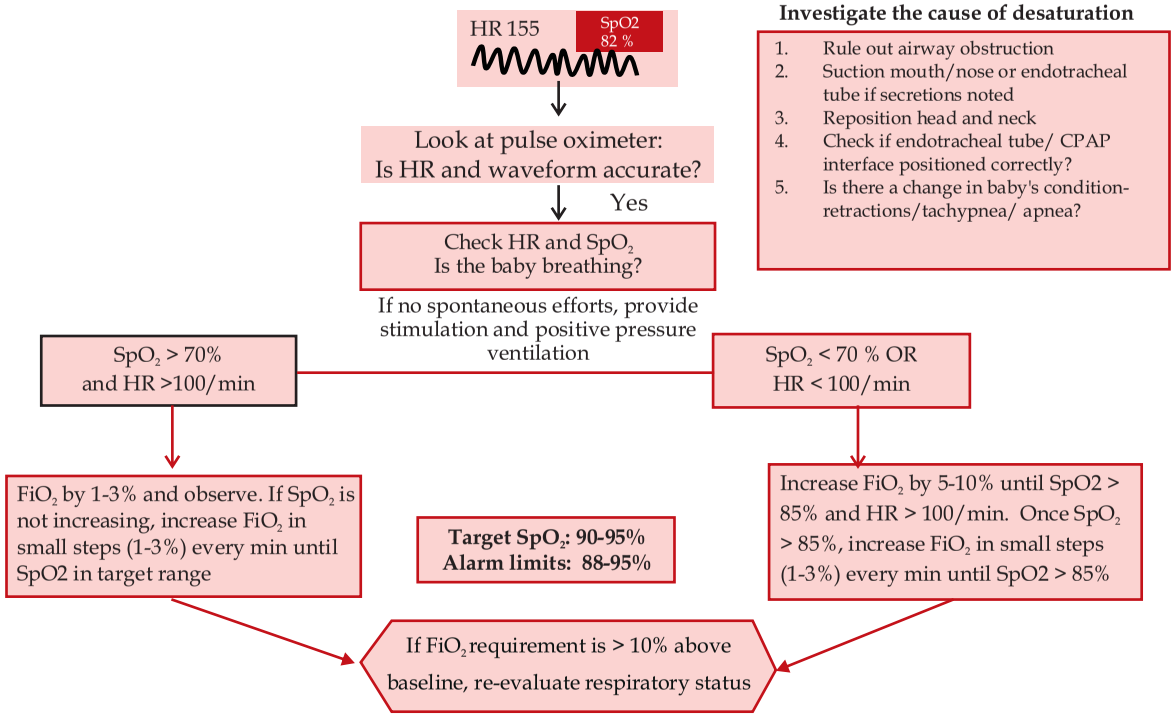


Figure 47.1: Algorithm for high SpO2 alarm

Figure 47.2: Algorithm for low SpO_2 alarm



References

1. Lau YY, Tay YY, Shah VA, Chang P, Loh KT. Maintaining optimal oxygen saturation in premature infants. *Perm J.* 2011;15(1):e108-113.
2. Saugstad OD, Aune D. Optimal oxygenation of extremely low birth weight infants: a meta-analysis and systematic review of the oxygen saturation target studies. *Neonatology.* 2014;105(1):55-63.
3. Sola A, Golombek SG, Montes Bueno MT, et al. Safe oxygen saturation targeting and monitoring in preterm infants: can we avoid hypoxia and hyperoxia? *Acta paediatrica.* 2014;103(10):1009-1018.