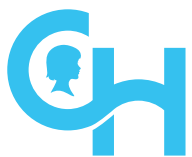




# Neonatal Oxygen Targeting Consensus



**Children's Hospital  
of Philadelphia®**  
Division of Neonatology

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## Abstract

The need for consistent care practices and improvement of Retinopathy of Prematurity (ROP) and Chronic Lung Disease (CLD) was the rationale for the oxygen targeting consensus. A group of expert stakeholders identified from participating hospitals met and reviewed evidence from recent published articles including COT, BOOST II and SUPPORT as well as a Neonatal Research Network (NRN) retrospective cohort. Using a modified Delphi method with three rounds of surveys, consensus was developed for oxygen targeting that considers the gestational age and postmenstrual age in two categories, using 32 weeks PMA as the threshold. For neonates less than 32 wks PMA on supplemental oxygen, the oxygen saturation target range is 90-94%, and those on room air is >90%. For neonates at or greater than 32 wks PMA on supplemental oxygen, the oxygen saturation target range is 92-98% and those on room air is >92%. For neonates identified with CLD at 36 wk PMA on supplementation oxygen saturations of 92-98%.

## Consensus Goals

Identify age categories for oxygen saturation target range

Identify appropriate oxygen saturation ranges for GA categories

Identify appropriate oxygen saturation ranges for infants with chronic lung disease

## Background

Controversy exists around the appropriate oxygen parameters for neonates in the neonatal intensive care unit. Data from CHOP and the CNBC Neonatal Care Network suggest need for improvement of CLD and ROP rates in comparison to the VON national data. Studies have shown that lower oxygen parameters decrease the rates of ROP in premature neonates. Recent published studies including SUPPORT and BOOST II revealed that these lower oxygen targets may increase the risk for mortality in premature neonates. The COT Study did not show any changes in mortality in the lower oxygen targeted group of premature neonates. A retrospective cohort from the NRN showed no increased morbidity or mortality in the higher oxygen targeting range following publication of the previous studies. There exists little data to support the oxygen targeting ranges for neonates with chronic lung disease.

***Previous Consensus Statement or Data from Division of Neonatology (if applicable)***

CHOP/HUP Interim Guidelines from 2011

Infants born at <30 wks gestation and /or <1250 grams at birth until they reach 36 weeks corrected age or are in room air baseline target range for oxygen saturations: 88 – 94%. At 36 weeks corrected gestational age, oxygen supplementation should be titrated to keep saturations between 92 – 95% unless baby is in room air.

## Literature Review

Title	Author	Level of Evidence	Primary Outcome	Results	Key Findings/Conclusions
SUPPORT	NICHD/NRN	Level II	Severe ROP (threshold, surgery, bevacizumab) or death before discharge	Lower target range of oxygenation (85-89%), as compared with a higher range (91-95%), did not significantly decrease the composite outcome of severe retinopathy or death, but it resulted in an increase in mortality and a substantial decrease in severe retinopathy among survivors.	The increase in mortality is a major concern, since a lower target range of oxygen saturation is increasingly being advocated to prevent retinopathy of prematurity
BOOST II	UK, Australia, and New Zealand Collaborative groups	Level II	Oxygen Saturation and Outcomes in Preterm Infants impact on death or disability at 2 years CGA	Those in the lower-target (85-89%) group for oxygen saturation had a reduced rate (compared to higher-target [91-95%]) of retinopathy of	Targeting an oxygen saturation below 90% with the use of current oximeters in extremely preterm infants was associated with an increased risk of death

Title	Author	Level of Evidence	Primary Outcome	Results	Key Findings/Conclusions
				prematurity and an increased rate necrotizing enterocolitis	
COT	Barbara Schmidt; Robin Whyte; Elizabeth Asztalos	Level II	Effects of Targeting Higher vs. Lower Arterial Oxygen Saturations on composite of death, gross motor disability, cognitive or language delay, severe hearing loss, bilateral blindness	Of the infants who were assigned to lower target range [85-89%] 51% died or survived with disability compared to the infants assigned to higher range [91-95%] 49% had the same outcome	In extremely preterm infants, targeting lower oxygen sats compared to higher, had no significant effect on the rate of death or disability at 18months.
NeoOProm Neonatal Oxygenation Prospective Meta-analysis	LM Askie et al	Level I	Oxygen saturation targets effects on death or major disability	No difference in composite death or major disability	Increased risk of death in lower target group (RR 1.17 p=0.01) Increased risk of severe NEC in lower target group (RR 0.74 p<0.001) Decreased incidence of ROP requiring treatment in lower target group (RR 1.33 p=0.003)
Association between Policy Changes for Oxygen Saturation Alarm Settings and	Foglia et al	Level IV	Policy change and neonatal morbidity	Showed no change in ROP, increase CLD/BPD, no change in mortality	Showed no change in ROP, increase CLD/BPD, no change in mortality

Title	Author	Level of Evidence	Primary Outcome	Results	Key Findings/Conclusions
Neonatal Morbidity and Mortality in Infants Born Very Preterm					

**Literature Summary**

- SUPPORT and BOOST II showed increased mortality to discharge for lower oxygen parameter group
- COT did not show difference between high and low oxygen targeting group in terms of mortality or at time of discharge
  - No interim analysis
- NRN retrospective cohort
  - No change in morbidity or mortality with implementation of high oxygen targeting

**Delphi Survey Round Results (if applicable)**

Three rounds of Delphi surveys, initially with the expert stakeholder group for Round 1 and entire Division of Neonatology for rounds 2 and 3. Able to narrow down to 2 categories for oxygen targeting based on PMA and then to determine oxygen targeting goals for Chronic Lung Disease.

**Consensus Statement and Clinical Recommendations**

- Neonates < 32+0 wk PMA
  - ON supplemental oxygen, target oxygen range of 90-94%
  - OFF supplemental oxygen, target oxygen range of > 90%
- Neonates ≥ 32+0 wks PMA
  - ON supplemental oxygen, target oxygen range of 92-98%
  - OFF supplemental oxygen, target oxygen range of >92%
- Neonates with Chronic Lung Disease > 36 +0 wks PMA
  - Oxygen targeting range of 92-98%

**Caveats**

- *For term corrected neonates, please use unit based acceptable saturations that meet critical congenital heart disease testing parameters*
- *For late preterm neonates please err on the side of clinical judgement for further evaluation for persistent desaturations*

	<b>&lt; 32+0 weeks Post Menstrual Age</b>	<b>≥ 32+0 weeks Post Menstrual Age</b>
<b>On Supplemental Oxygen</b>	90-94%	92-98%
<b>Off Supplemental Oxygen</b>	>90%	>92%

**Neonates > 36+0 wk PMA with Chronic Lung Disease: Oxygen targeting range of 92-98%**

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