**The Hierarchy of Evidence**

I Evidence obtained from a systematic review of all relevant randomised control trials.

II Evidence obtained from at least one well designed randomised control trial.

III Evidence obtained from well-designed controlled trials without randomisation.

IV Evidence obtained from well-designed cohort studies, case control studies, interrupted time series with a control group, historically controlled studies, interrupted time series without a control group or with case-series.

V Evidence obtained from systematic reviews of descriptive and qualitative studies.

VI Evidence obtained from single descriptive and qualitative studies.

VII Expert opinion from clinicians, authorities and/or reports of expert committees or based on physiology.

**Evidence Table**

<table>
<thead>
<tr>
<th>Reference (title, author, journal title, year of publication, volume and issue, pages)</th>
<th>Evidence level (I-VII)</th>
<th>Key findings, outcomes or recommendations</th>
</tr>
</thead>
</table>
• No difference in death or major disability, including blindness alone, as primary outcome in lower oxygen saturation targets (sp02 85-89%) compared to higher (sp02 91-95%) in <28 weeks.
• Incidence of death at 18-24 months corrected age is significantly higher in lower oxygen target group compared to the higher target group. Although other clinical and demographic factors likely also contributed to this outcome, researchers addressed heterogeneity of factors via pre-specified selection |
<table>
<thead>
<tr>
<th>Authors</th>
<th>Criteria and sensitive data analysis.</th>
<th>Authors recommend targeting 91-95% sp02.</th>
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</thead>
<tbody>
<tr>
<td>BOOST II: Stenson, B.J., Tarnow-Mordi, W.O., Darlow, B.A., Simes, J., Juszczak, E., Askie, L., et al. (2013).</td>
<td>Rate of death was significantly higher in the lower target group (sp02 85-89%) compared to the higher target group (sp02 91-95%) in preterm infants &lt; 28 weeks gestation.</td>
<td>Authors recommend targeting 91-95% sp02.</td>
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<td>Patient Safety Authority (USA) recommendations based on literature review.</td>
<td>Case report of a 15 month old child found to have a full thickness burn from a temperature probe being taped in situ for 2 days.</td>
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<td>50% of reported cases of pulse oximetry related burns in America were in the neonatal population.</td>
<td>The authors hypothesize that a combination of heat, pressure and reduced blood flow caused this injury. Reduced blood flow was suggested to be due to circumferential taping.</td>
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<td>Despite manufacturers recommendations that continuous pulse oximeters are safe for use on healthy tissue for 8 hours without rotation, the PSA found at least 8 cases of</td>
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significant tissue damage from its use.

- One case of a neonate receiving a second degree burn on a finger and a third degree burn to an ear where a pulse oximeter had been placed.
- A preterm infant who sustained burns to the dorsum of the foot, resulting in gangrene and the loss of four toes.


- No statistically significant difference in rate of death or major disability at 18 months when targeting a lower range (spO2 85-89%) compared to a higher target (spO2 90-95%) in preterm infants <28 weeks gestation.
- Authors recommend clinicians may target a range of 85-95% spO2 in preterm infants <28 weeks gestation, with strict alarm limits of 85-95%.

- Compared a conventional saturation target of spO2 89-94% to a supplemental target of spO2 96-99% in preterm infants with confirmed pre threshold ROP.
- The supplemental group (spO2 96-99%) did not cause an increased rate of progression of ROP.
- Supplemental targets did not significantly decrease the number of infants requiring ablative surgery for treatment of ROP.
- An increased rate of pneumonia, chronic lung disease and adverse pulmonary events requiring
hospitalisation at corrected age 3 months occurred in the supplemental group.  
- The authors note that whilst a supplemental oxygen saturation range of 96-99% may not worsen the progression of established ROP, it is associated with other pulmonary adverse events.


**II**
- The rate of death or ROP was not significantly different in the lower target group (sp02 85-89%) compared to the higher target group (sp02 91-95%) in preterm infants <28 weeks gestation.  
- However, death before discharge occurred more in the lower target group.  
- ROP occurred less in the lower target group.  
- The authors caution the use of a lower oxygen saturation target range in the preterm population, as it may lead to increased mortality.


**IV**
- Oximetry readings in the range of sp02 85-89% in the NICU have been shown to be more frequently inaccurate, arterial saturations in this range may be lower by as much as 10 points.  
- Longer time averaging algorithms used by continuous pulse oximetry devices may decrease device sensitivity to fleeting desaturations (< 30 seconds or reading <70%).  
- Pulse oximetry readings derive Sp02 from an internal algorithm using empirical
measurements of Sao2 in healthy adult subjects.
- No pulse oximeter devices use data derived from critically unwell adults nor healthy infants.
- The relationship between SaO2 and PaO2 is linear only to the point of SaO2 values <80%.
- Alarm limits set with a narrow range results in more frequent alarms and has shown to cause ‘alarm fatigue’ amongst staff, reducing responsiveness to alarms.
- The authors recommend an upper alarm limit of 95% for infants on oxygen therapy and a lower limit near to 89%.


- Supplemental oxygen therapy should be implemented, maintained and weaned to target an oxygen saturation target of equal to or greater than 90%.