Higher oxygen saturation targets did not improve growth and neurodevelopment in extremely preterm infants


Does maintenance of higher oxygen saturation (SpO\textsubscript{2}) targets (95–98%) improve growth and neurodevelopment compared with standard targets (91–94%) in extremely preterm infants dependent on supplemental oxygen?

**MAIN RESULTS**

Analysis was by intention to treat. The groups did not differ for growth outcomes or major developmental abnormalities (table), or worst retinopathy (p = 0.34). However, the higher target group had higher rates of dependence on supplemental oxygen at 36 weeks PA (table) and spent more days on oxygen (median 40 v 17.5 d, p<0.001) than those in the standard target group.

**CONCLUSION**

In extremely preterm infants who are dependent on supplemental oxygen, maintenance of higher oxygen saturation targets (95–98%) did not improve growth or neurodevelopment.

**METHODS:**

- **Design:** randomised controlled trial.
- **Allocation:** concealed.
- **Blinding:** blinded (patients, healthcare providers, data collectors, outcome assessors, monitoring committee)*
- **Follow up period:** corrected age (chronologic age plus number of wks of prematurity) at 12 months.
- **Setting:** 8 tertiary perinatal centres in Sydney, Australia.
- **Patients:** 358 infants (mean age 26.5 wks, 53% boys) who were born at <30 weeks gestational age and remained dependent on supplemental oxygen at 32 weeks postmenstrual age (PA).
- **Exclusion criteria:** major congenital abnormalities; major surgery or severe intracranial disorder diagnosed at <32 weeks PA; and multiple births with >3 eligible infants.
- **Interventions:** infants were stratified by hospital, singleton or multiple birth, and gestational age (22–27 wks or 28–29 wks) and allocated to higher SpO\textsubscript{2} targets (95–98%) (n = 180) or standard SpO\textsubscript{2} targets (91–94%) (n = 178).
- **Outcomes:** growth (mean weight, length, and head circumference); and weight <10\textsuperscript{th} percentile and major developmental abnormality (blindness, cerebral palsy, or a score on the revised Griffiths Mental Developmental Scales >2 standard deviations below the mean). Secondary outcomes included duration of oxygen therapy, worst retinopathy, and dependence on supplementary oxygen at 36 weeks PA.
- **Patient follow up:** 93%; analysis included all patients.

*Information provided by author.

**Commentary**

Increasingly, research is being done in neonatal intensive care units (NICUs) to examine clinical practices and oxygen saturation monitoring of premature infants. Most of these studies assess incidence and severity of retinopathy of prematurity (ROP) as a primary outcome. The study by Askie et al is one of the few studies that assess growth and neurodevelopmental outcomes. At 12 months corrected age, the groups did not differ for weight, length, head circumference, or frequency of major developmental abnormalities. In addition, Askie et al showed that the higher target group had increased dependence on supplemental oxygen and more days on oxygen but did not differ from the standard target group for worst ROP. However, NICUs can vary with respect to pulse oximetry monitoring. The target range used by Askie et al may differ from those used in other NICUs. The lower SpO\textsubscript{2} target of 91% is higher than those reported by Chow et al, who used SpO\textsubscript{2} targets of 85–93% to evaluate the clinical practice of oxygen management and its effects on ROP.\textsuperscript{1} As well, the study by Askie et al may not have been large enough to detect a significant difference between groups for several adverse outcomes, such as worst ROP, as it was powered to find large differences between groups.

The results of this study may prompt neonatal nurses to evaluate the oxygen monitoring practices of their own nurseries. Although the optimal SpO\textsubscript{2} range for extremely premature infants has not been identified, it appears that lower alarms settings (91–94%) may have benefits for infants, such as less respiratory support, without compromising growth and neurodevelopment. As recent ROP research is using even lower oxygen saturations, it would be interesting to repeat this study using targets of 85–93%.

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<table>
<thead>
<tr>
<th>Outcomes at 12 months corrected age</th>
<th>Higher targets (n = 180)</th>
<th>Standard targets (n = 178)</th>
<th>Mean difference (95% CI)</th>
<th>RRR (CI)</th>
<th>NNT</th>
</tr>
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<tbody>
<tr>
<td><strong>Weight (kg)</strong></td>
<td>9.25</td>
<td>9.10</td>
<td>0.15 (0.2 to 0.5)</td>
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<tr>
<td><strong>Length (cm)</strong></td>
<td>74.1</td>
<td>74.0</td>
<td>0.1 (0.8 to 1.0)</td>
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<tr>
<td><strong>Head circumference (cm)</strong></td>
<td>46.3</td>
<td>46.3</td>
<td>0.0 (0.4 to 0.4)</td>
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<tr>
<th>RRI (CI)</th>
<th>NNT</th>
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<tbody>
<tr>
<td>0.65 (0.2 to 1.6)</td>
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<tbody>
<tr>
<td><strong>Weight &lt;10\textsuperscript{th} percentile</strong></td>
<td>33%</td>
<td>37%</td>
<td>11.4% (34–19)</td>
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<tr>
<td><strong>Major developmental abnormality</strong></td>
<td>23%</td>
<td>24%</td>
<td>3.7% (34–41)</td>
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<tr>
<th>RRI (CI)</th>
<th>NNH (CI)</th>
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<tr>
<td>0.42 (0.1 to 1.6)</td>
<td>1.0 (4 to 23)</td>
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</table>

*PA = postmenstrual age, other abbreviations defined in glossary. RRI, NNH, and CI calculated from data in article.

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