TREATMENT

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


Does maintenance of higher oxygen saturation (SpO₂) targets (95–98%) improve growth and neurodevelopment compared with standard targets (91–94%) in extremely preterm infants dependent on supplemental oxygen?

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 SpO₂ targets (95–98%) (n = 180) or standard SpO₂ targets (91–94%) (n = 178).
- Outcomes: growth (mean weight, length, and head circumference; and weight <10th 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.

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.

**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 oxygen monitoring practices of their own nurseries. Although the optimal SpO₂ 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 lower SpO₂ targets of 85–93% to evaluate the clinical practice of oxygen management and its effects on ROP. 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 SpO₂ 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%.

Carol Botwinski, RNC, EdD(c), MS, ARNP

All Children’s Hospital

St Petersburg, Florida, USA


Higher oxygen saturation targets (95–98%) v standard saturation targets (91–94%) for extremely premature infants

<table>
<thead>
<tr>
<th>Outcomes at 12 months corrected age</th>
<th>Higher targets</th>
<th>Standard targets</th>
<th>Mean difference (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (kg)</td>
<td>9.25</td>
<td>9.10</td>
<td>0.15 (–0.2 to 0.5)</td>
</tr>
<tr>
<td>Length (cm)</td>
<td>74.1</td>
<td>74.0</td>
<td>0.1 (–0.8 to 1.0)</td>
</tr>
<tr>
<td>Head circumference (cm)</td>
<td>46.3</td>
<td>46.3</td>
<td>0.0 (–0.4 to 0.4)</td>
</tr>
<tr>
<td>RRR (CI)</td>
<td></td>
<td>NNT</td>
<td></td>
</tr>
<tr>
<td>Weight &lt;10th percentile</td>
<td>33%</td>
<td>37%</td>
<td>Not significant</td>
</tr>
<tr>
<td>Major developmental abnormality</td>
<td>23%</td>
<td>24%</td>
<td>Not significant</td>
</tr>
<tr>
<td>RRR (CI)</td>
<td></td>
<td>NHH (CI)</td>
<td></td>
</tr>
<tr>
<td>Dependence on supplemental oxygen at 36 wks PA</td>
<td>64%</td>
<td>46%</td>
<td>40% (16 to 70)</td>
</tr>
</tbody>
</table>

*PA = postmenstrual age; other abbreviations defined in glossary. RRI, NNH, and CI calculated from data in article.
Higher oxygen saturation targets did not improve growth and neurodevelopment in extremely preterm infants

Evid Based Nurs 2004 7: 41
doi: 10.1136/ebn.7.2.41

Updated information and services can be found at:
http://ebn.bmj.com/content/7/2/41

These include:

References
This article cites 2 articles, 1 of which you can access for free at:
http://ebn.bmj.com/content/7/2/41#BIBL

Email alerting service
Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

Topic Collections
Articles on similar topics can be found in the following collections

- Child health (466)
- Infant health (122)
- Neonatal health (66)
- Cerebral palsy (11)
- Neonatal intensive care (19)
- Ophthalmology (36)

Notes

To request permissions go to:
http://group.bmj.com/group/rights-licensing/permissions

To order reprints go to:
http://journals.bmj.com/cgi/reprintform

To subscribe to BMJ go to:
http://group.bmj.com/subscribe/