

Cochrane Review Summary: Positioning for Acute Respiratory Distress in Hospitalised Infants and Children

Cochrane summaries are based on new and updated systematic reviews published in The Cochrane Library. The summary must be read in conjunction with the full review when making decisions. The authors' conclusions are summarised but have not been reinterpreted.

Clinical context

An association has been established between prone positioning and sudden infant death syndrome (SIDS) which has led to the recommendation that young infants be positioned supine. Yet, the prone position has been shown to improve the arterial oxygenation in older infants and children with respiratory distress. Due to structural and physiological immaturity, the respiratory mechanics differ between adults and children, which means that the risks and benefits of positioning in the younger age group may have more clinical significance. Given the SIDS recommendations for supine positioning in young infants and the benefits associated with prone positioning with respiratory distress, a systematic review of the literature was necessary to guide clinical practice in hospitalised infants and children.

The aim of this Cochrane Review was to compare the effects of different body positions (prone, supine, lateral, elevated and flat) on infants and children hospitalised with acute respiratory distress. The search for this review was updated in August 2008.

Inclusion criteria

Studies

Randomised, or pseudo randomised controlled trials comparing two or more positions in the management of acute respiratory distress in hospitalised infants and children.

Participants

Infants and children aged 16 years or under diagnosed with acute respiratory distress or an acute exacerbation of a chronic respiratory illness. Subgroup analyses were undertaken by respiratory condition, (e.g. for hyaline membrane disease, bronchiolitis, croup and pneumothorax,) age categories and ventilatory support.

Intervention

Body positioning used for infants and children with acute respiratory distress including sitting (erect and non-erect), prone, semi-prone, horizontal (flat) and head elevated, lateral/side-lying position - horizontal (flat) and head elevated, supine (horizontal (flat) and head elevated), recumbent/semi-recumbent, kinetic positioning (ie continuous postural therapy) and body tilting.

Outcomes

Blood gases (PaCO₂ and PaO₂), oxygen saturation (SaO₂), oxygenation indices (PaO₂/FiO₂), respiratory rate (RR), respiratory effort, heart rate (HR), %FiO₂, duration of supplemental oxygenation, intensive care unit (ICU) admission, length of hospital stay, mortality, episodes of apnoea, haemodynamic parameters and ventilatory parameters.

Results

Twenty three studies with 560 infants and children were included in the review. A randomised cross-over design comparing supine, prone lateral, elevated and flat positions was used in 19 studies and 4 parallel group randomised studies compared only supine and prone positions. 74% of the participants were preterm neonates, and most of these neonates were mechanically ventilated (71%). The remaining participants were aged between one month and 16 years, and most of these infants and children were mechanically ventilated (84%).

Risk of bias: Only three trials used adequate allocation concealment with 20 unable to be determined.

Eight studies showed a statistically significant improvement in oxygen saturation for infants positioned in the prone position compared with the supine position (MD 2.06%, 95% CI 1.06 to 3.06). Most of the participants in these studies were preterm infants with respiratory distress (84%). The only study which measured PaO₂ showed a statistically significant increase in the prone position (MD 6.24 mm Hg, 95% CI 2.20 to 10.28) compared to supine. Three studies could not demonstrate a significant difference in transcutaneous PCO₂ in preterm infants receiving mechanical ventilation nursed either prone or supine. In the one study which analysed oxygen index in 10 children aged two months to 11 years requiring mechanical ventilation for moderate to severe acute respiratory failure, they found the index improved once the children were nursed prone for 6 hours, and that the improvement was sustained for up to 12 hours. Respiratory rate decreased in five studies when infants were nursed prone compared to supine (MD -3.82 breaths/min, 95% CI -5.92 to -1.71). Participants nursed prone had statistically significant less desaturation events (SaO₂<80%) in 2 studies (MD -3.46, 95% CI -4.60 to -2.33) compared with the supine position.

Since only 3 studies collected data from children over one year of age, the authors believed that the ability to generalise the results was limited.

No statistically significant differences were demonstrated for any of the outcomes with other positions.

Authors' conclusions

Implications for practice

The authors concluded that the prone position provides considerable short and medium term oxygenation benefits for hospitalised, ventilated preterm

infants. Extrapolation of benefit beyond this group of infants is not possible due to the limited studies. Because of the association of the prone position with SIDS in young infants, the authors recommend that all hospitalised infants nursed in the prone position receive continuous cardio respiratory monitoring.

Implications for research

There is a need for more research with larger sample sizes, and a range of age groups to answer the questions regarding the effect of other positions on oxygenation.

Summarised from: Gillies D, Wells D. Positioning for acute respiratory distress in hospitalised infants and children. *Cochrane Database of Systematic Reviews* 2005, Issue 2. Art. No.: CD003645. DOI: 10.1002/14651858.CD003645.pub2.

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