Effectiveness of Bubble Continuous Positive Airway Pressure for Treatment of Children Aged 1–59 Months with Severe Pneumonia and Hypoxemia: A Systematic Review and Meta-Analysis of Randomized Controlled Trials

Systematic Review

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ABSTRACT

OBJECTIVE

Continuous positive airway pressure (CPAP) is a standard treatment for children with moderate to severe respiratory distress; however, ventilators are often unavailable in developing countries. Bubble CPAP (bCPAP) is considered a simple, cost effective and less invasive alternative to CPAP, however, its efficacy has not been assessed for children with pneumonia until recently. This meta-analysis aims to compare the effectiveness of bCPAP with low-flow oxygen for treating severe pneumonia and hypoxemia in children.

METHODS

PubMed, EMBASE, Cochrane Library, Web of Science, and CENTRAL were searched to identify eligible randomized controlled trials reported up to March 23, 2024. Outcomes were reported as risk ratios (RRs) or mean difference (MD) and confidence intervals (CIs) using Review Manager software. P value < 0.05 was considered statistically significant.

RESULTS

Three studies with 2030 patients were included and revealed no significant difference between bCPAP and control in overall mortality [RR (95% CI) 0.46 (0.09, 2.32); P = 0.348], death during hospital stay [0.48 (0.02, 9.09), P = 0.619], composite primary outcome [0.48 (0.12, 1.97), P = 0.301], pneumothorax [1.94 (0.16, 23.11), P = 0.601], leaving hospital against medical advice [0.63 (0.16, 2.39), P = 0.489], and length of hospital stay [MD (95%CI) 0.15 days (− 0.66, 0.96), P = 0.706]. Children on bCPAP had significantly fewer events of severe hypoxemia [RR (95% CI) 0.22 (0.10, 0.49), P < 0.001], and less requirement for mechanical ventilation [RR (95% CI) 0.38 (0.15, 0.99), P = 0.048].

CONCLUSIONS

bCPAP is not superior to low-flow oxygen for improving survival and reducing hospital stay in children with pneumonia, albeit the need for mechanical ventilation decreases.

Keywords: CPAP · Bubble CPAP · Severe pneumonia

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