Review: adding non-invasive positive pressure ventilation to usual care reduces treatment failure in respiratory failure


In patients with respiratory failure precipitated by an acute exacerbation of chronic obstructive pulmonary disease (COPD), is non-invasive positive pressure ventilation (NPPV) plus usual care more effective than usual care alone for reducing rates of treatment failure, all cause mortality, and endotracheal intubation?

METHODS

Data sources: Cochrane Airways Group randomised controlled trials (RCTs) register, Medline, CINAHL, EMBASE/Excerpta Medica, and online respiratory journal databases (all up to April 2004); bibliographies of selected RCTs; and researchers in the field.

Study selection and assessment: RCTs that compared usual care (including supplemental oxygen, antibiotics, bronchodilators, steroids, and respiratory stimulants) plus NPPV (applied by nasal or face mask) with usual care alone in adults with respiratory failure precipitated by an acute exacerbation of COPD. Exclusion criteria included studies of weaning, patients with pneumonia, or where continuous positive airway pressure or endotracheal intubation preceded enrolment. Study quality was assessed on the basis of concealment of allocation and the Jadad criteria.

Outcomes: treatment failure (a composite of all cause mortality, endotracheal intubation, and intolerance to the allocated treatment), mortality during the hospital episode of respiratory failure, and endotracheal intubation.

MAIN RESULTS

14 RCTs (758 patients, mean age 63–76 y) met the selection criteria. 13 RCTs used pressure cycled ventilation for NPPV, and 1 RCT used volume cycled nasal pressure ventilation. Where reported, 5 RCTs used face masks only, 4 used nasal masks only, and 2 used a combination of face masks and nasal masks for delivery of NPPV. Meta-analyses were done using a fixed effects model. Rates of treatment failure, all cause mortality, and endotracheal intubation were lower in the NPPV plus usual care group than in the usual care alone group (table).

CONCLUSION

Non-invasive positive pressure ventilation plus usual care is more effective than usual care alone for reducing rates of treatment failure, all cause mortality, and endotracheal intubation in patients with respiratory failure precipitated by an acute exacerbation of chronic obstructive pulmonary disease.

<table>
<thead>
<tr>
<th>Outcomes at 7.6–35 days</th>
<th>Number of trials (n)</th>
<th>NPPV plus usual care</th>
<th>Usual care alone</th>
<th>RRR (95% CI) NNT (CI)</th>
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</thead>
<tbody>
<tr>
<td>Treatment failure</td>
<td>10 (541)</td>
<td>19.7%</td>
<td>41.7%</td>
<td>52% (37 to 63) 5 (4 to 7)</td>
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<tr>
<td>All cause mortality</td>
<td>10 (622)</td>
<td>10.8%</td>
<td>20.8%</td>
<td>48% (24 to 65) 10 (7 to 25)</td>
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<tr>
<td>Endotracheal intubation</td>
<td>14 (758)</td>
<td>16.5%</td>
<td>40.5%</td>
<td>59% (47 to 67) 5 (4 to 6)</td>
</tr>
</tbody>
</table>

*Treatment failure = a composite of all cause mortality, endotracheal intubation, and intolerance to the allocated treatment. Other abbreviations defined in glossary; weighted event rates, RRR, and CI calculated from data in article using a fixed effects model.