Review: metered dose inhalers with a holding chamber do not differ from nebulisers for hospital admission rates in asthma


In patients with acute asthma, is inhalation of β2 agonists from a metered dose inhaler (MDI) with a holding chamber more effective than inhalation from a nebuliser for reducing hospital admission rates or duration of inpatient stay?

METHODS

Data sources: Cochrane Airways Group Trials Register (November 2002), the Cochrane Library (2002, Issue 3), bibliographies of relevant articles, and individual researchers in the field.

Study selection and assessment: randomised controlled trials (RCTs) published in any language that compared any β2 agonist given by an MDI with any holding chamber with the same β2 agonist given by any nebuliser in adults or children with acute asthma presenting for medical assistance in the hospital emergency department.

Outcomes: admission to hospital and duration of inpatient stay.

MAIN RESULTS

22 RCTs (444 adults and 1076 children) from emergency and community settings and 5 RCTs (28 adults and 184 children) of inpatients met the selection criteria. Meta-analyses were completed using a fixed effect model. RCTs from emergency and community settings. The groups did not differ for rates of hospital admission in adults or children (table). In children, duration of stay in the emergency department was shorter in the holding chamber group than in the nebuliser group (weighted mean difference [WMD] –0.47 h, 95% CI –0.58 to –0.37) (2 RCTs). In adults, the groups did not differ for duration of stay in the emergency department (WMD 0.02 h, CI –0.4 to 0.44) (2 RCTs). RCTs of inpatients. Meta-analysis of 2 RCTs showed that the groups did not differ for duration of admission (WMD 0.26 h, CI –0.23 to 0.75).

CONCLUSION

In patients with acute asthma, inhalation of β2 agonists from a metered dose inhaler with a holding chamber is as effective as inhalation from a nebuliser for reducing hospital admission rates and duration of inpatient stay.

Commentary

Asthma morbidity continues to increase globally despite improvements in the understanding of the disease pathophysiology and the availability of new pharmacologic agents. β2 agonists remain the most useful bronchodilators for treating asthma and are most effective when inhaled. Delivery of β2 agonist by nebulisation has been described as the preferred choice for the management of acute asthma due to its advantage of reaching superficial airway cells. Use of MDI chambers for delivering β2 agonists, however, has many practical advantages over nebulisation. MDIs are less expensive than nebulisers, easier to administer, and tend to have fewer medication side effects. The review by Cates et al provides sufficient evidence to support the equivalency of these 2 delivery systems. However, the fact that patients with “life-threatening asthma” were excluded from all studies means the results should not be assumed to apply to such patients. The review is limited by the absence of a case definition for acute asthma. The authors also discussed the methodological limitations of the included studies, such as small sample sizes, lack of intention to treat analyses, and lack of studies done in community based settings.

The results of this review are relevant to nurses working in hospitals and in advanced practice roles as it reinforces the benefits of using β2 agonists in patients with asthma exacerbations. Studies that investigate cost effectiveness, especially in community based settings, would further assist nurses as they plan asthma management with patients. However, the current findings allow for both patient and provider preferences in the choice of delivery method, which should facilitate more efficient management of asthma exacerbation.

Susan A Bruce, ANP, MS
Yvonne K Scherer, RN, EdD
School of Nursing, University at Buffalo
Buffalo, New York, USA

Inhalation of β2 agonists from a metered dose inhaler with a holding chamber v inhalation from a nebuliser in acute asthma*

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Patients</th>
<th>Number of RCTs (n)</th>
<th>Weighted event rates</th>
<th>RRR (95% CI)</th>
<th>NNT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chamber</td>
<td>Nebuliser</td>
<td></td>
</tr>
<tr>
<td>Admission to hospital</td>
<td>adults</td>
<td>6 (352)</td>
<td>13%</td>
<td>15%</td>
<td>12% (–38 to 46)</td>
</tr>
<tr>
<td></td>
<td>children</td>
<td>5 (353)</td>
<td>12%</td>
<td>16%</td>
<td>35% (–6 to 60)</td>
</tr>
</tbody>
</table>

*Abbreviations defined in glossary; RRR, NNT, and CI calculated from data in article.