Levalbuterol reduced admissions more than racemic albuterol in children with acute asthma


Clinical impact ratings Respirology ★★★★★★ Paediatrics ★★★★★★

Q In children presenting to the emergency department (ED) with acute asthma, does levalbuterol reduce hospital admissions compared with racemic albuterol?

METHODS

- **Design:** randomised controlled trial.
- **Allocation:** (concealed)*.
- **Blinding:** blinded (patients, clinicians, data collectors, outcome assessors, data analysts, and manuscript writers); *.
- **Follow up period:** to discharge or hospital admission.
- **Setting:** the paediatric ED of a university affiliated, tertiary care children’s hospital in Cleveland, Ohio, USA.
- **Patients:** 552 enrolments of 482 children who were 1–18 years of age (mean age 7 y, 67% boys), had physician diagnosed asthma, and presented to the ED with acute asthma. (Children representing were re-randomised each time; † Exclusion criteria: first episode of wheezing; lack of current asthma treatment; pregnancy; known hypersensitivity to albuterol; cystic fibrosis; cyanotic or uncorrected congenital heart disease; chronic obstructive pulmonary disease; or treatment at another institution before ED presentation.
- **Interventions:** aerosol therapy of levalbuterol ([R]-albuterol), 1.25 mg, (n = 281 enrolments); † or racemic albuterol ([R]-albuterol, 1.25 mg, and [S]-albuterol, 1.25 mg) (n = 271 enrolments); † Patients were treated according to a standardised, assessment driven algorithm. Children <6 years of age received nebulised treatments via face mask, and those >6 years of age via mouthpiece, at 20 minute intervals until they met discharge criteria or had a maximum of 6 treatments within 2 hours, at which time they were admitted. Patients who did not meet discharge criteria after the first ED aerosol treatment received an oral prednisone, 2 mg/kg/day to a maximum of 60 mg.
- **Outcomes:** included hospital admissions and inpatient and ED length of stay.
- **Patient follow up:** 99% of enrolments were included in the analysis (intention to treat).

*See glossary. http://ebm.bmjournals.com/cgi/content/full/9/4/28
†Information provided by author.

MAIN RESULTS

Fewer patients in the levalbuterol group than in the racemic albuterol group were admitted to hospital (table). The groups did not differ for length of ED of stay (mean 2.3 ± 2.2 h, p = 0.25) or hospital stay (mean 45 ± 50 h, p = 0.63).

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Levalbuterol v racemic albuterol</th>
<th>RR (95% CI)</th>
<th>NNT (CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital admission</td>
<td>36% v 45%</td>
<td>20% (2 to 35)</td>
<td>12 (6 to 129)</td>
</tr>
</tbody>
</table>

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

Levalbuterol v racemic albuterol for children presenting to the emergency department with acute asthma

CONCLUSION

Levalbuterol reduced hospital admissions more than racemic albuterol in children who presented to the emergency department with acute asthma.

Commentary

Racemic albuterol, which contains 2 isomeric forms (R- and S-enantiomers), is a mainstay for treating acute asthma. Levalbuterol was developed because the R-enantiomer was found to be the active component of the racemic form. This large, blinded, randomised trial by Carl et al tested whether the R-enantiomer alone is associated with fewer side effects and/or improved efficacy than racemic albuterol for acute asthma.

No differences were found between the 2 treatments for vital signs, nausea, vomiting, or rash. This is consistent with other studies that have failed to find improved safety with levalbuterol.

Fewer hospital admissions occurred among children receiving the R-enantiomer alone. However, if levalbuterol was superior, one would expect continued poorer outcomes among those receiving racemic albuterol because the same study medication was continued after admission. The 2 groups did not differ for length of hospital stay or rate of transfer to the intensive care unit. No objective measures of pulmonary function were used to support the conclusion that use of levalbuterol led to improved physiological outcomes.

Although an important outcome, hospital admission is dependent not only on the severity of illness, but also on social factors such as socioeconomic status. This was not controlled for in the multivariate analyses, which makes it difficult to interpret the significance of this isolated finding in light of the previously mentioned negative outcomes. Current clinical data suggest that both preparations are equally efficacious. Therefore, the greater cost of levalbuterol is the critical factor in the decision to use it as a first line treatment for acute asthma. At our institution, patients are treated with racemic albuterol, with levalbuterol reserved for children with underlying cardiac disease or those with side effects to the racemic form.

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