Metered-dose inhaler accessory devices in acute asthma. Efficacy and comparison with nebulizers: a literature review

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Authors' objectives
To evaluate the efficacy of metered-dose inhalers (MDIs) and accessory devices (ADs) in the management of acute asthma in children, and to compare the outcome with small volume nebulisers (SVNs), which represent the current standard of care.

Searching
MEDLINE was searched from 1980 to 1996 for publications in the English language, using the keywords 'acute asthma', 'children', 'aerosols' and 'nebulizers'. The reference lists of the retrieved studies were examined, and citation searches were made using the Science Citation Index. The authors of the primary studies were also contacted for additional references.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials of MDIs with conventional SVN treatment were included.

Specific interventions included in the review
MDIs and ADs compared with the current standard of care, i.e. SVNs. Only drug aerosols used in the USA were included.

Participants included in the review
Children with acute asthma, aged from 0.5 to 18 years, were included.

Outcomes assessed in the review
Clinical outcome, oxyhaemoglobin saturation and pulmonary function were assessed.

How were decisions on the relevance of primary studies made?
Two reviewers and three external reviewers (who were board-certified in paediatric pulmonology, paediatric allergy and paediatric emergency medicine) were involved in decisions about the inclusion or exclusion of eligible studies.

Assessment of study quality
No systematic assessment of quality was undertaken.

Data extraction
The authors do not state how the data were extracted for the review, or how many of the authors performed the data extraction.

Methods of synthesis
How were the studies combined?
A qualitative synthesis was undertaken.

How were differences between studies investigated?
Each study was discussed in terms of the design, participants, intervention, outcome, and adverse effects.
Results of the review
Ten randomised controlled trials, with a total of 552 participants, were included. One trial used a crossover design where the participants received both a MDI and SVN. Three studies were double-blind, 2 were single-blind, and no information was given about the other 5 studies.

Eight of the ten studies showed no significant difference between the two treatments, whilst two studies showed that MDIs and ADs were superior to SVNs.

Cost information
Two studies reported that the cost and time for MDI and AD therapy was about 40 to 60% that of SVN therapy. Based on adult studies, it was estimated that replacing SVNs with MDIs and ADs in the management of acute asthma could result in substantial savings for US hospitals (more than $200 million per year).

Authors' conclusions
In view of the clinical benefit, lower cost, more rapid administration, personnel time expended and ease of administration, the current data justify the use of MDIs and ADs instead of SVNs in most cases of acute childhood asthma. In addition, further studies to resolve the remaining questions are warranted.

CRD commentary
This was a well-written review with a good summary of each of the included studies. However, it appears from the information given that the authors did not quality assess the included studies in a systematic way. The authors only searched for English language studies, therefore it is unclear how many relevant studies may have been excluded due to publication in a foreign language. Based on the evidence presented, the authors appear to be over enthusiastic in their recommendation to use MDIs and ADs instead of SVNs: in only two of the ten studies were the results in favour of MDIs and ADs, and one of those studies was a crossover trial with only 21 participants. In addition, three relevant studies were excluded because the drugs administered by aerosol were not used in the USA. Therefore, the review has a particular USA bias. It should be noted that there is a discrepancy between the numbers of participants presented in the table (n=552) and in the text (n=575).

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