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[Intervention Review]

Continuous versus intermittent beta-agonists for acute asthma

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ABSTRACT

Background

Patients with acute asthma treated in the emergency department are frequently treated with intermittent inhaled beta-agonists delivered by nebulisation. The use of continuous beta-agonist (CBA) via nebulisation in the emergency setting may offer additional benefits in acute asthma.

Objectives

To determine the efficacy (e.g., reductions in admission, improvement in pulmonary functions) and risks (e.g., adverse events, effects on vital signs) of continuous versus intermittent inhaled beta-agonists for the treatment of patients with acute asthma managed in the emergency department.

Search methods

Randomised controlled trials were identified from the Cochrane Airways Group Specialised Register of trials. In addition, primary authors and content experts were contacted to identify eligible studies. Bibliographies from included studies, known reviews and texts were also searched. The search is considered updated to February 2011.

Selection criteria

Only randomised controlled trials (RCTs) were eligible for inclusion. Studies were included if patients presented with acute asthma and were treated with either continuous or intermittent inhaled beta-agonists early in the ED treatment. "Continuous" nebulisation was defined as truly continuous aerosol delivery of beta-agonist medication (e.g., using a commercially available large-volume nebuliser, or a small-volume nebuliser with infusion pump) or sufficiently frequent nebulisations that medication delivery was effectively continuous (i.e., 1 nebulisation every 15 minutes or > 4 nebulisations per hour). Studies also needed to report either pulmonary function or admission results. Two reviewers independently selected potentially relevant articles and two additional reviewers independently selected articles for inclusion. Methodological quality was independently assessed by two reviewers.

Data collection and analysis

Data were extracted independently by two reviewers if the authors were unable to verify the validity of information. Missing data were obtained from authors or calculated from other data presented in the paper. The data were analysed using the Cochrane Review Manager (Version 4.1). Relative risks (RR), weighted mean differences (WMD) and standardized mean differences (SMD) are reported with corresponding 95% confidence intervals (CI); both peak expiratory flow rates (PEFR) and forced expiratory volume in one second (FEV-1) data are reported.

Main results

165 trials were reviewed and eight were included; a total of 461 patients have been studied (229 with CBA; 232 with intermittent beta-agonists). Overall, admission to hospital was reduced with CBA compared to intermittent beta-agonists (RR: 0.68; 95% CI: 0.5 to 0.9); patients with severe airway obstruction at presentation appeared to benefit most from this intervention (RR: 0.64; 95% CI: 0.5 to 0.9). Patients receiving CBA demonstrated small but statistically significant improvements in pulmonary function tests when all studies were pooled. Patients receiving CBA had greater improvements in % predicted FEV-1 (SMD: 0.3; 95% CI: 0.03 to 0.5) and PEF (SMD: 0.33; 95% CI: 0.1 to 0.5); this effect was observed by 2-3 hours. Continuous treatment was generally well tolerated, with no clinically important differences observed in pulse rate (WMD: -2.87; 95% CI: -6.0 to 0.3) or blood pressure (WMD: -1.75; 95% CI: -5.6 to 2.1) between the treatment groups. Tremor was equally common in both groups (OR: 0.81; 95% CI: 0.5 to 1.3) and potassium concentration was unchanged (WMD: 0.02; 95% CI: -0.2 to 0.2).

Authors' conclusions

Current evidence supports the use of CBA in patients with severe acute asthma who present to the emergency department to increase their pulmonary functions and reduce hospitalisation. Moreover, CBA treatment appears to be safe and well tolerated in patients who receive it.

PLAIN LANGUAGE SUMMARY

Continuous versus intermittent beta-agonists for acute asthma

During acute asthma attacks, inhaled beta-agonists (reliever medications) are used to treat spasm in the airways in the lungs. The medication can be administered by wet nebulisation or from an inhaler with a holding chamber; wet nebulisation may be delivered in a continuous or intermittent fashion. This review has collected information from randomised controlled trials comparing continuous to intermittent nebulised delivery methods in acute asthma attacks. Overall, differences were found between the two methods, with continuous nebulisers producing a modest reduction in admissions compared to intermittent beta-agonist therapy. This finding was especially pronounced in severe acute asthma. Continuous nebuliser therapy may be more effective than intermittent nebulisers for delivering beta-agonist drugs to relieve airway spasm in selected asthma populations.