

Review: Inhaled corticosteroids reduce hospital admissions in acute asthma

Edmonds ML, Camargo CA Jr, Pollack CV Jr, Rowe BH. The effectiveness of inhaled corticosteroids in the emergency department treatment of acute asthma: a meta-analysis. *Ann Emerg Med.* 2002;40:145-54.

QUESTION

In patients with acute asthma in the emergency department (ED), are inhaled corticosteroids (ICSs) more effective than placebo?

DATA SOURCES

Studies were identified by searching the asthma and wheeze randomized controlled trial (RCT) register of the Cochrane Airways Review Group, which is maintained by searches of MEDLINE, EMBASE/Excerpta Medica, CINAHL, CENTRAL, and 20 respiratory care journals. In addition, reference lists of studies and review articles were scanned; abstracts of respiratory and emergency medicine proceedings were reviewed; and authors of primary studies, other asthma researchers, and scientific advisors of pharmaceutical companies manufacturing ICSs were contacted.

STUDY SELECTION

Studies were selected if they were RCTs done in an ED setting involving children or adults with unprovoked asthma exacerbations and ICS therapy was compared with placebo. A secondary analysis included studies comparing ICSs alone with systemic corticosteroids (SCSs) alone.

DATA EXTRACTION

Data were extracted on methodological quality (allocation concealment and blinding), patient characteristics, severity of asthma, type of ICS, ICS and control regimens, and outcomes. The primary outcome was hospital admission.

MAIN RESULTS

7 trials were included in the primary analysis: 5 trials compared ICSs with placebo, and 2 trials compared ICSs plus systemic SCSs with placebo plus systemic SCSs; 6 trials provided data (352 patients). 5 trials reported hospital admission rates and could be pooled in a meta-analysis: Patients who received ICSs had lower admission rates than did patients who received placebo (Table). ICS therapy showed a small improvement in peak expiratory flow rate (PEFR) at 1 hour (weighted mean difference [WMD] 5% of predicted PEFR, 95% CI 0.4% to 11%) and at 2 hours (WMD 8% of predicted PEFR,

CI 3% to 13%). 4 trials (313 patients) compared ICSs with SCSs. Significant heterogeneity existed among the studies; pooling with the random-effects model did not show a difference between the groups for hospital admission (odds ratio 0.89, CI 0.18 to 4.52).

CONCLUSIONS

In patients with acute asthma in the emergency department, inhaled corticosteroids are more effective than placebo in reducing hospital admission. Inhaled corticosteroids improve peak expiratory flow rate at 1 and 2 hours.

Sources of funding: University of Alberta; National Institutes of Health; Canada Research Council.

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Inhaled corticosteroids (ICSs) vs placebo for acute asthma in the emergency department*

Outcome	Number of trials	Weighted event rates		RRR (95% CI)	NNT (CI)
		ICSs	Placebo		
Hospital admission	5	10%	27%	61% (35 to 77)	6 (4 to 11)

*Abbreviations defined in Glossary; RRR and CI provided by author; a fixed-effects model was used.

COMMENTARY

Despite half a century of clinical use and research, the beneficial effects, dose, and route of delivery of corticosteroids in acute asthma remain controversial. This well-done meta-analysis by Edmonds and colleagues showed that use of ICSs in the ED reduces hospitalizations and improves PEFR at 1 and 2 hours.

The molecular action of corticosteroids involves translocation into the nucleus and the ability to inhibit or stimulate transcription of target genes involved in immunoregulation. However, the rapid response to ICSs found in this meta-analysis supports recent studies that suggest that ICSs may act through additional mechanisms (1, 2). The topical anti-inflammatory effects of ICSs may reduce the airway mucosal edema and thickness that occur in acute asthma.

The data included in this analysis combined adult and pediatric studies, different levels of asthma severity, and various types of treatment used in the control group. In addition, in the largest adult study (3), only 6% of patients had received ICSs in the week before their ED visit, no patients received anticholinergic therapy, and the benefits of ICSs were noted only in patients with symptoms \geq 24 hours. Each of

these issues may limit generalizability of the data for primary care physicians. However, since subgroup analysis of adults only showed that the benefits persisted, these results may be robust enough. This meta-analysis emphasizes the potential role of ICSs in addition to SCSs as a treatment for patients with acute exacerbations of asthma. Additional research is needed to clarify the magnitude of the benefit obtained by combining ICSs with SCSs usually provided during acute exacerbations.

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References

- Gibson PG, Saltos N, Fakes K. Acute anti-inflammatory effects of inhaled budesonide in asthma: a randomized controlled trial. *Am J Respir Crit Care Med.* 2001;163:32-6.
- Tsai YG, Lee MY, Yang KD, et al. A single dose of nebulized budesonide decreases exhaled nitric oxide in children with acute asthma. *J Pediatr.* 2001;139:433-7.
- Rodrigo G, Rodrigo C. Inhaled flunisolide for acute severe asthma. *Am J Respir Crit Care Med.* 1998;157:698-703.