FPIN's Clinical Inquiries

Intravenous Magnesium Sulfate for Acute Asthma Exacerbations

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Clinical Question

Is intravenous magnesium sulfate effective for the treatment of acute asthma exacerbations?

Evidence-Based Answer

Patients presenting to the emergency department with an acute asthma exacerbation that has not responded to first-line therapy (bronchodilators and corticosteroids) can be treated effectively with intravenous magnesium sulfate. In children, magnesium sulfate reduced hospital admissions by 68%. (Strength of Recommendation [SOR]: B, based on a meta-analysis of three small randomized controlled trials [RCTs].) In adults, magnesium sulfate reduced admissions by 25%. (SOR: A, based on a meta-analysis of 14 RCTs.)

Evidence Summary

A 2016 Cochrane review of three RCTs found that treatment with intravenous magnesium sulfate reduced the odds of hospital admissions by 68% in patients 18 months to 18 years of age who presented to the emergency department with acute asthma exacerbations (N = 115; odds ratio [OR] = 0.32; 95% confidence interval [CI], 0.14 to 0.74).[1] Magnesium sulfate was given if inhaled short-acting bronchodilators and corticosteroids were ineffective. Dosing was not standardized, but most studies used weight-based dosing according to guidelines from the *British National Formulary for Children*, which advises 40 mg per kg of body weight, up to a maximal dose of 2 g, delivered as a single intravenous infusion over 20 minutes. The analysis was limited because of the number and size of studies, but there were no reports of harm. Patients were not grouped based on an asthma severity score, such as the Pediatric Asthma Severity Score or the Pediatric Respiratory Assessment Measure.

A 2014 Cochrane review of 14 RCTs found a 25% reduction in hospital admissions in adults who were treated in the emergency department with intravenous magnesium sulfate for asthma exacerbation (N = 1,769; OR = 0.75; 95% CI, 0.60 to 0.92).[2] The number needed to treat to prevent one admission was 7 (95% CI, 2 to 13). Most of the studies were double-blinded trials comparing intravenous magnesium sulfate (1.2 g to 2 g) vs. placebo after first-line therapy was ineffective. The authors reported statistically significant but clinically minimal improvements in the secondary outcomes of forced expiratory volume in one second and peak expiratory flow.

Neither of the meta-analyses included adverse events because of inconsistent reporting in the RCTs. The most common adverse effects noted were dose-related skin flushing and rate-related hypotension and vasodilation.[1,2]

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Guidelines from the Global Initiative for Asthma recommend treating patients with acute asthma exacerbation with repeated doses of short-acting bronchodilators, early oral corticosteroids, and controlled-flow oxygen if available.[3] In those with severe exacerbations, ipratropium (Atrovent) should be added and nebulized short-acting bronchodilators should be considered. In acute care facilities, intravenous magnesium sulfate may be considered if the patient does not respond to intensive initial treatment.

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References

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