

Metered-dose inhalers vs. nebulization for the delivery of albuterol in pediatric asthma exacerbations: a systematic review with meta-analysis

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Abstract

Objectives: Although albuterol, the most frequently used bronchodilator, has been traditionally and generally delivered via nebulization (NEB) with compressed air/oxygen, the benefits of metered-dose inhalers with a spacer (MDI+S) have been widely recognized as an alternative method for albuterol administration. The aim of this systematic review was to compare the response to albuterol delivered through NEB with albuterol delivered through MDI+S in pediatric patients with asthma exacerbations.

Methods: We conducted an electronic search in MEDLINE/PubMed, EMBASE, Ovid and ClinicalTrials. To be included in the review, a study had to a randomized clinical trial comparing albuterol delivered via NEB versus MDI+S; and had to report the rate of hospital admission (primary outcome), or any of the following secondary outcomes: oxygen arterial saturation, heart rate (HR), respiratory rate, the pulmonary index score (PIS), adverse effects, and need for additional treatment. **Results:** Fifteen studies ($n=2057$) met inclusion criteria. No significant differences were found between the two albuterol delivery methods in terms of hospital admission (RR 0.89; 95% CI 0.55 to 1.46; $I^2=32\%$; $p=0.65$). There was a significant reduction in the PIS score (MD -0.63; 95% CI -0.91 to -0.35; $I^2=0\%$; $p < 0.00001$), and a significantly smaller increase in HR (better) (MD -6.47; 95% CI -11.69 to -1.25; $I^2=0\%$; $p=0.02$) when albuterol was delivered through MDI+S than when it was delivered through NEB.

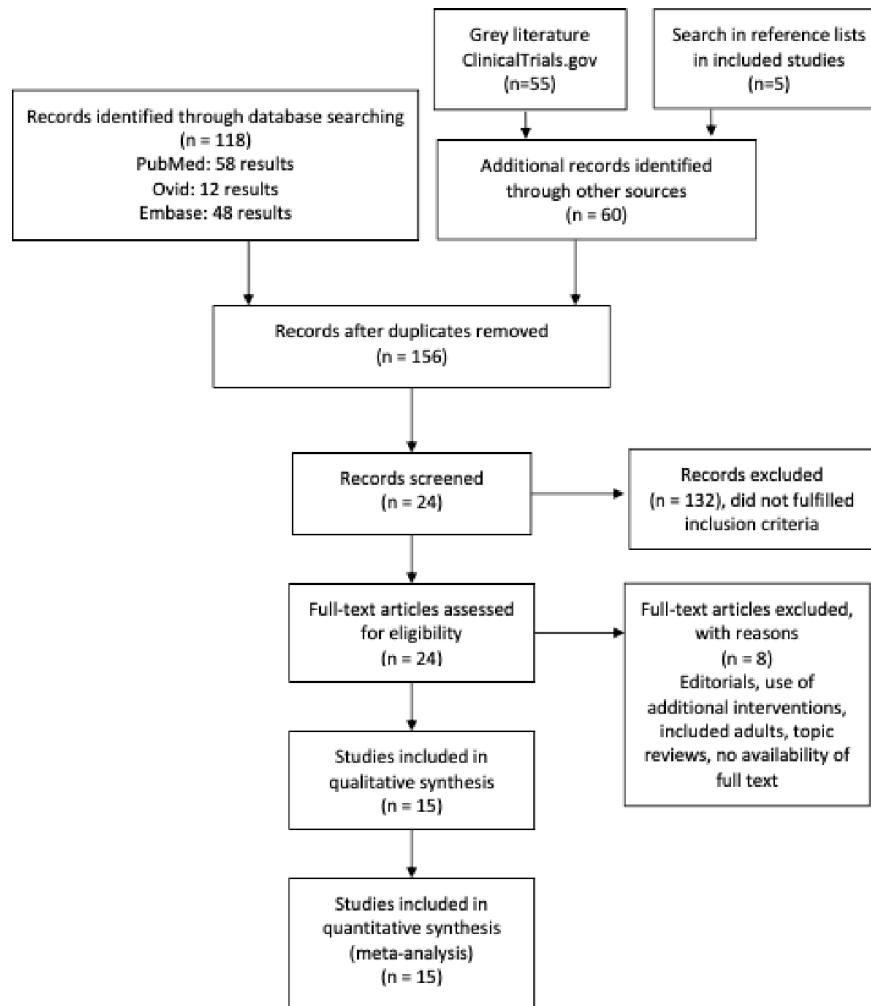
Conclusions: This review showed a significant reduction in the PIS and a significantly smaller increase in HR when albuterol was delivered through MDI+S than when it was delivered through NEB.

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Table 1.doc available at <https://authorea.com/users/334430/articles/460410-metered-dose-inhalers-vs-nebulization-for-the-delivery-of-albuterol-in-pediatric-asthma-exacerbations-a-systematic-review-with-meta-analysis>



	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
Batra 1997	+	-	-	+	+	+	+
Chou 1995	+	+	-	+	-	+	+
Deerojanawong 2005	+	+	+	+	+	+	+
Delgado 2003	+	+	+	+	+	+	+
Kerem 1993	+	+	+	+	-	-	+
Leelathipkul 2016	?	?	?	?	-	?	+
Maldonado 1997	+	+	-	+	-	?	+
Mandelberg 2000	+	+	+	+	-	?	?
Mitselou 2016	+	+	-	+	+	+	+
Ploin 2000	+	+	+	+	+	+	+
Robertson 1997	+	-	+	+	-	+	+
Rubilar 2000	+	+	-	+	+	+	+
Schuh	+	?	+	+	+	+	+
Snider 2015	+	+	-	+	+	+	+
Vangveravong 2008	+	?	?	?	+	+	+

