



**TITLE: Medication Administration via Metered Dose Inhalers and Aerochambers Versus Nebulizers For Adult Patients: Clinical Effectiveness**

**DATE:** 13 November 2013

## **RESEARCH QUESTION**

What is the comparative effectiveness of medication administration via metered dose inhalers (MDI) and aerochambers versus nebulizers for adult patients in health care settings?

## **KEY MESSAGE**

Two systematic reviews, two RCTs, and two non-randomized studies were identified regarding the comparative effectiveness of medication administration via metered dose inhalers and aerochambers versus nebulizers for adult patients in health care settings.

## **METHODS**

A limited literature search was conducted on key resources including PubMed, The Cochrane Library (2013, Issue 10), University of York Centre for Reviews and Dissemination (CRD), ECRI (Health Devices Gold) databases, Canadian and major international health technology agencies, as well as a focused Internet search. No filters were applied to limit the retrieval by study type. The search was also limited to English language documents published between Jan 1, 2008 and Nov 4, 2013. Internet links were provided, where available.

The summary of findings was prepared from the abstracts of the relevant information. Please note that data contained in abstracts may not always be an accurate reflection of the data contained within the full article.

## **RESULTS**

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials (RCTs), non-randomized studies, economic evaluations, and evidence-based guidelines.

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Two systematic reviews, two RCTs, and two non-randomized studies were identified regarding the comparative effectiveness of medication administration via metered dose inhalers (MDI) and aerochambers versus nebulizers for adult patients in health care settings. No relevant health technology assessments were identified. Additional references of potential interest are provided in the appendix.

## OVERALL SUMMARY OF FINDINGS

One systematic review<sup>1</sup> compared the effectiveness of beta-agonist delivery via MDIs with an aerochamber with nebulizers for the treatment of acute asthma. Six of the 39 trials included in the review involved inpatients and there were more children included in the analysis than adults. For adults, the length of stay, peak flow, and expiratory volume were all similar between the two methods and the authors concluded there was no significant difference between the two delivery methods.

One systematic review<sup>2</sup> compared MDIs and nebulizers for the delivery of aerosol bronchodilators for mechanically ventilated adults in critical care. Limitations of the data meant meta-analysis could not be undertaken and the authors concluded that there was not sufficient evidence to support either delivery method. One RCT<sup>3</sup> compared salmeterol and fluticasone delivered via a MDI with spacer with ipratropium, terbutaline, and budesonide via nebulizer for mechanically ventilated patients with chronic obstructive pulmonary disease (COPD). No significant differences in minute ventilation, expiratory pressure, or airway resistance were observed between groups.

One crossover RCT<sup>4</sup> compared intermediate dose ipratropium and salbutamol via MDI with spacer and high dose ipratropium and salbutamol via nebulizer for patients with COPD. There were no significant differences in clinical outcomes reported between the two methods. The authors suggested stepping up the intermediate dose via MDI before moving on to nebulized therapy. One non-randomized study<sup>6</sup> examined lung deposition of salbutamol via MDI with spacer or nebulizer following an acute exacerbation of COPD or asthma and found no significant differences in urinary salbutamol excretion or forced expiratory volume between the two delivery methods.

A non-randomized crossover study<sup>5</sup> examined the effects of bronchodilator therapy via MDI or nebulizer on inspiratory lung function parameters. Lung function parameters improved significantly following treatment with both devices. The authors concluded that the MDI with spacer was a better method of administration than the nebulizer for patients with stable COPD.

## REFERENCES SUMMARIZED

### Health Technology Assessments

No literature identified.

### Systematic Reviews and Meta-analyses

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### Randomized Controlled Trials

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4. Brophy C, Kastelik J, Gardiner E, Greenstone M. Quality of life measurements and bronchodilator responsiveness in prescribing nebulizer therapy in COPD. *Chron Respir Dis.* 2008;5(1):13-8.

### Non-Randomized Studies

5. Ramlal SK, Visser FJ, Hop WC, Dekhuijzen PN, Heijdra YF. The effect of bronchodilators administered via aerochamber or a nebulizer on inspiratory lung function parameters. *Respir Med.* 2013 Sep;107(9):1393-9.
6. Mazhar SH, Ismail NE, Newton DA, Chrystyn H. Relative lung deposition of salbutamol following inhalation from a spacer and a Sidestream jet nebulizer following an acute exacerbation. *Br J Clin Pharmacol [Internet].* 2008 Mar [cited 2013 Nov 12];65(3):334-7. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2291256>

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**APPENDIX – FURTHER INFORMATION:**

**Non-Randomized Studies – before and after**

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**Guidelines and Recommendations**

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10. Chronic obstructive pulmonary disease: management of chronic obstructive pulmonary disease in adults in primary and secondary care (partial update) [Internet]. London: The National Institute for Health and Care Excellence (NICE); 2010 Jun. [cited 2013 Nov 12]. (NICE clinical guideline 101). Available from: <http://www.nice.org.uk/nicemedia/live/13029/49397/49397.pdf>  
*See: Delivery systems used to treat patients with stable COPD, page 20*

**Review Articles**

11. Sellers WF. Inhaled and intravenous treatment in acute severe and life-threatening asthma. *Br J Anaesth*. 2013 Feb;110(2):183-90.
12. Dhand R. Aerosol therapy in patients receiving noninvasive positive pressure ventilation. *J Aerosol Med Pulm Drug Deliv*. 2012 Apr;25(2):63-78.
13. Sims MW. Aerosol therapy for obstructive lung diseases: device selection and practice management issues. *Chest* [Internet]. 2011 Sep [cited 2013 Nov 12];140(3):781-8. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3204795>
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