Think twice about nebulizers for asthma attacks

MDIs with spacers are as effective as nebulizers for delivering beta-agonists and less likely to cause adverse effects.

Kate Kirley, MD, MS; Liz Nguyen, MD
Department of Family Medicine, The University of Chicago

PURLs EDITOR
Kate Rowland, MD, MS
Department of Family Medicine, The University of Chicago

PRACTICE CHANGER

Stop ordering nebulizers to deliver beta-agonists to patients over age 2 with mild or moderate asthma exacerbations. A metered-dose inhaler (MDI) with a spacer produces the same benefits with fewer adverse effects.[1]

STRENGTH OF RECOMMENDATION

A: Based on an updated Cochrane meta-analysis of 39 randomized controlled trials (RCTs).

Cates CJ, Welsh EJ, Rowe BH. Holding chambers (spacers) versus nebulisers for beta-agonist treatment of acute asthma. *Cochrane Database Syst Rev*. 2013;9:CD000052.

ILLUSTRATIVE CASE

A 6-year-old girl with a history of reactive airway disease comes to your office complaining of cough and wheezing. On exam, she has mild retractions, a respiratory rate of 35, and an oxygen saturation of 96% on room air. Her lung fields are diffusely wheezy. Her parents would like to keep her out of the hospital. How should you order her albuterol to decrease her wheezing and minimize adverse effects?

Asthma affects nearly 19 million adults and 7 million children in the United States.[2] Asthma exacerbations are the third most common reason for hospitalization in children.[2,3] Treatment usually requires multiple agents, including inhaled beta-agonists. These are most effective when delivered to the peripheral airways, which is a challenge during an asthma exacerbation because of airway swelling and rapid breathing. Two devices have been developed to effectively deliver medication to the peripheral airways: nebulizers and MDIs with a holding chamber (spacer).[1]

Several studies have demonstrated that for mild to moderate asthma exacerbations, administering a beta-agonist via an MDI with a spacer is as effective as using a nebulizer.[4,5] Asthma treatment guidelines also state that spacers are either comparable to or preferred over nebulizers for beta-agonist administration in children and adults.[6,7] However, based on our experience, physicians still frequently order nebulizer treatments for patients with asthma exacerbations, despite several advantages of MDIs with spacers. Notably, they cost less and don't require maintenance or a power source. Physicians administered nebulizer therapy at more than 3.6 million emergency department (ED) visits in 2006.[8]

In this latest Cochrane review, Cates et al[1] added 4 new studies to those included in their earlier Cochrane meta-analysis, and looked at what, if any, effect these studies had on our understanding of nebulizers vs MDIs with spacers.

STUDY SUMMARY

Outcomes with nebulizers are no better than those with spacers

This systematic review and meta-analysis

INSTANT POLL

For what percentage of patients having a mild or moderate asthma attack do you routinely order nebulizer treatment?

- ☐ <25%
- ☐ 25% to 50%
- ☐ 51% to 75%
- ☐ >75%

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The time children spent in the ED was cut by about half an hour when MDIs with spacers were used.

pooled the results of RCTs comparing spacers to nebulizers for administering beta-agonists during acute, non-life-threatening asthma exacerbations.[1] The authors reviewed studies conducted in EDs, hospitals, and outpatient settings that included children and adults. The primary outcomes were hospital admission rates and duration of hospital stay. Secondary outcomes included time spent in the ED, change in pulse rate, and incidence of tremor.

Cates et al[1] analyzed 39 trials that included 1897 children and 729 adults and were conducted primarily in an ED or outpatient setting. The 4 new studies added 295 children and 58 adults to the researchers' earlier meta-analysis. Studies involving adults and children were pooled separately. Most patients received multiple treatments with beta-agonists titrated to the individual's response.

No differences in hospitalizations. Rates of hospital admissions did not differ between patients receiving beta-agonists via a spacer compared to a nebulizer in both adults (relative risk [RR]=.94; 95% confidence interval [CI], .61-1.43) and children (RR=.71; 95% CI, .47-1.08). Duration of hospital stay did not differ between the 2 delivery methods in adults (mean difference [MD]=-.60 days; 95% CI, -3.23 to 2.03) and children (MD=.33 days; 95% CI, -.10 to .76).

For kids, spacers meant less time in the ED. Duration in the ED was approximately half an hour shorter for children using spacers (MD=-33.48 minutes; 95% CI, -43.3 to -23.6, *P*<.001). There was no difference in time spent in the ED observed in adults (MD=1.75 minutes; 95% CI, -23.45 to 26.95). The rate of tremor was lower in children using spacers (RR=.64; 95% CI, .44-.95, *P*=.027), and was similar in adults (RR=1.12; 95% CI, .66-1.9). The rise in pulse rate was lower in children using spacers (MD=-5.41% change from baseline; 95% CI, -8.34 to -2.48; *P*<.001), and was similar in adults (MD= -1.23%; 95% CI, -4.06 to 1.60).

WHAT'S NEW

Additional evidence that spacers are as effective as nebulizers

This meta-analysis, which included 4 new studies, should finally dispel the myth that nebulizers deliver beta-agonists more effectively than MDIs with spacers. Additionally, in children, spacers are associated with lower rates of side effects, including tremor and elevated pulse rate.

CAVEATS

Most studies involving children were open label

Although most of the adult trials in this meta-analysis involved a double-dummy design, which allows for effective participant blinding, most of the studies involving children were open label. This open-label design might have been a source of reporting bias for symptom-related outcomes, but should not have affected hospital admission rates or duration of hospital stay.

In the double-dummy studies, adults received both a nebulizer and a spacer, which likely explains the similar time spent in the ED by the treatment and control groups.

CHALLENGES TO IMPLEMENTATION

Old habits are hard to break

Doctors may think that patients view nebulizers as more potent or more effective than spacers and thus be more likely to order them. Some patients may prefer nebulizers because of convenience or other factors. JFP

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CONTINUED ON PAGE 346

CONTINUED FROM PAGE 322

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