Medicine by the Numbers

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The NNT Group rating system:

Green:	Benefits greater than harms
Yellow:	Unclear benefits
Red:	No benefits
Black:	Harms greater than benefits

Bronchodilators for Bronchiolitis

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BRONCHODILATORS FOR BRONCHIOLITIS

Number needed to treat or harm = None were helped

Benefits	*Harms*
None were helped (improved oxygen saturation)	Uncertain (decreased oxygen saturation)
None were helped (decreased rate of hospitalization)	Uncertain (tachycardia)
None were helped (duration of hospitalization)	

Details for This Review

Study Population: Infants up to 12 months of age without a history of wheezing

Efficacy End Points: Improved oxygen saturation, rate of hospitalization, duration of hospitalization

Harm End Points: Decreased oxygen saturation, tachycardia

Narrative: Bronchiolitis is a common viral infection of childhood that is most often caused by respiratory syncytial virus. Bronchiolitis causes significant inflammation in the lower respiratory tract, which leads to large amounts of secretions and debris that obstruct small airways leading to wheezing on examination. Although bronchiolitis is not caused by the same mechanism that leads to wheezing in asthma, the similarity in presentation has led to the common use of bronchodilators to treat bronchiolitis.[1]

Clinical trials of bronchodilators to treat bronchiolitis have yielded varied results over the past several decades. The lack of clarity about the efficacy of bronchodilators has led to widespread continued use. This review included 30 randomized, placebo-controlled trials with a total of 1,922 patients.[2] Trials evaluating treatment with epinephrine were not included in this version of the review. Twenty-two of the trials excluded patients with prior wheezing in an effort to minimize the number of patients with asthma in the sample. Most of these studies had relatively small sample sizes.

In 11 inpatient and 10 outpatient studies, oxygen saturation did not improve with bronchodilators (mean difference [MD] in oxygen saturation = –0.43%; 95% confidence interval [CI], –0.92 to 0.06; n = 1,242). This did not change when the analysis was limited to only the nine studies that used nebulized albuterol or salbutamol (MD = –0.19%; 95% CI, –0.59 to 0.21; n = 572).

The use of bronchodilators in outpatients did not reduce the rate of hospitalization to a statistically significant degree (11.9% in the bronchodilator group vs. 15.9% in the placebo group; odds ratio = 0.75; 95% CI, 0.46 to 1.21). Similarly, the duration of hospitalization was not shortened by the use of bronchodilators. The mean difference in stay was a statistically nonsignificant 0.06 days (95% CI, –0.27 to 0.39 days).

Not all of the studies in this review reported adverse effects. When adverse effects were reported, they were noted only in the groups receiving bronchodilators. Studies that looked at tachycardia noted a statistically significant increase in heart rate in the study groups compared with the placebo groups. For instance, in one study of 83 patients, patients receiving salbutamol had an average heart rate of 159 beats per minute (standard deviations [SD] = 16) 60 minutes after treatment, whereas those receiving placebo had a heart rate of 151 beats per minute (SD = 16; $P = .03$).[3] This small increase is a known adverse effect of bronchodilators and is not clinically important. Similarly, some studies have noted an initial decrease in oxygen saturation.[4,5] This seems to be

transient and of questionable clinical significance. Based on these findings, it is hard to know with certainty whether any patients are harmed by bronchodilators in the setting of bronchiolitis. However, given their cost, lack of efficacy, and potential to cause adverse effects, it is clear that bronchodilators should not be used routinely for the treatment of bronchiolitis, at least in children without a history of wheezing.

Caveats: A separate Cochrane review has looked at epinephrine vs. placebo in the treatment of bronchiolitis.[6] Epinephrine reduced admissions in the short term (relative risk = 0.67; 95% CI, 0.50 to 0.89), but there was no difference in admission rate compared with placebo by day 7. This would imply that the use of epinephrine allowed some children to be sent home from the emergency department only to return and be admitted at some point during the next week. Minimal adverse effects were noted from epinephrine.

Some trials included clinical scores as an outcome measure, and there was a statistically significant improvement in short-term clinical scores. However, the clinical significance of this improvement is uncertain. The short-lived nature of this improvement is underscored by the lack of change in rates of hospitalizations or duration of inpatient stays.

One important point to understand in examining the literature on the benefits of bronchodilators in bronchiolitis is that some older studies did not exclude patients with a history of wheezing. These studies likely included many patients with asthma who would be expected to improve with bronchodilators. Several newer studies have excluded patients with a history of wheezing. When only these studies are pooled, any apparent benefit from bronchodilators disappears. It must be remembered that these newer findings do not apply to patients with a history of wheezing. Such patients may have asthma and therefore might benefit from bronchodilators.

The American Academy of Pediatrics Subcommittee on the Diagnosis and Management of Bronchiolitis has published guidelines that have been endorsed by the American Academy of Family Physicians. These guidelines explicitly state that bronchodilators and epinephrine should not be used in the management of bronchiolitis.[7,8]

This series is coordinated by Dean A. Seehusen, MD, MPH, *AFP* Contributing Editor, and Daniel Runde, MD, from the NNT Group.

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