

Spacers made from sealed cold-drink bottles were as effective as conventional spacers in children with acute asthma

Zar HJ, Brown G, Donson H, et al. Home-made spacers for bronchodilator therapy in children with acute asthma: a randomised trial. *Lancet*. 1999 Sep 18;354:979-82.

QUESTION

In children with acute asthma, are home-made spacers as effective as conventional ones for improving response to a β_2 -agonist given by metered-dose inhaler (MDI)?

DESIGN

Randomized {allocation concealed*}†, blinded (outcome assessors)*, controlled trial with 15- to 30-minute follow-up.

SETTING

A children's hospital in South Africa.

PATIENTS

88 children, 5 to 13 years of age (mean age 10 y, 60% boys, 50% moderate to severe airway obstruction [peak expiratory flow rate {PEFR} 20% to 59% of predicted normal value]), with a history of asthma, and presented with an acute asthma attack. Exclusion criteria were inability to use an MDI and spacer or to have pulmonary function tests with PEFR < 20% of the predicted normal value, arterial O_2 < 92% in air, or cardiac or other chronic pulmonary disease; recent use of oral corticosteroids; or use of β_2 -agonists within 4 hours of presentation. Follow-up was 100%.

INTERVENTION

Children were allocated to 1 of 4 types of spacers: a conventional spacer (Aerochamber, Trudell Medical, Canada) ($n = 22$); a 500-mL plastic cold-drink bottle with glue to seal the joint between the MDI and bottle ($n = 22$); an unsealed, 500-mL plastic cold-drink bottle ($n = 22$); and a 200-

mL polystyrene cup ($n = 22$). Children received fenoterol hydrobromide, 100 μ g/puff, in an MDI and spacer, 1 puff every 10 seconds. Children who weighed ≤ 25 kg received 400 μ g; those who weighed > 25 kg received 600 μ g.

MAIN OUTCOME MEASURES

Changes in clinical score and pulmonary function and need for nebulization.

MAIN RESULTS

Analysis was by intention to treat. An improvement in lung function was seen in all groups. Results for the sealed-bottle group were similar to those for the conventional-spacer group; a cup was least effective ($P = 0.02$) (Table). Among children with mild airway obstruction, clinical scores, pulmonary function, and need for nebulization did not differ among study groups. Among children with moderate-to-severe airway obstruction, clinical scores did not differ among study groups and a cup was least effective for improving pulmonary



function ($P < 0.05$) (Table). Nebulization was needed by 10 of 11 children who used a cup, 8 of 11 children who used a sealed bottle, 9 of 11 who used an unsealed bottle, and 4 of 11 who used a conventional spacer.

CONCLUSION

In children with acute asthma, spacers made from sealed cold-drink bottles were as effective as conventional spacers.

Source of funding: Medical Research Council of South Africa.

For correspondence: Dr. H. Zar, Child Health Unit, 46 Sawkins Road, Rondebosch, South Africa 7700. FAX 27-21-689-5403.

*See Glossary.

†Information supplied by author.

Median increase in lung function at 15 to 30 minutes after an acute asthma attack for homemade spacers vs conventional spacers in children‡

Disease severity	Outcomes	Conventional spacer (95% CI)	Sealed bottle (CI)	Unsealed bottle (CI)	Cup (CI)
All children	FEV ₁	24% (14 to 37)	20% (15 to 33)	17% (10 to 34)	13% (0 to 23)
	FVC	13% (6 to 20)	13% (8 to 26)	10% (4 to 23)	5% (0 to 8)
Mild-to-moderate obstruction	FEV ₁	37% (19 to 53)	33% (18 to 55)	18% (9 to 57)	0% (-4 to 24)§
	PEFR	59% (22 to 69)	36% (21 to 102)	21% (16 to 99)	12% (-5 to 37)§
	FVC	17% (8 to 22)	23% (14 to 36)	18% (5 to 26)	6% (-5 to 15)§

‡FVC = forced vital capacity; PEFR = peak expiratory flow rate.

§Not significant.

COMMENTARY

The study by Zar and colleagues was a well-designed, randomized, controlled trial—the gold standard for evaluating therapeutic methods. It shows that adequate medication delivery for asthma can be achieved with both expensive and inexpensive tools. The study took place at the Red Cross Children's Hospital in Cape Town, South Africa.

Overall, the results have practical implications for asthma guidelines in developing and industrialized countries. Some programs only allow replacement of spacers once every 2 years. Spacers may also be the only alternative for delivery of nonnebulized anti-inflammatory medications. Furthermore, spacers can become plugged, torn, broken, or misplaced or can be left at home.

Future studies need to evaluate the use of these devices in younger children, especially in areas where neither spacers nor nebulizers are readily available (1). This study shows that homemade spacers work in the hospital setting, but will they also work in the home setting? Will differences in priming and washing alter drug delivery?

Lynnette J. Mazur, MD, MPH
University of Texas Houston Health Science Center
Houston, Texas, USA

Reference

1. Pedersen S, Mortensen S. Use of different inhalation devices in children. *Lung*. 1990;168 Suppl:653-7.