Inhaled bronchodilators, particularly β₂-agonists, are one of the most effective therapies for rapid reversal of airway narrowing in acute asthma. In children bronchodilators are best given using a metered dose inhaler (MDI) with attached spacer; this is as effective as nebulised therapy, with fewer side-effects. However, a spacer must be used with a MDI as children are unable to synchronise inspiration with actuation of the MDI nor can they breath hold at the end of inspiration, particularly when there is lower airways obstruction as occurs during an acute asthma attack. A modified 500 ml plastic bottle spacer has been found to be as effective as a conventional small-volume spacer for delivery of bronchodilators in children with acute wheezing. In contrast, a cup has been shown to be a very poor spacer, with poor efficacy when used for giving bronchodilators in the treatment of acute asthma.

The Department of Health has recently begun to institute the World Health Organization (WHO) programme of Integrated Management of Childhood Illness (IMCI) nationally, to promote timely diagnosis and treatment of the major illnesses in children under 5 years of age. Such an approach has great potential to improve child health and substantially reduce under-5 morbidity and mortality. The South African adaptation of these guidelines recommends use of inhaled β₂-agonists via MDI bottle-spacer and oral steroids in managing children with recurrent wheezing; these recommendations do not currently form part of the WHO IMCI core programme. However, we note with concern the method of making and using a bottle spacer advocated to health care providers. The guideline states that to make a spacer from a 500 ml plastic cold-drink bottle one should ‘hold the top opening [of the bottle] in very hot water to make it soft. Push the MDI into it … Then cut off the bottom of the bottle with a sharp knife. Put tape over this cut edge to avoid hurting the child. Place this end over the face like a mask. When the child breathes spray 5 puffs into the bottle.’

These directions are incorrect and quite different from the recommended way of adapting and using a 500 ml bottle as a spacer. In our studies establishing the efficacy of such a spacer, great care was taken to adapt and use the bottle in a specific way as has been described previously. The following points are of particular importance.

1. A hole should be made in the base of the bottle through which the MDI can be inserted (Fig. 1). As the plastic base is difficult to cut, a hole is melted by applying a heated mould of steel wire (similar in shape and size to the end of the MDI) to the base of the bottle. Cutting a plastic bottle is extremely difficult. Studies have shown that the best method of creating a hole is to use heat to melt an opening similar in shape to the MDI canister. Cutting the bottle may create sharp, jagged edges which may hurt the child even when covered with tape. Cutting and taping a bottle, as recommended in the IMCI guidelines, simulates a cup, which has been shown to be a very ineffective spacer for delivery of bronchodilators in children.

2. The neck of the bottle must be held in the mouth, simulating a mouthpiece in children older than 3 years of age.
around the face, with little delivery to the lungs.\textsuperscript{8,9} Around the edges would result in substantial aerosol leakage if an attached face mask is used this should fit tightly around the edges of the cup where it fits onto the face.\textsuperscript{8} Use of a bottle as recommended in the South African IMCI guidelines, with the bottom cut off to act as a facemask, simulates a cup and would result in substantial loss of aerosol around the face, with little or no drug delivered to the lower airways. This would be a completely ineffective way of administering bronchodilators.

The current recommendations for delivery of bronchodilators as contained in the South African IMCI guidelines\textsuperscript{6} are dangerous and to be discouraged. If we are to use a homemade spacer then we should recommend modification and use of a 500 ml bottle, as has been demonstrated to work effectively in carefully conducted and published trials.\textsuperscript{3,5,8,9} It is ironic that such recommendations should be included in international guidelines, but not in the current IMCI South African guidelines, despite a large amount of research on homemade spacers having been done in South Africa.

Although a homemade bottle spacer seems simple to make and use, this is potentially deceptive. Patients, caregivers and health care professionals must be educated as to the optimal way in which an MDI spacer should be made and used. Studies\textsuperscript{3,4} have demonstrated the efficacy of a 500 ml bottle when adapted and used in the correct way. A 500 ml plastic cold-drink bottle (modified as per published recommendations) and conventional spacer have been shown to produce equivalent aerosol deposition in the lungs;\textsuperscript{2} however, pulmonary deposition obtained with a cup was found to be only approximately one-fifth of that achieved using a conventional spacer.\textsuperscript{3,5} Furthermore, clinical studies\textsuperscript{8} of children with acute asthma confirm the utility of the 500 ml cold-drink bottle and the poor efficacy of the cup as a spacer, especially in patients with moderate or severe airway obstruction. The poor efficacy of a cup is most likely due to loss of aerosol around the edges of the cup where it fits onto the face.\textsuperscript{8} Use of a bottle as recommended in the South African IMCI guidelines, with the bottom cut off to act as a facemask, simulates a cup and would result in substantial loss of aerosol around the face, with little or no drug delivered to the lower airways. This would be a completely ineffective way of administering bronchodilators.

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