

Bye-Bye, Blow-By

The term “blow-by” is used to describe the administration of medication from a jet nebulizer when the aerosol is directed toward the patient’s face, using either a mask or tubing attached to the nebulization port. The rationale is that it can be difficult to get children to cooperate, so if the aerosol is blown towards the child’s face, they should be able to inhale enough medication for a therapeutic effect. A number of studies have shown that, even under ideal circumstances in vitro, there is a 40–85% decrease in aerosol delivery when the mask is held 2 cm away from the child’s face.^{1–5} These studies have generally been done with a mannequin head, held absolutely still, with the face mask placed in an optimal orientation, up to 2 cm from the mannequin, with no circulating air currents in the room, and with the nebulizer properly used. For the North American who may be metrically challenged, 1 inch is 2.54 cm or roughly the diameter of Canadian or American quarter dollar coin. In the clinic a child will probably not hold still, so it will probably not be possible to keep the mask directly in front of the nose and mouth. In some cases a tube is used to blow the medication toward the patient, with no aerosol entrainment, and room air currents disperse the aerosol. Add to this the poor efficiency of jet nebulization and it is safe to say that there is no effective drug deposition with blow-by.

SEE THE ORIGINAL STUDY ON PAGE 1021

In this issue of *RESPIRATORY CARE*, Restrepo and colleagues report a bench study of 1 standard and 2 novel pediatric aerosol masks that are designed to entrain more of the aerosol. One of the novel masks is designed so that the aerosol enters the mask directed toward the child’s nasal/oral area, whereas in the other 2 masks the entering aerosol is directed upwards toward the inner surface of the mask.⁶ Although the mask that aims the aerosol directly at the nasal/oral area decreases aerosol loss to “just” 40% with the mask held 2 cm from the mannequin face, even under these ideal bench-test circumstances this would yield a nearly undetectable aerosol deposition in the lung. Indeed, if an infant is willing to sit as

still as a mannequin with a mask just 2 cm in front of his or her face, why not place the mask directly on the child’s face and optimize aerosol delivery?

Why does this practice of blow-by administration persist? I would guess that it is partly due to ignorance of the literature or the stubborn belief that blow-by is effective therapy. I have had respiratory therapists defiantly tell me that they always use blow-by to administer bronchodilators to infants and that the response is excellent. However, bronchodilators such as albuterol do not provide any benefit to the child with bronchiolitis, whether administered systemically⁷ or via aerosol,⁸ and published guidelines do not recommend their use.⁹ Given that albuterol is ineffective in bronchiolitis, it probably doesn’t matter how it is administered.

It is time that we all say goodbye to blow-by administration of aerosol medications. Blow-by is a waste of time, a waste of money, and an unnecessary irritation for the distressed child. I can think of many more pleasurable ways for respiratory therapists to waste their time.

Bruce K Rubin MEngr MD MBA FAARC
 Department of Pediatrics
 Wake Forest University School of Medicine
 Winston-Salem, North Carolina

REFERENCES

1. Everard ML, Clark AR, Milner AD. Drug delivery from jet nebulisers. *Arch Dis Child* 1992;67(5):586–591.
2. Smaldone GC, Berg E, Nikander K. Variation in pediatric aerosol delivery: importance of facemask. *J Aerosol Med* 2005;18(3):354–363.
3. Amirav I, Newhouse MT. Aerosol therapy with valved holding chambers in young children: importance of the facemask seal. *Pediatrics* 2001;108(2):389–394.
4. Shah SA, Berlinski AB, Rubin BK. Force-dependent static dead space of face masks used with holding chambers. *Respir Care* 2006; 51(2):140–144.
5. Janssens HM, Tiddens HA. Facemasks and aerosol delivery by metered dose inhaler-valved holding chamber in young children: a tight seal makes the difference. *J Aerosol Med* 2007;20 Suppl 1:S59–S65.
6. Lin H-L, Restrepo RD, Gardenhire DS, Rau JL. Effect of facemask design on inhaled mass of nebulized albuterol using a pediatric breathing model. *Respir Care* 2007;52(8):1021–1026.
7. Patel H, Gouin S, Platt RW. Randomized, double-blind, placebo-controlled trial of oral albuterol in infants with mild-to-moderate acute viral bronchiolitis. *J Pediatr* 2003;142(5):509–514.
8. Ralston S, Hartenberger C, Anaya T, Qualls C, Kelly HW. Randomized, placebo-controlled trial of albuterol and epinephrine at equipotent beta-2 agonist doses in acute bronchiolitis. *Pediatr Pulmonol* 2005;40(4):292–299.
9. Gadomski AM, Bhasale AL. Bronchodilators for bronchiolitis. *Cochrane Database Syst Rev* 2006 Jul 19;3:CD001266.

Correspondence: Bruce K Rubin MEngr MD MBA FAARC, Department of Pediatrics, Wake Forest University School of Medicine, Medical Center Boulevard, Winston-Salem NC 27157-1081. E-mail: brubin@wfbmc.edu.

The author reports no conflicts of interest related to the content of this editorial.