

# A Syringe-Actuated Metered-Dose Inhaler for Patients with Tracheal Intubation: A Comment

Sir,

In a letter to the editor by Dubey *et al.* made for interesting reading.<sup>[1]</sup> We congratulate the authors for reporting this. In this article, it is mentioned that metered-dose inhaler (MDI) is considered more effective than nebulizers. We would really like to make the following comments:

- The spray emerging from MDI can have velocity in excess of 30 m/s,<sup>[2]</sup> and when this high-velocity spray is delivered directly into the mouth, most of the spray impacts the posterior wall of the oropharynx which is not inhaled. This inertial impaction is reduced by using a spacer device or holding chamber (HC) to reduce the velocity of aerosol delivery. Hence, when the MDI is used alone, 80% of the drug aerosol is deposited in the oropharynx, but when an HC is used with the MDI, drug deposition in the mouth is almost completely eliminated. Hence, HC is recommended for all bronchodilator treatments with MDIs.<sup>[3]</sup>
- The notable features of aerosol drug therapy is the equivalent bronchodilator responses produced by nebulizers and MDIs despite a large drug dosage [Table 1] which shows that dose of albuterol deposited in the lungs would be 12% of 2.5 mg (250 µg) for the nebulizer whereas 9% of 360 µg for MDI (MDI dose of 180 µg represents two puffs) and 20% of 360 µg for MDI with HC. Thus, despite the 3.5-fold difference in drug dose in the airways, the bronchodilator responses produced by nebulizer and MDIs are equivalent.<sup>[4-7]</sup> Equivalent responses have also been observed in ventilator-dependent patients.<sup>[8,9]</sup>
- The response or effectiveness of MDIs is optimal when it is used with HC.<sup>[9]</sup>

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

**Table 1: Distribution of inhaled albuterol by the delivery system**

Site of deposition	Nebulizer (2.5 mg)	MDI (180 µg)	MDI + HC (180 µg)
Exhaled (%)	20	1	1
Apparatus (%)	66	10	78
Oropharynx (%)	2	80	1
Lungs (%)	12	9	20

MDI: Metered-dose inhaler, HC: Holding chamber

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10.4103/ijrc.ijrc\_16\_20

**How to cite this article:** Prakash J, Khan MS, Kharwar RK. A syringe-actuated metered-dose inhaler for patients with tracheal intubation: A comment. *Indian J Respir Care* 2020;9:242.

**Received:** 28-02-2020  
**Published:** 19-06-2020

**Accepted:** 28-02-2020

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