# Impact Of Inhalation Delay On Medication Delivery From A Ventolin<sup>†</sup> HFA Pressurized Metered Dose Inhaler Used With And Without A New Prototype Portable Valved Holding Chamber

## RATIONALE

 Valved Holding Chambers (VHCs) are commonly prescribed for patients if they are not able to perfectly coordinate actuation of the pressurized Metered Dose Inhaler (pMDI) with inhalation.



- It is well known however that many patients do not use VHCs for their reliever medication when "on the go" due to a number of reasons, including portability and appearance.
- This study evaluated the impact of inhalation delay when using a Ventolin<sup>+</sup> HFA pMDI with and without a prototype portable VHC.

Vacuum source with constant flow of 30 L/min



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#### METHODS

 The adult Aerosol Delivery to an Anatomic Model (ADAM) oropharyngeal airway was used in order to provide a clinically relevant laboratory determination of medication delivery of Ventolin<sup>+</sup> HFA pMDI at various locations of the model using a constant flow rate of 30 L/min.

 Inhalation 0 seconds after pMDI actuation simulated perfect coordination, with delays of I, 2 and 5 seconds also being investigated (for pMDI alone and pMDI with prototype VHC).



Experimental arrangement showing adult oropharyngeal inlet. The same configuration was utilized for evaluation of MDI alone or with VHC present.

#### RESULTS

#### Mass of Medication Deposited on the Filter (Carina)

Un the miler (Camaj		( $\mu$ g/actuation, mean ± SD)
Delay (sec)	pMDI Alone	pMDI + Portable Chamber
0	$29.0 \pm 4.8$	$32.3 \pm 3.7$
1	$5.7 \pm 0.8$	$30.5 \pm 3.5$
2	$4.3 \pm 1.2$	$29.5 \pm 1.3$
5	n/a	$22.9 \pm 1.3$



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• The mean results of the medication deposited on the filter (simulating mass of medication delivered to the carina) indicated that when the pMDI was used alone, even a 1-sec inhalation delay reduced medication delivery to the filter (carina) by approximately 80% compared to perfect coordination (0-sec delay).

• The prototype portable VHC had similar delivery to MDI alone (perfect coordination) after a 2-sec delay

• Even after a 5-sec delay medication deposited on the filter was only approximately 20% reduced.

#### **Carinal Deposition**



### CONCLUSIONS

- in an emergency.
- protection against oropharyngeal deposition.

![](_page_0_Figure_37.jpeg)

• The prototype portable VHC may provide a potential option for patients previously unwilling to carry more conventional VHCs with them, providing dose assurance of their reliever medication

• If the drug delivered included an inhaled corticosteroid, the VHC would additionally provide

![](_page_0_Picture_40.jpeg)

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