Pressurized Metered Dose Inhaler Delivery to Infants Via Valved Holding Chamber with Facemask: Not All Valved Holding Chambers Perform the Same

RATIONAL

• Delivery of inhaled medication to an infant from a Pressurized Metered Dose Inhaler (pMDI) via Valved Holding Chamber (VHC)-facemask is dependent upon the interaction between facemask and face of the patient.

• Using an anatomically accurate nasopharynx (ADAM-III) infant model we report the findings of clinically appropriate testing from several VHC facemask products used to deliver Ventolin†.

METHODS

• Each VHC (n = 5 per VHC type) was prepared to manufacturer instructions, then evaluated by breathing simulator (ASL 5000), mimicking tidal breathing with the following parameters:
  • Tidal volume (Vt) = 50 mL
  • I:E ratio = 1:3
  • Rate = 30 BPM

• 5 doses of Ventolin† were delivered, timing each actuation to coincide with
  • Inhalation (coordinated)
  • Exhalation (uncoordinated)

• An electret filter was located at the outlet of the model, representing the carina

• The mass of Ventolin was subsequently recovered from the filter and assayed by HPLC to determine delivered mass

CONCLUSIONS

• Delivered mass of VHC devices was significantly greater than the other VHC devices (unpaired t-test, p<0.001)

• Potential reasons for this could relate to mask leakage, VHC design and VHC material

• Clinicians should be aware that the delivered mass from VHCs can differ significantly, which may have a clinical impact