Laboratory usage habits and delivered salbutamol dose of spacers available in Australia and New Zealand

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Background

• Spacers are classified as semi-critical devices.
• In July 2007 changes to TGA regulations for re-processing of such devices came into effect.
• Delivery device may be influenced by
  – Purchase and processing costs
  – Delivery efficiency
• Delivery efficiency will be influenced by
  – Materials used
  – Valve design
  – Inhalation technique.
Aims

• We aimed to:
  – Determine laboratory medication delivery device habits
  – Quantify the delivered salbutamol dose of locally available spacers

• Our primary objective was to provide evidence able to be used for spacer purchasing decisions.

Methods

- Survey

• An on-line survey was used to obtain spacer usage and processing habits of RFLs

• Questions included details of:
  – Aerosol delivery method (spacers, pMDI, nebs)
  – Spacer type (if used)
  – Processing procedures
Methods
- Output and particle size distribution

- Aerosol is fractionated by particle size onto plates
- Quantification of respirable dose
  - UV spectrophotometry (λ=246nm)
- Results presented as average of 6 measurement runs per spacer type
- A run is average of 10 “puffs” of 100 µg Salbutamol.

Methods
- Flow volume simulation

- Patterns used to simulate breathing using a flow volume simulator (FVS)
- Results presented as average of 6 measurement runs per spacer type
- A run is average of 5 “puffs” of 100 mg Salbutamol.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mean</th>
<th>SD</th>
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</thead>
<tbody>
<tr>
<td>Insp. volume (ml)</td>
<td>3000</td>
<td>200</td>
</tr>
<tr>
<td>Insp. time (sec)</td>
<td>4.5</td>
<td>0.3</td>
</tr>
<tr>
<td>Peak inspir. V’ (L/min)</td>
<td>89.0</td>
<td>8.0</td>
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</tbody>
</table>
Results - Survey

• Responses received from 50 RFLs representing ~70% response rate
• Bronchodilator delivery methods included:
  – Nebuliser 18
  – pMDI 6
  – Spacer 37
  – Dry powder 10
• 18 RFLs used two or more delivery methods

Results - Survey

• 8 different spacers were used and included:
  – Volumatic 23
  – Breath-a-tech 8
  – Space Chamber 7
  – LiteAire 1
  – Aerochamber 1
  – Volumetric 1
  – Babyhaler 1
  – Pocket chamber 1
Results
- Survey

- RFLs reported discarding or giving to patients 4 spacer types
- RFLs processed 39 spacers types, of which 23 (59%) classified as single patient use.
- Reported processing costs averaged $4.60 per item and included staff time and consumables.

Results
- Salbutamol delivery

- Volumatics (GSK) were tested being the most prevalent spacer in use.
- Other spacers tested included:
  - LiteAire - Thayer Medical
  - Space Chamber - Medical Developments International
  - Space Pod - Medical Developments International
  - Breath-a-tech - Visiomed
  - E-chamber - Bird Healthcare
Results
- Salbutamol delivery

![Graph showing dose exiting spacer (µg) for different large volume and small volume spacers.]

Results
- Respirable dose (<4.7 µm)

![Graph showing dose exiting spacer (µg) for different respirable doses.]

- Cascade Impactor
- FVS - Tidal breathing
- FVS - TLC inhalation

Volumatic Space Pod E-Chamber Space Chamber LiteAire Breaths-a-tech

Dose exiting spacer (µg)

p<0.05

p=0.001
Results
- Slow maximal inhalation

Discussion

• Spacers the most common delivery device in RFLs in Australia and New Zealand
• Nearly 60% of RFLs were processing single patient spacers in mid 2007.
• Spacer performance significantly altered by inhalation technique
• The clinical relevance of the differences in delivered dose between spacers is unknown
Conclusions

• RFLs need to ensure the revised TGA guidelines are followed for spacer processing.
• Large volume spacers provide increased Salbutamol delivery compared to smaller spacers.
• The current results provide evidence able to be used for spacer purchasing decisions.

Acknowledgements

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