Background

- Delivery of inhaled medications by nebulizer for the treatment of respiratory disease is widespread.
- Important factors to consider in a delivery system are the amount and consistency of drug delivered to the lungs, as well as the amount of drug/droplets that are emitted to the local environment (Fugitive Emissions).

Methodology

- Two nebulizers (AEROECLIPSE II BAN* Nebulizer and Aerogen† Ultra) were evaluated with 2.5mg/3.0mL fill of salbutamol and connected to a breathing simulator mimicking adult tidal volume (500-mL) with inhalation/exhalation (I/E) ratios of 1:1, 1:2 and 1:3.
- Emitted aerosol was captured by filter at 1-minute intervals until sputtering to determine total mass (TMsal).
- The percentage of drug mass lost to the environment (ELsal) was determined by combining the TMsal recovered from the inhalation filters along with the residual mass recovered from the nebulizer and subtracting that from the initial 2.5mg salbutamol placed in the nebulizer.
- Salbutamol assay was undertaken by HPLC.
- Fine droplet mass (FDMsal, μg) was determined by laser diffractometry as the product of TMsal and fine droplet fraction (%<4.7μm).

Results

- **AEROECLIPSE II BAN*** Nebulizer consistently produced more fine droplet mass of salbutamol (FDMsal) and the percentage of drug mass lost to the environment (ELsal) was reduced compared to the Aerogen† Ultra.

<table>
<thead>
<tr>
<th>I:E Ratio</th>
<th>FDMsal (μg)</th>
<th>ELsal (%)</th>
<th>FDMsal (μg)</th>
<th>ELsal (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:1</td>
<td>803 ± 76</td>
<td>4.1 ± 1.0</td>
<td>503 ± 31</td>
<td>23.8 ± 1.6</td>
</tr>
<tr>
<td>1:2</td>
<td>715 ± 82</td>
<td>5.2 ± 2.7</td>
<td>316 ± 12</td>
<td>34.0 ± 2.8</td>
</tr>
<tr>
<td>1:3</td>
<td>695 ± 52</td>
<td>4.2 ± 1.3</td>
<td>234 ± 13</td>
<td>37.8 ± 3.4</td>
</tr>
</tbody>
</table>

Conclusion

- Higher and more consistent delivery was achieved by the **BAN*** Nebulizer as well as lower fugitive emissions.
- Clinicians should be aware of the ability to get increased amounts of medication to the lungs while maintaining a safer work environment for staff with breath actuated delivery.