Patient Response to an Aerosolized Bronchodilator Administered Via the Aerogen® Solo Versus a Jet Nebulizer During Non-invasive Ventilation in Patients With Acute Exacerbation of COPD


Background
There are limited data on the efficacy of aerosolized bronchodilators administered during non-invasive ventilation in patients with acute exacerbation of COPD, including the performance of different aerosol delivery devices in this setting.

Objective
The aim of this study was to compare the efficacy of bronchodilator therapy delivered using the Aerogen Solo versus a jet nebulizer in patients with acute exacerbation of COPD undergoing non-invasive ventilation.

Materials and Methods
Prospective randomized controlled cross-over design

- **Background**: Objective
- **Objective**: Materials and Methods

Non-invasive ventilation indicated because of acute hypercapnic respiratory failure*

Treatment with salbutamol 2.5 mg/2.5 mL

Randomization

<table>
<thead>
<tr>
<th>Day 1</th>
<th>Day 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jet nebulizer†</td>
<td>Aerogen Solo‡</td>
</tr>
<tr>
<td>Aerogen Solo‡</td>
<td>Jet nebulizer†</td>
</tr>
</tbody>
</table>

Both devices were placed between the leak port and the non-vented oronasal mask.

* pH < 7.35, partial pressure of carbon dioxide ≥ 45 mmHg; † Operated until sputter (median 11 min); ‡ Operated until no more aerosol was produced (median 7 min).

COPD, chronic obstructive pulmonary disease.
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Flow and volume responses and improvements in breathlessness were superior with bronchodilator delivery via the Aerogen Solo versus a jet nebulizer in patients with acute exacerbation of COPD undergoing non-invasive ventilation.

Change from baseline in FEV₁ after 120 minutes

<table>
<thead>
<tr>
<th></th>
<th>Change from baseline (mL)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerogen Solo</td>
<td>165</td>
<td>0.001</td>
</tr>
<tr>
<td>Jet nebulizer</td>
<td>116</td>
<td></td>
</tr>
</tbody>
</table>

Clinically significant* improvements in lung function with the Aerogen Solo versus a jet nebulizer

- **Increase in FVC**: +394 vs +123 mL at 120 min (P<0.001)
- **Borg dyspnea score**: 4.4 vs 5.3 at 120 min (P=0.007)
- **Respiratory rate**: 19.7 vs 21.2 BPM at 120 min (P=0.001)
- **PaCO₂**: 47.3 vs 56.1 mm Hg at 120 min (P=0.004)

*Refers to the between-group difference in change from baseline.

BPM, breaths per minute; COPD, chronic obstructive pulmonary disease; FEV₁, forced expiratory volume in 1 second; FVC, forced vital capacity; PaCO₂, partial pressure of carbon dioxide.