1. **Randomized Controlled Trial of a Breath-Activated Nebulizer in Patients with Exacerbation of Chronic Obstructive Pulmonary Disease**


**Abstract**

BACKGROUND: Exacerbations of chronic obstructive pulmonary disease (ECOPD) are characterized by increased dyspnea due to dynamic pulmonary hyperinflation. This study sought to determine whether the AeroEclipse II breath-activated nebulizer (BAN) would produce greater bronchodilator responses than a continuous flow small volume nebulizer (SVN) in patients with ECOPD. METHODS: Prospective randomized controlled trial. Forty patients with ECOPD were recruited to participate in the trial. The primary study outcomes were inspiratory capacity (IC) and dyspnea via the Borg scale. Subjects were randomized to receive bronchodilator from either a BAN or a continuous flow SVN. Subjects in both groups received 2.5 mg albuterol sulfate and 0.5 mg ipratropium bromide by nebulizer every 4 hours and 2.5 mg albuterol every 2 hours as needed. Approximately 2 hours after the subject’s 6th scheduled nebulizer treatment IC, dyspnea, respiratory frequency and pulse rate measurements were repeated. RESULTS: Both groups received an equal number of nebulizer treatments over the study period (BAN 6.25 ± 0.55, control 6.2 ± 0.7, p = 0.8). Following completion of the study protocol the BAN group had a higher inspiratory capacity (IC) than the SVN (1.83 ± 0.65 L vs. 1.42 ± 0.49 L, p = 0.03, respectively). The change in IC was higher in the BAN group (0.33 ± 0.31 vs. the SVN group (0.15 ± 0.19; p = 0.03). The BAN group also had a lower respiratory rate (19 ± 3.3 b/min vs. 22 ± 5.3 b/min, p = 0.03, respectively). There was no difference in resting dyspnea as measured with the Borg scale (BAN 3.3 ± 2.1, SVN 3.5 ± 2.4, p = 0.69) or length-of-stay (BAN 4.6 ± 2.6 days, SVN 5.7 ± 2.8 days, p = 0.21). CONCLUSIONS: In this cohort of patients with ECOPD, a BAN was more effective in reducing lung hyperinflation and respiratory frequency than a continuous-flow SVN.

Key words: chronic obstructive pulmonary disease, COPD, exacerbation, nebulizers, bronchodilators.

2. **A Prospective, Comparative Trial of Standard and Breath Actuated Nebulizer: Efficacy, Safety, and Satisfaction**


**Abstract**

BACKGROUND: Nebulized drug delivery is a cornerstone of therapy for obstructive lung disease, but the ideal nebulizer design is uncertain. The breath-actuated nebulizer (BAN) may be superior to conventional nebulizers. This study compares the BAN to standard nebulizer with regards to efficacy, safety, and patient and respiratory therapists (RT) satisfaction. METHODS: Adults
admitted where nebulizer therapy was prescribed were enrolled. Patients were randomly assigned to either AeroEclipse-II® (Monaghan Medical®) or standard nebulizer and were surveyed at the completion of each treatment. BAN delivered albuterol of 2.5 mg or albuterol 2.5 mg plus ipratropium 0.25 mg. Standard nebulizer delivered albuterol 2.5 mg or albuterol plus ipratropium 0.5 mg. RT assessed each patient’s heart rate, respiratory rate, and peak expiratory flow rate (PEFR) prior to and following treatment. Treatment time and adverse events were recorded. Each RT was asked to assess his/her satisfaction with each of the nebulizers.

RESULTS: Twenty-eight patients were studied. Mean age was 69 years. 54% of patients indicated that overall the BAN was superior to conventional nebulizer therapy; 68% indicated that duration was preferable with the BAN. RTs were more satisfied with the BAN based on overall performance, treatment duration, and ease of use. There were no significant differences in heart rate, PEFR, or respiratory rate before or after nebulization therapy with either device. The duration of treatment was significantly lower with the BAN (4.1 vs. 9.9 min p=<0.001). Additionally, the BAN was associated with a lower occurrence of adverse events.

CONCLUSION: Patients and RTs expressed greater satisfaction with the BAN compared with standard nebulizer. Pre- and post-treatment vital signs did not differ between groups but use of the BAN was associated with a shorter duration and a lower occurrence of adverse events. Taken together, these data support the use of the BAN for nebulized medication delivery.

KEY WORDS: Nebulizers, Breath actuated nebulizer, Conventional nebulizer, Breath actuated nebulizer compared with conventional nebulizer, Patient satisfaction with breath actuated nebulizer, Respiratory satisfaction with breath actuated nebulizer, Adverse events with breath actuated nebulizer, Treatment time for breath actuated nebulizer.