

Vibratory/Positive Expiratory Pressure Device (PEP-FV) and Hospital Length of Stay for Acute Exacerbation of Chronic Obstructive Pulmonary Disease

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Introduction

Acute exacerbation of chronic obstructive pulmonary disease (AECOPD) is a major cause of prolonged hospitalizations. Reduction of hospital length of stay is an important goal in order to improve quality of life and prevent iatrogenic complications. The acapella® choice Vibratory PEP Therapy System (PEP-FV) is a mucus clearing device which employs the principles of positive expiratory pressure along with high-frequency oscillation within the airways to assist with secretion mobilization and clearance. We hypothesize that the PEP-FV used as adjunctive therapy will result in decreased hospital length of stay and improvement of overall outcomes.

Method

- Patients admitted with AECOPD were randomized into treatment and control groups.
- Inclusion Criteria
 - Production of ≥ 15 mL of sputum daily or the subjective feeling of inability to clear secretions, evidence of coarse rhonchi on respiratory examination
 - ≥ 10 pack-year smoking history.
- Treatment subjects had fully functional Vibratory PEP device while controls received a sham device.
- Subjects and treating physicians were blinded to treatment allocation.
- The primary outcome measure was hospital length of stay.
- Secondary measures included daily sputum volumes, Modified Medical Research Council Dyspnea scale, BORG scores, 6MWT distance, and spirometric measures.

Distribution of hlos by device

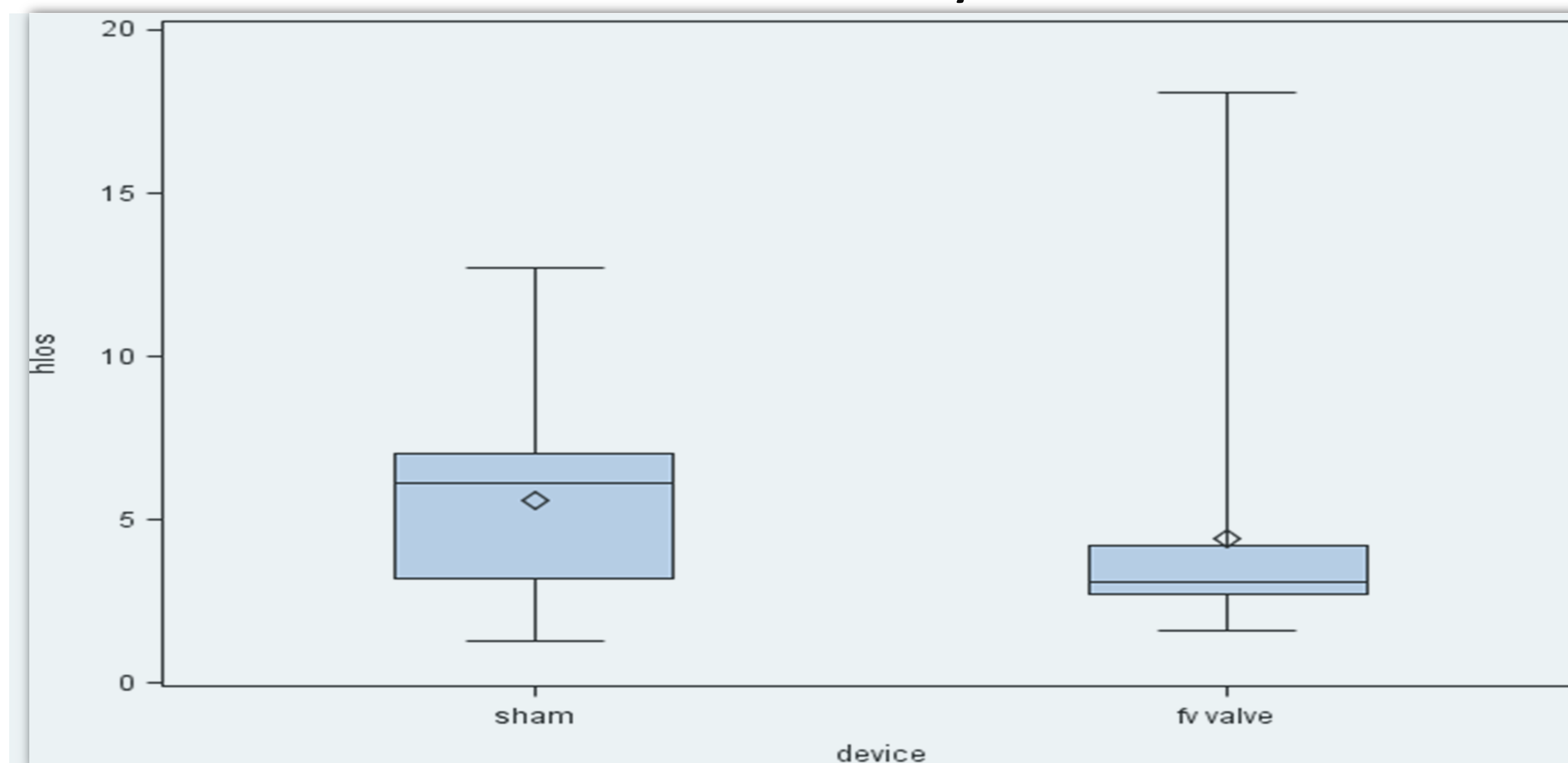


Table 1	Sham Device (21)	Flutter Valve (23)
Age (years)	61.7 (10.3)	62.2 (12.6)
Male	6 (28.6%)	11 (47.8%)
Height (cm)	164.4 (10.4)	168 (6.3)
Weight (KG)	89.1 (24.9)	85 (20.9)
BMI	33.8 (9.3)	31.6 (6.4)
Smoking (pack years)	35.7 (21.1)	50.9 (44.8)

Table 2	Sham Device (21)	Flutter Valve (23)
Hospital length of Stay (days)	5.6 (2.9)	4.4 (3.9)
Steroid Dose Day 1 (Equivalent to Prednisone mliligrams)	146.1 (77.3)	155.5 (92.5)
Steroid Dose Day of discharge or day 5 (Equivalent to Prednisone mliligrams)	55.2 (33.9)	70.6 (58)
FEV 1 (Liters)	1.3 (0.6)	1.3 (0.6)
FEV 1 (% of predicted)	50.8 (20.2)	45.1 (15.8)
FVC (Liters)	2.2 (0.7)	2.2 (0.9)
FVC (% of predicted)	63.4 (17.8)	60.7 (16.9)
FEV1 / FVC %	62.1 (16.7)	57.1 (14.4)
Borg Score Day 1	4.2 (2.4)	4.3 (2.3)
Borg score Day of discharge or Day 5	3 (2.1)	3.5 (2.4)
MMRC Score Day 1	2.7 (1)	3.1 (1.3)
MMRC Score Day of discharge or Day 5	1.8 (0.8)	2.7 (1.2)
Sputum amount Day 1 (ml)	5.9 (6.8)	7.6 (5)
Sputum amount Day of discharge or day 5 (ml)	5 (7.7)	11.6 (8.8)
Six minute Walk distance day 1 (meters)	166 (131)	206.7 (131.9)
Six minute Walk distance day of discharge or day 5 (meters)	190 (95)	180 (93.7)

Results

- 44 patients have been enrolled so far and their baseline Characteristics of the patients are as described in **Table 1**.
- The primary and secondary outcome measures are as described in **Table 2**.
- There was a trend towards decreased hospital length of stay in the PEP-FV group compared with controls of 1.2 days (4.4 ± 2.8 vs 5.6 ± 4.3 days, $p=0.27$). (See Graph)
- There were no significant differences between treatment and control regarding changes in BORG score and MMRC score from day 1-5 (or day of discharge, whichever came first).
- However, there was evidence of increased daily sputum production in the PEP-FV group compared with control over the course of hospitalization (day 5 or day of discharge compared with day 1; 4.9 ± 6.7 vs -0.7 ± 8.6 mL, $p=0.037$).

Conclusion

- Preliminary evidence suggests that adjunctive treatment with PEP-FV reduces hospital length of stay in patients admitted with AECOPD.
- A potential mechanism of this finding is increased sputum production/clearance.
- Continued enrollment to further clarify these findings is ongoing.

Flutter Valve



Flutter Valve



Disclosure: Smiths Medical provided the devices for the study (Acapella® Choice Vibratory PEP Therapy System). Smiths Medical was not involved in study design, conduction or interpretation of the study. No additional funding was received.