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25-28 MART 2026

Sueno Deluxe Hotel, Belek/Antalya

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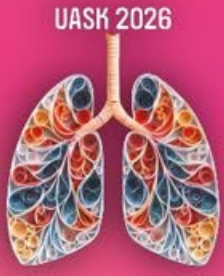
Kronik Akciğer Hastalıklarında Pulmoner Rehabilitasyonda Güncel Uygulamalar

GÖĞÜS OSSİLASYON YELEĞİ KULLANIMI (VEST)

Doç. Dr. Gülhan YILMAZ GÖKMEN

Bandırma Onyedi Eylül Üniversitesi Sağlık Bilimleri Fakültesi Fizyoterapi ve Rehabilitasyon Bölümü
Kardiyopulmoner Rehabilitasyon Anabilim Dalı





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Yüksek Frekanslı Göğüs Duvarı Osilasyon Yeleği (Vest), hava yolu sekresyonlarının mobilizasyonunu sağlamak ve pulmoner hijyeni iyileştirmek amacıyla kullanılan bir cihazdır.



Klinik hedef:

Pulmoner rehabilitasyon sürecinde, özellikle sekresyon retansiyonu olan hastalarda **hava yolu temizliğini optimize ederek klinik sonuçları iyileştirmek.**



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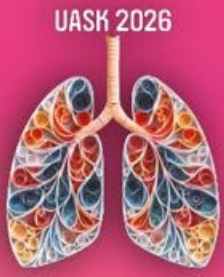
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Tanım

- ❖ **Yüksek Frekanslı Göğüs Duvarı Osilasyonu (HFCWO - High-Frequency Chest Wall Oscillation)**, solunum sistemi dışından uygulanan kuvvetlerle oluşturulan ekstra-torasik osilasyonlar olarak tanımlanır (Warwick, 1991).
- ❖ Göğüs duvarına uygulanan dış osilasyonlar, gövde etrafına yerleştirilen şişirilebilir bir yelek aracılığıyla sağlanır. Hasta ile makine arasındaki ara yüzün özel yapım bir yelek olması nedeniyle **“Vest”** olarak adlandırılır.
- ❖ Sistem:
 - ❖ Pille çalışan bir ünite olabilir
 - ❖ Ya da değişken frekans ve yoğunlukta titreşim üreten bir makineye bağlı olabilir
- ❖ Frekans ve şiddet hastanın konforu ve uyumu sağlanacak şekilde ayarlanır.





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HFCWO'nun Fiziolojisi

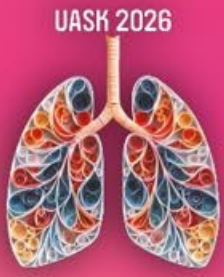
HFCWO, göğüs duvarına dışarıdan uygulanan hızlı ve ritmik basınç değişiklikleriyle çalışır.

Cihaz, yelege yüksek frekansta hava atımları gönderir ve bu da göğüs duvarında titreşimli kompresyon oluşturur.

Şişirme fazında göğüs duvarı basıncı 5–20 cmH₂O'ya kadar çıkar.

Bu basınç artışı, kısa süreli fakat güçlü bir ekspirasyon akımı (saniyede yaklaşık 1.6 litreye kadar) oluşturur.

Cihaz genellikle 2–25 Hz frekans aralığında çalışır; yani saniyede 2 ila 25 titreşim üretir.



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Artan hava-sıvı kesme kuvveti (shear force):

Ekspirasyon sırasında artan hava akımı, mukus üzerinde kaydırıcı bir etki oluşturur ve onu yerinden oynatır.

Havayolu duvarlarının mikroskobik yer değiştirmesi:

Titreşimler bronş duvarlarında küçük hareketler oluşturur. Bu hareket, yapışmış sekresyonların gevşemesine yardımcı olabilir.

HFCWO

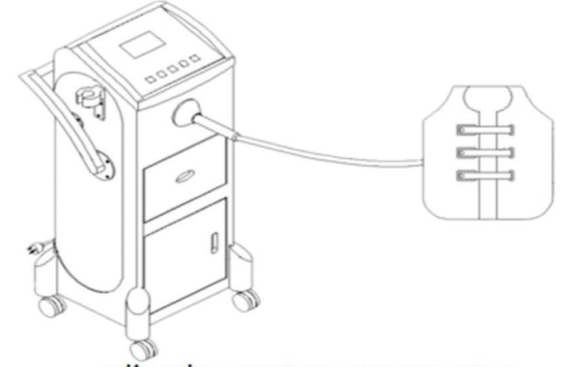
Mukusu Nasıl Hareket Ettirir?

Siliyer aktivitenin artması:

Silyaların daha aktif çalışması desteklenir.

Sekresyonun kıvamının azalması:

Bronşiyal sekresyonların "yapışkanlığı" azalır, daha akışkan hale gelir ve böylece öksürükle daha kolay atılabilir.



vibrating sputum expectorator



Vibration of the airflow to promote the loosening, dislodging and expulsion of phlegm, to maintain the patient's airway open.

HFCWO, hem mekanik titreşim hem de basınç değişimi yoluyla mukusu gevşetir, yerinden ayırır ve merkezi hava yollarına doğru taşınmasını kolaylaştırır. Bu da ekspektorasyonu daha etkin hale getirir.



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Uygulama Özellikleri

- Postüral drenaj pozisyonlarında veya oturur pozisyonda uygulanabilir
- Fizyoterapist, eğitilmiş bakım veren veya hasta tarafından uygulanabilir
- Mukolitik inhalasyon + PEP + huffing ile kombine edilebilir



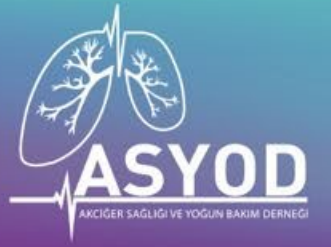


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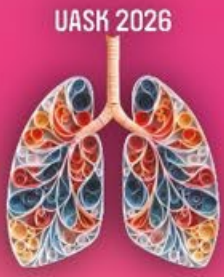
Endikasyonlar

- ✓ Kistik fibroz
- ✓ Bronşektazi
- ✓ KOAH-AEKOAH
- ✓ Nöromusküler hastalıklar
- ✓ Postoperatif sekresyon retansiyonu
- ✓ Uzun süre mekanik ventilasyon



◆ Kontrendikasyonlar

- Hemodinamik instabilite
- Aktif hemoptizi
- Pulmoner emboli
- Kosta kırıkları
- Plevral efüzyon / ampiyem
- Stabil olmayan servikal yaralanma



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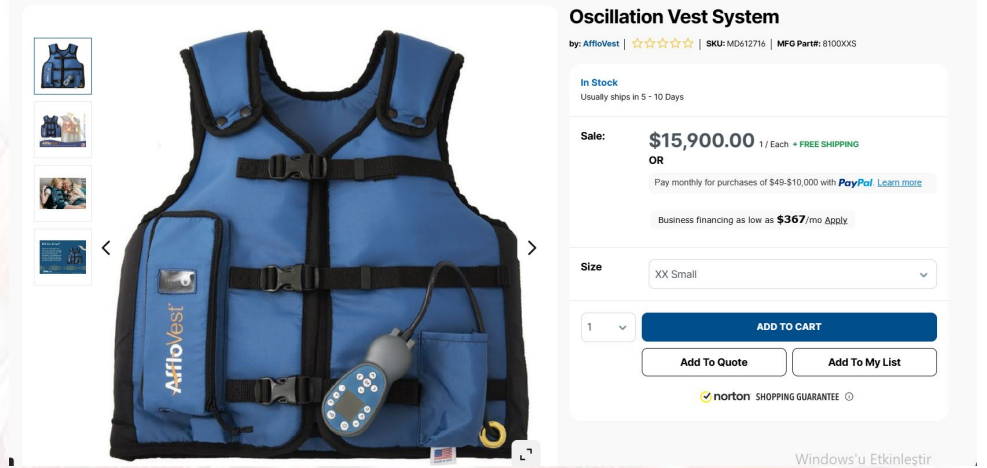
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◆ Avantajlar

- ✓ Bağımsız kullanım imkânı
- ✓ Kombine tedaviye uygun
- ✓ Aktif teknik uygulayamayan hastalarda alternatif



A - Optional remote control port
B - Easy to read display screen
C - Air Hose connection ports
D - Frequency or Hertz (Hz)
E - Pressure
F - Time



◆ Dezavantajlar

- Yüksek maliyet
- Ağır (~8 kg) ve gürültülü
- Taşınabilirliği sınırlı
- Torasik mobiliteyi azaltabilir

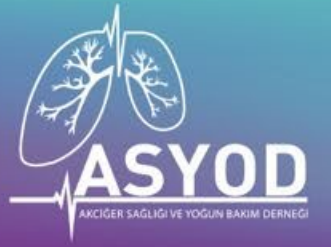


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HISTORY

Comparative Study [Am Rev Respir Dis](#)
doi: 10.1164/arrd.1984.130.5.703.

Tracheal mucus clearance oscillation. II: Chest wa

M King, D M Phillips, A Zidulka, H K Chang

PMID: 6497152 DOI: [10.1164/arrd.1984.13](#)

Abstract

We compared the tracheal mucus clearance breathing (SB), ventilation by high-frequency ventilation by high-frequency oscillation of using a piston pump with a high impedance tube; HFO/CW was effected by creating rap the lower thorax of the animal, causing sma observing the rate of displacement of a cha bronchoscope was used to deposit the mar run. In 7 dogs, mean TMCR during control (tidal volume (VTO) of 1.5 ml/kg, mean TMCI and 76% of control with HFO/AO (NS). Duri was 97% of control. We conclude that high-enhances tracheal mucus clearance when cc frequency oscillation at the mouth does not

[Am Rev Respir Dis](#). 1985 Aug;132(2):350-3. doi: 10.1164/arrd.1985.132.2.350.

Nitrogen washout during tidal breathing with superimposed high-frequency chest wall oscillation

A Harf, A Zidulka, H K Chang

PMID: 4026058 DOI: [10.1164/arrd.1985.132.2.350](#)

Abstract

In order to assess the efficacy of high-frequency chest wall oscillation (HFCWO) superimposed on tidal ventilation, multiple-breath nitrogen washout curves were obtained in 7 normal seated subjects. To maintain a regular breathing pattern throughout the study, the subjects breathed synchronously with a Harvard ventilator set at a constant tidal volume and frequency for each subject during a trial period. Washout curves were obtained during 3 different maneuvers performed in random order. Series A was the control condition with no superimposed HFCWO. In Series B and C, HFCWO at 5 Hz was superimposed on the regulated tidal breathing; the magnitude of the oscillatory tidal volume measured at the

Inspirasyon sırasında

- HFCWO akciğer periferisinde gaz karışımını artırır

Ekspirasyon sırasında

- hava yollarında gaz karışımı iyileşir

Bu iki mekanizma birlikte:

- ✓ alveollerde efektif ventilasyonu artırır
- ✓ gaz değişimini daha verimli hale getirir.

washout

individual

mediate

partment

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iration

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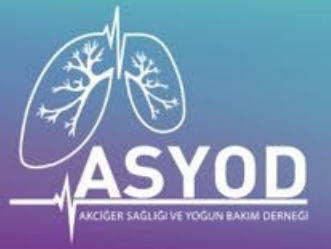


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PublMed® "high-frequency chest wall oscillation" Search

PublMed® "high-frequency chest wall oscillation" Search

PublMed® "high-frequency chest wall oscillation"AND"COPD" Search

Advanced Create alert Create RSS User Guide

Save Email Send to Sort by: Publication date Display options

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RESULTS BY YEAR

1985

PUBLICATION DATE

1 year 5 years

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RESULTS BY YEAR

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PUBLICATION DATE

1 year 5 years 10 years Custom Range

TEXT AVAILABILITY

Abstract

36 results

PublM

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RESULTS BY YEAR

2011 2026

MY CUSTOM FILTERS Edit custom filter:

RESULTS BY YEAR

1996 2026

6 articles found by citation matching

Effects of High Frequency Chest Wall Oscillation (HFCWO) on Clinical Symptoms in COPD.
Bruner MM, et al. Res Sq. 2024. PMID: 38659871 Free PMC article. Preprint.

High-frequency chest wall oscillation in infective exacerbation of COPD: is airway secretion clearance the cornerstone?

The following term was not found in PubMed: ossicillation

A comparison of bronchial drainage treatments in cystic fibrosis.
1 Klufft J, Beker L, Castagnino M, Gaiser J, Chaney H, Fink RJ.
Cite Pediatr Pulmonol. 1996 Oct;22(4):271-4. doi: 10.1002/(SICI)1099-0496(199610)22:4<271::AID-PPUL7>3.0.CO;2-P.

PPUL7>3.0.CO;2-P.
PMID: 8905888 Clinical Trial.
We compared standard chest physical therapy and postural drainage (CPT/PD) with a new airway clearance therapy called **high-frequency chest wall oscillation** (HFCWO) in a group of stable cystic fibrosis (CF) patients.



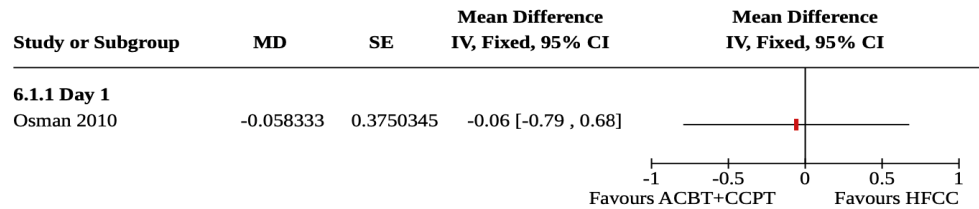
Aktif Solunum Teknikleri Döngüsü+Göğüs Fizyoterapisi VS

Bizim Kongremiz...

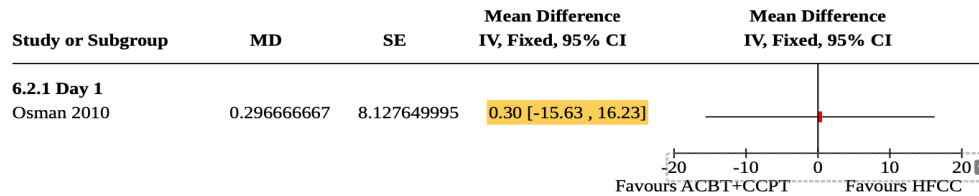
Active cycle of breathing technique for cystic fibrosis (Review)

Wilson LM, Saldanha IJ, Robinson KA

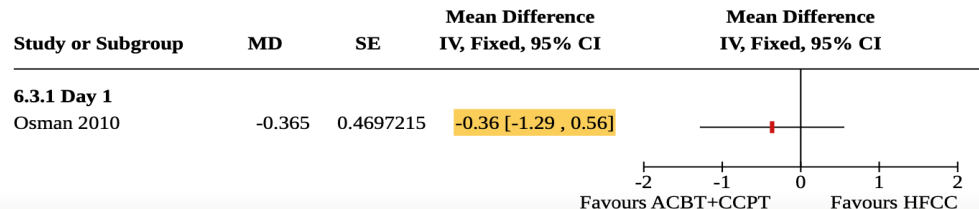
Analysis 6.1. Comparison 6: ACBT + CCPT versus HFCC (HFCWO), Outcome 1: FEV₁ (L)



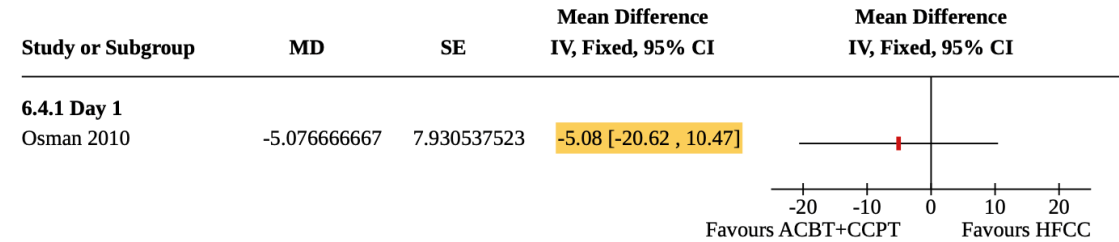
Analysis 6.2. Comparison 6: ACBT + CCPT versus HFCC (HFCWO), Outcome 2: FEV₁% predicted



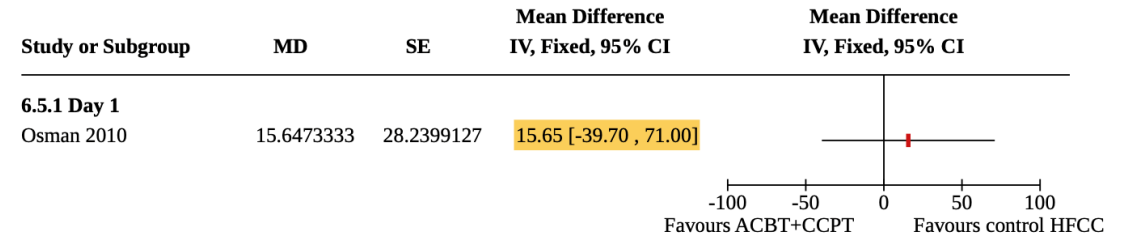
Analysis 6.3. Comparison 6: ACBT + CCPT versus HFCC (HFCWO), Outcome 3: FVC (L)



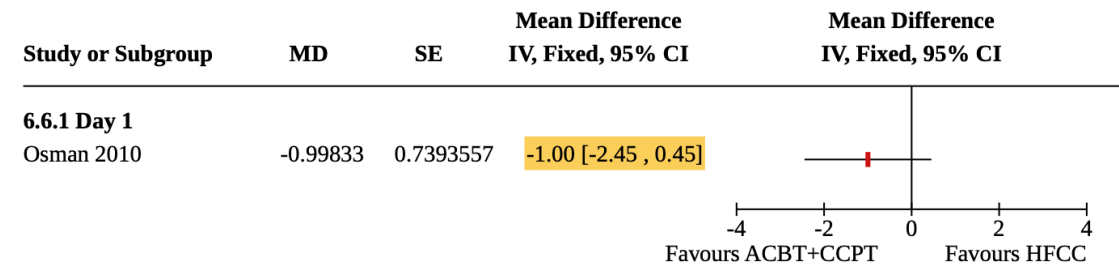
Analysis 6.4. Comparison 6: ACBT + CCPT versus HFCC (HFCWO), Outcome 4: FVC % predicted

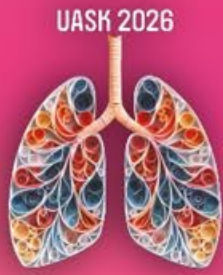


Analysis 6.5. Comparison 6: ACBT + CCPT versus HFCC (HFCWO), Outcome 5: Sputum weight



Analysis 6.6. Comparison 6: ACBT + CCPT versus HFCC (HFCWO), Outcome 6: Oxygen saturation





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Cochrane Library

Cochrane Database of Systematic Reviews

Morrison L, Milroy S.
Oscillating devices for airway clearance in people with cystic fibrosis.
Cochrane Database of Systematic Reviews 2020, Issue 4. Art. No.: CD006842.
DOI: 10.1002/14651858.CD006842.pub5.

Oscillating devices for airway clearance in people with cystic fibrosis (Review)

Morrison L, Milroy S

Analysis 4.1. Comparison 4: Flutter versus HFCWO, Outcome 1: FEV₁ [% predicted]

| Study or Subgroup | Favours Flutter | | | Favours Vest | | | Mean Difference IV, Fixed, 95% CI | Mean Difference IV, Fixed, 95% CI |
|---|-----------------|----|-------|--------------|-----|-------|--------------------------------------|--------------------------------------|
| | Mean | SD | Total | Mean | SD | Total | | |
| 4.1.1 Over two weeks and up to one month | | | | | | | | |
| Oermann 2001 (1) | 54.9 | 3 | 24 | 56.5 | 3.5 | 24 | -1.60 [-3.44, 0.24] | |

Footnotes
(1) This study is of a cross-over design

Analysis 4.2. Comparison 4: Flutter versus HFCWO, Outcome 2: FEF₂₅₋₇₅ [% predicted]

| Study or Subgroup | Flutter | | | Vest | | | Mean Difference IV, Fixed, 95% CI | Mean Difference IV, Fixed, 95% CI |
|---|---------|-----|-------|------|-----|-------|--------------------------------------|--------------------------------------|
| | Mean | SD | Total | Mean | SD | Total | | |
| 4.2.1 Over two weeks and up to one month | | | | | | | | |
| Oermann 2001 (1) | 31.5 | 4.3 | 24 | 33.3 | 4.6 | 24 | -1.80 [-4.32, 0.72] | |

Footnotes
(1) This study is of a cross-over design


Analysis 4.3. Comparison 4: Flutter versus HFCWO, Outcome 3: FVC [% predicted]

| Study or Subgroup | Flutter | | | Vest | | | Mean Difference IV, Fixed, 95% CI | Mean Difference IV, Fixed, 95% CI |
|---|---------|-----|-------|------|----|-------|--------------------------------------|--------------------------------------|
| | Mean | SD | Total | Mean | SD | Total | | |
| 4.3.1 Over two weeks and up to one month | | | | | | | | |
| Oermann 2001 (1) | 72.6 | 2.9 | 24 | 74 | 3 | 24 | -1.40 [-3.07, 0.27] | |

Footnotes
(1) This study is of a cross-over design

Analysis 4.4. Comparison 4: Flutter versus HFCWO, Outcome 4: Treatment satisfaction (long term)

| Study or Subgroup | Flutter | | | HFCWO | | | Mean Difference IV, Fixed, 95% CI | Mean Difference IV, Fixed, 95% CI |
|-----------------------------------|---------|------|-------|-------|------|-------|--------------------------------------|--------------------------------------|
| | Mean | SD | Total | Mean | SD | Total | | |
| 4.4.1 Effectiveness | | | | | | | | |
| Modi 2010a | 17.9 | 4.73 | 35 | 19.4 | 2.88 | 52 | -1.50 [-3.25, 0.25] | |
| 4.4.2 Convenience | | | | | | | | |
| Modi 2010a | 22.5 | 2.37 | 35 | 17.7 | 4.33 | 52 | 4.80 [3.39, 6.21] | |
| 4.4.3 Discomfort | | | | | | | | |
| Modi 2010a | 22.3 | 1.77 | 35 | 21.2 | 3.61 | 52 | 1.10 [-0.04, 2.24] | |
| 4.4.4 Overall satisfaction | | | | | | | | |
| Modi 2010a | 7.9 | 2.37 | 35 | 8.5 | 2.16 | 52 | -0.60 [-1.58, 0.38] | |
| 4.4.5 Mean score | | | | | | | | |
| Modi 2010a | 4.2 | 0.47 | 35 | 3.9 | 0.65 | 52 | 0.30 [0.06, 0.54] | |

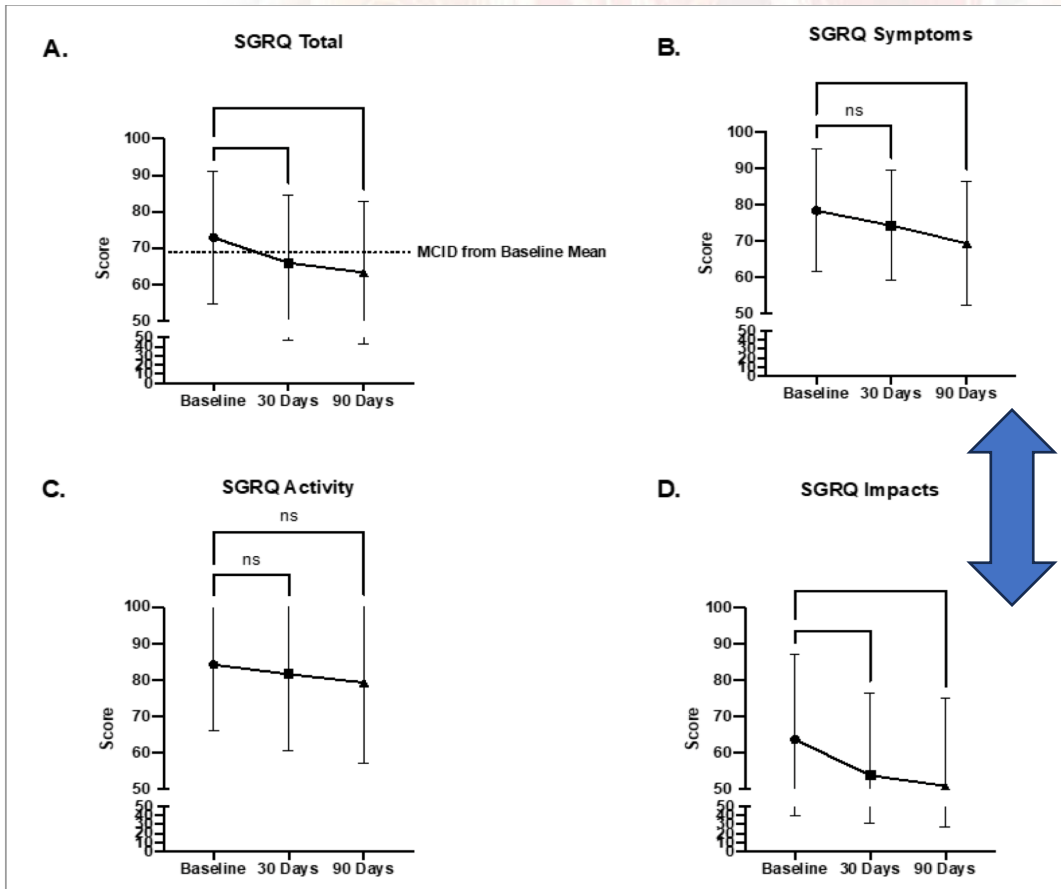
► Res Sq [Preprint]. 2024 Apr 11:rs.3.rs-4165729. [Version 1] doi: [10.21203/rs.3.rs-4165729/v1](https://doi.org/10.21203/rs.3.rs-4165729/v1) 

Effects of High Frequency Chest Wall Oscillation (HFCWO) on Clinical Symptoms in COPD

[Meaghan M Bruner](#)¹, [Clarissa Bazan](#)², [Bo Liu](#)³, [Christina Cheng](#)⁴, [Marion Chad](#)⁵, [Chet Sievert](#)⁶, [Lloyd Edwards](#)⁷, [George M Solomon](#)⁸

► [Author information](#) ► [Copyright and License information](#)

PMCID: PMC11042428 PMID: [38659871](#)



Study Design and Methods:

We conducted a prospective, open-label, observational study in COPD patients without concomitant bronchiectasis. Participants had assessments of QOL at baseline (day 0) and then at 30 and 90 days after initiation of HFCWO therapy. The St. George's Respiratory Questionnaire for COPD Patients (SGRQ-C) was employed and longitudinally followed at each timepoint. Paired t-tests were used to compare means between each time points adjusted for multiple comparisons. A linear mixed model for the analysis of longitudinal data was then constructed to determine the simultaneous contribution of race, gender, ethnicity, time, and selected interactions in the primary outcome of change in SGRQ-C across 0, 30, and 90 days.

Results:

The cohort of patients (n=102) demonstrated a significant reduction in the SGRQ-C at 30 and sustained at 90 days compared to baseline. In addition, two component scores of the SGRQ-C questionnaire ("Symptoms" and Impacts") were significantly reduced at 30 and 90 days.



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International Journal of Chronic Obstructive Pulmonary Disease Dovepress
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Open Access Full Text Article

ORIGINAL RESEARCH

Effects of High-Frequency Chest Wall Oscillation on Acute Exacerbation of Chronic Obstructive Pulmonary Disease: A Systematic Review and Meta-Analysis of Randomized Controlled Trials

Hsiao-Ping Huang¹, Kee-Hsin Chen²⁻⁶, Chen-Liang Tsai⁷, Wen-Pei Chang^{8,9}, Sherry Yueh-Hsia Chiu^{10,11}, Shin-Rou Lin^{10,11}, Yu-Huei Lin¹²

Purpose: This study aimed to evaluate the efficacy of high-frequency chest wall oscillation for sputum expectoration and hospital length of stay in patients with acute exacerbations of chronic obstructive pulmonary disease. The improvements in pulmonary function and oxygenation were also investigated.

Patients and Methods: This systematic review and meta-analysis followed the Preferred Reporting Items for Systematic Review and Meta-analyses (PRISMA) guidelines. Automated literature database searches were conducted from the earliest records to March 31, 2022. The methodological quality of the included studies was assessed using the Cochrane Risk of Bias tool (RoB 2.0), and meta-analysis software (RevMan 5.4) was used to analyze the data.

Results: From 5439 identified articles, 13 studies (with 756 patients) were included in this meta-analysis. Compared to other airway clearance techniques, HFCWO significantly increased expectorated sputum volume by 6.18 mL (95% CI: 1.71 to 10.64; $I^2 = 87%$), shortened hospital stay by 4.37 days (95% CI: -7.70 to -1.05; $I^2 = 84%$). However, FEV₁ (%), PaO₂, and PaCO₂ did not improve significantly.

Conclusion: AECOPD patients may benefit from HFCWO therapy. HFCWO enables AECOPD patients to excrete more sputum and shorten their hospital stays. However, due to heterogeneity among the included research, these results should be interpreted with caution.

Keywords: acute exacerbation of chronic obstructive pulmonary disease, AECOPD, high-frequency chest wall oscillation, HFCWO, sputum expectoration, length of hospital stay

Table 1 Characteristics of Included Studies

| First Author, Year | Subject | Average Age (Years) | Treatment Group | N | Treatment Setting F, Frequency; P, Pressure | Duration | | | |
|---------------------------------|--|--|----------------------|-------|---|--|--|---|---|
| Chakravorty, 2011 ¹⁰ | AECOPD | 71 | HFCWO | 11 | F: 13-15 Hz; P: NR 0 min/time; 2 times/day | 4 weeks | | | |
| Risk of bias domains | | | | | | | | | |
| | Study | D1 | D2 | D3 | D4 | D5 | Overall | | |
| D1 | Chakravorty 2011 ¹⁰ | ! | ! | + | + | ! | ! | | |
| | Duan 2019 ¹⁵ | ! | + | + | - | ! | - | | |
| Gr 20 | Goktalay 2013 ⁹ | + | + | + | + | ! | ! | | |
| | Huang 2013 ¹⁷ | ! | + | + | + | ! | ! | | |
| Hi 20 | Li 2017 ¹⁴ | ! | + | + | + | ! | ! | | |
| | Li 2020 ¹⁹ | ! | + | + | - | ! | - | | |
| Li | Liu 2014 ¹¹ | ! | ! | + | + | ! | ! | | |
| | Mahajan 2011 ¹² | ! | + | + | + | + | ! | | |
| Li | Ouyang 2020 ²⁰ | ! | + | + | - | ! | - | | |
| | Tan 2020 ¹³ | ! | + | - | + | ! | - | | |
| Li | Wang 2021 ¹⁸ | ! | + | + | + | ! | ! | | |
| | Xie 2017 ¹⁶ | ! | + | + | + | ! | ! | | |
| Li | Zhang 2019 ²¹ | ! | + | + | - | ! | - | | |
| | Domains: D1: Bias arising from the randomization process. - High D2: Bias due to deviations from intended intervention. ! Some concerns D3: Bias due to missing outcome data. + Low D4: Bias in measurement of the outcome. D5: Bias in selection of the reported result. | | | | | | | | |
| Li | Bias arising from the randomization process Bias due to deviations from intended... Bias due to missing outcome data Bias in measurement of the outcome Bias in selection of the reported result Overall risk of bias | | | | | | aerosol inhalation of an acetylcysteine solution 1 mL/time; 3 times/day | NR | |
| | M: 20 | Overall risk of bias | | | | | | 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% ■ Low risk ■ Some concerns ■ High risk | 10-15 Hz; P: 2-4 units 5 min/time; 3 times/day |
| Ouyang, 2020 ²⁰ | | AECOPD | 65.3 | HFCWO | 38 | F: 8-15 Hz; P: 4-6 kPa 15-30 min/time; NR | NR | | |
| | | 65.7 | Conventional therapy | 36 | - | NR | | | |

Safety, tolerability, and efficacy of high-frequency chest wall oscillation in pediatric patients with cerebral palsy and neuromuscular diseases: an exploratory randomized controlled trial

Nanci Yu

Affiliation

PMID: 20

Abstract

- ✓ HFCWO (Vest) güvenli ve iyi tolere edilebilir
- ✓ Tedaviye uyum (adherence) klasik göğüs fizyoterapisine göre daha yüksektir
- ✓ Hava yolu temizliğinde iyileşme potansiyeli
- ✓ Bu iyileşme hastane yatışlarını azaltabilir

Airway secretions and infections are common in cerebral palsy and neuromuscular c... physiotherapy is standard therapy but effort is substantial. High-frequency chest wa... used in cystic fibrosis but tolerability and safety data in cerebral palsy and neuromu... are limited. A prospective, randomized, controlled trial of high-frequency chest wall... standard chest physiotherapy was performed in participants with neuromuscular dis... cerebral palsy. Outcome measures included respiratory-related hospitalizations, ant... chest radiographs, and polysomnography. Care-givers were questioned regarding th... adherence. A total of 28 participants enrolled, 23 completed (12 chest physiotherap... period 5 months). No adverse outcomes were reported. Adherence to prescribed re... higher with high-frequency chest wall oscillation ($P = .036$). Our data suggest safety... and better compliance with high-frequency chest wall oscillation. Improvement in ai... may help prevent hospitalizations. Larger controlled trials are required to confirm th...

The Impact of High-Frequency Chest Wall Oscillation on Healthcare Use in Patients with Neuromuscular Diseases

Noah Lechtzin¹, Lisa F Wolfe², Kevin D Frick³

Affiliations

PMID: 26999271 DOI: 10.1513/AnnalsATS.201509-597OC

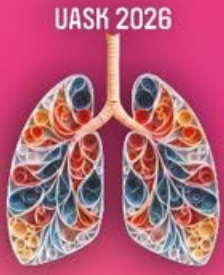
Abstract

- ✓ HFCWO sonrası sağlık hizmeti kullanımı azalmıştır
- ✓ Toplam medikal maliyetler düşmüştür (~%18.6)
- ✓ Hastaneye yatış maliyetlerinde belirgin azalma vardır (~%41.7)
- ✓ Pnömoni ile ilişkili maliyetler azalmıştır (~%18.1)
- ✓ Genel olarak: Hospitalizasyon ve komplikasyon yükü azalmıştır

subjects were commercial insurance members with an International Classification of Diseases, Ninth Revision, code for a neuromuscular disease and a claim for HFCWO between 2007 and 2011. The study included both children and adults.

Measurements and main results: There were 426 patients in this study. Their mean age was 29.9 ± 22 years. Total medical costs per member per month decreased by \$1,949 (18.6%) after initiation of HFCWO ($P = 0.002$). Inpatient admission costs decreased by \$2,392 (41.7%) ($P = 0.001$), and pneumonia costs decreased by \$514 (18.1%) ($P = 0.015$). To account for the possibilities of misclassification based on diagnosis and bias due to loss to follow-up, we compared outcomes between those lost to follow-up and those not, and we found similar results.

Conclusions: Total medical costs, hospitalizations, and pneumonia claims were less after than before initiation of HFCWO in a broad group of patients with neuromuscular disease. Subject to the limitations that administrative data did not capture how HFCWO was used and that HFCWO may be a marker of generally better care, our findings lend support to the routine use of this intervention in the care of patients with neuromuscular diseases.



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<https://doi.org/10.1007/s41669-021-00299-y>

ORIGINAL RESEARCH ARTICLE



Budget Impact of the Vest™ High Frequency Chest Wall Oscillation System for Managing Airway Clearance in Patients with Complex Neurological Disorders: A US Healthcare Payers' Perspective Analysis

Amir Ansaripour¹ · Kari Roehrich² · Atefeh Mashayekhi³ · Mwanamisi Wanjala² · Shani Noel⁴ · Mohsen Rezaei Hemami⁵ · Angela Murray⁶ · Mehdi Javanbakht^{3,7}

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HFCWO (High-Frequency Chest Wall Oscillation), hava yolu enfeksiyonlarını azaltarak 5 yılda hasta başına **US\$6.845** hastane maliyeti tasarrufu sağlamaktadır.

cNMD yönetiminde **maliyet tasarrufu sağlayan bir stratejidir**. Azalan hospitalizasyon maliyetleri, **Vest™ sisteminin ek cihaz maliyetlerini tamamen kompanse etmektedir**.

ABD'de 1 milyon sigortalıya sahip bir ticari sağlık planında, cNMD hastalarının %80'ine HFCWO reçete edilmesi durumunda, 5 yıl içinde yaklaşık **US\$9.6 milyon net tasarruf** elde edilebilir.

Key Points for Decision Makers

High-frequency chest wall oscillation (HFCWO) is an efficient technology that reduces hospitalization costs by US\$6845 per patient over 5 years due to decreased airway infections in patients with complex neuromuscular disorders (cNMD).

This budget impact analysis shows HFCWO is a cost-saving strategy in managing cNMD. The reduction in hospitalization costs offset additional costs of the HFCWO device (Vest™ System).

Prescribing HFCWO consistently for 80% of patients with cNMD could lead to cost savings of almost US\$9.6 million over 5 years for a commercial healthcare payer with one million insureds in the USA.

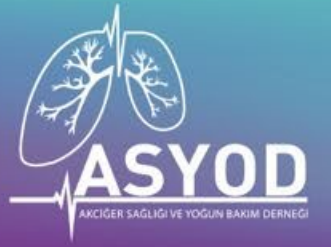


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RESEARCH ARTICLE

The Vest™ High-Frequency Chest Wall Oscillation System Compared with Manual Chest Wall Physiotherapy for Managing Airway Clearance in Patients with Complex Neurological Disorders: A UK-based Cost-Effectiveness Analysis

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The Vest™ HFCWO Sistemi vs. Manuel Göğüs Fizyoterapisi

Ana parametreler:

- Solunum yolu enfeksiyon oranı
- Hastaneye yatış
- Antibiyotik kullanımı
- Cihaz maliyeti

Bulgular:

- ✓ Daha fazla QALY kazanımı: **(Quality-Adjusted Life Year)** = kaliteyle düzeltilmiş yaşam yılı.
- ✓ Daha düşük toplam maliyet (dominant strateji)
- ✓ 5 yılda hasta başı ortalama tasarruf: **£5.660**
1.000 hastada:
~£6 milyon tasarruf
- ✓ 2.442 daha az hastane yatışı
- ✓ 49.868 daha az yatak günü
- ✓ £20.000–£30.000/QALY eşiklerinde **>%98 olasılıkla maliyet-etkin**



High-frequency chest wall oscillation devices: An umbrella review and bibliometric analysis

Admilson Marin^a, Victória Cônsoli Chiaradia^a, Mirela Dobre^b, Andrei Brateanu^c,
Ovidiu Constantin Baltatu^{a,d,*}, Luciana Aparecida Campos^{a,**}

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^b Division of Nephrology and Hypertension, University Hospitals, Cleveland, OH, USA

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^d College of Medicine, Alfaisal University, Riyadh, Saudi Arabia

- ✓ HFCWO'nun etkinliğini destekleyen 12 sistematik derleme belirlenmiştir.
- ✓ kistik fibroz, bronşektazi, KOAH, pnömoni ve nöromusküler hastalıklar...
- ✓ HFCWO'nun pulmoner fonksiyon parametrelerini, balgam özelliklerini, dispneyi, sağlık skorlarını ve yaşam kalitesini iyileştirebildiğini göstermektedir.
- ✓ Advers olay bildirilmemesine rağmen çalışmalar arasındaki genel kanıt kalitesi düşük ile çok düşük arasında değerlendirilmiştir.
- ✓ Bibliyometrik analiz ise son yirmi yılda bu alana yönelik küresel ilginin arttığını göstermiştir; toplam 230 araştırma yayını, 137 patent ve 56 klinik çalışma belirlenmiştir.



High-frequency chest wall oscillation devices: An umbrella review and bibliometric analysis

Admilson Marin^a, Victória Cónsoli Chiaradia^a, Mirela Dobre^b, Andrei Brateanu^c, Ovidiu Constantin Baltatu^{a,d,*}, Luciana Aparecida Campos^{a,*,**}

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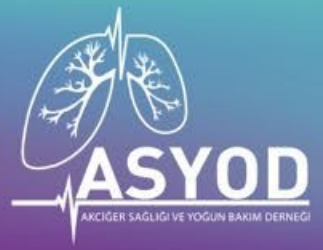


Table 3

High-frequency chest wall oscillation (HFCWO) treatment regimens and devices in English-language full-text articles retrieved from systematic reviews.

| Authors/Reference | HFCWO Device | HFCWO Device Settings | Treatment Regimen | Indication |
|--------------------------------------|--|---|--|-----------------|
| (Braggion et al., 1995)/[31] | ThAIRapy Bronchial Drainage System (American Biosystems) | Oscillating frequencies of 6, 8, 14, 15, 18, and 19 Hz for 5-min intervals | 2 consecutive days 2 times per day of 50-min sessions | Cystic fibrosis |
| (Grosse-Onnebrink et al., 2017)/[32] | The Vest® Model 104 (Hill-Rom) | Oscillating frequency of 13 Hz pulse pressure of 3 mbar | 1 session of 30 min | Cystic fibrosis |
| (Osman et al., 2010)/[33] | The Vest Airway Clearance System Model 4 (Hill-Rom) | Oscillating frequencies of 10, 13, and 15 Hz at 8 min at each, followed by a 2-min rest interval pulse pressure adjusted based on the individual comfort | 2 non-consecutive days 2 times per day of 30-min sessions | Cystic fibrosis |
| (Phillips et al., 2004)/[34] | Hayek Oscillator 1000 Cuirass TM (Flexico Medical Instruments) | Secretion mode: the two-phase cycle consisted of four two-phase cycles, 600 oscillations per minute for 3 min, followed by | 2 consecutive days 2 times per day of 20-min sessions | Cystic fibrosis |

Table 3 (continued)

| Authors/Reference | HFCWO Device | HFCWO Device Settings | Treatment Regimen | Indication |
|---------------------------------|--|---|---|---|
| (Chakravorty et al., 2011)/[39] | SmartVest® Airway Clearance System (Electromed) | System (Hill-Rom) pulse pressure of 4–6 units Oscillating frequency of 13–15 Hz, based on patient's tolerance pulse pressure for a comfortable fit | day of 15-min sessions 4 weeks (5 days per week) 3 times per day of 20-min sessions | COPD and asthma Acute exacerbation of COPD |
| (Goktalay et al., 2013)/[40] | The Vest Airway Clearance System (Hill-Rom) | Oscillating frequency of 10 and 20 Hz pulse pressure of 12 cm H ₂ O | 5-day treatment 3 times per day of 20-min sessions | Acute exacerbation of COPD |
| (Arens et al., 1994)/[41] | ThAIRapy Bronchial Drainage System (American Biosystems) | Oscillating frequencies of 6, 8, 14, 15, 18, and 19 Hz for 5-min each | 14 days 3-times per day 30-min sessions | Cystic fibrosis |
| (Kluft et al., 1996)/[42] | ThAIRapy Bronchial Drainage System (American Biosystems) | Oscillating frequencies of 6, 8, 14, 15, 18, and 19 Hz for 5-min each | 2 non-consecutive days 3-times per day of 30-min sessions | Cystic fibrosis |
| (Oermann et al., 2001)/[43] | ThAIRapy Vest system, American Biosystems | Oscillating frequencies of 5, 10, 15, and 25 Hz, for 5-min each separated by deep breathing | 4 weeks 2-3 times per day of 20-min sessions | Cystic fibrosis |



ORIGINAL ARTICLE

Effectiveness of a new “focused pulse” high-frequency chest wall oscillation in patients with moderate to severe COPD

Maria T. PESTELLI ¹, Bruna GRECCHI ¹, Erica VOTTERO ¹, Alice GALLI ¹, Antonello NICOLINI ² *, Elena COMPALATI ², Paolo BANFI ², Teresa DIAZ DE TERAN ³, Monica GONZALES ³, Francesco D'ABROSCA ^{4,5}, Lorenzo LIPPI ^{4,5}, Gianluca FERRAIOLI ⁶, Shauna SHERIDAN ⁷, Marian DIMABUYU-FRANCISCO ⁸, Paolo SOLIDORO ⁹

ABSTRACT

BACKGROUND: Chest physiotherapy plays a crucial role in the treatment of COPD, although the optimal techniques for airway clearance have not been definitively established. Among the different techniques, high-frequency chest wall oscillation (HFCWO) has gained attention for its potential to create a widespread lung percussion, facilitating the removal of secretions and potentially clearing the peripheral bronchial tree. This study aims to assess the effectiveness of a novel “focused pulse” HFCWO in patients with moderate to severe COPD.

METHODS: Sixty patients were randomized to three groups: a group treated with the PEP technique, a group with “focused pulse” HFCWO and a group with pharmacological therapy alone (control group). The primary outcomes were changes in respiratory function parameters, changes in dyspnea and quality of life scores as well as daily life activity and health status assessment. The secondary outcomes were the number of exacerbations and the number of practitioner or emergency department (ED) visits after 1, 3, and 6 months.

RESULTS: Sixty patients concluded the study with 20 patients allocated to each group. The two devices improved respiratory function tests, quality of life and health scores and dyspnea compared to the control group. Maximal expiratory pressure and diffusing lung carbon oxide were significantly improved in the focused pulse HFCWO group compared to the PEP group. Only pulse-focused HFCWO showed a statistically significant lower number of exacerbations and visits to ED or practitioner compared to the control group.

CONCLUSIONS: The focused pulse HFCWO technique improves daily life activities and lung function in patients with stable COPD. The device demonstrated significantly greater effectiveness in lowering COPD exacerbations as well as visits to ED or practitioner.

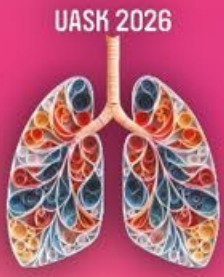
(Cite this article as: Pestelli MT, Grecchi B, Vottero E, Galli A, Nicolini A, Compalati E, *et al.* Effectiveness of a new “focused pulse” high-frequency chest wall oscillation in patients with moderate to severe COPD. *Minerva Med* 2024;115:4-13. DOI: 10.23736/S0026-4806.23.08874-2)

KEY WORDS: Chronic obstructive pulmonary disease; Chest wall oscillation; Respiratory function tests; Quality of life.



Figure 1.—Mechanical device of chest physiotherapy called RespIn 11 using the high-frequency chest wall oscillation technique.

- özel valfler, basınç pistonları ve elektronik kontrol mekanizmalarından oluşan bir yapı içermektedir.
- Bu sistem, terapötik pulsasyonların hastanın toraksındaki hedeflenen bölgelere doğrudan iletilmesini sağlar.
- Bu odaklanmış yaklaşım, maksimum terapötik fayda elde etmeyi amaçlamakta ve tedavinin hastalar için daha etkili ve daha konforlu olmasına katkıda bulunmaktadır.



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Randomized Controlled Trial > Pulmonology. 2025 Dec 31;31(1):2594888.

doi: 10.1080/25310429.2025.2594888. Epub 2025 Dec 1.

Electrovest®: A novel portable electro-vibratory device for airway clearance in chronic hypersecretory lung diseases



ABSTRACT

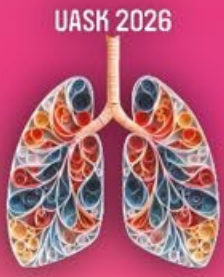
Background: Chronic respiratory diseases such as COPD, cystic fibrosis, and bronchiectasis are frequently associated with bronchial hypersecretion, leading to airflow obstruction and recurrent infections. Effective airway clearance techniques are essential but often limited by adherence, cost, and usability.

Research question: To evaluate the clinical efficacy, safety, tolerability, and comfort of Electrovest®, a novel portable electro-vibratory device that integrates neuromuscular electrical stimulation (NMES) to promote thoracic vibrations in patients with chronic hypersecretory respiratory diseases.

Study design and methods: A randomized, controlled, crossover pilot study including 21 clinically stable patients with hypersecretory chronic respiratory diseases underwent two interventions: Electrovest® and The Vest®. Pulmonary, muscular, functional, and comfort parameters were assessed before and after each therapy. The trial was registered (NCT07175012).

Results: Sputum mobilisation was similar between devices, but Electrovest® was rated as significantly more comfortable ($p = 0.023$). Electrovest® significantly improved P_{lmax} ($p = 0.035$), 6MWT distance ($p = 0.005$), and pectoral strength ($p = 0.020$). No muscle or renal injury was detected. Cough and Sputum Assessment Questionnaire (CASA-Q) scores improved in most domains.

Conclusion: Electrovest® is a safe, well-tolerated, and effective alternative for airway clearance in chronic hypersecretory respiratory diseases. Its portability, comfort, and potential for home use may enhance long-term adherence compared to traditional systems.



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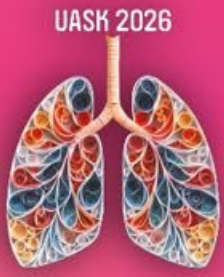
> [Respir Med.](#) 2024 Mar:223:107555. doi: 10.1016/j.rmed.2024.107555. Epub 2024 Feb 1.

Severity of bronchiectasis predicts use of and adherence to high frequency chest wall oscillation therapy – Analysis from the United States Bronchiectasis and NTM research registry

Ashwin Basavaraj ¹, Radmila Choate ², Brian C Becker ³, Timothy R Aksamit ⁴, Mark L Metersky ⁵; Bronchiectasis and NTM Research Registry Investigators

Conclusions: Patients who have more severe disease and continue to experience exacerbations and hospitalizations are more likely to continue HFCWO therapy.





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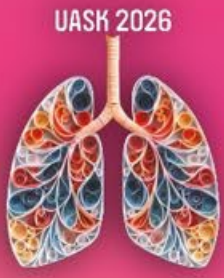
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Ana Mesajlar

- ✓ HFCWO (Vest), sekresyon klirensini artırarak hava yolu temizliğini etkin şekilde sağlar.
- ✓ Hospitalizasyon, enfeksiyon ve sağlık maliyetlerini azaltma potansiyeline sahiptir.
- ✓ Doğru hasta seçimi ile pulmoner rehabilitasyonda yüksek etkili bir tamamlayıcıdır.





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