

Airway Clearance Devices

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Health Equity Considerations

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which individuals are born, grow, live, work, and age.

Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following: safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

Criteria

High Frequency Chest Wall Oscillation Devices

A high frequency chest wall oscillation system (HCPCS E0483, A7025, A7026) is indicated for an individual with excessive mucus production and difficulty clearing secretions when **both** of the following conditions are met:

- There is documentation of **any** of the following:
 - The individual has a nerve or muscle disease that limits their ability to cough.
 - The individual has a disease where it is hard to move fluid out of the lungs called cystic fibrosis.
 - The individual has bronchiectasis (a permanent enlargement of some of the airways in the lungs that makes it hard to move fluid out of the lungs) confirmed on imaging and **any** of the following:
 - The individual has bronchiectasis leading to a chronic cough.
 - The individual has bronchiectasis and has needed frequent antibiotics over the last year to treat lung infections.
- The individual has tried chest therapy and other treatments that did not work, or they could not tolerate the treatments because they were not safe, could cause problems, or were not possible.

Oscillatory Positive Expiratory Pressure Devices

An oscillatory (vibratory) positive expiratory pressure device (HCPCS E0480, E0484, S8185) is indicated for an individual with excessive mucus production and difficulty clearing secretions when **both** of the following conditions are met:

- There is documentation of **any** of the following:
 - The individual has bronchiectasis (a permanent enlargement of some of the airways in the lungs that makes it hard to move fluid out of the lungs) confirmed on imaging and **any** of the following:
 - The individual has bronchiectasis leading to a chronic cough.
 - The individual has bronchiectasis and has needed frequent antibiotics over the last year to treat lung infections.
 - The individual has a disease where it is hard to move fluid out of the lungs called cystic fibrosis.
 - The individual has Chronic Obstructive Pulmonary Disease (COPD) (i.e., chronic bronchitis or emphysema).
- The individual has tried chest therapy and other treatments that did not work, or they could not tolerate the treatments because they were not safe, could cause problems, or were not possible.

Mechanical Insufflation-Exsufflation Devices

A mechanical insufflation-exsufflation device (HCPCS E0482) is indicated for an individual with excessive mucus production and difficulty clearing secretions with a nerve or muscle disease that limits their ability to cough.

Intrapulmonary Percussive Ventilation Devices

An intrapulmonary percussive ventilation (IPPV) device (HCPCS E0481) is considered experimental, investigational, or unproven.

Definitions

1. Bronchiectasis is a chronic illness characterized by permanent and abnormal dilation of bronchi. This condition presents with symptoms of chronic or recurrent cough, purulent sputum, dyspnea, and hemoptysis. Bronchiectasis is common in individuals with cystic fibrosis and chronic obstructive pulmonary disease. Noncontrast chest CT has become the definitive study to confirm the diagnosis of bronchiectasis.
2. **Cystic fibrosis (CF)** chronic and progressive genetic disease. Inflammation in the airways of individuals with CF causes a breakdown of cellular products, producing thick and difficult to expectorate secretions leading to airway obstruction. This process is exaggerated by frequent bacterial infection and ineffective mucociliary

clearance. Treatments to improve symptoms, reduce complications, and enhance quality of life may include pharmacological therapy, airway clearance techniques, and pulmonary rehabilitation.

3. **Chronic obstructive pulmonary disease (COPD)** is characterized by airflow obstruction with narrowing of airways which may close prematurely, trap gas, reduce expiratory air flow, and limit the effectiveness of a cough, thus diminishing the body's ability to clear secretions. Chronic cough and hypersecretion of sputum in individuals with COPD are associated with frequent exacerbations and an increased hospitalization risk.
4. A **high frequency chest wall oscillation (HFCWO) device** consists of a nonstretchable, inflatable vest connected by hoses to a small air-pulse generator that provides external high frequency chest wall oscillation. Small volumes of air are injected into and withdrawn from the vest at a rapid rate, creating vibrations that are transmitted across and through the chest wall of the person wearing the device. This changed or disrupted airway pattern may assist in loosening retained secretions, thus moving mucus towards the larger airways where it can be cleared by coughing. High frequency chest wall compression can be used by patients independently, without the need for an assistant or caregiver.
5. An **oscillatory positive expiratory pressure (PEP) device** combines positive expiratory pressure with airway oscillation. The device is pipe-shaped with a mouthpiece at one end and a steel ball in a hard plastic housing at the other end. As the individual exhales, the steel ball rolls and vibrates producing oscillations in pressure, which are transmitted throughout the tracheobronchial tree. The angle at which the device is held determines the amount of vibration. The oscillations dislodge mucus from the airway walls and the increased pressure maintains the patency of the airway so that mucus does not become trapped as it moves up the airway.
6. A **mechanical percussor** is used to mimic the manual action of clapping the chest with cupped hands. The device is applied to the chest wall, which vibrates the thorax through deep pulses, promoting secretion mobilization.
7. An **intrapulmonary percussive ventilation (IPPV) system** provides high frequency mini-bursts of air through a mouthpiece, face mask, or artificial airway. This device is designed to create internal vibration or percussion in the lung to loosen and mobilize secretions.
8. **Chest physiotherapy (CPT)** is a treatment program that attempts to compensate for abnormal airway clearance. Available techniques include chest percussion, positive airway pressure, forced expirations, and exercise. Given the lack of clear superiority of any one technique, specific choices should be individualized and guided by a specialist in respiratory therapy.

Evidence Discussion

Airway clearance devices may include mechanical percussor, positive expiratory pressure, oscillatory (vibratory) positive expiratory pressure, mechanical insufflation/exsufflation, high frequency chest wall compression, or combination devices. Research shows airway clearance devices are effective at treating bronchiectasis, cystic fibrosis, chronic obstructive pulmonary disease (COPD), and neuromuscular diseases including cerebral palsy.^{1 2 3 4 5}

Studies demonstrate that high frequency chest wall oscillation (HFCWO) significantly improves pulmonary function, quality of life, and reduces inflammation markers in individuals with bronchiectasis, while also showing better compliance and safety profiles in pediatric populations with neuromuscular conditions.¹⁶ In individuals with COPD, airway clearance devices have been associated with significant improvements in sputum volume and reduced exacerbation frequency.⁴

Intrapulmonary percussive ventilation (IPPV) shows mixed results across different conditions, with some evidence suggesting it may improve gas exchange and reduce hospital length of stay during COPD exacerbations, though insufficient evidence exists for its routine use in chronic obstructive airway diseases.⁷ The American College of Chest Physicians evidence-based clinical practice guidelines recommend that oscillatory devices be considered as an alternative to chest physiotherapy in individuals with cystic fibrosis.⁸

¹ Nicolini A, Cardini F, Landucci N, Lanata S, Ferrari-Bravo M, Barlaschini C. Effectiveness of treatment with high-frequency chest wall oscillation in patients with bronchiectasis. *BMC Pulm Med*. 2013;13:21. doi:

² Warnock L, Gates A. Airway clearance techniques compared to no airway clearance techniques for cystic fibrosis. *Cochrane Database Syst Rev*. 2023;4(4):CD001401. doi: 10.1002/14651858.CD001401.pub4

³ Main E, Rand S. Conventional chest physiotherapy compared to other airway clearance techniques for cystic fibrosis. *Cochrane Database Syst Rev*. 2023;5(5):CD002011. doi: 10.1002/14651858.CD002011.pub3

⁴ Daynes E, Jones AW, Greening NJ, Singh SJ. The use of airway clearance devices in the management of chronic obstructive pulmonary disease. A systematic review and meta-analysis of randomized controlled trials. *Ann Am Thorac Soc*. 2021;18(2):308-320. doi:10.1513/AnnalsATS.202005-482OC

⁵ de Alvarenga GM, Remigio Gamba H, Elisa Hellman L, Ganzert Ferrari V, Michel de Macedo R. Physiotherapy intervention during level I of pulmonary rehabilitation on chronic obstructive pulmonary disease: a systematic review. *Open Respir Med J*. 2016;10:12-19. doi:10.2174/1874306401610010012

⁶ Yuan N, Kane P, Shelton K, Matel J, Becker BC, Moss RB. Safety, tolerability, and efficacy of high-frequency chest wall oscillation in pediatric patients with cerebral palsy and neuromuscular diseases: an exploratory randomized controlled trial. *J Child Neurol*. 2010;25(7):815-821. doi: 10.1177/0883073809350223

⁷ Reyckler G, Debier E, Contal O, Audag N. Intrapulmonary percussive ventilation as an airway clearance technique in subjects with chronic obstructive airway diseases. *Respir Care*. 2018;63(5):620-631. doi:10.4187/respcare.05876

⁸ McCool FD, Rosen MJ. Nonpharmacologic airway clearance therapies: ACCP evidence-based clinical practice guidelines. *Chest*. 2006;129(1 Suppl):250S-259S. doi:10.1378/chest.129.1_suppl.250S

Codes

HCPSC Codes	Description
A7025	High frequency chest wall oscillation system vest, replacement for use with patient owned equipment, each
A7026	High frequency chest wall oscillation system hose, replacement for use with patient owned equipment, each
E0480	Percussor, electric or pneumatic, home model
E0481	Intrapulmonary percussive ventilation system and related accessories
E0482	Cough stimulating device, alternating positive and negative airway pressure
E0483	High frequency chest wall oscillation system, with full anterior and/or posterior thoracic region receiving simultaneous external oscillation, includes all accessories and supplies, each
E0484	Oscillatory positive expiratory pressure device, non-electric, any type, each
S8185	Flutter Device

References

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