



TRACOE

Weaning with
One-way Valves



Enhancing Tracheostomy Weaning with One-Way Speaking Valves

The process of tracheostomy tube weaning involves a set pathway of care whereby patients are exposed to a stepped reduction in tracheostomy dependency leading to the goal of decannulation. The process also requires complex multidisciplinary efforts, as well as potential adjustments to the tracheostomy tube (i.e. downsizing) and incorporation of other devices to aid in the journey (i.e. OWVs).¹

Ventilator and tracheostomy tube weaning should be started in parallel as early as possible. The advantages are that patients gain quality of life during the weaning process, as oral communication is at least partially possible and swallowing training or oralization can begin.¹⁻⁴

Laryngeal Rehabilitation

The cuffed tracheostomy tube, which is necessary for ventilation, prevents the flow of air via the upper airways. The absence of an airstream sometimes leads to severe sensory impairment because chemo and pressure receptors in the laryngeal mucosa are not adequately stimulated.⁴

The lack of airflow and stimulation can negatively affect both coughing and swallowing when cuff deflation is attempted. This may lead to further complications, such as dysphagia and aspiration.^{3,4}

A stimulating stream of air through the trachea, larynx and pharynx is crucial to restoring sensation and an adequate rate of spontaneous swallowing. Laryngeal Rehabilitation using cuff deflation and a one-way speaking valve to redirect the airflow via the upper airways is therefore important. It stimulates oropharyngeal sensation, swallowing and effective secretion management, as well as enabling communication^{3,4}



Voicing

Speech is our most important means of communication. Due to the absence of airflow over the vocal cords due to the inflated cuff of a tracheostomy tube, there is a resultant loss of voice, which can highly affect a patient's life.⁵

The improved airflow may positively affect tube weaning and phonation due to the increasing airflow to the upper airway. This can lead to a shorter weaning time, fewer respiratory infections, improved swallowing functions and better secretion management.⁶⁻⁸

However, patients may experience fatigue when the resistance of a one-way speaking valve is introduced, so time is necessary to adapt to this change.^{1,9}



Initiating the use of a one-way speaking valve when the cuff is deflated may lead to:

1. Improved communication ability for patients leading to enhanced exchange of information with the treating team, family, and friends
2. Improved quality of life for patients
3. Assists the multidisciplinary team (MDT) to gain a better understanding of a patient's possible level of delirium, cognitive function, and mood
4. Enables assessment of voice quality, which provides an indication of potential laryngeal injury and laryngeal dysfunction, including secretion management problems and dysphagia¹⁰

Swallowing Dysfunction and Secretion Management

Swallowing dysfunction affects 30% to 70% of patients with a tracheostomy¹¹, highlighting the close relationship between breathing and swallowing due to their shared anatomy and neurophysiological control.⁷

Clinicians have various strategies to assist with tracheostomy weaning, all of which aim to reestablish and optimize airflow to the upper airway (i.e. downsizing the cannula).

These methods often lead to improvements in swallowing function, particularly in areas like secretion clearance, coughing, and airway protection.¹² Early deflation of the tracheostomy cuff and the use of a one-way speaking valve is a particular method of interest as it may help reduce aspiration during swallowing.⁷

Humidification and Filtration

Pulmonary health is also an important aspect in the tracheostomy weaning process. The upper airways provide humidification and filtration upon inspiration. A tracheostomy bypasses the upper airways, leading to the loss of these natural functions. This creates an entry point for unconditioned air and airborne particles to reach the lower airways, potentially causing pulmonary issues like excessive mucus production and coughing.^{13,14}

A Heat and Moisture Exchanger (HME) helps retain heat and moisture during exhalation and returns them during inhalation. Using HMEs in patients with a tracheostomy can improve the humidity and temperature of inspired air, leading to positive pulmonary effects such as decreased mucus viscosity, less coughing, and better respiratory function.¹⁴

HMEs also support patient mobility, rehabilitation, compliance, and sleeping comfort more effectively than external humidification systems.¹⁵ Compared to external humidifiers, HMEs significantly reduce adverse events like mucus plugs and decrease the number of days requiring chest physiotherapy during hospital stays.¹⁶ Additionally, HMEs partially restore natural breathing resistance, which can reduce dynamic airway collapse and optimize respiratory function.^{13,14,17,22}

To maximize humidification, an HME should be used when a one-way speaking valve is not in use. This can be achieved either by using a device that combines both an HME and a one-way speaking valve or by utilizing a separate HME when the one-way speaking valve is not needed.

Restoring normal upper airway physiology has numerous physiological and sensory benefits¹⁰:

1. Re-establishes the ability to generate physiological Positive End Expiratory Pressure (PEEP) from the upper airway
2. Enables the generation of subglottic pressure, which enhances the success of swallowing and reduces the risk of aspiration.
3. Supports glottic closure, necessary for an effective cough and airway protection, by triggering the laryngeal adductor reflex.
4. Enhances laryngopharyngeal sensory stimulation, improving awareness of pooled saliva secretions and the need to swallow.
5. Improves the senses of taste and smell

These factors also create an optimal environment for rehabilitating the laryngeal complex, with a focus on restoring laryngeal airflow and function. This process of "laryngeal weaning" is crucial for preparing the patient for decannulation once they are liberated from mechanical ventilation.¹⁰



Tracoe Phon Assist I

The Tracoe Phon Assist one-way valve has infinitely adjustable airway resistance and offers therapeutic options, such as weaning from ventilation, stimulation of the oropharyngeal region, and voice production.^{1,10} By turning the head part of the Tracoe Phon Assist one-way speaking valve, the side openings can be adjusted to reduce exhalation resistance and assist weaning.⁷⁻¹⁰

Breathing resistance can be individually adjusted as expiration takes place partially via the side openings and the natural airway. It functions as a bias-closed speaking valve when in the completely closed position.

It is available in transparent or in orange signal color for increased distinguishability from other attachments, with or without an oxygen connection and adapter, and is compatible with a 15 mm connector. It is an ideal tool for use at the beginning of the weaning process, e.g. in the intensive care unit. The Phon Assist can be used for up to 3 months.



Important

Do not use a one-way valve during sleep since the airway could be blocked unintentionally. During sleep, use an HME instead, e.g. TrachPhone.

Ordering information

Ref.no	Product name	Qty
REF 650-T	Tracoe Phon Assist I	1 pc
REF 650-TO	Tracoe Phon Assist I O2	1 pc*
REF 650-TO-5	Tracoe Phon Assist I O2	5 pcs*
REF 650-TO-C	Tracoe Phon Assist I orange O2	1 pc*
REF 650-TO-C-5	Tracoe Phon Assist I orange O2	5 pcs*

*Including: adapter for oxygen supply

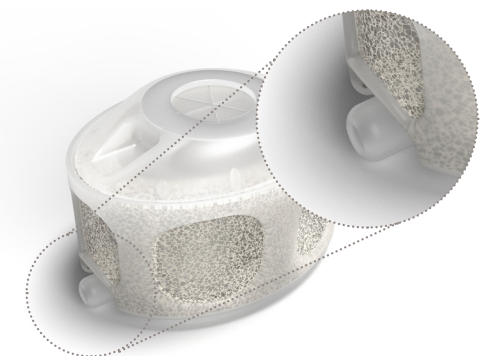
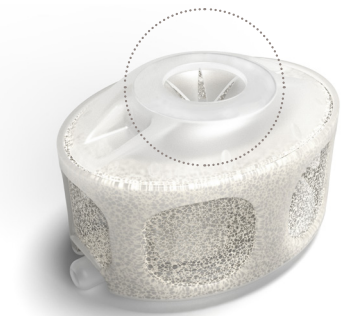
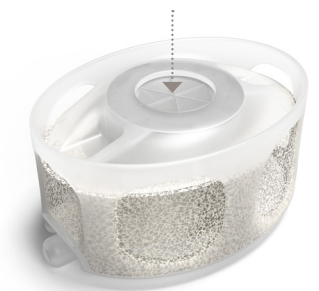
TrachPhone

The TrachPhone is a multifunctional HME providing humidification and facilitates speech. The HME media is a foam which retains heat and moisture from exhaled air and uses it to humidify air upon inhalation. The foam is treated with calcium chloride, referred to as hygroscopic compound, which enhances the moisture retention properties. Hygroscopic compounds have been found to provide better moisture output to the respiratory system, when compared to non-hygroscopic HMEs.^{18,19}

HMEs partially restore breathing resistance, which can reduce dynamic airway collapse and optimize respiratory function.¹⁹⁻²²

TrachPhone contains a valve with a spring that can easily be depressed with a finger to facilitate speech. After releasing the finger, the valve will open automatically.

The integrated suction port allows for tracheal suction without removing the HME. In case of coughing or blockage the suction port acts as a cough relief valve. TrachPhone has an oxygen port (4 mm) that allows for integrated administration of supplemental oxygen. It is compatible with 15 mm connector of a tracheostomy tube.



Important

Replace it every 24 hours or more often as required, to avoid resistance increase due to accumulation of secretions.

Ordering information

Ref.no	Product name	Qty
7723	TrachPhone	5 pcs
7707	TrachPhone	30 pcs
7704	TrachPhone	50 pcs

Freevent DualCare

The Freevent DualCare combines a one-way valve and a Heat and Moisture Exchanger (HME), enabling hands-free speech and supporting the lungs with important heat and moisture. It can be used as soon as the patient can breathe spontaneously.²⁰



Freevent DualCare consists of two parts that are assembled together, a one-way valve and an HME, providing patients the ability to voice along with the benefits of an HME. The switch between the speaking mode and HME mode is done with a simple twist of the lid.²⁰



The lid is twisted to an open position

The patient breathes both in and out through the HME, saving heat and moisture when breathing out, and giving heat and moisture back when inhaling.

The HME is available both with 15 mm and 22 mm interfaces to fit different tube connections. The speaking valve can be cleaned and re-used for 2 months whereas the HME needs to be replaced at least every 24 hours. The DualCare speaking valve is also available in blue color.

Freevent DualCare system makes it possible for the patient to use an HME both day and night. Freevent HMEs fit with both the speaking valve to be used during daytime and with the HME DigiTop to be used during sleep.



The lid is twisted into a closed position

The membrane in the lid will open when you breathe in through the device but will close when you breathe out.

Important

Do not use the speaking valve during sleep since the airway could be blocked unintentionally. During sleep, use the HME DigiTop instead.

Ordering information

Ref.no	Product name	Qty
7741	Freevent DualCare Set 15	1 set*
7740	Freevent DualCare Set 22	1 set*
7744	Freevent DualCare Speaking Valve	1 pc**
7755	Freevent DualCare Speaking Valve Blue	1 pc**
7742	Freevent HME 15 Regular	30 pcs
7747	Freevent HME 22 Regular	30 pcs
7756	HME DigiTop O2 Blue	1 pc
7745	Removal Aid	2 pcs
7746	Freevent Connection Strap	2 pcs

*Including: 30 pcs Freevent HME, 1 pc Speaking Valve, 1 pc HME DigiTop, 1 pc Removal Aid and 1 pc Freevent Connection Strap

**Including: 1 pc HME DigiTop and 1 pc Freevent Connection Strap

References

- Hunt K, McGowan S. Tracheostomy management. *BJA Education*. 2015 Jun 1;15(3):149-53.
- Pham T, Heunks L, Bellani G, Madotto F, Aragao I, Beduneau G, Goligher EC, Grasselli G, Laake JH, Mancebo J, Peñuelas O. Weaning from mechanical ventilation in intensive care units across 50 countries (WEAN SAFE): a multicentre, prospective, observational cohort study. *The Lancet Respiratory Medicine*. 2023 May 1;11(5):465-76.
- Schwegler, H. (2022). *Trachealknülenmanagement* (4. Auflage). Schulz-Kirchner Verlag.
- Heidler MD, Salzwedel A, Jöbges M, Lück O, Dohle C, Seifert M, et al. Decannulation of tracheotomized patients after long-term mechanical ventilation – results of a prospective multicentric study in German neurological early rehabilitation hospitals. *BMC Anesthesiology*. 2018 Jun 13;18(1).
- Sutt AL, Caruana LR, Dunster KR, Cornwell PL, Anstey CM, Fraser JF. Speaking valves in tracheostomised ICU patients weaning off mechanical ventilation-do they facilitate lung recruitment?. *Critical Care*. 2016 Dec;20:1-9.
- Hernandez G, Pedrosa A, Ortiz R, Cruz Accuaroni MD, Cuena R, Vaquero Collado C, García Plaza S, González Arenas P, Fernandez R. The effects of increasing effective airway diameter on weaning from mechanical ventilation in tracheostomized patients: a randomized controlled trial. *Intensive Care Medicine*. 2013 Jun;39:1063-70.
- Rose L, Messer B. Prolonged Mechanical Ventilation, Weaning, and the Role of Tracheostomy. *Critical Care Clinics*. 2024 Apr 1;40(2):409-27.
- O'Connor LR, Morris NR, Paratz J. Physiological and clinical outcomes associated with use of one-way speaking valves on tracheostomised patients: A systematic review. *Heart & Lung*. 2019 Jul;48(4):356-64.
- Prigent H, Orlikowski D, Blumen MB, Leroux K, Legrand L, Lejaille M, Falaize L, Ruquet M, Raphael JC, Lofaso F. Characteristics of tracheostomy phonation valves. *European Respiratory Journal*. 2006 May 1;27(5):992-6
- Wallace S, McGowan S, Sutt AL. Benefits and options for voice restoration in mechanically ventilated intensive care unit patients with a tracheostomy. *J Intensive Care Soc*. 2023 Feb;24(1):104-111. doi: 10.1177/17511437221113162. Epub 2022 Jul 10. PMID: 36874291; PMCID: PMC9975806.
- Whitmore KA, Townsend SC, Laupland KB. Management of tracheostomies in the intensive care unit: a scoping review. *BMJ open respiratory research*. 2020 Jul 1;7(1):e000651.
- Skoretz SA, Anger N, Wellman L, Takai O, Empey A. A systematic review of tracheostomy modifications and swallowing in adults. *Dysphagia*. 2020 Dec;35:935-47.
- Wong CY, Shakir AA, Farboud A, Whittet HB. Active versus passive humidification for self-ventilating tracheostomy and laryngectomy patients: a systematic review of the literature. *Clinical Otolaryngology*. 2016 Dec;41(6):646-51.
- van den Boer C, Lansaat L, Muller SH, van den Brekel MW, Hilgers FJ. Comparative ex vivo study on humidifying function of three speaking valves with integrated heat and moisture exchanger for tracheotomized patients. *Clin Otolaryngol*. 2015
- Mérol JC, Charpiot A, Langagne T, Hémar P, Ackerstaff AH, Hilgers FJ. Randomized controlled trial on postoperative pulmonary humidification after total laryngectomy: external humidifier versus heat and moisture exchanger. *The Laryngoscope*. 2012 Feb;122(2):275-81.
- Foreman A, De Santis RJ, Sultanov F, Enepekides DJ, Higgins KM. Heat and moisture exchanger use reduces in-hospital complications following total laryngectomy: A case-control study. *Journal of Otolaryngology-Head & Neck Surgery*. 2016 Jan;45(1):40.
- Scheenstra RJ, Muller SH, Vincent A, Sinaasappel M, Hilgers FJ. Influence of breathing resistance of heat and moisture exchangers on tracheal climate and breathing pattern in laryngectomized individuals. *Head & neck*. 2010 Aug;32(8):1069-78.
- Membius C. A comparative evaluation of disposable humidifiers. *Acta anaesthesiologica scandinavica*. 1983 Oct;27(5):403-9.
- Kearney A, Norris K, Bertelsen C, Samad I, Cambridge M, Croft G, Peavler S, Groen C, Doyle PC, Damrose EJ. Adoption and utilization of heat and moisture exchangers (HMEs) in the tracheostomy patient. *Otolaryngology-Head and Neck Surgery*. 2023 Nov;169(5):1374-81.
- de Kleijn BJ, van As Brooks CJ, Wedman J, van der Laan BF. Clinical feasibility study of protrach dualcare a new speaking valve with heat and moisture exchanger for tracheotomized patients. *Laryngoscope Investigative Otolaryngology*. 2017 Dec;2(6):453-8.
- Jones AS, Young PE, Hanafi ZB, Makura ZG, Fenton JE, Hughes JP. A study of the effect of a resistive heat moisture exchanger (trachinaze) on pulmonary function and blood gas tensions in patients who have undergone a laryngectomy: A randomized control trial of 50 patients studied over a 6 month period. *Head & Neck: Journal for the Sciences and Specialties of the Head and Neck*. 2003 May;25(5):361-7.
- Zuur JK, Muller SH, de Jongh FH, Van Zandwijk N, Hilgers FJ. The physiological rationale of heat and moisture exchangers in post-laryngectomy pulmonary rehabilitation: a review. *European Archives of Oto-Rhino-Laryngology and Head & Neck*. 2006 Jan;263:1-8.

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