

Why Should I Use a Passy Muir Valve With My Patient?

Example Research Studies Supporting the Benefits of the Passy Muir Valve (PMV®) Adult and Pediatric Considerations

More than just speech benefits:



Restores a closed respiratory system



Improves speech production



Improves olfaction



Improves swallowing



May promote better hygiene



May reduce aspiration



Facilitates secretion management



Ventilator application



Facilitates weaning



Expedites decannulation



Restores a more normal closed respiratory system: Using a bias-closed position, no-leak designed Valve allows the patient to create positive airway pressure without the need for manual occlusion of the tracheostomy tube. In infants and toddlers, restored pressure is particularly important as it also impacts gross motor development for trunk control during sitting, crawling, standing, and walking, which have a direct correlation with self-feeding, advancement of oral intake, and language development.

- Gross, R. D., Mahlmann, J., & Grayhack, J. P. (2003). Physiologic effects of open and closed tracheostomy tubes on the pharyngeal swallow. *Annals of Otology, Rhinology & Laryngology*, 112(2), 143-152. <https://doi.org/10.1177/000348940311200207>
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- Raynor, E. M. & Wohl, D. (2024). Tracheostomy-related swallowing issues in children. *Otolaryngologic Clinics of North America*, S0030-6665. <https://doi.org/10.1016/j.otc.2024.02.017>
- Sutt, A. L., Antsey, C., Caruana, L. R., Cornwell, P. L., & Fraser, J. (2017). Ventilation distribution and lung recruitment with speaking valve use in tracheostomized patient weaning from mechanical ventilation in intensive care. *Journal of Critical Care*, 40,164-170. <https://doi.org/10.1016/j.jcrc.2017.04.001>



Speech: Patients with tracheostomies and ventilator-dependence can produce speech with more normal phrasing, better vocal quality, and increased volume. Having access to communication improves the psychological well-being of patients and allows for the typical development of speech and language in infants and children.

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- Freeman-Sanderson, A. L., Togher, L., Elkins, M. R., & Phipps, P. R. (2016). Quality of life improves with return of voice in tracheostomy patients in intensive care: An observational study. *Journal of Critical Care*, 33, 186-191. <https://doi.org/10.1016/j.jcrc.2016.01.012>
- Martin, K. A., Cole, T., Percha, C. M., Asanuma, N., Mattare, K., Hager, D. N., Brenner, M. J., & Pandian, V. (2021). Standard versus accelerated speaking valve placement after percutaneous tracheostomy: A randomized controlled feasibility study. *Annals of the American Thoracic Society*, 18(10), 1693 – 1701. <https://doi.org/10.1513/AnnalsATS.202010-1282OC>
- Ruano, R., Ibiroba, E. R., Wyatt, M. A., Balakrishnan, K., Qureshi, M. Y., Kolbe, A. B., Dearani, J.A., Boesch, R.P., Segura, L., Arendt, K. W., Bendel-Stenzel, E., Salik, S.S., & Klinkner, D.B. (2021). Sequential minimally invasive fetal interventions for two life-threatening conditions: A novel approach. *Fetal Diagnostics Therapy*, 48, 70 – 77. <https://doi.org/10.1159/000510635>
- Sutt, A., Cornwell, P., Hay, K., Fraser, J., & Rose, L. (2022). Communication success and speaking valve use in intensive care patients receiving mechanical ventilation. *American Journal of Critical Care*, 31(5), 411-415. <https://doi.org/10.4037/ajcc2022516>
- Wallace, S., McGowan, S., & Sutt, A.-L. (2022). Benefits and options for voice restoration in mechanically ventilated intensive care unit patients with a tracheostomy. *Journal of the Intensive Care Society*, 24(1), 104-111. <https://doi.org/10.1177/17511437221113162>
- Zaga, C., Berney, S., Vogel, A. (2019). The feasibility, utility, and safety of communication interventions with mechanically ventilated Intensive care unit patients: A systematic review. *American Journal of Speech-Language Pathology*, 28(3), 1335-1355. https://doi.org/10.1044/2019_AJSLP-19-0001

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Swallowing: Using the PMV® can improve the safety and efficiency of swallowing and may reduce aspiration. Using a Valve restores the patient to a more normal closed system which facilitates increased pharyngeal/laryngeal sensation and restores positive subglottic air pressure.

- da Cunha de Lima, J. A., Collet, N., Baggio, M. A., & de Almeida, A. M. (2021). Breastfeeding based on the experience of mothers of tracheostomized children and the use of the Passy-Muir® Valve. *Anna Nery School Journal of Nursing*, 25(3), 1-7. <https://doi.org/10.1590/2177-9465-EAN-2020-0290>
- Han, X., Ye, Q., Meng, Z., Pan, D., Wei, X., Wen, H., & Dou, Z. (2022). Biomechanical mechanism of reduced aspiration by the Passy-Muir valve in tracheostomized patients following acquired brain injury: Evidences from subglottic pressure. *Frontiers in Neuroscience*, 16, 1004013. <https://doi.org/10.3389/fnins.2022.1004013>
- Marvin, S., & Thibeault, S. L. (2021). Predictors of aspiration and silent aspiration in patients with new tracheostomy. *American Journal of Speech-language Pathology*, 30(6), 2554–2560. https://doi.org/10.1044/2021_AJSLP-20-00377
- Pullens, B. & Streppel, M. (2021). Swallowing problems in children with tracheostomies. *Seminars in Pediatric Surgery*, 30, 151053. <https://doi.org/10.1016/j.sempedsurg.2021.151053>
- Skoretz, S. A., Anger, N., Wellman, L., Takai, O., & Empey, A. (2020). A systematic review of tracheostomy modifications and swallowing in adults. *Dysphagia*, 35(6), 935-947. <https://doi.org/10.1007/s00455-020-10115-0>



Secretion Management: The bias-closed position no-leak design of the PMV facilitates secretion management as it re-establishes a “closed system” that enables the patient to produce a stronger, more effective cough and throat clear, and improving swallowing due to restored positive subglottic pressure. It also facilitates evaporation of secretions due to redirection of air through the upper airway during exhalation. As a result, suctioning needs may be reduced.

- Alhashemi, H., Algarni, M., Al-Hakami, H., Seebran, N., Hussain, T., Bhutto, T., Tashkandi, A., Alayed, M., Bukhari, E., & Alzahari, A. (2022). An interdisciplinary approach to the management of individuals with tracheostomy. *Respiratory Care*, 67(1), 34 – 39. <https://doi.org/10.4187/respcare.08869>
- Gipsman, A., Prero, M., Ioltzis, P., & Craven, D. (2022). Tracheobronchitis in children with tracheostomy tubes: Overview of a challenging problem. *Pediatric Pulmonology*, 1 – 8. <https://doi.org/10.1002/ppul.25814>
- Seder, D. (2019). Tracheostomy practices in neurocritical care. *Neurocritical Care*, 30, 555 – 556. <https://doi.org/10.1007/s12028-019-00706-7>



Olfaction: The PMV can improve the sense of smell by re-establishing airflow through the oral and nasal cavities during exhalation. This improved sense of smell may lead to an increase in sense of taste, appetite, and caloric intake.

- Lichtman, S. W., Birnbaum, I. L., Sanfilippo, M. R., Pellicone, J. T., Damon, W. J., & King, M. L. (1995). Effect of a tracheostomy speaking valve on secretions, arterial oxygenation, and olfaction: A quantitative evaluation. *Journal of Speech Language and Hearing Research*, 38(3), 549-555. <https://doi.org/10.1044/jshr.3803.549>
- Mohapatra, B. & Mohan, R.(2020). Speech-language pathologists' role in the multi-disciplinary management and rehabilitation of patients with Covid-19. *Journal of Rehabilitation Medicine - Clinical Communications*, 3. <https://doi.org/10.2340/20030711-1000037>
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Hygiene: The PMV facilitates improved tracheal hygiene. This is due to the elimination of the need for manual/finger occlusion of the tracheostomy tube which can lead to infections. The PMV also acts as a filter by reducing the particulates that enter the trachea. Secretions are redirected through the upper airway allowing oral expectoration and reducing contamination of the environment. The use of a speaking Valve reduces infection risk by making communication hands-free.

- Carmona, A. F., Díaz, M. A., Alonso, E. A., Guarasa, I. M., López, P. M., & Castellanos, M. D. (2015). Use of speaking valve on preventing respiratory infections in critical tracheostomized patients diagnosed of dysphagia secondary to artificial airway. *Edisval study. Intensive Care Medicine Experimental*, 3(Suppl 1). <https://doi.org/10.1186/2197-425x-3-s1-a936>
- Dunford, M. & Sankey, P. (2022). Tracheostomy clinical management procedures for adult inpatients. *NSW Government Health: South Eastern Sydney Local Health District*, SESLHDP/298
- Li, L., Wikner, E., Behzadpour, H., Perez, G., & Mudd, P. (2021). Decrease in respiratory related hospitalizations in tracheostomy-dependent children who tolerate Passy-Muir Valve use. *The Annals of Otology, Rhinology, and Laryngology*, 130(6), 623–628. <https://doi.org/10.1177/0003489420966612>

 **Ventilator Use:** The PMV 005 (white), PMV 007 (Aqua Color®), PMV 2000 (clear) and PMV 2001 (Purple Color®) can be used interchangeably on or off the ventilator with adult, pediatric and neonatal patients. In-line speaking Valves have been shown to improve communication, reduce risk of aspiration, improve quality of life and care, and restore pressure.

- Althubaiti, A. Worobetz, N., Inacio, J. Lukens, J., Mousset, M., Onwuka, A., Stevens, M., Justice, L., Shepherd, E., & Wiet., G. (2022). Tolerance of one-way in-line speaking valve trials in ventilator dependent children. *International Journal of Pediatric Otorhinolaryngology*, 157. <https://doi.org/10.1016/j.ijporl.2022.111131>
- Brooks, L., Figueroa, J., Edwards, T., Reeder, W., McBrayer, S., & Landry, A. (2019). Passy Muir Valve tolerance in medically complex infants and children: Are there predictors for success? *The Laryngoscope*, 130(11), E632–E639. <https://doi.org/10.1002/lary.28440>
- Rose, L., Sutt, A.L., Amaral, A. C., Fergusson, D. A., Smith, O. M., & Dale, C. M. (2021). Interventions to enable communication for adult patients requiring an artificial airway with or without mechanical ventilator support. *Cochrane Library: Cochrane Database of Systematic Reviews*, 10 (CD013379). <https://doi.org/10.1002/14651858.CD013379.pub2>
- Sohn, E. Y., Peck, K., Kamerman Kretzmer, R., Kato, R., Keens, T. G., & Davidson Ward, S. L. (2021). Comparison of SIMV+ PS and AC modes in chronically ventilated children and effects on speech. *Pediatric Pulmonology*, 56(1), 179 – 186. <https://doi.org/10.1002/ppul.25102>
- Sutt, A., Cornwell, P., Mullany, D., Kinneally, T., & Fraser, J. F. (2015). The use of tracheostomy speaking valves in mechanically ventilated patients results in improved communication and does not prolong ventilation time in cardiothoracic intensive care unit patients. *Journal of Critical Care*, 30(3), 491-494. <https://doi.org/10.1016/j.jcrc.2014.12.017>
- Zaga, C., Berney, S., Vogel, A. (2019). The feasibility, utility, and safety of communication interventions with mechanically ventilated Intensive care unit patients: A systematic review. *American Journal of Speech-Language Pathology*, 28(3), 1335-1355. https://doi.org/10.1044/2019_AJSLP-19-0001

 **Weaning:** The PMV can be used as an augmentative tool for weaning patients from mechanical ventilation. With re-establishing a more normal closed respiratory system and physiologic PEEP, oxygenation improves as does lung recruitment, which facilitates weaning. As the patient becomes accustomed to exhaling through the upper airway, patient confidence also improves and respiratory muscle retraining is facilitated.

- Dolinay, T., Hsu, L., Maller, A., Corbett Walsh, B., Szucs, A., Jerng, J., & Jun, D. (2024). Ventilator weaning in prolonged mechanical ventilation - A narrative review. *Journal of Clinical Medicine*, 13(7), 1909 <https://doi.org/10.3390/jcm13071909>
- Gallice, T., Cugy, E., Germain, C., Barthélemy, C., Laimay, J., Gaube, J., Engelhardt, M., Branchard, O., Maloizel, E., Frison, E., & Dehail, P. (2023). A pluridisciplinary tracheostomy weaning protocol for brain-injured patients, outside of the intensive care unit and without instrumental assessment: Results of pilot study. *Dysphagia*, 39, 608-622. <https://doi.org/10.1007/s00455-023-10641-7>
- Gallice, T., Cugy, E., Laimay, J., Branchard, O., Germain, C., Dehail, P., Cuny, E., & Engelhardt, J. (2024). Effect of a speaking valve on nasal airflow during tracheostomy weaning: A case series. *Neurocritical Care*. <https://doi.org/10.1007/s12028-024-01966-8>
- Girard, T. D., Alhazzani, W., Kress, J. P., Ouellette, D. R., Schmidt, G. A., Truitt, J. D., Nurns, S. M., Epstein, S. K., Esteban, A., Fan, E., Ferrer, M., Fraser, G. L., Gong, M. N., Hough, C. L., Mehta, S., Nanchal, R., Patel, S., Pawlik, A. J., Schweickert, W. D., Sessler, C., N., Morris, P. E. (2017). An official American Thoracic Society/American College of Chest Physicians clinical practice guideline: Liberation from mechanical ventilation in critically ill adults: Rehabilitation protocols, ventilator liberation protocols, and cuff leak tests. *American Journal of Respiratory Critical Care Medicine*, 195, 120–133.
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Decannulation: The PMV can be used as an alternative to tracheal tube plugging for patients who cannot tolerate plugging due to physiologic or emotional reasons. If a patient is tolerating plugging for only short periods of time, the PMV can be used in the interim (between plugging trials) as a step to assist the patient's transition from an open tracheostomy tube to tracheal plugging. The PMV assists in the tracheostomy decannulation process by allowing the patient to begin to adjust to a more normal breathing pattern through the upper airway on exhalation. This allows the patient to gain confidence and the physician to assess for airway patency.

- Bösch, E., Wendt, A., Müller-Stöver, S., Piechnik, L., Fuchs, H., Lund, M., Steindor, M., Große-Onnebrink, J., Keßler, C., Grychtol, R., & Rothoef, T. (2023). Tracheostomy decannulation in children: a proposal for a structured approach on behalf of the working group chronic respiratory insufficiency within the German-speaking society of pediatric pulmonology. *European Journal of Pediatrics*, 182 (7), 2999 – 3006. <https://doi.org/10.1007/s00431-023-04966-6>
- Eichar, B., Kaffenberger, T., McCoy, J., Padia, R., Muzumdar, H., & Tobey, A. (2024). Effects of speaking valves on tracheostomy decannulation. *International Archives of Otorhinolaryngology*, 28(1), e157-e164. <https://doi.org/10.1055/s-0043-1767797>
- Fuller, C., Wineland, A. M., & Richter, G. T. (2021). Update on pediatric tracheostomy: Indications, technique, education, and decannulation. *Current Otorhinolaryngology Reports*, 9(2), 188-199. <https://doi.org/10.1007/s40136-021-00340-y>
- Kennedy, A., Hart, C. K., de Alarcon, A., Balakrishnan, K., Boudewyns, A., Chun, R., Fayouix, P., Goudy, S. L., Hartnick, C., Hsu, W., Johnson, R. F., Kuo, M., Peer, S., Pransky, S. M., Rahbar, R., Rickert, S., Roy, S., Russell, J., Sandu, K., Sidell, D. ... Rutter, M. J. (2021). International pediatric otolaryngology group (IPOG) management recommendations: Pediatric tracheostomy decannulation. *International Journal of Pediatric Otorhinolaryngology*, 141, 110565. <https://doi.org/10.1016/j.ijporl.2020.110565>
- Lloyd, A. M., Behzadpour, H. K., Rana, M. S., & Espinel, A. G. (2024). Time considerations and outcomes in pediatric tracheostomy decannulation. *International Journal of Pediatric Otorhinolaryngology*, 179. <https://doi.org/10.1016/j.ijporl.2024.111934>
- Kolb, C.M., Halbert, K., Xaio, W., Strang, A.R., & Briddell, J.W. (2021). Comparing decannulation failures and successes in pediatric tracheostomy: An 18-year experience. *Pediatric Pulmonology*, 56, 2761 – 2768. <https://doi.org/10.1002/ppul.25170>
- Young, A., Walsh, K., Ida, J., Thompson, D. M., & Hazkani, I. (2024). Transtracheal pressure for evaluation of decannulation readiness. *The Laryngoscope*, 134(7), 3377-3383. <https://doi.org/10.1002/lary.31280>

