Worcestershire Acute Hospitals NHS Trust

# PASSY-MUIR SPEAKING VALVE (PMSV)

| | |
|---|---|
| **Key Document code:** | WAHT-KD-022 |
| **Key Document Owner:** | Gareth Sellors |
| **Approved by:** | *Intensive Care Forum*<br>*SCSD Governance meeting* |
| **Date of Approval:** | *14th October 2022* |
| **Date of review:**<br>**This is the most current document and should be used until a revised version is in place** | *14th October 2025* |

**Key Amendments**

| Date | Amendment | Approved by |
|---|---|---|
| 8th October 2019 | Document extended with no changes as part of Disease Management section in critical care | Dr Nick Cowley/Dr Andy Burtenshaw |
| 14th October 2022 | Document reviewed with no changes | Intensive Care Forum/ SCSD Governance |

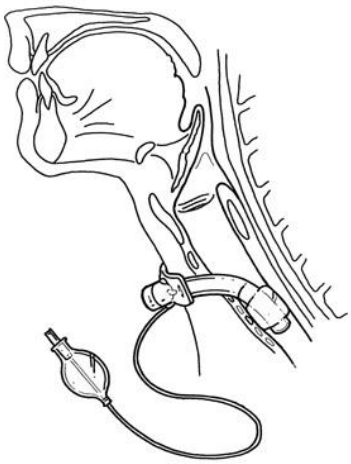
## INTRODUCTION

Critically ill patients requiring long term mechanical ventilation through a cuffed tracheostomy tube are unable to verbally communicate (Kaut et al 1996), and impaired communication is cited by many as being the major source of interpersonal stress associated with mechanical ventilation (Gries and Fernsler 1988, Bergbom-Engberg and Haljamäe 1988). Tracheostomy speaking valves consist of a one way valve that closes upon exhalation, causing a redirection of exhaled gas into the upper airway, thus allowing for the primary benefit of speech without resorting to writing, gesticulating or lip reading, which can be frustrating to both patient and caregiver (Lichtman et al 1995).

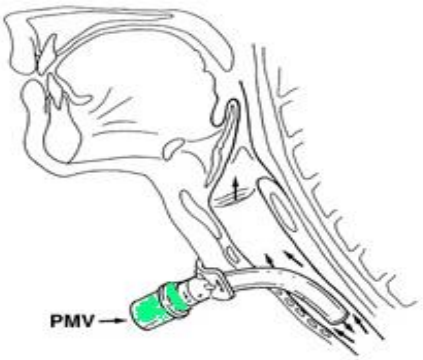
The Passy-Muir Speaking Valve (PMSV) is a relatively simple, effective and inexpensive device which allows verbal communication in the short and long term mechanically ventilated patient. It consists of a one-way, closed position, no leak, silicone diaphragm check valve that fits over the end of the tracheostomy tube. The valve opens during inspiration and closes during expiration to direct exhaled air through the upper airway via the vocal cords, mouth and nose (Elpern et al 2000). With the PMSV speech is louder, stronger and resembles a normal speech pattern (Kaut et al 1996). One way valve placement may not be beneficial for all patients (Suiter et al 2003), however studies have found that there is a significant reduction in secretions with the use of a speaking valve (Lichtman et al 1995, Passy et al 1993), possibly as a result of redirection of airflow to the oral and nasal passages allowing secretions to be expectorated or swallowed, thus reducing the requirement for suctioning through the tracheal lumen. Swallowing skills also improve because the speaking valve normalises pressure below the level of the glottis, thus potentially improving swallowing efficiency (Lichtman et al 1995, Kaut et al 1996). Many patients also reported a vastly increased sense of smell, helping to improve a patients' appetite.

Patients with tracheostomy tubes often have risk factors other than the presence of a tracheostomy tube that predispose them to aspirate e.g. Chronic Obstructive Pulmonary

Disease, Head Injury (Suiter et al 2003), the presence of the PMSV helps to reduce aspiration in selected patients with tracheostomies (Elpern et al 2000).



Tracheostomy with a 'cuff', preventing airflow to or from the nose or mouth.




The one-way Passy-Muir Speaking Valve (PMSV) allows inhalation through the tracheostomy tube, but the exhaled air must pass the vocal cords and the mouth or nose.

## DETAILS OF GUIDELINE

### MAINTENANCE OF AIRWAY PRESSURES WITH PMSV

The PMSV membrane is designed to stay in a closed position, opening only during inspiration, to minimise the work of breathing and to trap air within the tracheostomy tube to inhibit occlusion of the valve by secretions (Kaut et al 1996). The design also facilitates the restoration of Positive End Expiratory Pressure (PEEP), which can result in a lowering of the mechanically set levels of PEEP (Frey and Wood 1991). Adjustments which are important when mechanically set levels of PEEP are greater than 5cm are achieved by monitoring volume, pressure and physiological variables during PMSV trials. Pressures generated by the valve may effect initial compensation settings and require adjustment after placement (Kaut et al 1996).

The PMSV used for patients with a tracheostomy who are on mechanical ventilation is the PMSV 007, an aqua coloured tapered valve with an internal diameter of 15mm and an external diameter of 22mm

### Summary of the Benefits of Using a PMSV:

- Restores a closed respiratory system
- Improves speech production
- Improves swallowing
- May reduce aspiration
- Facilitates secretion management
- Facilitates weaning
- Expedites decannulation
- Improves olfaction
- Promotes better hygiene elimination of finger occlusion, filters air

### Patients Who May Benefit From the PMSV:

- ✓ COPD
- ✓ Neuro-muscular diseases
- ✓ Ventilatory dependent patients
- ✓ Quad / Paraplegia
- ✓ Non-obstructive laryngeal tumours
- ✓ Closed head injury / trauma
- ✓ Bronchopulmonary Dysplasia
- ✓ Bilateral Vocal Cord Paralysis
- ✓ Mild Tracheal / Laryngeal Stenosis
- ✓ Tracheomalacia
- ✓ Sleep apnoea patients

**USE THE PMSV WITH CAUTION FOR:**

- Patients with thick secretions
- Severe COPD patients

**PATIENTS WHERE THE USE OF A PMSV IS ABSOLUTELY CONTRAINDICATED:**

- Unconscious or comatosed patients
- Patients unable to tolerate an uncuffed tracheostomy tube
- Severe upper airway obstruction
- Patients who are unconscious
- Patients with frequent aspiration
- Unmanageable secretions

## Competencies required

Qualified nurse who has undergone the appropriate training

## Patients covered

Any patient in Critical Care with a tracheostomy, who might benefit from the use of a speaking valve.

## Assessment and preparation of the patient

- Document base-line observations of Pulse, BP, Respiratory Rate, $FiO_2$, $O_2$ Sats, Arterial Blood Gases, Level of Consciousness
- Inform the patient about what you are going to do and why
- Clear tracheal and oral secretions
- Completely deflate the tracheostomy cuff whilst suctioning to remove secretions trapped above, and assess for signs of respiratory insufficiency.
- Patients will be unable to breathe if the cuff is not completely deflated.
- Inspect the tracheostomy tube to ensure that it does not exceed 2/3 of the size of the tracheal lumen
- Assess glottal patency by occluding the tracheostomy lumen with your fingers to ensure air passes easily around the deflated cuff through the upper airway. Changing to a smaller tracheostomy tube may be needed to provide sufficient exhaled airflow.
- If respiratory insufficiency persists reinflate the cuff and reassess at another time
- Place the PMSV directly between the tracheostomy tube and the respiratory circuit
- Observe the patient to ensure the diaphragm opens during inspiration and closes during exhalation
- Ventilation mode, rate, volumes, pressures, PEEP and $FiO_2$ must be adjusted by the ICCU Consultant to compensate for losses and maintain patient comfort
- Disable the expiratory ventilator alarms as expired air will be exhaled via the nose and mouth not through the ventilator
  'Sensory-Parameters – Flow – Monitoring off'
- Label the tracheostomy tube to say that the cuff is deflated. **It is vital that all members of the team know the status of the cuff**
- Encourage the patient to attempt to speak

## CARE OF THE PATIENT ON A PMSV

Many patients adjust immediately and easily to the PMSV however some patients will require a gradual transition. The Critical Care Nurse must monitor the patient for tolerance to the PMSV.

- Continuously monitor Heart rate, BP, Respiratory Rate and $O_2$ sats
- Monitor $CO_2$ levels by checking ABGs within 30 minutes of commencing the trial and as required
- Monitor work of breathing, accessory muscle utilisation and other indicators of respiratory insufficiency
- Assess tracheal and oral secretions
- ICCU Consultant to refine ventilator settings as necessary
- Do not leave the patient unsupervised
- Terminate the trial when the patient indicates fatigue
- Assess the patient for changes in swallowing, smelling, coughing, ventilator weaning and secretion management
- Use caution when using a PMSV with A Heat Moisture Exchanger (HME). When using a HME humidity is obtained from exhaled breath. When the PMSV is in place air is not exhaled via the tracheostomy which might affect the HME performance and extra humidification may be required.
- For non ventilated patients humidity and oxygen can be applied via a humidified tracheostomy circuit and mask

## REMOVAL OF THE PMSV

- At the end of the trial remove the PMSV from the circuit
- Inflate the cuff
- Recommence he patient on pre-trial ventilator settings
- Cleanse the PMSV in warm water

## ADDITIONAL PRECAUTIONS

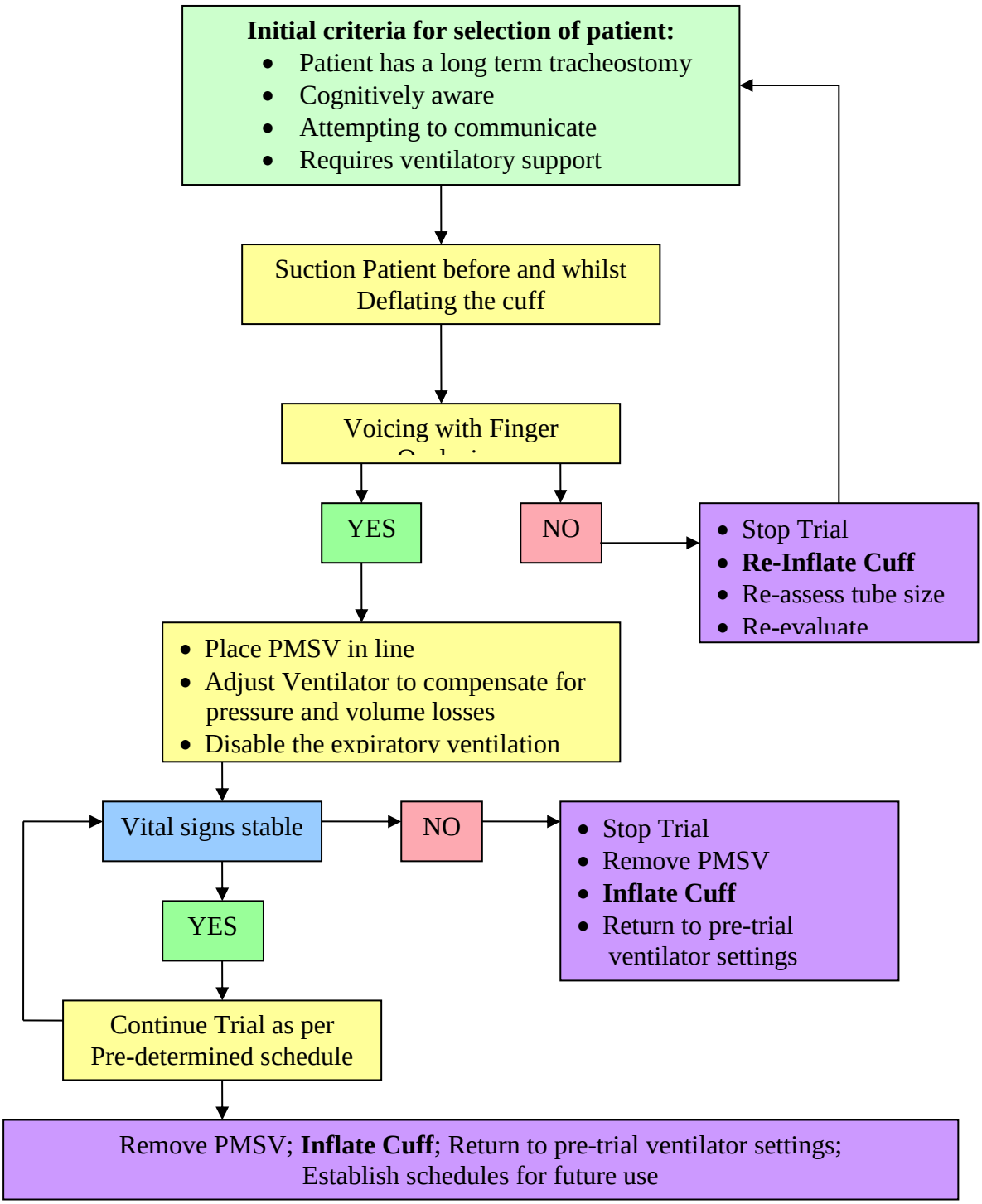
Remove the PMSV when:

- The patient has planned rest
- During nebuliser treatment
- Other interventions that potentiate aspiration
- Do not use for 48 hours post changing of a tracheostomy tube due to possible swelling

## CARE OF THE PMSV

- Single patient use only
- Can be tolerated for 16 – 18 hours a day in some patients
- Clean between use or if excess secretions with soap and warm water. Rinse with clear water and allow to dry thoroughly
- Each PMSV is guaranteed to last for a minimum of 2 months.

## PASSY-MUIR DECISION TREE



## REFERENCES


| | | |
|---|---|---|
| Bergbon-Enberg I.<br>Haljamäe H. | 1988 | A Retrospective Study of Patients' Recall of Respirator Treatment: Nursing Care Factors and Feelings of Security / Insecurity<br>**Intensive Care Nursing** 4 (3); pages 95 - 101 |
| Eggleston G.<br>Stanek R.<br>McCauley M.<br>Belzberg H.<br>Schwartz R. | 1990 | Utilization of Passy-Muir Tracheostomy Speaking Valve With Acute CHI Patients<br>**Maryland Institute for Emergency Medical Services Systems** |
| Elpern E.<br>Borkgren M.<br>Bacon M.<br>Gerstung C.<br>Skrzynski M. | 2000 | Effect of the Passy-Muir Tracheostomy Speaking Valve on Pulmonary Aspiration in Adults<br>**Heart and Lung. The Journal of Acute and Critical Care.** Vol. 29 (4) |
| Frey J.<br>Wood S. | 1991 | Weaning from Mechanical Ventilation Augmented by Passy-Muir Speaking Valve. Abstract<br>**American Thoracic Society** |
| Gries M.<br>Fernsler J. | 1988 | Patients Perception of the Mechanical Ventilation Experience<br>**Focus on Critical Care** 15 (2); pages 52 - 59 |
| Kaut K.<br>Turcott J.<br>Lavery M. | 1996 | Passy-Muir Speaking Valve<br>**Dimensions of Critical Care Nursing**<br>Vol 15. (6) |
| Lichtman S.<br>Birnbaum I.<br>Sanfillipo M.<br>Pellicone J.<br>Damon W.<br>King M. | 1995 | Effect of a Tracheostomy Speaking Valve on Secretions, Arterial Oxygenation, and Olfaction: A Quantitative Evaluation<br>**Journal of Speech and Hearing Research**<br>Vol. 38, pages 549 - 555 |
| Passy V.<br>Ventilator<br>Baydur A.<br>Prentice W.<br>Darnell-Neal R. | 1993 | Passy-Muir Tracheostomy Speaking Valve on<br><br>Dependent Patients<br>**Laryngoscope** 103; pages 653 - 658 |
| Suiter D.<br>McCullough G.<br>Powell P. | 2003 | Effect of Cuff Deflation and One-Way Tracheostomy Speaking Valve Placement on Swallowing Physiology<br>**Dysphagia** 18; pages 284 - 292 |

Worcestershire Acute Hospitals NHS Trust

## MONITORING AND COMPLIANCE

**This section should identify how the Trusts plan to monitor compliance with and the effectiveness of this Treatment pathway. It should include auditable standards and/or key performance indicators (KPIs) and details on the methods for monitoring compliance**

| What | How | Who | Where | When |
|---|---|---|---|---|
| *These are the 'key' parts of the process that we are relying on to manage risk.* | *What are we going to do to make sure the key parts of the process we have identified are being followed?* | *Who is responsible for the check?* | *Who will receive the monitoring results?* | *Set achievable frequencies.* |
| Two consultant decision to use $ECCO_2R$ | Audit | Dr Bhardwaj | ICU Forum | Annually |
| All $ECCO_2R$ patients included in ELSO registry | Audit | Dr Bhardwaj | ICU Forum | Annually |
| Each patient should have complete sets of observations and a NEWS score calculated | Compliance with NEWS will be monitored by audit of patient observation charts | Ward Managers | Director of Nursing, Matrons | Weekly |
| Transfers from critical care should avoided between 22:00 and 07:00 | Compliance with avoidance of out of hours transfers will be monitored via ICNARC data | ICNARC clerk | Consultant Clinical Lead ICU | Monthly |
| Patients transferred from critical areas should have a formal documented structured handover of care | Compliance with transfer documentation will be monitored by audit of patients notes | Outreach Team/FY1 | Matron for ICU<br>Clinical Director | Once Yearly |
| Critical Care Nutrition guidelines | Observation and chart reviews | Sr Julie Share, Nutrition Link Nurse Critical Care ALX, Sr Andrea Carn, Nutrition Link Nurse, WRH | | Six monthly intervals |
| Management of patients with tracheostomy tubes | Audit | Critical Care outreach teams and physiotherapists at Alex and WRH | | All tracheostomy patients |

Worcestershire Acute Hospitals NHS Trust

| SUPPORTING DOCUMENT ONE – EQUALITY IMPACT ASSESSMENT TOOL | | |
|---|---|---|
| ***To be completed by the Treatment pathway owner and submitted to the appropriate committee for consideration and approval.*** | | |
| | | **Yes/No** |
| 1. | Does the treatment pathway affect one group less or more favourably than another on the basis of: | |
| | Race | **NO** |
| | Ethnic origins (including gypsies and travellers) | **NO** |
| | Nationality | **NO** |
| | Gender | **NO** |
| | Culture | **NO** |
| | Religion or belief | **NO** |
| | Sexual Orientation | **NO** |
| | Age | **NO** |
| 2. | Is there any evidence that some groups are affected differently? | **NO** |
| 3. | If you have identified potential discrimination, are any exceptions valid, legal and/or justifiable? | **NO** |
| 4. | Is the impact of the policy/guidance likely to be negative?<br>If so can the impact be avoided? | **NO** |
| 5. | What alternatives are there to achieving the policy/guidance without the impact? | **NO** |
| 6. | Can we reduce the impact by taking different action? | **NO** |
| 7. | Other comments | |

If you have identified a potential discriminatory impact of this key document, please refer it to Human Resources, together with any suggestions as to the action required to avoid/reduce this impact.

For advice in respect of answering the above questions, please contact Human Resources.

Worcestershire Acute Hospitals NHS Trust

| SUPPORTING DOCUMENT TWO – FINANCIAL IMPACT ASSESSMENT | | |
|---|---|---|
| ***To be completed by the Treatment pathway owner and submitted to the appropriate committee for consideration and approval.*** | | |
| | | **Yes/No** |
| 1. | Does the implementation of this document require any additional Capital resources | **NO** |
| 2. | Does the implementation of this document require additional revenue | **NO** |
| 3. | Does the implementation of this document require additional manpower | **NO** |
| 4. | Does the implementation of this document release any manpower costs through a change in practice | **NO** |
| 5. | Are there additional staff training costs associated with implementing this document which cannot be delivered through current training programmes or allocated training times for staff | **NO** |
| 6. | Other comments | |

If the response to any of the above is yes, please complete a business case and which is signed by your Finance Manager and Directorate Manager for consideration by the Accountable Director before progressing to the relevant committee for approval