

TO VALVE OR NOT TO VALVE - THE DECISION MAKING PROCESS IN THE PAEDIATRIC TRACHEOSTOMY VENTILATED POPULATION



Jo Matthews, Advanced Paediatric Speech and Language Therapist (SLT)
Audrey Martin, Advanced Paediatric Respiratory Physiotherapist (PT)
Birmingham Women’s and Children’s NHS Trust



INTRODUCTION

The One-Way Tracheostomy Valve (OWV) offers more than just speech benefits. A review by Zabih et al. (2017) highlights that most research focuses on OWV use and tolerance rather than broader multisystem impacts, emphasising the need for further studies to reduce morbidity and mortality in paediatric patients. Similarly, Lian et al. (2022) call for standardised OWV use in an adult cohort.

Despite existing guidelines, there is no comprehensive decision-making tool to address all aspects of OWV consideration for patients with tracheostomy and long-term ventilation (tr-LTV) within an individualised, holistic framework. This gap increases the risk of inconsistent OWV decision making and management, potentially compromising patient safety and care quality and equality, especially in teams lacking experienced practitioners.

The authors have developed a comprehensive OWV decision-making tool for use with the paediatric tr-LTV population with the aim of standardising the OWV decision making process. This tool enables practitioners to consider patient safety and risk within the context of prognosis, well-being and quality of life.

METHODS

The authors developed a comprehensive OWV decision-making tool with three core components:

- Key Clinical Considerations for OWV Use -**
Structured into a RAG (Red-Amber-Green) format:
 - Red – Significant caution/high risk**
 - Amber – Caution/medium risk (requiring further evaluation)**
 - Green – Proceed/low risk**
- Predicted OWV Benefits –** Individual to each child.
- Predicted Long-Term Ventilation (LTV) and Tracheostomy Pathway –**Based on the ‘Bridge to Recovery’ or ‘Destination’ framework outlined by Brookes (2019) and adapted by the authors for tracheostomy prognosis and management.

Development Process

The tool was designed using a multi-faceted approach:

- Retrospective analysis** of previous clinical OWV assessments and outcomes.
- Informal thematic analysis** of common practitioner queries around OWV consideration and use, as well as feedback from parents and patients.
- Multi-professional expertise**, integrating perspectives from SLTs, RPs, and other healthcare professionals.
- Review of relevant literature and resources**, including the Passy Muir website and cited references

Pilot Testing & Implementation

The tool was piloted with 10 tr-LTV patients, refined based on findings, and finalised to optimise its usability in clinical decision making. Effective implementation required joint assessment by SLT and RP, alongside multidisciplinary collaboration with healthcare professionals, patients, and families.

RESULTS



Figure 1: Matthews & Martin OWV decision-making tool

Patient Information		Predicted OWV Benefits				
Patient Name	*****	Benefit for Valve trial			Comment	
Patient Number	*****	Upper airway Resonance		x		
Age	13 months	Upper airway Rehabilitation		x		
Weight	9.2kg	Swallow Function		x		
Current status	narrow upper airway, trache,	Cough effectiveness		x		
PHN	Pierre Robin Sequence, cleft palate	Upper airway Secretion Management				
General Status	well, awaiting gastroscopy and cleft repair, awaiting discharge	Lower airway Secretion Management		x		
		Restoring physiological PEEP/Time off ventilator		x		
		Voice/vocalisation		x		
		Tone and trunk stability		x		
		Other				
Medical Pathway						
LTV	Bridge to recovery	Destination				
Trache	x					
Key Clinical Considerations						
Parameter	Comment	Red (significant caution/high risk)	Amber (caution/medium risk)	Green (proceed/low risk)	Supplementary considerations	Additional comments
Patient weight	9.2kg		x		Potential lack of space around tube	Low weight for age
Clinical Diagnosis	known risk, unable to mitigate		x		Manometry	
PHN			x			
General status	stable			x		
LTV outcome	Narrow airways		x		Manometry	Cervical Auscultation
Supraglottis			x		Manometry	Cervical Auscultation
Glottis			x			
Subglottis			x		Manometry	Cervical Auscultation
Trachea/tube type	Bivona Flovent			x		
Size (diameter)	3.5		x		No downsizing	7 support airway leak
Size (length)	neat			x		
Cut/Resuscitated	unclotted			x		
Flange	straight			x		
Stoma (large, well healed, wet)	red/sticky		x			Stoma health not optimised - ENT review
Other						
Ventilation						
Self-ventilating						
Severities						
Oxygen						
Invasively Ventilated	x					
Ventilator mode	control			x		
Mode	ST			x		
Single-limb limb	single			x		
Day circuit tolerance	dry all day			x		
EPAP Ventilation Pressures (cmH2O)	15			x		
EPAP Ventilation Pressures (cmH2O)	5			x		
Saturations	95			x		
Oxygen (%)	21%			x		
Time off Ventilator	2 x 1.5 hours			x		
Recent de-escalation	N/A			x		
Recent de-escalation	N/A			x		
Trache ventilation	yes			x		
Work of Breathing	yes, moderate		x			Normal for patient
Auscultation	breath sounds T10, nil added			x		
Chest X-ray	no hyperinflation			x		
Other						
Alleviate Clearance						
Oral/Nasal Suction Requirement	None			x		
Trache Suction Requirement	frequent, sticky + normal for pt		x			managed by current nebs and suctioning.
Chest Physiotherapy Requirement (stable, unstable, variable)	none			x		
Other						
Pre OWV function						
Upper airway airflow (cervical auscultation)	some		x		Manometry and co2	
Stoma airflow	none			x		
Voice/communication	bursts of vocalisation		x		Manometry and co2	
Cough	few		x			Normal for patient
Swallow Function	present			x		
Feed regime (oral, continuous, bolus)	NG bolus		x			Handful of assessment testing if around feeds
Other						
Medications						
Saliva management	none			x		
Chest secretion management (nebulisers)	saline nebs (0.9%) 3 hourly			x		
Seizure medications	none			x		
Tone medication	none			x		
Other						
Progress to OWV Trial (yes/no)		Date of Trial	Trial Outcome	Evaluation	Future Plan	
Yes - with caution and awareness	*****		Fail	Lack of space around trache tube	Await growth, weight gain and observe for increased vocalisation strings	

The authors successfully developed a standardised OWV decision-making tool for use within their hospital trust (figure 1) which was intuitive to navigate and effectively identified risks and challenges associated with OWV use. It facilitated structured discussions in multi-professional meetings, guiding the timing of OWV introduction and risk mitigation strategies.



CONCLUSIONS

This OWV decision-making tool is a crucial step toward standardising clinical decisions, improving patient safety, and optimising the quality, appropriateness, and timing of OWV interventions. Its structured framework ensures a patient-centered approach, facilitating individualised risk-benefit analysis within each patient’s clinical context. By highlighting key indications and cautions, it encourages multidisciplinary collaboration and informed decisions making.

Colleagues have recognised the tool’s value in supporting junior SLT and RP education and fostering multi-professional skill development. Family feedback was overwhelmingly positive, with improved engagement, clearer communication and better experiences for children and their families.

The pilot study emphasised the tool’s reliance on the expert clinical judgment of the experienced SLT and PT. Future adaptations, such as refining the RAG format into a formal risk assessment tool, could expand its use across a broader professional base, supporting less experienced staff.

The standardised data collection enabled by this tool supports consistent tracking of patient outcomes across diverse diagnostic populations, facilitating future audits and research. By identifying key factors influencing OWV success or failure, it informs clinical practice improvements, enhances patient experiences, and contributes to better outcomes, potentially reducing hospital stays and ventilation dependency.

REFERENCES

- Brookes, I, (2019), ‘Long Term Ventilation in Children’, Paediatrics and Child Health, 29:4
- Lian, S, Teng, L, Mao, Z, Jiang, H (2022) ‘Clinical Utility and future direction of the speaking valve: A review’, Front Surg; 9: 13147
- Zabih, W, Holler, T, Syed, F, Russell, L, Allegro, J (2017) ‘The Use of Speaking Valves in Children With Tracheostomy Tubes, Respiratory Care, December 2017, Vol 62, No 12

With special thanks to our amazing children and families for their support with this poster