

# Go with the flow: SLT strategies for early rehabilitation for patients with a tracheostomy

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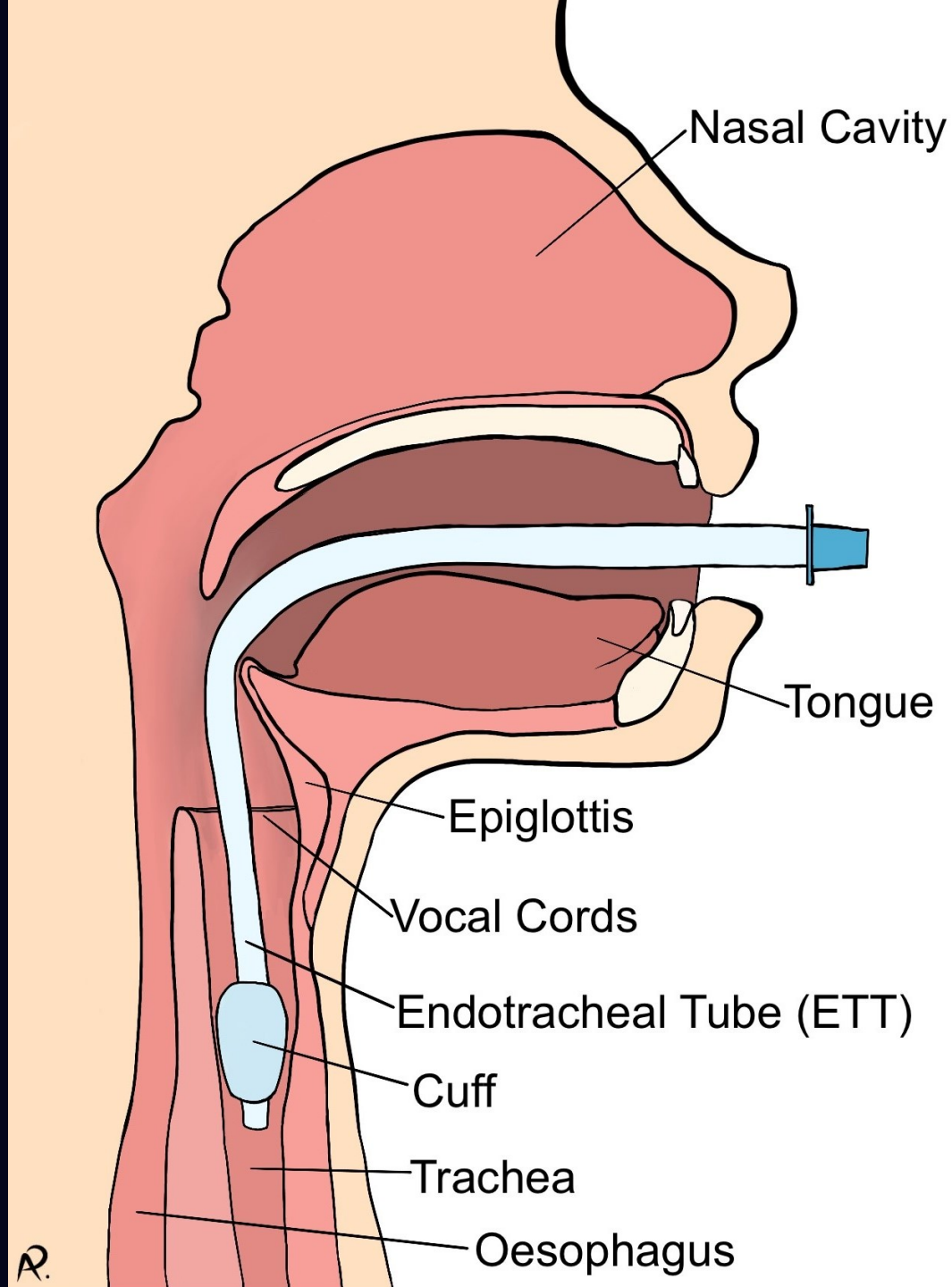
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# Outline

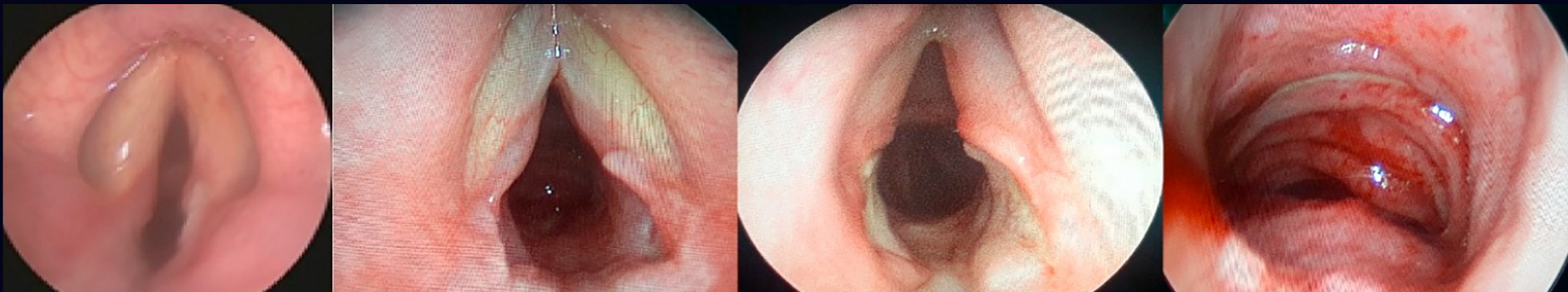
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- What impact does tracheostomy have on our patients?
- What rehabilitation strategies should we be focusing on?



# Impact of previous intubation

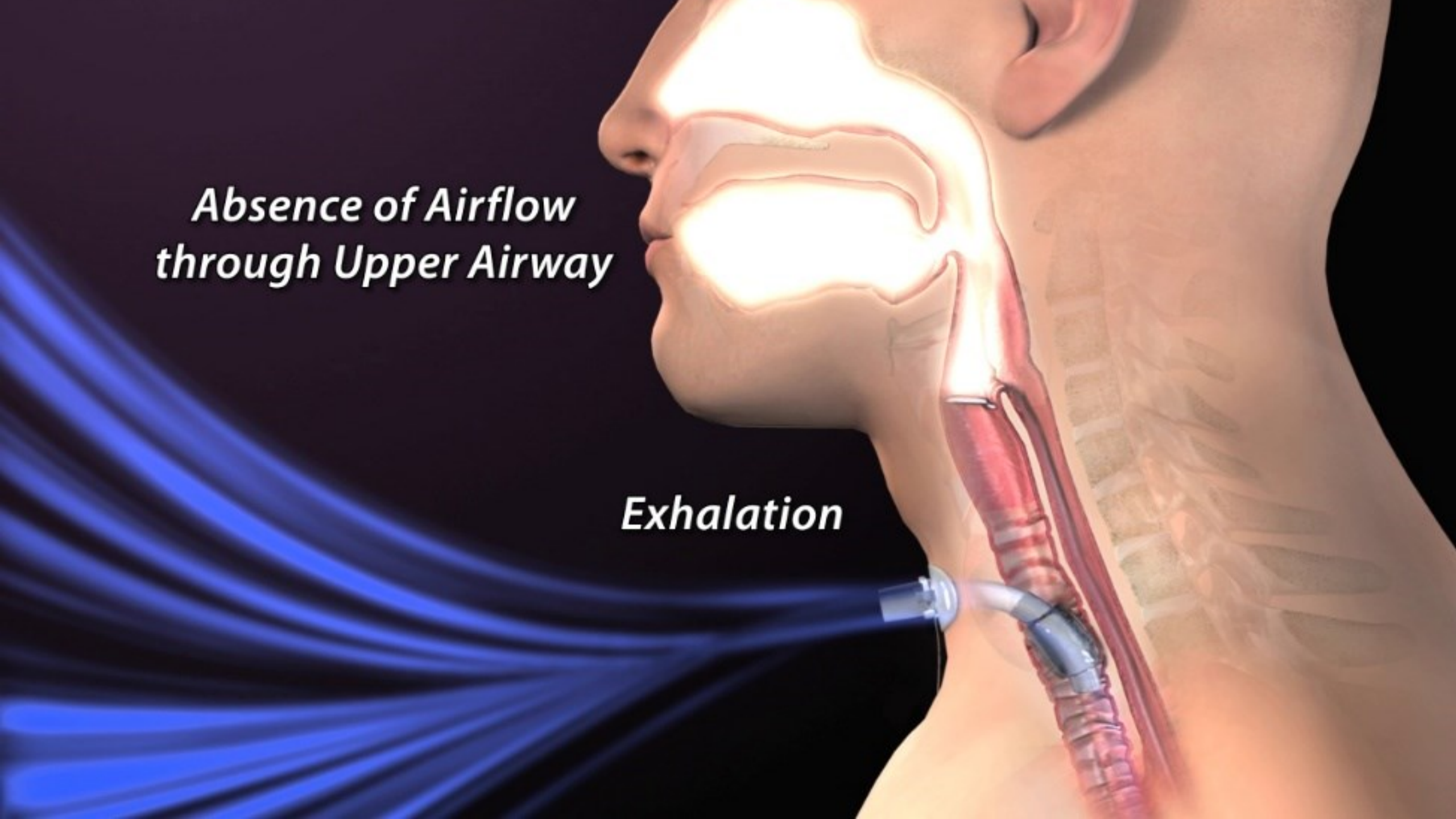
- PED in 10 to 62%<sup>1</sup> and as high as 68%<sup>2</sup>
- Odds of PED increase by a factor of 2 for every additional 12 hrs of ETT<sup>2</sup>
- High rates of silent aspiration<sup>3</sup>
- Laryngeal injury occurring in 83%<sup>4</sup>



Mehel et al. Am J Otolaryngol 2020

*Absence of Airflow  
through Upper Airway*

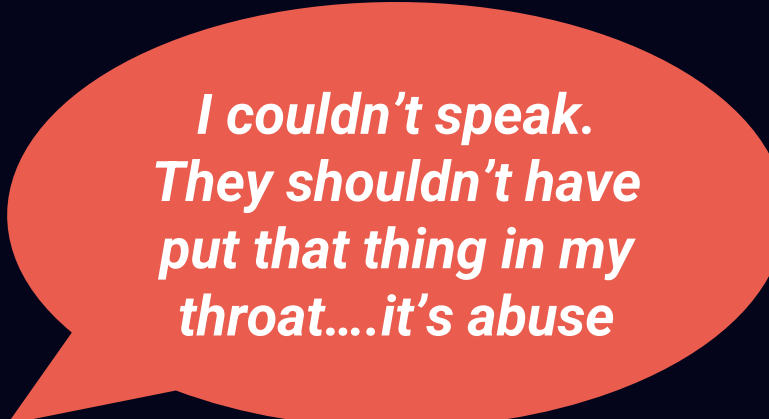
*Exhalation*





# Impact of Tracheostomy: Communication

- Frustration, fear, anger, worry, helplessness, stress, isolation, vulnerability, powerlessness<sup>1, 2, 3</sup>
- Prolonged impact on patients<sup>4</sup>
- Profound impact on staff and family members<sup>5,6</sup>
- Voice is valued most by patients<sup>4,7</sup>

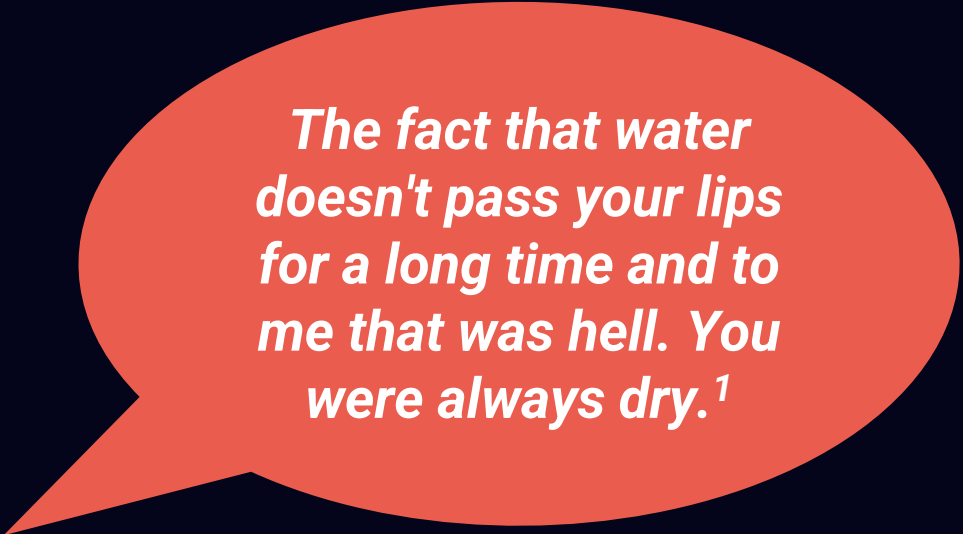


*I couldn't speak.  
They shouldn't have  
put that thing in my  
throat....it's abuse*

***'patients want to be seen and treated as a whole person, and having a voice makes this easier' <sup>8</sup>***

# Impact of Tracheostomy: Swallowing

- Incidence: 11-93%<sup>2</sup>
- Characteristics:
  - Reduced laryngo-pharyngeal sensation<sup>3</sup>
  - Disuse atrophy<sup>4</sup>
  - Altered pressures<sup>5</sup>
- Impact:
  - 93% of patients reported feeling thirsty was the most bothersome experience<sup>5</sup>
  - Resumption of oral intake is humanising and a recovery milestone<sup>6</sup>



*The fact that water doesn't pass your lips for a long time and to me that was hell. You were always dry.<sup>1</sup>*

***Need for caution even after decannulation***





GPICS: All patients with a tracheostomy must have communication and swallowing impairment assessed by an SLT<sup>1</sup>

# Potential Solutions



***Exhalation***

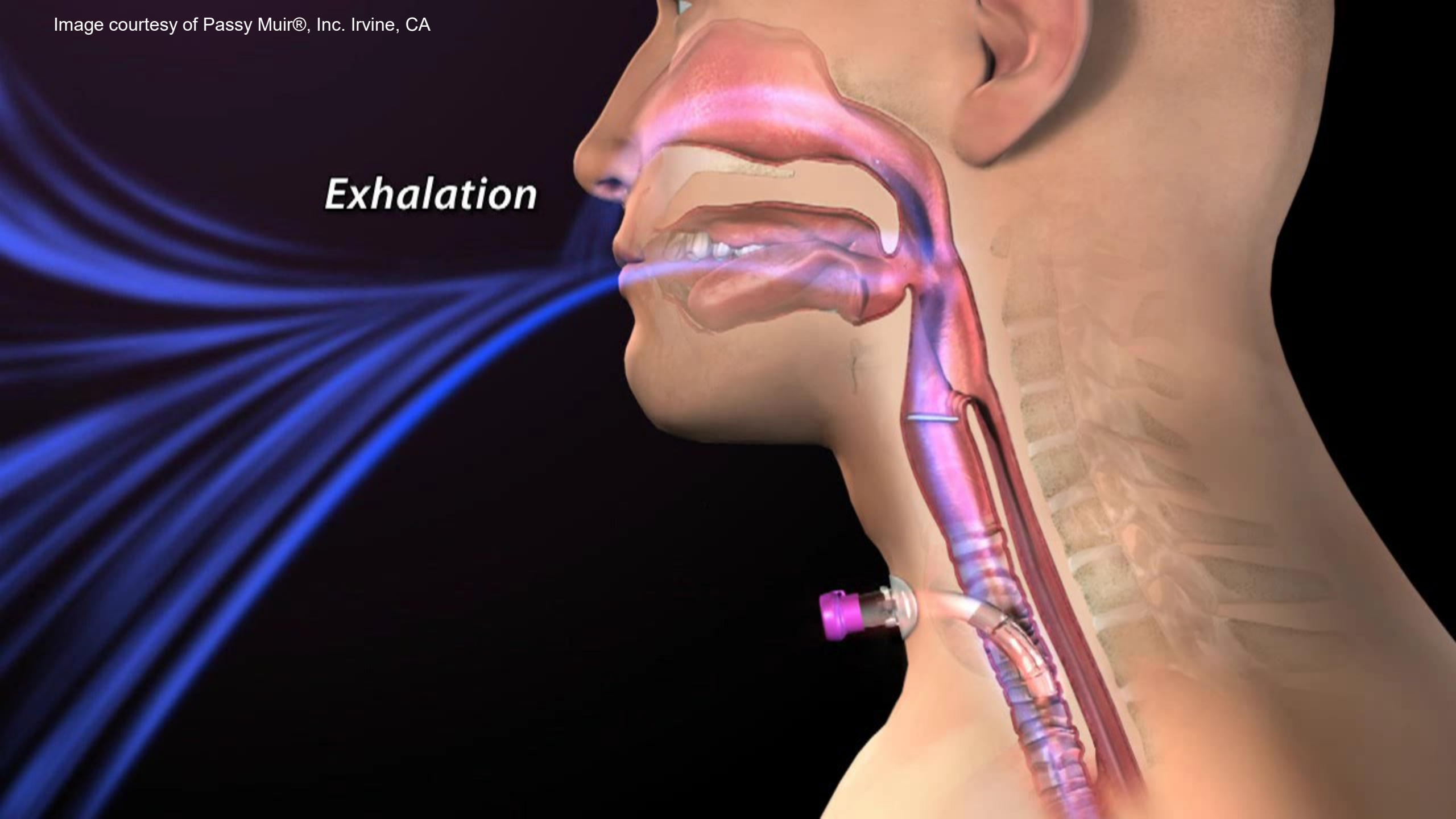




Image courtesy of Passy Muir®, Inc. Irvine, CA

# Potential Solutions: one-way valve

## Potential benefits of OWV:

- Improved laryngopharyngeal sensation<sup>1,2</sup>
- Improved taste and olfaction<sup>3</sup>
- Restores sub-glottic and pharyngeal pressures<sup>2</sup>
- Improved cough strength<sup>4</sup>
- Improved swallow function and saliva management<sup>2,3,5</sup>



# Potential Solutions: one-way valve

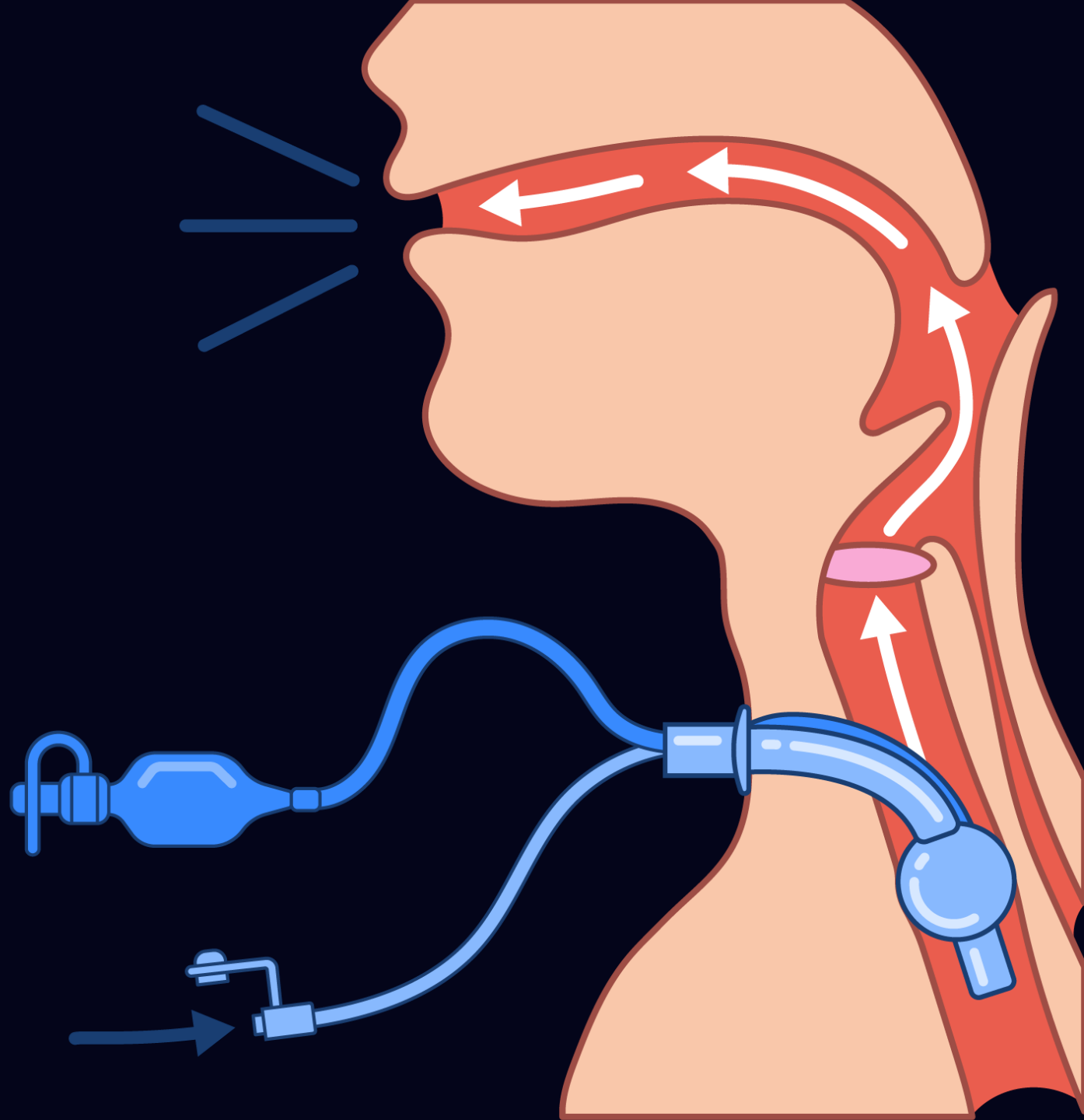
## Potential benefits of OWV:

- Increased postural stability<sup>1</sup> and mobility<sup>2</sup>
- Earlier vocalisation<sup>3</sup> and better communication success<sup>4</sup>
- Restores natural physiological PEEP<sup>5</sup>
- Earlier decannulation<sup>6</sup>

*No evidence to suggest lung hyperinflation or prolonged ventilation in ventilated patients<sup>4,7</sup>*



**Potential Solution: Above Cuff Vocalisation**



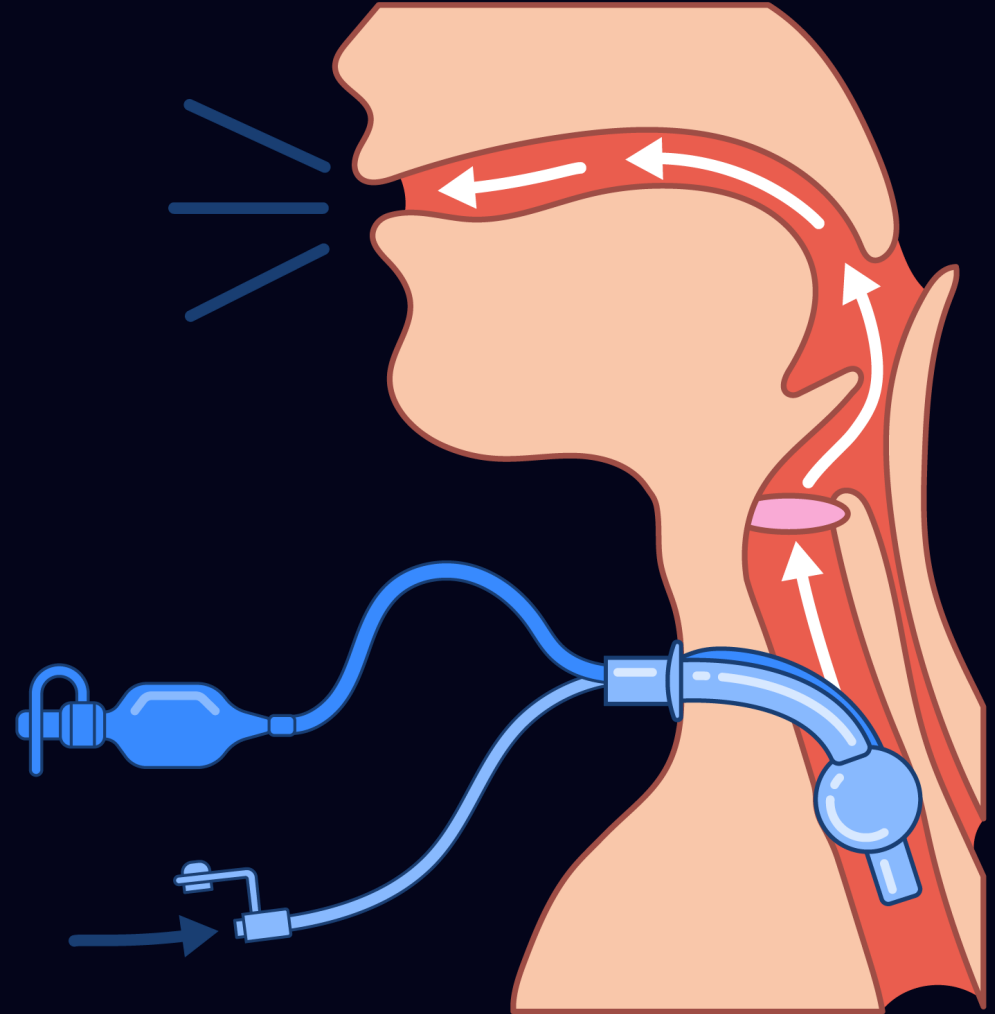
# Potential Solutions: Above Cuff Vocalisation

## Potential benefits:

- Vocalisation<sup>1,2</sup>
- Swallowing<sup>2,3</sup>
- Airway protection<sup>2,3</sup>
- Quality of life<sup>1</sup>

## But:

- Limited evidence<sup>4</sup>
- Variable uptake and application<sup>5</sup>



## Evidence for Above Cuff Vocalization in Patients With a Tracheostomy: A Systematic Review

Claire S. Mills, MSc ; Emilia Michou, PhD ; Natalie King, MSc ; Mark C. Bellamy, PhD   
Heidi J. Siddle, PhD ; Cathy A. Brennan, PhD ; Chris Bojke, PhD 

**Objectives/Hypothesis:** To determine how above cuff vocalization (ACV) is implemented in clinical practice, to identify what evidence exists on the effectiveness and safety of ACV, and to evaluate the acceptability of ACV.

**Study Design:** Systematic review.

**Methods:** A literature search was conducted in eight databases (MEDLINE, Embase, AMED, CINAHL, Cochrane Library, PsycINFO, Scopus, and Web of Science) in May 2019 and updated in June 2020. Two reviewers independently screened, selected, and extracted data. Study quality was appraised using the Joanna Briggs Institute Critical Appraisal Tools and a narrative synthesis was conducted. Systematic review registration number: CRD42019133942.

**Results:** The searches identified 1327 records. The 13 eligible studies included four case studies, three case series, four observational studies without a control group, one quasi-experimental study, and one randomized controlled trial. Study quality was low, with most studies having high risk of bias. There was a high level of heterogeneity in study design and outcome measures used. Detailed information on ACV application and dose-delivered was lacking in 12 studies. Positive effects were reported for communication ( $n = 7$ ), swallowing ( $n = 4$ ), cough response ( $n = 2$ ), and quality-of-life ( $n = 2$ ), but with inconsistent use of objective outcome measures. There is limited quantitative or qualitative evidence for acceptability. Adverse events and complications were reported in nine studies, and four highlighted the importance of involving an experienced speech and language therapist.

**Conclusions:** There is limited evidence for the acceptability, effectiveness, safety, or optimal implementation of ACV. The evidence is insufficient to provide recommendations regarding optimal intervention delivery. Future research should ensure detailed recording of ACV delivery and utilize a core outcome set.

**Key Words:** Above cuff vocalization, talking tracheostomy, communication, deglutition, tracheostomy.

*Laryngoscope*, 132:600–611, 2022

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Additional supporting information may be found in the online version of this article.

Editor's Note: This Manuscript was accepted for publication on April 17, 2021.

All authors declare no conflict of interest or competing interests in relation with this publication. This study is funded by the National Institute for Health Research (NIHR) as part of an HEE/NIHR ICA Program. CM is funded by an NIHR Clinical Doctoral Research Fellowship (ICA-CDRF/2017-03-036). The views expressed are those of the author(s) and not necessarily those of the NIHR or the Department of Health and Social Care.

The authors have no other funding, financial relationships, or conflicts of interest to disclose.

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DOI: 10.1002/lary.29591

### INTRODUCTION

Patients with a tracheostomy in intensive care often have their tracheostomy cuff inflated for extended periods of time. This impedes airflow through the larynx which results in desensitization of the upper airway<sup>1,2</sup> and prevents patients from speaking, which can lead to high levels of frustration.<sup>3,4</sup> Reduced oropharyngeal sensory input can lead to reduced swallowing frequency<sup>5</sup> and difficulties swallowing.<sup>6</sup> Additionally, patients are unable to protect their airway from aspiration.<sup>7</sup> This inability to eat, drink, or speak results in reduced quality of life (QoL) for patients with a tracheostomy.<sup>8,9</sup>

One solution to restore laryngopharyngeal airflow is above cuff vocalization (ACV). This technique was introduced in the mid-1960s<sup>10</sup> and is referred to as “talking tracheostomy,”<sup>11,12</sup> “speaking tracheostomy,”<sup>13,14</sup> and “external subglottic air flow.”<sup>15</sup> This review will use the term ACV to refer to the intervention.

ACV involves applying a continuous or intermittent flow of air via the subglottic port of a tracheostomy tube. This air passes through the larynx allowing vocalization, and can re-establish oropharyngeal and laryngeal sensation. It offers potential benefits for communication, swallowing, and QoL, but there are potential complications. A recent systematic review evaluated communication interventions in patients receiving mechanical ventilation,<sup>16</sup> including some ACV research, and a scoping



# Summary of systematic review

- Large variation in application approaches
- Inconsistent use of outcome measures
- Evidence available is limited, low quality and biased
- Effectiveness and acceptability of ACV is unclear for any outcome: communication, swallowing, airway protection, quality of life, LoS
- Adverse events and complications do occur
- Lack of evidence for how it should be implemented in clinical practice

ORIGINAL RESEARCH

## Determining the Prevalence, Implementation Approaches, and Opinions of Above Cuff Vocalization: A Survey of Health Care Professionals



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### Abstract

**Objective:** To conduct an international survey to investigate the use of above cuff vocalization (ACV) and how practice and opinion differs.

**Design:** Observational, cross-sectional online survey.

**Setting:** Critical care, acute, rehabilitation, long-term care, and community.

**Participants:** Health care professionals involved in tracheostomy care or weaning (N=243).

**Interventions:** Not applicable.

**Main Outcome Measures:** Tracheostomy management, prevalence, personal experiences and opinions, and barriers to use. Quantitative data were reported descriptively, and content analysis was conducted with qualitative data.

**Results:** The survey was completed by 243 health care professionals from 9 professional groups and 25 countries, with most responses from the United Kingdom (54%) and speech and language therapists (55%). ACV was used in 39% of services (n=93). Sixty percent (n=50/83) of health care professionals with direct experience of ACV had used it with <10 people. Implementation of ACV varied widely concerning procedures, contraindications, safety processes, professionals involved, competencies, staff training, delivery, and outcome measures. The top benefits were communication (n=76/93; 82%), mood (n=62/93; 67%), and laryngeal sensation (n=49/93; 53%). Complications included discomfort (n=54/93; 58%) and strained vocal quality (n=39/93; 42%). Barriers to ACV implementation included lack of knowledgeable staff (n=92/238; 39%) and lack of access to training (n=73/238; 31%).

**Conclusions:** ACV uptake varies internationally with no standardized approach to ACV delivery. Diversity of opinions on approaches and benefits exist. Serious complications are infrequent, but minor complications are common. Future research is needed to establish optimal ACV implementation to maximize benefits and minimize risks.

Archives of Physical Medicine and Rehabilitation 2022;103:394–401

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Presented as posters to the 10th European Society for Swallowing Disorders Congress, October 8–10, 2020, virtual; the European Society of Intensive Care Medicine LIVES 2020 Digital 33rd Annual Congress, December 6–9, 2020, virtual. These short abstracts will be published in the conference proceedings of the *Dysphagia Journal* and *Intensive Care Medicine Journal*.

Supported by the National Institute for Health Research (NIHR) as part of an HEE/NIHR JCA Programme. Claire S. Mills is funded by an NIHR Clinical Doctoral Research Fellowship (ICA-CDRF-2017-03-036). The views expressed are those of the author(s) and not necessarily those of the NIHR or the Department of Health and Social Care.

Disclosures: none

A tracheostomy is a life-saving intervention that facilitates the management of airway obstruction and enables prolonged mechanical ventilation in critical care. However, many patients with tracheostomies experience dysphagia and communication impairment, usually as a result of a combination of factors including intubation trauma, disuse atrophy, intensive care unit

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<https://doi.org/10.1016/j.apmr.2021.08.016>



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# ACV application

ACV Implementation		N	%	ACV Implementation		N	%
Earliest introduction of ACV	0-24 hrs	3	3.2	Upper limit of airflow duration per day	<15 mins	7	38.9
	25-48 hrs	10	10.8		15-30 mins	3	16.7
	49-72 hrs	14	15.1		31-60 mins	4	22.2
	>72 hrs	45	48.4		61-90 mins	0	0.0
	Don't know	21	22.6		91-120 mins	1	5.6
	Total number of responses	93			>120 mins	0	0.0
Type of air used	Humidified oxygen	14	15.1		Don't know	2	11.1
	Non-humidified oxygen	45	48.4		No response	1	5.6
	Medical air	25	26.9		Total number of responses	18	
	Don't know	9	9.7	Typical daily duration of airflow per day	<15 mins	27	29.0
	Total number of responses	93			15-30 mins	21	22.6
Airflow delivery	Intermittent	28	30.1		31-60 mins	9	9.7
	Continuous	34	36.6		61-90 mins	3	3.2
	Both intermittent and continuous (with equal frequency)	3	3.2		91-120 mins	2	2.2
	Both intermittent and continuous (with intermittent used more frequently)	9	9.7		>120 mins	4	4.3
	Both intermittent and continuous (with continuous used more frequently)	9	9.7		Don't know	27	29.0
	Don't know	10	10.8		Total number of responses	93	
	Total number of responses	93		Typical number of days duration having ACV	≤1 day	1	1.1
Upper airflow limit	2 L/min	1	1.1		2-5 days	19	20.4
	3 L/min	3	3.2		6-7 days	4	4.3
	5 L/min	30	32.3		1-4 weeks	13	14.0
	6 L/min	11	11.8		>1 month	3	3.2
	7 L/min	2	2.2		Ongoing (e.g. long-term tracheostomy)	18	19.4
	8 L/min	13	14.0		Don't know	33	35.5
	9 L/min	1	1.1		No response	2	2.2
	10 L/min	10	10.8		Total number of responses	93	
	15 L/min	4	4.3				
	No upper limit	4	4.3				
	Don't know	14	15.1				
	Total number of responses	93					



# ACV application

Upper airflow limit	2 L/min	1	1.1
	3 L/min	3	3.2
	5 L/min	30	32.3
	6 L/min	11	11.8
	7 L/min	2	2.2
	8 L/min	13	14.0
	9 L/min	1	1.1
	10 L/min	10	10.8
	15 L/min	4	4.3
	No upper limit	4	4.3
	Don't know	14	15.1
	<b>Total number of responses</b>	<b>93</b>	

# Summary of survey

- Limited uptake
- Large variation in implementation and application
- Adverse events appear infrequent, minor side effects seem common
- Variable perceptions on benefits
- Major barriers to ACV use: staff, training, subglottic tubes

# Worth a try or a last resort: Healthcare Professionals' experiences of Above Cuff Vocalisation

## INTRODUCTION

- Above Cuff Vocalisation (ACV):
- facilitates vocalisation<sup>1</sup>
  - potential benefits for swallowing and saliva management<sup>2</sup>
  - improves quality of life<sup>1</sup>
- But:
- limited evidence on acceptability, effectiveness, safety, or optimal implementation<sup>3</sup>
  - variable uptake and application<sup>4</sup>



ACV: Application of a cuff to the trachea to facilitate vocalisation

## OBJECTIVES

To explore the experience of healthcare professionals using ACV, their perceptions of best practice, and the impact of COVID-19 on ACV use.

## METHOD

- Qualitative interview study design using semi-structured online interviews.
- Purposive sampling of a range of professional groups with a range of ACV experience.
- Data analysed using reflexive thematic analysis<sup>5</sup>.

## RESULTS



### Participant characteristics

Professional group	Speech and Language Therapists (13), Physiotherapists (8), Advanced Critical Care Practitioner (1), Nurse (1), Occupational Therapist (1)
Country	UK (12), Australia (5), Norway (2), USA (2), Denmark (1), Greece (1), Ireland (1)
Gender	Female (20) Male (4)
Number of years practising clinically	Median: 19.5 years Range: 8 – 30 years
Number of years using ACV	Median: 5 years Range: 0.5 – 16 years

### Theme 4

"But I think if you know it works...and there's a chance it could work for your patient, you know you're going to try!" [PT 7]

"...to be honest, it was when all else had failed!" [SLT 10]

## CONCLUSION

- Uncertainties and subjectivities lead to a reliance on direct experiences.
- Experiences and opinions are impacted by the purpose for which ACV is used and approach.
- Wider focus of purpose might maximise potential benefits.
- A more cautious approach developed as knowledge and experience with ACV increased.
- Future research should focus on establishing the cost-effectiveness of ACV to support decision-making regarding its use.



## ACKNOWLEDGEMENTS

We are grateful to the healthcare professionals who took the time to contribute to this research. We also acknowledge the support of the project advisory group: Graham Beckett, Frank Beckett, David Brown, Nicki Davidson, Dr. Gary Middleton, Dr. Elizabeth Middleton, Dr. Michael Tisdale, Dr. David Tisdale, Dr. David Tisdale, and Dr. David Tisdale. We thank our public, patient, and public involvement group for their valued input into this research.

This study is funded by the National Institute for Health and Care Research (NIHR) as part of an NIHR Clinical Research Programme. NIHR is funded by an NIHR Clinical Research Programme. Following (2021-2023) 2023. The views expressed are those of the authors and not necessarily those of the NIHR or the Department of Health and Social Care.

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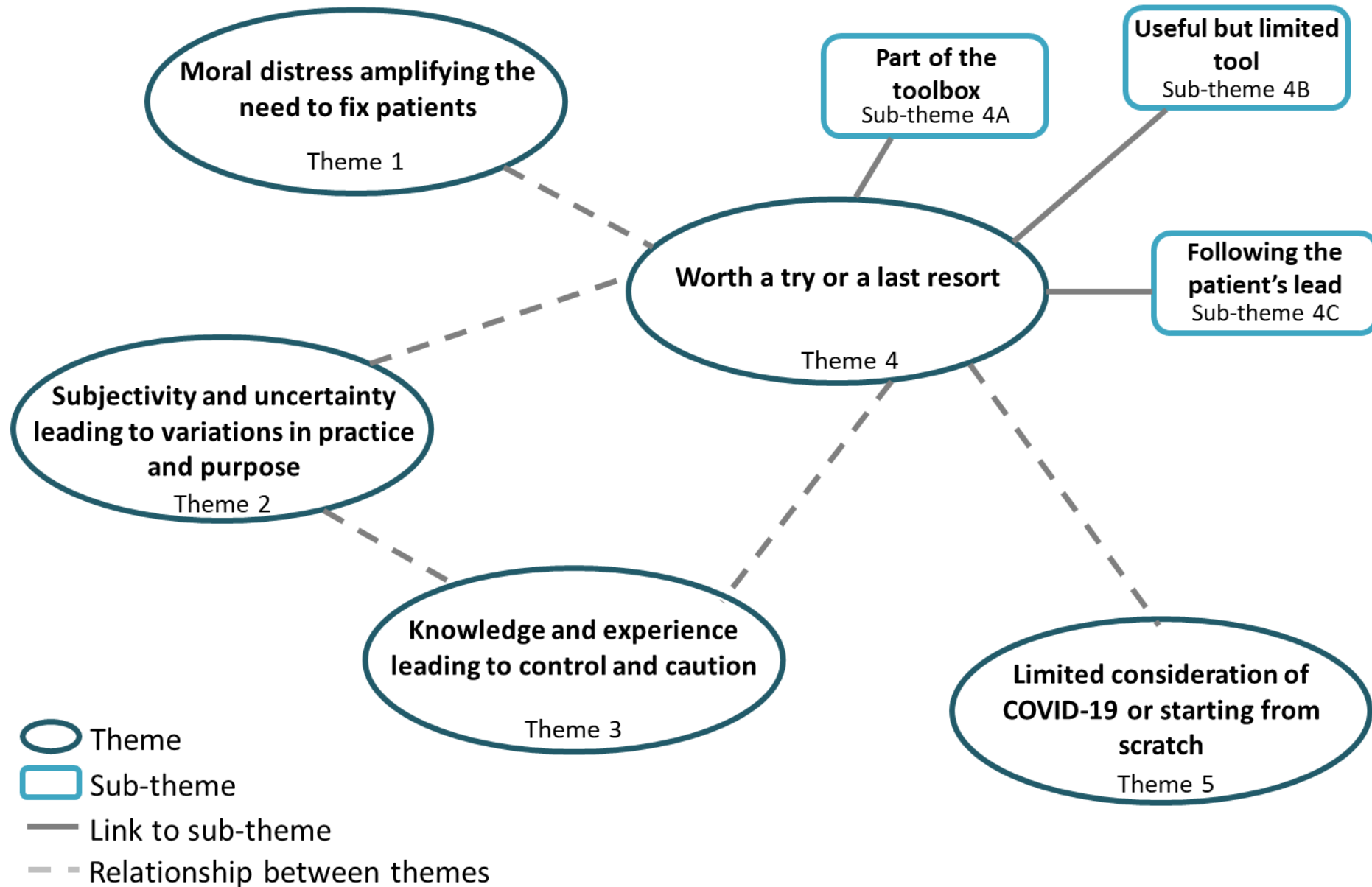
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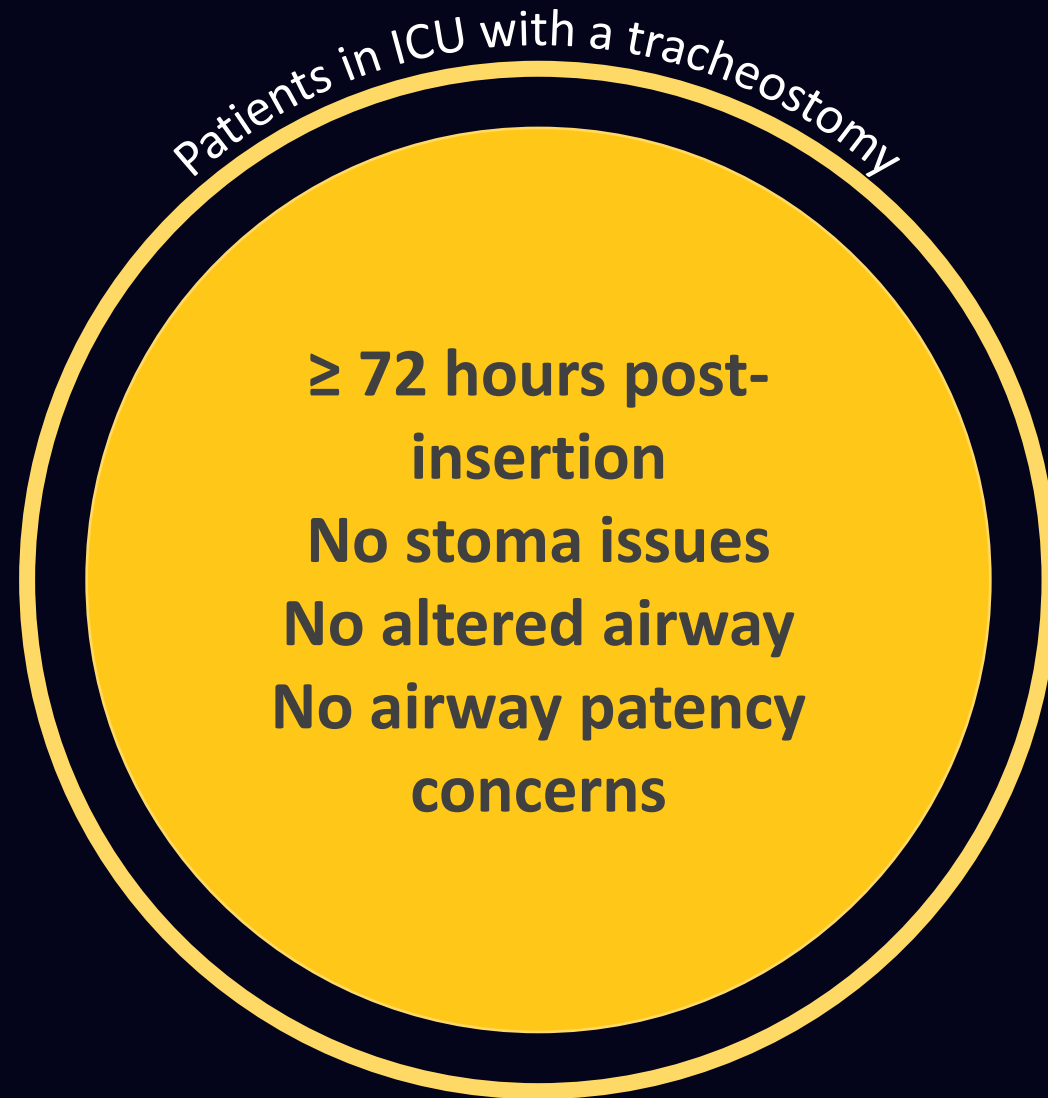


# Thematic map



# Clinical implications

- Need for standardised protocols, guidance, safety processes and competencies
- Wider focus of purpose to maximise benefits
- Regular use to maintain competencies



## WHAT'S NEW IN INTENSIVE CARE

# What's new in reducing the impact of tracheostomy on communication and swallowing in the ICU



Claire S. Mills<sup>1,2\*</sup> , Brian H. Cuthbertson<sup>3,4</sup>  and Emilia Michou<sup>5,6</sup> 

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Approximately 14% of ventilated patients in the intensive care unit (ICU) receive a tracheostomy, which has a profound impact on communication, swallowing and other co-morbidities [1, 2]. Difficulties for patients often originate before tracheostomy insertion, primarily as a result of prolonged endotracheal intubation with post-extubation dysphagia and laryngeal injury being very common [3]. Whilst insertion of a tracheostomy increases the odds for functional communication and oral intake, it can exacerbate prior difficulties, particularly by preventing airflow through the laryngo-pharynx.

Patients report that voicelessness is one of the most distressing aspects of their ICU experience [4] and using

(OWV), (2) applying an external airflow via the subglottic port with the cuff inflated.

### One-way valves

OWVs can be used safely in ventilated patients with no evidence of negative effects on ventilation [5]. However, serious adverse events (e.g. gas trapping, barotrauma, asphyxiation and death) can occur with misapplication of OWVs, particularly if used with a fully or partially inflated cuff, or where there is reduced airway patency. Airway patency assessment is typically a subjective clinical evaluation. Some guidance suggests a 40–50% reduction of tidal volume (V<sub>T</sub>) is indicative of adequate patency



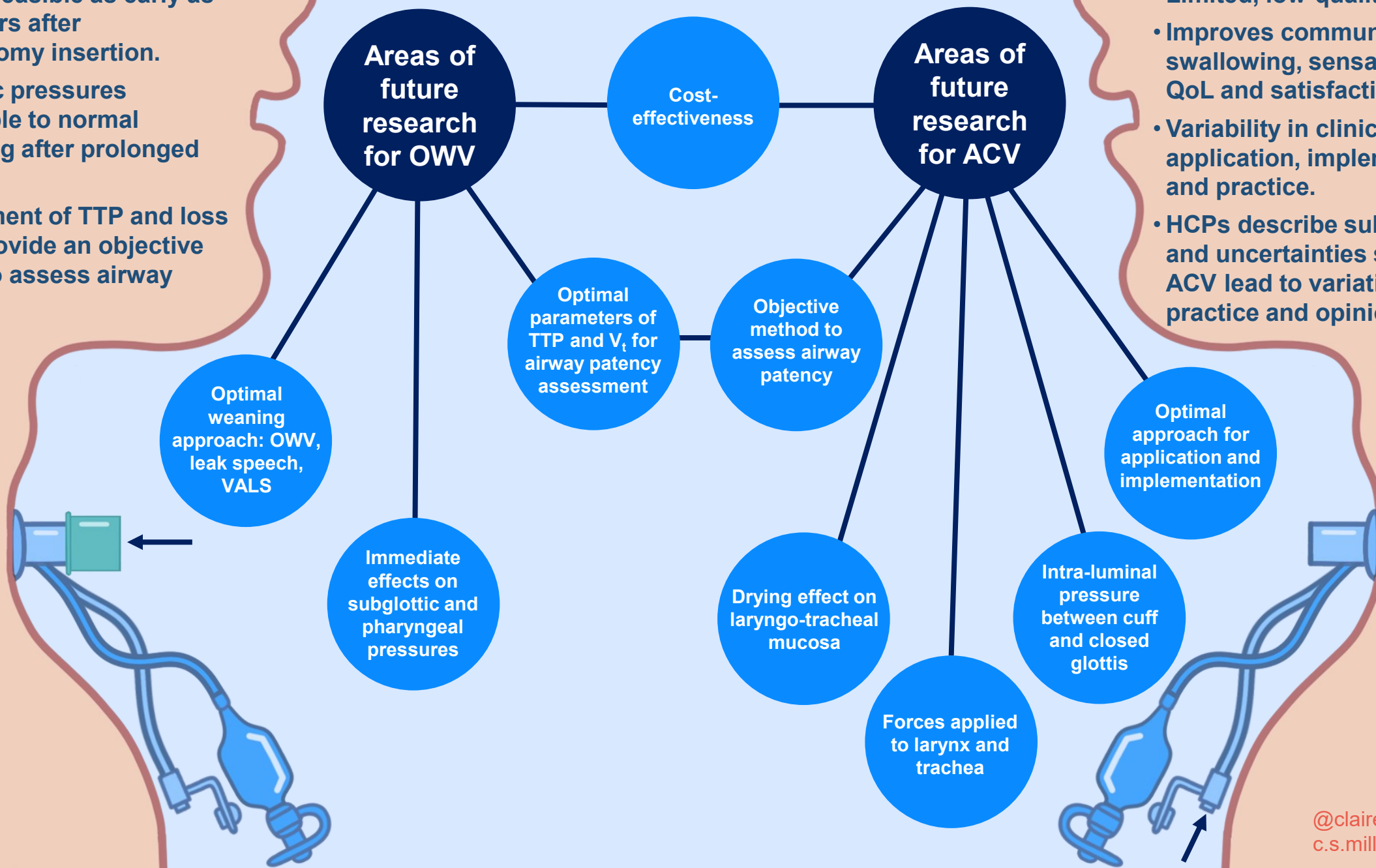


## What's new with OWVs?

- Safe and feasible as early as 12-24 hours after tracheostomy insertion.
- Subglottic pressures comparable to normal swallowing after prolonged use.
- Measurement of TTP and loss  $V_t$  may provide an objective method to assess airway patency.

## What's new with ACV?

- Limited, low-quality evidence.
- Improves communication, swallowing, sensation, cough, QoL and satisfaction.
- Variability in clinical application, implementation and practice.
- HCPs describe subjectivities and uncertainties surrounding ACV lead to variation in practice and opinions.





# Summary

- All patients with a tracheostomy should be referred to SLT<sup>1</sup>
- Early restoration of airflow is key
- Cuff deflation and one-way valve is best
- One-way valves are not just for voice

# Acknowledgements

## NIHR


Claire Mills is funded by the National Institute for Health and Care Research (NIHR) as part of an HEE/NIHR ICA Programme Clinical Doctoral Research Fellowship (ICA-CDRF-2017-03-036). The views expressed are those of the author(s) and not necessarily those of the NIHR or the Department of Health and Social Care.


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