

# Above Cuff Vocalisation in Tracheostomised Patients

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## Abstract

Above-Cuff Vocalisation (ACV) is an emerging communication rehabilitation technique that enables selected tracheostomised patients to speak while maintaining cuff inflation. Communication impairment in critically ill and ventilator-dependent patients contributes to psychological distress, reduced autonomy, and impaired participation in rehabilitation. By restoring airflow through the larynx, ACV may improve communication, patient engagement, and rehabilitation outcomes.

This narrative review discusses the physiological basis, clinical applications, safety considerations, and multidisciplinary implementation of ACV, with emphasis on its relevance to Physical Medicine and Rehabilitation (PM&R). Current evidence suggests that ACV is feasible and generally safe in appropriately selected patients when performed by trained multidisciplinary teams. ACV represents a promising adjunct in tracheostomy rehabilitation and early neurorehabilitation, although further research is needed to establish standardised protocols and long-term functional outcomes.

## Introduction

Communication is one of the most fundamental human needs. For patients with tracheostomy tubes requiring prolonged cuff inflation, the inability to speak often becomes one of the most distressing aspects of critical illness and rehabilitation. Patients may remain conscious, cooperative, and cognitively intact, yet remain unable to communicate effectively with caregivers and family members. This communication barrier contributes significantly to anxiety, frustration, emotional distress, and impaired participation in rehabilitation.

Above Cuff Vocalisation (ACV) has emerged as an innovative technique that enables selected tracheostomised patients to produce speech even while the tracheostomy cuff remains inflated<sup>1,2</sup>. By restoring airflow through the upper airway and vocal cords, ACV allows selected patients to communicate while maintaining important airway and ventilatory requirements. For many patients and families, the return of spoken communication after

severe injury or prolonged ventilation represents a meaningful milestone in recovery.

As survival after critical illness and prolonged mechanical ventilation increases, communication rehabilitation is becoming increasingly relevant in rehabilitation medicine practice, including in Indian critical care and neurorehabilitation settings. Restoration of communication may significantly improve participation in therapy, psychological adjustment, and patient-centred care. However, awareness regarding ACV remains limited across many rehabilitation centres.

## What is Above Cuff Vocalisation?

Above Cuff Vocalisation refers to the delivery of airflow above the inflated tracheostomy cuff through the subglottic suction port of specialised tracheostomy tubes. The retrograde airflow passes upward through the larynx and vocal cords, thereby facilitating phonation<sup>1</sup>.

Unlike traditional speaking valves, which generally require cuff deflation, ACV allows speech while maintaining cuff inflation in carefully selected patients<sup>1,2</sup>. This becomes especially useful in patients who continue to require positive pressure ventilation or cannot yet tolerate cuff deflation because of respiratory instability, secretion burden, or aspiration concerns.

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The technique is usually performed using humidified air or oxygen delivered at controlled flow rates through the subglottic port under multidisciplinary supervision involving Physiatrists, Respiratory Therapists, and Speech-Language Pathologists<sup>2</sup>.

### Physiological Basis

During normal speech, expired air passes through the vocal folds, causing vibration and sound production. In patients with inflated tracheostomy cuffs, airflow bypasses the upper airway entirely, making phonation impossible. ACV restores airflow to the larynx despite the cuff remaining inflated<sup>1</sup>

In addition to voice restoration, ACV may help improve laryngeal sensation, swallowing frequency, cough effectiveness, and secretion management<sup>2</sup>.

### Clinical Benefits

#### 1. Restoration of Communication

The primary advantage of ACV is the restoration of verbal communication. Patients are able to express needs, discomfort, emotions, and concerns directly. This reduces dependence on non-verbal communication methods such as writing boards or gestures. The ability to communicate with family members after severe neurological injury, trauma, or prolonged ICU stay may have substantial psychological importance<sup>1</sup>.

#### 2. Psychological and Emotional Benefits

Loss of voice during critical illness is associated with anxiety, helplessness, social isolation, and reduced autonomy. Restoration of speech may improve emotional well-being and enhance patient participation in rehabilitation programmes<sup>4</sup>. Patients who can communicate effectively are often better able to engage with multidisciplinary rehabilitation care.

#### 3. Rehabilitation Advantages

Emerging evidence suggests that ACV may support laryngeal rehabilitation and swallowing recovery. Clinical studies have demonstrated improvements in cough and swallowing frequency in ventilator-dependent patients undergoing ACV<sup>2</sup>. Improved upper airway airflow may also contribute to better secretion clearance and sensory stimulation of the aerodigestive tract.

### Safety and Patient Selection

Although ACV is promising, careful patient selection remains essential. Appropriate candidates generally include:

- Patients with intact or functional vocal cords
- Patients with stable respiratory status
- Individuals unable to tolerate cuff deflation
- Patients requiring ongoing mechanical ventilation
- Patients with tracheostomy tubes containing subglottic suction ports



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Contraindications may include severe upper airway obstruction, significant surgical emphysema, severe agitation, or unstable cardiopulmonary status.

Clinical studies have shown ACV to be feasible and generally safe when performed by trained teams using standardised protocols<sup>2</sup>. Nevertheless, clinicians should monitor for:

- Air trapping
- Discomfort
- Excessive airway pressures
- Subcutaneous emphysema
- Desaturation
- Poor voice quality or fatigue

### Multidisciplinary Approach

Successful implementation of Above-Cuff Vocalisation (ACV) requires coordinated multidisciplinary collaboration involving speech-language pathologists, respiratory therapists, nursing staff, intensivists, and rehabilitation physicians. Speech-language pathologists play a central role in communication assessment and vocalisation training, while respiratory therapists contribute to airway management, ventilator optimisation, and cuff-related adjustments. Rehabilitation physicians assist in patient selection, monitoring physiological tolerance, and ensuring overall procedural safety<sup>4</sup>

International studies suggest increasing clinical interest in ACV across critical care and rehabilitation settings; however, variability persists in implementation practices due to differences in institutional protocols, clinician expertise, and resource availability<sup>4</sup>. A structured multidisciplinary approach may facilitate safer implementation, improve communication outcomes, and promote integration of communication-focused rehabilitation within tracheostomy care pathways.

### Limitations and Future Directions

Despite growing interest in ACV, the current evidence base remains relatively limited. Many available studies are feasibility studies or observational reports involving small patient populations. Standardised

protocols regarding airflow settings, patient selection, monitoring, and outcome assessment are still evolving.

Awareness regarding communication rehabilitation in critically ill patients is increasing worldwide. Newer tracheostomy technologies and standardised ACV protocols may improve accessibility and safety in the future. Further research is still needed regarding optimal flow settings, long-term outcomes, swallowing benefits, and standardised safety guidelines<sup>2</sup>

### Conclusion

Above Cuff Vocalisation represents an important advancement in tracheostomy rehabilitation. By enabling speech while maintaining cuff inflation, ACV allows carefully selected patients to reconnect with caregivers and loved ones during vulnerable phases of illness<sup>1,2</sup>.

Restoration of speech may contribute substantially to emotional well-being, autonomy, and participation in

rehabilitation. As rehabilitation medicine increasingly embraces patient-centred care, techniques such as ACV highlight the importance of communication as both a clinical and human priority.

### References

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