



This month's top papers: January 2025

Welcome to the latest blog in the literature podcast from the NTSP. We try to bring you a quick roundup of what is hot in the world of tracheostomy and laryngectomy publications by scouring internationally recognised journals and media and bringing you the highlights.

The papers we will discuss this month are detailed below, along with an automated transcript of the podcast. Please note that the transcript is generated by AI and so may not be totally accurate.

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This month's top papers

- Tracheostomy Practice in the Italian Intensive Care Units: A Point-Prevalence Survey.
- Use of virtual reality to remotely train healthcare professionals in paediatric emergency tracheostomy skills: protocol for a multi-centre, non-inferiority educational interventional study with historical controls.
- Long-Term Follow-up of Percutaneous Dilatational Tracheostomy in the Intensive Care Unit.

Tracheostomy Practice in the Italian Intensive Care Units: A Point-Prevalence Survey.

Lay Summary:

This study is the first comprehensive survey to determine the actual prevalence and practices surrounding tracheostomy in Intensive Care Units (ICUs) across Italy. A tracheostomy is an important procedure for critically ill patients who need long-term breathing support. The researchers found that the procedure is common, with a prevalence of 9.1% among all ICU patients. The typical tracheostomized patient was a male with a mean age of 59.5 years, and nearly half of them were admitted due to a neurological condition.



The surgery was typically performed after patients had been on a mechanical ventilator for an average of 12.9 days, primarily because they were struggling to be taken off the ventilator (prolonged weaning, 64.5% of cases). Despite the benefits of improved comfort and reduced sedation, the patients faced difficult outcomes. Their average stay in the ICU was significantly long, at 43.0 days, and tragically, 19.35% did not survive beyond one month following the procedure.

The study highlights that high complication rates, both early and late, are a prominent concern. The authors conclude that this essential procedure is complicated by a lack of standardized clinical guidelines. There is an urgent need to create unified protocols to optimize patient outcomes and reduce adverse events.

Summary for Healthcare Professionals:

This observational, cross-sectional, point-prevalence survey determined the clinical characteristics, complications, and outcomes of tracheostomized patients across eight Italian Intensive Care Units (ICUs). The study found an overall tracheostomy prevalence of 9.1% among currently admitted ICU patients, reflecting a rate of 1.8 tracheostomies per 1000 admission days.



The tracheostomized cohort (n=31) had a mean age of 59.5 years (SD=13.8), with a predominance of males (67.7%). Neurological conditions were the most frequent admission diagnosis (48.4%). Tracheostomy was performed after a mean of 12.9 days of invasive mechanical ventilation (IMV). The primary indication was difficult/prolonged weaning (64.5% of cases). The most utilized technique was the Ciaglia single dilator (38.7%), and cuffed tracheostomy tubes were used in 58.1% of patients.

In terms of morbidity, early and late complications were observed. The mean ICU length of stay (LOS) was significantly extended, averaging 43.0 days (SD=34.3). Post-procedure mortality at one month was 19.35%. The authors conclude that while tracheostomy is an essential intervention associated with benefits like reduced sedation, the high prevalence and complication rates underscore the urgent need for standardized clinical protocols and ongoing staff education to optimize patient outcomes and manage the high resource burden in Italian ICUs.

Use of virtual reality to remotely train healthcare professionals in paediatric emergency tracheostomy skills: protocol for a multi-centre, non-inferiority educational interventional study with historical controls.



Lay Summary:

This document outlines the plan for an important study to develop a new way to teach hospital staff and students how to handle life-threatening emergencies in children and young people (CYP) who have a tracheostomy. Since many children require a breathing tube and quick action is needed when it gets blocked or comes out, comprehensive training for the care team is essential for patient safety. Currently, highly effective training programs exist, but they are expensive and difficult to deliver to the entire healthcare workforce at scale. The project aims to solve this problem by creating a novel Virtual Reality (VR) training tool that can be used remotely. The VR tool will simulate the emergency management of common complications in a safe, yet realistic, environment. The study will recruit 69 healthcare staff and students who will use the VR training for one week. The main question the researchers are asking is whether this remote VR training is just as effective as the traditional hands-on courses. They will measure how well the participants perform the emergency skills and how much their knowledge and confidence improve. The successful implementation of this VR program would allow hospitals to train staff at a massive scale, drastically improving their preparedness for high-stakes pediatric airway crises and ultimately reducing the risk of patient harm. This commitment to innovative education is a crucial step toward improving the safety of care for all CYP living with a tracheostomy.

Summary for Healthcare Professionals:

This document presents the protocol for a multi-centre, non-inferiority educational interventional study designed to evaluate a novel Virtual Reality (VR) training tool for managing paediatric tracheostomy emergencies. The rationale is to address the significant challenge of scaling specialized education, as traditional simulation programs supported by the National Tracheostomy Safety Project (NTSP) are resource-intensive. The overarching aim is to widen access to essential skills training needed for the aftercare of children and young people (CYP) with a tracheostomy. The study will recruit a cohort of 69 healthcare staff and students who will engage with the VR package over one week. The VR tool simulates the emergency management protocol for complications such as airway obstruction. The primary outcome measure is the post-intervention skill performance in simulation, which will be assessed against historical control data using non-inferiority metrics. Secondary outcomes include knowledge gain and retention, system usability, and participant satisfaction. The successful implementation of this VR protocol would demonstrate that remote, technologically-driven training is an educational equivalent to traditional simulation, thereby allowing institutions to implement effective, scalable training programs to enhance workforce competency in managing high-risk paediatric airway crises. This is vital for mitigating preventable morbidity associated with inadequate education.



Long-Term Follow-up of Percutaneous Dilatational Tracheostomy in the Intensive Care Unit.

Lay Summary:

This study compared two different surgical approaches for inserting a breathing tube (tracheostomy) in patients who had suffered a severe stroke. The two methods were Surgical Tracheostomy (ST), a traditional open surgery, and Dilational Tracheostomy (DT), a less-invasive bedside procedure. The goal was to determine which technique provided a smoother path to recovery and a better long-term outcome.



The analysis found that both methods resulted in comparable long-term survival and functional recovery at six months. However, the surgical method (ST) was associated with significant delays and complications. Patients who underwent ST had to remain on the breathing machine for a longer period (median of 19 days versus 14 days for DT) and spent more time in the Intensive Care Unit (ICU). Furthermore, the time it took to successfully remove the tube (decannulation) was substantially longer after ST.

Most critically, the ST group had a significantly higher rate of intrahospital infections compared to the DT group (14.6% vs. 1.2%), a major risk in critically ill patients. The authors conclude that while both methods are viable, the dilational approach is preferred. It supports a more efficient recovery, reducing the time spent on life support and lowering the risk of early infections without compromising the patient's final recovery status.

Summary for Healthcare Professionals:

This study presents a post hoc analysis of the SETPOINT2 randomized controlled trial, comparing outcomes of Surgical Tracheostomy (ST) with Dilational Tracheostomy (DT) in mechanically ventilated patients with severe stroke. Patients were matched using propensity scores.



The analysis confirmed that the primary long-term outcomes were comparable: decannulation rates (56% for ST vs. 61% for DT), functional outcome (mRS 0-4), and 6-month mortality showed no significant difference between the two techniques.

However, the ST method was independently associated with a higher rate of morbidity and resource utilization. The ST group experienced significantly prolonged times: duration of mechanical ventilation (median 19 vs. 14 days, $P=0.008$), ICU length of stay (median 23 vs. 17 days, $P=0.047$), and time to decannulation (median 81 vs. 58 days, $P=0.004$). Furthermore, a major safety finding was the significantly higher intrahospital infection rate in the ST cohort compared to the DT cohort (14.6% vs. 1.2%, $P=0.002$). The authors conclude that while both methods lead to similar long-term recovery, the dilational approach is associated with fewer early infections and accelerates the weaning and recovery process. This evidence supports the dilational approach as the preferred strategy for tracheostomy in ventilated stroke patients.

Scientific abstracts and references



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Tracheostomy Practice in the Italian Intensive Care Units: A Point-Prevalence Survey.

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Background and Objectives: A tracheostomy is a frequently performed surgical intervention in intensive care units (ICUs) for patients requiring prolonged mechanical ventilation. This procedure can offer significant benefits, including reduced sedation requirements, improved patient comfort, and enhanced airway management. However, it is also associated with various risks, and the absence of standardized clinical guidelines complicates its implementation. This study aimed to determine the prevalence of tracheostomy among ICU patients, while also evaluating patient characteristics, complication rates, and overall outcomes related to the procedure. **Materials and Methods:** We conducted an observational, cross-sectional, point-prevalence survey across eight ICUs in Italy. Data were collected over two 24 h periods in March and April 2024, with a focus on ICU characteristics, patient demographics, the details of tracheostomy procedures, and associated complications. **Results:** Among the 92 patients surveyed in the ICUs, 31 (33.7%) had undergone tracheostomy. The overall prevalence of tracheostomy was found to be 9.1%, translating to a rate of 1.8 per 1000 admission days. The mean age of patients with a tracheostomy was 59.5 years (SD = 13.8), with a notable predominance of male patients (67.7%). Neurological conditions were identified as the most common reason for ICU admission, accounting for 48.4% of cases. Tracheostomy procedures were typically performed after a mean duration of 12.9 days of mechanical ventilation, primarily due to difficulties related to prolonged weaning (64.5%). Both early and late complications were observed, and 19.35% of tracheostomized patients did not survive beyond one month following the procedure. The average length of stay in the ICU for these patients was significantly extended, averaging 43.0 days (SD = 34.3). **Conclusions:** These findings highlight the critical role of tracheostomy in the management of critically ill patients within Italian ICUs. The high prevalence and notable complication rates emphasize the urgent need for standardized clinical protocols aimed at optimizing patient outcomes and minimizing adverse events. Further research is

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essential to refine current practices and develop comprehensive guidelines for the management of tracheostomy in critically ill patients.

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Use of virtual reality to remotely train healthcare professionals in paediatric emergency tracheostomy skills: protocol for a multi-centre, non-inferiority educational interventional study with historical controls.

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BACKGROUND: The insertion of a tracheostomy is an established technique used to wean patients off ventilatory support, manage secretions in complex conditions, and as a potentially life-saving procedure to bypass upper airway obstruction. Life-threatening complications during aftercare are not uncommon and may be influenced by a lack of education of carers or healthcare providers of children and young people living with a tracheostomy. Education programmes designed and supported by the National Tracheostomy Safety Project are effective, but resources are not available to educate the workforce at scale. With the overarching aim of widening access to paediatric tracheostomy skills training, we present the protocol for the development and evaluation of a novel virtual reality (VR) training tool designed to simulate the emergency management of paediatric tracheostomy complications. **METHODS AND DISCUSSION:** A multi-centre, non-inferiority educational interventional study with historical controls will be used to evaluate the novel VR training package. A group of 69 healthcare staff and students will have one week to use the educational intervention as often as necessary to learn paediatric emergency tracheostomy skills. The primary outcome measure is skill performance in simulation in a pre- and post-intervention structure within subjects. Participant performance will also be assessed using non-inferiority metrics against historical traditional educational control data. Secondary outcomes include knowledge gain, knowledge retention, usability, side effects, and participant satisfaction. To minimise the risk of cybersickness, teleportation was the preferred locomotion method for the user navigation within the VR environment. **TRIAL REGISTRATION:** Full registration of this study was completed at ClinicalTrials.gov. The registration number is NCT06350708 and was accepted on the 4th April 2024.

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Long-Term Follow-up of Percutaneous Dilatational Tracheostomy in the Intensive Care Unit.

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OBJECTIVE: The primary objective was to analyze percutaneous dilatation tracheostomy (PDT) management in the intensive care unit (ICU) by comparison with surgical tracheostomy (ST) outside of the ICU, with respect to: (i) long-term postoperative outcomes, including rate of follow-up, return to the emergency department, and major and minor complications; (ii) timing of decannulation, including time to decannulation, decannulation after >30 days, and decannulation at discharge. The secondary objective was to compare perioperative outcomes, including major and minor complications. **METHODS:** A retrospective study from April 2013 to 2024 at a tertiary referral center. Eligible patients included those over 18 years old without PDT contraindications who received PDT in the ICU or ST. **RESULTS:** Final analysis included 250 patients (125 [50%] PDT; 125 [50%] ST). The mean (SD) age of patients was 60.05 (16.41) years, and 85 (34.0%) were female. Compared with the ST group, the PDT group experienced significantly decreased long-term follow-up (41 [39.8%] vs. 115 [95.0%], respectively, $p < 0.001$), increased emergency department returns (61 [64.2%] vs. 31 [26.1%], $p < 0.001$), longer time to decannulation (estimated median difference: 11.00 days [95% CI: 7.00 to 15.00, $p < 0.001$]), increased decannulation after >30 days (23 [34.8%] vs. 13 [12.7%], $p < 0.001$), and similar postoperative complications (8 [8.4%] vs. 8 [6.8%], $p = 0.664$). The PDT group experienced significantly more perioperative complications (37 [30.1%] vs. 22 [17.6%], $p = 0.021$). **CONCLUSION:** The decreased long-term follow-up, delayed decannulation, and increased complications after PDT highlight potential pitfalls in ICU tracheostomy management, demonstrating the need for refined protocols, appropriate consultant involvement, and improved patient selection. **LEVEL OF EVIDENCE:** 3 Laryngoscope, 2025.

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