NTSP Podcast series

National Tracheostomy Safety Project

This month's top papers: December 2021

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.

You can find the links to the podcast on www.tracheostomy.org.uk and by searching for NTSP on your favourite podcast platform. Some of the podcasts are also uploaded to YouTube if you prefer to get your news that way. Check out the NTSP YouTube channel at https://www.youtube.com/c/NationalTracheostomySafetyProject. Please follow us and/or subscribe to keep up to date! https://x.com/NTSP_UK

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This month's top papers

- An Interprofessional Approach to Preventing Tracheostomy-Related Pressure Injuries
- Incidence and determinants of malpositioning tracheostomy tubes in critically ill adult patients
- Fiber-optic Bronchoscope-guided vs Mini-surgical Technique of Percutaneous Dilatational Tracheostomy in Intensive Care Units

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An Interprofessional Approach to Preventing Tracheostomy-Related Pressure Injuries

Lay Summary:

This study looked at how a team of hospital staff improved care for patients with tracheostomies to prevent skin injuries around the breathing tube. A tracheostomy is an opening in the neck for a tube that helps a person breathe. These tubes can sometimes cause pressure sores or other injuries to the skin, which are called tracheotomy-related pressure injuries (TRPIs).

A special team was created to address this problem. The team developed a new set of care guidelines, or a "bundle," that included instructions on using protective dressings, managing stitches, and properly cleaning and positioning the tube. They also created a system for nurses and other staff to quickly report any potential skin problems.

The results showed that these new guidelines were very effective. After the new procedures were put in place, the daily rate of TRPIs was cut in half (50%). The study concludes that having a team work together to create and follow a standard set of care rules can significantly reduce skin injuries and lead to better outcomes for patients with tracheostomies.

Summary for Healthcare Professionals:

This quality improvement initiative assessed the effectiveness of a multidisciplinary Tracheostomy Steering Committee (TSC) in preventing tracheostomy-related pressure injuries (TRPIs) and standardizing tracheostomy care. The study used a pre- and post-intervention design, with the TSC developing and implementing a TRPI-prevention bundle.

The bundle included recommendations for protective foam dressing, skin barrier film use, suture tension and timing of removal, stoma care, offloading and positioning, and a new escalation process for clinicians. An electronic tracheostomy report was also developed to facilitate patient tracking.

A total of 289 patients with tracheostomies were evaluated during their inpatient hospital stay between January 2018 and December 2019. Following the implementation of the standardized bundle, the daily rate of TRPIs was reduced by 50%. The authors conclude that the use of this bundle led to a significant reduction in the incidence of TRPIs. The timely escalation process and real-time feedback to clinicians were identified as key factors that enabled rapid intervention and reinforced best practices, demonstrating that interprofessional collaboration is essential for optimal tracheostomy care and improved patient outcomes.

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Incidence and determinants of malpositioning tracheostomy tubes in critically ill adult patients

Lay Summary:

This study looked at a common problem with tracheostomy tubes, which are used to help a person breathe through an opening in the neck. The problem, called malpositioning, happens when the tube is not in the right place, which can cause air leaks and other issues.

Researchers followed 30 critically ill patients and found that 20% of them had a malpositioned tube. The most common cause was the tube's inflatable cuff being too high, which caused an audible air leak. This was more likely to happen when a small and short tracheostomy tube was used in patients with a thick layer of tissue between their skin and windpipe (more than 0.8 cm). This finding is important because many standard tracheostomy tubes are often too short for the average adult.

To solve this, the study suggests that if a small and short tube is used, doctors should check the tube's position with a small camera inserted through the mouth (a translaryngeal bronchoscopy) to make sure it is placed correctly. This can help prevent air leaks and the need to change the tube later.

Summary for Healthcare Professionals:

This prospective clinical audit investigated the incidence and determinants of tracheostomy tube malpositioning in 30 critically ill adult patients. The study aimed to identify factors related to malpositioning and the subsequent need for tube change.

The audit found that 20% of patients experienced tracheostomy tube malpositioning, with a high riding cuff being the most common cause (10% of all patients). A high riding cuff was strongly associated with an audible air leak and the need for a tube change. This malpositioning was significantly predicted by the use of a small (internal diameter <8.0 mm) and short tracheostomy tube in patients with a skin-to-trachea depth greater than 0.8 cm. The study found that Portex tubes, particularly those with an internal diameter of 8.0 mm or smaller and a length of less than 7.5 cm, were often inadequate for these patients.

The authors conclude that malpositioning with a high riding cuff is a common problem in critically ill adults. They recommend that when a small and short tracheostomy tube is used, an intraoperative translaryngeal bronchoscopy should be performed to confirm proper cuff placement relative to the tracheal stoma. This practice can help prevent inadequate air seals and reduce the need for subsequent tube changes.

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Fiber-optic Bronchoscope-guided vs Mini-surgical Technique of Percutaneous Dilatational Tracheostomy in Intensive Care Units

Lay Summary:

This study compares two different ways of performing a tracheostomy, a procedure where a breathing tube is inserted into a patient's windpipe. The first method uses a special camera called a fiber-optic bronchoscope (FOB) to guide the procedure, and the second is a "mini-surgical" technique that doesn't use the camera. The goal was to find a safer, more affordable option for hospitals that don't have a bronchoscope.

Researchers randomly assigned 120 patients to one of the two methods. They found that the mini-surgical technique was much faster, taking an average of about 6 minutes compared to over 14 minutes for the camera-guided method. It also resulted in less blood loss. While the camera-guided group had more cases of low oxygen levels, the mini-surgical group had more cases of irregular heartbeats. Importantly, neither technique caused any perforation of the back wall of the windpipe.

The study concludes that the mini-surgical technique is a fast and safe alternative to the camera-guided method. It can be a valuable option for hospitals that lack the necessary equipment or expertise for the camera-guided procedure.

Summary for Healthcare Professionals:

This randomized comparative study evaluated the safety and efficacy of two techniques for percutaneous dilatational tracheostomy (PCDT): a fiber-optic bronchoscope (FOB)-guided technique (Group-F) and a mini-surgical technique (Group-M) that uses minimal blunt dissection without FOB guidance. The study included 120 mechanically ventilated patients from an ICU of a tertiary care hospital in North India.

The results showed that the mini-surgical technique (Group-M) was significantly faster, with a mean procedural time of 6.30±1.28 minutes compared to 14.43±1.84 minutes for Group-F ($p<0.001$). Mean blood loss was also significantly lower in Group-M (5.33±1.69 mL vs. 6.87±3.11 mL, $p=0.001$).

Regarding complications, Group-F had a significantly higher incidence of desaturation (35% vs. 16.7%, $p=0.022$). In contrast, Group-M had a higher incidence of cardiac arrhythmias (21.7% vs. 6.7%, $p=0.018$). There was no significant difference in the incidence of pneumothorax or subcutaneous emphysema between the groups. Neither technique resulted in a posterior tracheal wall perforation.

The authors conclude that the mini-surgical technique is a safe, effective, and faster alternative to FOB-guided PCDT. This makes it a viable option for intensive care units where the availability, cost, or expertise for FOB are not present.

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Scientific abstracts and references

Adv Skin Wound Care. 2021 Dec 2. doi: 10.1097/01.ASW.0000802864.20939.2d. Online ahead of print.

An Interprofessional Approach to Preventing Tracheostomy-Related Pressure Injuries.

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OBJECTIVE: An interprofessional team, also known as the tracheostomy steering committee (TSC) was established to prevent tracheotomy-related pressure injuries (TRPI) and standardize practice for tracheostomy insertion and care of patients with tracheostomies. In addition to reducing the number TRPIs, the TSC sought establish an escalation process for all clinicians to raise concerns about the care and management of patients with tracheostomies. METHODS: This quality improvement initiative used the DMAIC (Define, Measure, Analyze, Improve and Control) framework with a pre- and post-intervention design. The patient population included all adult patients requiring a tracheostomy. The TSC created a TRPI-prevention bundle, which included recommendations for protective foam dressing and skin barrier film, suture tension, timing of suture removal, stoma care, offloading and positioning, escalation, documentation, and dual skin assessment. An electronic tracheostomy report was developed to track patients with a tracheostomy across the enterprise. RESULTS: A total of 289 patients had a tracheostomy during their inpatient hospital stay from January 2018 through December 2019. There was an observed a reduction in the daily rate of TRPIs by 50% with the use of the standardized TRPI-prevention bundle. CONCLUSIONS: Use of the TRPI-prevention bundle at our institution resulted in a significant reduction in the incidence of TRPI. Timely escalation of possible tracheostomy injuries or tracheostomies at risk enabled rapid intervention, likely preventing many injuries, and real-time feedback to clinicians reinforced best practices. The use of an interprofessional team is necessary in providing optimal tracheostomy care to ensure the best outcomes.

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Incidence and determinants of malpositioning tracheostomy tubes in critically ill adult patients.

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Tracheostomy tubes are chosen primarily based on their internal diameter; however, the length of the tube may also be important. We performed a prospective clinical audit of 30 critically ill patients following tracheostomy to identify the type of tracheostomy tube inserted, the incidence of malpositioning and the factors associated with the need to change the tracheostomy tube subsequently. Anthropometric neck measurements, distance between the skin and tracheal rings and the position of the tracheostomy cuff relative to the tracheal stoma were recorded and analysed. Malpositioning of the tracheostomy tube was noted in 20%, with a high riding cuff being the most common cause of malpositioning, resulting in an audible leak and a need to change the tracheostomy tube subsequently. A high riding cuff was more common when a small tracheostomy tube (e.g. Portex (Smiths Medical Australasia, Macquarie Park, NSW) ≤8.0 mm internal diameter with length <7.5 cm) was used, with risk further increased when the patient's skin to trachea depth was greater than 0.8 cm. Identifying a high riding cuff relative to the tracheal stoma confirmed by a translaryngeal bronchoscopy strongly predicted the risk of air leak and the need to change the tracheostomy tube subsequently. Our study suggests that when a small (and short) tracheostomy tube is planned for use, intraoperative translaryngeal bronchoscopy is warranted to exclude malpositioning of the tracheostomy tube with a high riding cuff.

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Fiber-optic Bronchoscope-guided vs Mini-surgical Technique of Percutaneous Dilatational Tracheostomy in Intensive Care Units.

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BACKGROUND: Percutaneous dilatational tracheostomy (PCDT) using fiber-optic bronchoscope (FOB) is a widely practiced technique, but its availability and cost remain a concern in nations with limited resources. Mini-surgical technique of PCDT incorporating minimal blunt dissection has shown improved results even without the use of FOB. The study is primarily intended to compare these two techniques and establish a safer cost-effective alternative to FOB-guided PCDTs. PATIENTS AND METHODS: This randomized comparative study [registered (CTRI/2018/04/013191)] was conducted on 120 mechanically ventilated patients. In 60 patients, mini-surgical PCDT (group-M) was performed with 2 cm longitudinal skin incision and blunt dissection till pretracheal fascia without FOB guidance using Portex-Ultraperc™ sets. In remaining 60 patients, PCDT was performed under FOB vision with similar skin incision (without blunt dissection) using Portex-Ultraperc™ sets (group-F). Two techniques were compared with regard to procedural time and percentage of complications occurred during or after the procedure. RESULTS: Procedure time [group-M: 6.30 ± 1.28 minutes; group-F: 14.43 ± 1.84 minutes ($p < 0.001$)] and mean blood loss [group-M: 5.33 ± 1.69 mL; group-F: 6.87 ± 3.11 mL ($p = 0.001$)] was significantly less in group-M. Higher incidence of desaturation [group-M: 16.7%; group-F: 35% ($p = 0.022$)] was noted in group-F, whereas arrhythmias [group-M: 21.7%; group-F: 6.7% ($p = 0.018$)] were higher in group-M. There was no statistical difference in incidence of pneumothorax and subcutaneous emphysema. There was no incidence of posterior tracheal wall perforation in any of the patients. CONCLUSION: Mini-surgical technique is a faster alternative of FOB-guided PCDT with comparable incidence of complications. It can safely be used in intensive care units (ICUs) where FOB is not available. CLINICAL TRIAL REGISTRATION NUMBER: CTRI/2018/05/014307. NAME OF REGISTRY: Clinical Trials Registry of India (CTRI), URL-http://ctri.nic.in. HOW TO CITE THIS ARTICLE: Kumar A, Kohli A, Kachru N, Bhadoria P, Wadhawan S, Kumar D. Fiber-optic Bronchoscope-guided vs Mini-surgical Technique of Percutaneous Dilatational Tracheostomy in Intensive Care Units. Indian J Crit Care Med 2021;25(11):1269-1274.

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