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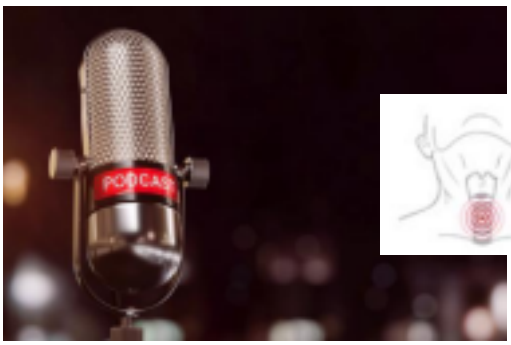

National Tracheostomy Safety Project

This month's top papers: May 2023

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

- Bronchoscopy Findings during Percutaneous Dilation Tracheostomy: A Single Tertiary Medical Center Experience
- Increased physiotherapy capacity reduces duration of tracheostomy in situ, reduces hospital length of stay and improves functional outcomes for people with an acquired brain injury (ABI): a service review.
- Transillumination and Point-of-Care Ultrasonography to Delineate Tracheal Deviation for Challenging Tracheostomy: A Case Report.
- Adoption and Utilization of Heat and Moisture Exchangers (HMEs) in the Tracheostomy Patient.

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Bronchoscopy Findings during Percutaneous Dilation Tracheostomy: A Single Tertiary Medical Center Experience

Lay Summary:

This study looked at the benefits of using a camera, called a bronchoscope, to guide a common neck breathing tube procedure, or tracheostomy, in critically ill patients. While a bronchoscope is generally recommended for safety during the procedure, this study specifically wanted to see if the camera found any unexpected problems in the patient's airway that doctors didn't already know about.

Researchers analyzed records from 41 patients who underwent the procedure, called Percutaneous Dilation Tracheostomy (PDT), with the camera guide. They found that using the camera was safe, with no reported complications or changes in breathing equipment settings due to the camera itself.

However, the camera revealed unexpected problems in the airway of over a third of the patients (36.6%). Most surprisingly, two patients had mass lesions—small growths or tumors—inside their main airways, causing a blockage. None of the patients found to have these airway masses could be taken off the breathing machine. The study concludes that performing this guided procedure is safe and provides an important extra benefit: it acts as an unexpected diagnostic check. Finding these hidden masses during the procedure gives doctors crucial information that directly relates to the patient's ability to breathe on their own and ultimately impacts their long-term care decisions.

Summary for Healthcare Professionals:

This retrospective study analyzed the utility of **bronchoscopy guidance** during **Percutaneous Dilation Tracheostomy (PDT)** by evaluating both procedural safety and clinical findings in 41 consecutively treated patients. The objective was to assess unexpected findings in patients with chronic respiratory failure who underwent PDT.

Procedurally, the study confirmed that utilizing bronchoscopy was safe: the average duration was approximately 50 seconds, and no complications or significant adverse changes in gas exchange or ventilator parameters were observed. The unexpected finding was the **high incidence of intra-airway abnormalities** detected: 15 patients (36.6%) exhibited abnormal bronchoscopy findings. Most clinically significant among these were **intra-airway mass lesions and obvious airway obstruction** found in two patients. None of the patients in the subgroup found to have these mass lesions could be successfully liberated from mechanical ventilation, suggesting a high rate of weaning failure in this unexpectedly abnormal cohort.

The authors conclude that while bronchoscopy is commonly recommended for guidance during PDT, its routine completion offers a valuable **additional clinical benefit** by detecting a non-negligibly high incidence of **unexpected endotracheal or endobronchial masses**. This unexpected diagnostic yield provides critical prognostic information related to liberation from mechanical ventilation and impacts subsequent therapeutic planning for patients with chronic respiratory failure. Further research is recommended to confirm these observations in larger multicenter cohorts.

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Increased physiotherapy capacity reduces duration of tracheostomy in situ, reduces hospital length of stay and improves functional outcomes for people with an acquired brain injury (ABI): a service review.

Lay Summary:

This study investigated how a major hospital managed the care of patients requiring a tracheostomy—a surgical procedure to insert a breathing tube—during the intense onset of the COVID-19 pandemic. The main concern was whether the massive operational demands of the pandemic, such as staff shortages and new safety protocols, negatively impacted the quality of care for non-COVID patients.

Researchers looked back at patient records from before and during the pandemic's first wave, analyzing over a year and a half of procedures. The key finding was reassuring: the quality of tracheostomy care was maintained for non-COVID patients despite the crisis. The time it took to perform the procedure, the length of hospital stay, and the rates of post-surgical complications remained comparable between the pre-COVID and post-COVID periods.

A notable change in surgical practice, however, was observed. The hospital significantly increased its reliance on the less-invasive percutaneous tracheostomy technique (which can be done at the bedside in the Intensive Care Unit) after the pandemic began, performing it in 83% of cases compared to 54% before. This shift likely helped preserve operating room time and staff resources, which were critical during the surge. The authors conclude that by adapting surgical methods and maintaining stringent protocols, hospitals can successfully maintain high-quality care for non-COVID patients even in the face of a large-scale public health crisis.

Summary for Healthcare Professionals:

This single-institution retrospective cohort study analyzed changes in tracheostomy practices and determined if quality patient care was sustained for non-COVID patients at the onset of the COVID-19 pandemic. The study compared outcomes for patients who underwent tracheotomy in the pre-COVID period (May 2019 to January 2021) with those in the post-COVID period.

The analysis demonstrated that key metrics of patient care and safety were successfully maintained. There was no significant difference found in the time from intubation to tracheotomy, the overall length of mechanical ventilation, or the length of hospital stay between the two periods. Crucially, the rate of perioperative and overall complications remained comparably low across both cohorts.

The most notable finding was a dramatic shift in procedural preference, with the use of percutaneous tracheotomy (PDT) significantly increasing from 54% in the pre-COVID period to 83% in the post-COVID period ($p<0.05$). This adaptation highlights a successful institutional response to conserve operating room resources and minimize patient transport during the pandemic surge. The authors conclude that quality tracheostomy care can be maintained during a crisis through adherence to safety protocols and the strategic adaptation of techniques, such as prioritizing the bedside PDT approach.

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Transillumination and Point-of-Care Ultrasonography to Delineate Tracheal Deviation for Challenging Tracheostomy: A Case Report.

Lay Summary:

This paper presents two case reports demonstrating a clever combined technique to safely perform a tracheostomy (a breathing tube in the neck) when the patient has a challenging or distorted neck anatomy. Ordinarily, the windpipe, or trachea, lies in the center, but tumors, severe swelling, or chest issues can push the trachea significantly off to the side, making the standard procedure difficult and dangerous.

The technique uses two visual aids: a portable ultrasound (PoCUS) and transillumination. The PoCUS is used at the bedside to find the trachea and nearby blood vessels in real-time. Transillumination involves inserting a flexible camera (bronchoscope) into the existing breathing tube and using its bright light to shine through the tracheal wall, visibly marking the trachea's precise, displaced location on the exterior of the neck. This light acts like a navigation system, guiding the surgeon directly to the deviated windpipe.

The paper describes one patient with a large neck swelling who needed surgical tracheostomy and another with a chest issue who needed a percutaneous tracheostomy. In both cases, using these combined visual aids successfully helped doctors find the deviated trachea and perform the necessary procedure without complications. The authors strongly recommend this simple, visual technique to ensure challenging tracheostomies can be done safely, avoiding the risks associated with blind or purely exploratory surgeries.

Summary for Healthcare Professionals:

This case report details the successful application of a combined technique—Point-of-Care Ultrasonography (PoCUS) and transillumination—to safely manage two instances of challenging tracheostomy secondary to tracheal deviation caused by cervical masses or mediastinal pathology. The procedure is indicated when a patient's trachea is impalpable or significantly shifted, which increases the risk of an "exploratory tracheostomy" or severe complications.

The technique leverages real-time visualization for enhanced safety. PoCUS is utilized pre-procedurally to localize the trachea, map cervical vasculature, and identify the optimal puncture point. Subsequently, transillumination—using the light source of a flexible bronchoscope passed down the endotracheal tube—acts as a real-time navigation system, visibly marking the precise external location of the deviated trachea for accurate dissection or puncture.

Case 1 involved an emergent surgical tracheostomy successfully performed by delineating the incision based on the transilluminated course of the trachea. Case 2 utilized PoCUS and transillumination to guide a percutaneous dilatational tracheostomy (PDT) in a patient with extreme deviation. Both procedures were completed without complication. The authors conclude that this easily implementable, bedside technique, utilizing readily available fiberscopes and PoCUS, is strongly advocated for safe and precise airway access in challenging tracheostomy scenarios.

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Adoption and Utilization of Heat and Moisture Exchangers (HMEs) in the Tracheostomy Patient.

Lay Summary:

This study outlines a successful hospital project aimed at improving the comfort and mobility of patients with a tracheostomy by switching from old humidification machines to a new device called a Heat and Moisture Exchanger (HME). Traditionally, patients rely on large, noisy humidifiers that restrict their movement, prevent them from speaking, and add to hospital costs. The HME is a small device that filters the patient's exhaled breath to capture warmth and moisture, keeping their airway healthy without the large machine.

A team of various hospital specialists, including doctors, nurses, and speech therapists, created new protocols to safely implement the HME device. The project enrolled 71 patients, and the results were overwhelmingly positive. The majority of patients who tolerated the HME showed a quick improvement in their lung status, had better mobility, and expressed higher satisfaction. The change was also beneficial for the hospital, as HME use was associated with a reduction in both costs and the length of time patients stayed in the hospital. The study concludes that adopting HMEs is a safe, effective, and beneficial change that puts the patient's well-being and autonomy first.

Summary for Healthcare Professionals:

This study details a successful quality improvement (QI) initiative evaluating the efficacy and adoption of Heat and Moisture Exchangers (HMEs) as an alternative to Conventional External Humidification Systems (CEHS) for managing humidification in tracheostomized patients. The rationale for the intervention focused on mitigating the adverse patient-centered and logistical issues associated with CEHS, such as noise, restricted mobility, prevention of phonation, and increased cost.

The methodology involved a collaborative, multidisciplinary approach that included stakeholders from Otolaryngology, Nursing, Speech-Language Pathology, and Administration. Protocols were systematically developed for product acquisition, comprehensive nursing education, and discharge planning. Seventy-one tracheostomized patients were enrolled, with the majority showing favorable clinical outcomes. Key efficacy findings included improvements in patient pulmonary status, enhanced mobility, and greater patient satisfaction. The intervention was also associated with significant logistical benefits, showing decreased hospital length of stay and reduced institutional costs, with no observed increase in adverse events. The authors conclude that the structured implementation of HMEs is a safe, effective, and value-added change that improves patient-centered care and enhances resource management in the acute care tracheostomy population.

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Scientific abstracts and references

Diagnostics (Basel). 2023 May 17;13(10):1764. doi: 10.3390/diagnostics13101764.

Bronchoscopy Findings during Percutaneous Dilation Tracheostomy: A Single Tertiary Medical Center Experience.

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Percutaneous dilation tracheostomy (PDT) is a common procedure in intensive care units. Bronchoscopy has been recommended to guide PDT to decrease complication rates, but no study has analyzed bronchoscopy outcomes during PDT. In this retrospective study, we analyzed bronchoscopy findings and clinical outcomes during PDT. We collected data on all patients who underwent PDT between May 2018 and February 2021. All PDT operations were guided by bronchoscopy, and we assessed the airway to the third order of the bronchi. Forty-one patients who underwent PDT were included in this study. The average duration of PDT was 102.8 ± 34.6 s, and the average duration of bronchoscopy was 49.8 ± 43.8 s. No complications related to bronchoscopy and no significant changes in gas exchange or ventilator parameters were noted after the procedure. Fifteen patients (36.6%) exhibited abnormal bronchoscopy findings, including two patients (13.3%) with intra-airway mass lesions and obvious airway obstruction. None of the patients with intra-airway masses could be liberated from mechanical ventilation. This study observed a non-negligibly high incidence of unexpected endotracheal or endobronchial masses in patients with chronic respiratory failure during PDT, and a high rate of weaning failure was noted in these patients. The completion of bronchoscopy during PDT may provide additional clinical benefits.

DOI: 10.3390/diagnostics13101764 PMID: 37238247

Disabil Rehabil. 2023 May 26:1-4. doi: 10.1080/09638288.2023.2216027. Online ahead of print.

Increased physiotherapy capacity reduces duration of tracheostomy in situ, reduces hospital length of stay and improves functional outcomes for people with an acquired brain injury (ABI): a service review.

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PURPOSE: To assess the impact of increased physiotherapy capacity in an acute regional Neurosurgery Centre on outcomes for people with an acquired brain injury (ABI) requiring a tracheostomy. MATERIALS AND METHODS: A service review of patients undergoing active tracheostomy weaning, admitted over two 15-week time periods; normal physiotherapy staffing with enhanced physiotherapy staffing. RESULTS: With a 50% increase in staffing, physiotherapy rehabilitation sessions increased from 2 to 4 times weekly. A mean improvement was found for patient outcomes; time with a tracheostomy in situ reduced by 11 days and the length of hospital stay reduced by 19 days. Functional status on discharge also improved, with 33% of patients able to mobilise on discharge with normal staffing levels and 77% of patients able to mobilise on discharge with enhanced staffing levels. CONCLUSION: A temporary increase in physiotherapy capacity gave the opportunity to evaluate the impact on physiotherapy rehabilitation frequency and patient outcomes. Results demonstrate the positive impact for this complex patient group on outcomes including rehabilitation frequency, length of stay, time to decannulation, and functional status on discharge. Early access to high-frequency specialist physiotherapy rehabilitation is a critical component of improving functional independence in people with an ABI requiring a tracheostomy.IMPLICATIONS FOR REHABILITATIONIncreasing the capacity of specialist neurological physiotherapy treatment within this healthcare setting for people who have acquired a brain injury and require tracheostomy intervention may have a significant impact for patients and the NHS.Service improvement projects that use rigorous research methodology produce outcomes and evaluations that are robust and reliable.Supporting health and care professionals to use research methods within service improvement projects exposes them to the value of embedding research within their clinical environments.

DOI: 10.1080/09638288.2023.2216027 PMID: 37233604

Cureus. 2023 Apr 5;15(4):e37164. doi: 10.7759/cureus.37164. eCollection 2023 Apr.

Transillumination and Point-of-Care Ultrasonography to Delineate Tracheal Deviation for Challenging Tracheostomy: A Case Report.

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Tracheostomy is indicated for varied reasons and is a relatively safe procedure that can be done with both open and percutaneous methods. However, the procedure is often challenging in cases of distorted neck anatomy. Neck swellings often push the trachea laterally or shield it. Even some gross intrathoracic pathology may shift the trachea from the typical trajectory making it challenging to delineate the course of the trachea. A bedside point-of-care technique having a visual aid that can guide the performer thus appears beneficiary. Fiber-optic assistance for correct puncture and confirmation is known, and light-based techniques have been used for tracheostomies. As fiberscopes are not infrequent in tertiary and even secondary care hospitals, transillumination from a flexible bronchoscope can identify the altered course of the trachea, much like a navigation system, and systematically aid the performer in steering away from the obstacles. We present two cases in two scenarios with tracheal deviation who underwent either open or percutaneous tracheostomy with point-of-care ultrasound and transillumination to delineate the course of the trachea and facilitate difficult tracheostomies safely.

DOI: 10.7759/cureus.37164 PMCID: PMC10166370 PMID: 37168164

Conflict of interest statement: The authors have declared that no competing interests exist.

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Adoption and Utilization of Heat and Moisture Exchangers (HMEs) in the Tracheostomy Patient.

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OBJECTIVE: Management of tracheostomized patients typically involves a conventional external humidification system (CEHS). CEHS are noisy, negatively impact patient mobility, and increases costs. Additionally, they prevent phonation and the ability to cough. Alternatively, heat and moisture exchange (HME) devices have been used in laryngectomized patients. We present an institutional quality improvement project exploring the use and efficacy of an HME device following tracheostomy. METHODS: Health care professionals and stakeholders from multiple disciplines were identified: otolaryngology, nursing, administration, case management, and speech-language pathology. The focus was on an otolaryngology acute care nursing unit. Protocols for product acquisition, nursing education, care flowcharts, and discharge planning were established. Efficacy was assessed by tracking patient pulmonary status, nursing notes, and questionnaires. RESULTS: Seventy-one tracheostomized patients were enrolled. Two patients (2.8%) were unable to tolerate the HME. There were no complications from mucous plugging or respiratory distress. Eighty-nine percent of nursing staff surveyed preferred the use of an HME device over CEHS, particularly for ease of patient mobility. Additional favorable findings were patient satisfaction, cost savings, reduced noise, communication, and ease of discharge education and planning. DISCUSSION: Replacing CEHS with HMEs provides distinct advantages, with a positive impact on patients, family members, and health care personnel. Resistance to changing from the traditional standard of care was alleviated with education, focused training, and positive outcomes. IMPLICATIONS FOR PRACTICE: These data indicate that an HME device is safe and offers advantages to both patients and nurses over traditional CEHS.

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