NTSP Podcast series

National Tracheostomy Safety Project

This month's top papers: January 2024

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

Please note that the comments below and on the podcasts represent the individual authors' opinions and do not reflect the opinions of any of the organisations that the authors work for. Please leave any comments in the chat function or via X.

This month's top papers

- Intensivist-led ultrasound-guided percutaneous tracheostomy: a phase IV cohort study.
- Economic Evaluation of Pediatric Tracheostomy: A Cost of Illness Analysis.
- Tracheotomy versus tracheostomy, the need for lexicographical clarification.
- "100 Things I Wish Someone Would Have Told Me": Everyday Challenges Parents Face While Caring for Their Children With a Tracheostomy.

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Intensivist-led ultrasound-guided percutaneous tracheostomy: a phase IV cohort study.

Lay Summary:

This study looked at the real-world safety and practice of a modern, less invasive procedure called ultrasound-guided percutaneous tracheostomy (PDT) when performed by intensive care doctors. PDT is a common bedside procedure, and using an ultrasound is increasingly popular because it helps the doctor see the neck structures to avoid blood vessels and safely guide the breathing tube.

The researchers tracked over 227 intensivist-led tracheostomies performed at the bedside over a four-year period. The main patient group was trauma patients with brain injuries who needed help protecting their airway. The procedure was typically performed about 14 days after the patient was put on a ventilator.

The key finding was that performing this procedure in a real-world setting, often by intensive care residents in training, is feasible and safe, with complication rates comparable to those reported in the best clinical trials. About 30% of procedures had at least one complication, though most were minor, such as drops in blood pressure. Only three procedures led to a serious complication. The study found that intensive care residents performed the majority of the procedures (76%). The authors conclude that intensivist-led, ultrasound-guided PDT is a safe practice that intensive care doctors can learn during their residency.

Summary for Healthcare Professionals:

This Phase IV cohort study evaluated the feasibility, outcomes, and complications of routine, intensivist-led ultrasound-guided percutaneous dilational tracheostomy (PDT) performed at the bedside in three intensive care units (ICUs) of a quaternary academic hospital. The primary objective was to describe the procedure's real-world safety profile, particularly risks not fully characterized in controlled trials.

The analysis included 227 intensivist-led PDTs performed from 2017 to 2021. The primary indication for tracheostomy was neurological impairment or inability to protect the airways (75%), with trauma being the main reason for ICU admission (43%). The median time from intubation to tracheostomy was 14 days. A total of 76% of the procedures were performed by intensive care residents (fellows).

The key finding is that the procedure is feasible in a routine clinical setting with outcomes and complications comparable to those found in the literature. At least one complication occurred in 29.5% of the procedures, with the most common events being hemodynamic instability and extubation during the procedure. Only three complications were classified as serious. The authors conclude that intensivist-led ultrasound-guided PDT is a viable practice that can be successfully acquired by intensivists during their training, provided they maintain awareness of potential complications to enhance procedural safety.

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Economic Evaluation of Pediatric Tracheostomy: A Cost of Illness Analysis.

Lay Summary:

This study performed a comprehensive analysis to determine the direct financial cost of caring for children with a tracheostomy (a breathing tube in the neck) within a major U.S. children's hospital system. The research tracked the costs associated with nearly 300 children, most of whom received the procedure as infants (median age 0.94 years), over a median follow-up period of 2.5 years.

The findings revealed the exceptionally high financial burden of caring for this patient population, with the total cost reaching a staggering $321 million. The vast majority of this cost—72%—was incurred during the initial hospital admission for the tracheostomy procedure. Subsequent inpatient admissions accounted for an additional 24% of the total cost.

The study found that the single greatest factor driving these high costs was the length of time the patient stayed in the hospital (LOS). Every additional day spent in the hospital increased costs by roughly $1,195, and each extra admission added approximately $130,223. Clinically, the costs were primarily driven by diagnoses of respiratory failure and infections. The study concludes that interventions focused on safely shortening the length of the initial hospitalization are the most effective way to improve care efficiency and contain the economic burden of pediatric tracheostomy.

Summary for Healthcare Professionals:

This prospective cost-of-illness analysis determined the direct financial burden of pediatric tracheostomy care within an academic children's hospital system, utilizing the Medicare/Medicaid charges-to-costs ratio. The cohort included 297 children, with a median age at tracheostomy of 0.94 years and a median follow-up of 2.5 years.

The total estimated cost for the cohort was $321 million over the follow-up period. The cost was highly concentrated, with the initial admission accounting for 72% ($231 million) of the total burden. Subsequent inpatient admissions added another 24%.

Multivariable analysis demonstrated that Length of Stay (LOS) was the primary cost driver for inpatient visits. Specifically, each additional hospital day was associated with a cost increase of roughly $1,195, and each extra admission added approximately $130,223 after adjusting for confounders. The predominant clinical diagnoses driving these high costs were respiratory failure and infections. The authors conclude that the initial hospitalization is the main cost driver, and interventions targeting a safe reduction in LOS and minimizing hospital readmissions represent the most effective strategies for improving value in pediatric tracheostomy care.

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Tracheotomy versus tracheostomy, the need for lexicographical clarification.

Lay Summary:

This paper addresses the common confusion between two important medical terms, "tracheotomy" and "tracheostomy," which often leads to imprecise language in healthcare. The confusion is widespread because general dictionaries, both in English and Spanish, provide ambiguous definitions that mix surgical procedures with outdated concepts.

The study clarifies that from an etymological (word-origin) perspective, which aligns with modern medical dictionaries, the terms have distinct meanings:

- Tracheotomy strictly refers to the surgical procedure itself: the act of making an incision or cut into the front of the windpipe.
- Tracheostomy strictly identifies the resulting opening or stoma that permanently connects the windpipe to the outside.

This distinction is crucial for clear communication. The terms can be used interchangeably when the surgical incision (tracheotomy) leads to a long-term stoma (tracheostomy). However, it is incorrect to use the term "tracheostomy" when a surgeon makes a cut into the windpipe and then closes the incision entirely, as no external opening is created. The authors emphasize that tracheostomies should be described by their characteristics, such as "temporary" or "permanent," without linking the word itself to a specific disease or surgical outcome. The final conclusion calls for dictionary publishers to urgently update their definitions to reflect the precise, etymologically correct medical usage.

Summary for Healthcare Professionals:

This paper addresses the lexicographical imprecision surrounding the usage of the terms "tracheotomy" and "tracheostomy" within the healthcare community, noting that confusion often stems from ambiguous definitions in general dictionaries. The study utilizes etymological and medical dictionary analyses to establish definitive clinical terminological guidance.

The analysis confirms that the terms should be strictly delineated based on their suffixes:

- Tracheotomy (-otomy): This term must be reserved solely for the surgical procedure—the creation of an incision in the anterior tracheal wall.
- Tracheostomy (-ostomy): This term must be reserved for the resultant stoma (the opening) that establishes a communication between the trachea and the exterior, thereby modifying the upper airway tract.

Clinical practice guidelines should note that the terms can be used synonymously only when the tracheotomy procedure culminates in the formation of a tracheostomy (stoma). However, usage of "tracheostomy" is inappropriate when the surgical planes are subsequently closed. The unique case where tracheostomy becomes the *sole* means of airway access is in total laryngectomies, though not all permanent tracheostomas are linked to this specific procedure. The paper concludes that lexicography must accept analogies with stomas formed elsewhere in the body and urges dictionary institutions to update their entries to accurately reflect the scientific etymological distinctions, thus eliminating ambiguity in clinical documentation and discourse.

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"100 Things I Wish Someone Would Have Told Me": Everyday Challenges Parents Face While Caring for Their Children With a Tracheostomy.

Lay Summary:

This study explores the overwhelming daily challenges faced by parents and primary caregivers who look after children with a tracheostomy (a breathing tube in the neck) and other complex medical needs at home. The researchers conducted in-depth qualitative interviews, asking parents what they wished they had known before taking on this enormous responsibility. The findings revealed that these families experience consistent difficulties due to a severe lack of support from various systems, leading to feelings of profound frustration. The challenges were grouped into three major themes that highlight systemic failures in care delivery:

First, inadequate training was a significant source of anxiety, leaving parents feeling unprepared for complex medical procedures and emergencies. Second, poor and inconsistent support systems—such as finding and keeping reliable in-home nurses or securing respite care—added immense stress and isolation. Third, inadequate healthcare coverage and complex billing rules created a relentless battle for essential equipment and financial strain.

The authors conclude that these persistent frustrations stem from poor interactions between the family and the health, social, and education systems. To improve the lives of these medically complex children and their families, the healthcare system must urgently address these institutional barriers by simplifying processes, ensuring consistent high-quality training, and providing equitable access to necessary home support aids and services.

Summary for Healthcare Professionals:

This qualitative study utilized interviews with primary caregivers to elucidate the pervasive, systemic challenges impacting the daily lives and care provision for children with medical complexity (CMC) who are tracheostomy-dependent. Guided by the ecological systems theory, the researchers identified the primary source of caregiver distress as poor interactions within the mesosystem, leading to significant frustration and inconsistent care delivery.

The participants' lived experiences were synthesized into three core thematic areas that emphasize the inextricable relationship between health, social, and education systems. The study found critical failures in:

- Ineffective Training: Resulting in perceived skill deficiencies for complex tracheostomy care and emergency management post-discharge.
- Insufficient Support: Including unreliable home nursing and inadequate respite care.
- Inadequate Healthcare Coverage: Leading to constant financial strain and systemic barriers to obtaining essential Durable Medical Equipment (DME).

The study concludes that these persistent frustrations are rooted in systemic inequities. To enhance the safety and Quality of Life (QOL) for this vulnerable cohort, clinical practice must adopt a holistic strategy that prioritizes equitable access to support aids, addresses DME coverage gaps, and implements more effective, competency-based discharge training.

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Scientific abstracts and references

Crit Care Sci. 2023 Oct-Dec;35(4):402-410. doi: 10.5935/2965-2774.20230174-en.

Intensivist-led ultrasound-guided percutaneous tracheostomy: a phase IV cohort study.

Bustamante PFO(1), Besen BAMP(1), Botêga AP(1), Cadamuro FM(1), Park M(1), Mendes PV(1), Roepke RML(1).

Author information: (1)Intensive Care Unit, Hospital das Clínicas, Faculdade de Medicina, Universidade de São Paulo - São Paulo (SP), Brazil.

OBJECTIVE: To describe, with a larger number of patients in a real-world scenario following routine implementation, intensivist-led ultrasound-guided percutaneous dilational tracheostomy and the possible risks and complications of the procedure not identified in clinical trials. METHODS: This was a phase IV cohort study of patients admitted to three intensive care units of a quaternary academic hospital who underwent intensivist-led ultrasound-guided percutaneous tracheostomy in Brazil from September 2017 to December 2021. RESULTS: There were 4,810 intensive care unit admissions during the study period; 2,084 patients received mechanical ventilation, and 287 underwent tracheostomy, 227 of which were performed at bedside by the intensive care team. The main reason for intensive care unit admission was trauma, and for perform a tracheostomy it was a neurological impairment or an inability to protect the airways. The median time from intubation to tracheostomy was 14 days. Intensive care residents performed 76% of the procedures. At least one complication occurred in 29.5% of the procedures, the most common being hemodynamic instability and extubation during the procedure, with only 3 serious complications. The intensive care unit mortality was 29.1%, and the hospital mortality was 43.6%. CONCLUSION: Intensivist-led ultrasound-guided percutaneous tracheostomy is feasible out of a clinical trial context with outcomes and complications comparable to those in the literature. Intensivists can acquire this competence during their training but should be aware of potential complications to enhance procedural safety.

OTO Open. 2024 Jan 17;8(1):e108. doi: 10.1002/oto2.108. eCollection 2024 Jan-Mar.

Economic Evaluation of Pediatric Tracheostomy: A Cost of Illness Analysis.

Zhang J(1), Liu P(1), Narayanan AM(1), Chorney SR(1)(2), Kou YF(1)(2), Johnson RF(1)(2).

Author information: (1)Department of Otolaryngology-Head and Neck Surgery University of Texas Southwestern Medical Center Dallas Texas USA. (2)Children's Health Airway Management Program Children's Medical Center Dallas Dallas Texas USA.

OBJECTIVE: This study aimed to determine the direct costs of pediatric tracheostomy care within a health care system. STUDY DESIGN: Prospective analysis. SETTING: Academic children's hospital. METHODS: Costs associated with caring for pediatric tracheostomy patients under 18 years were analyzed between 2015 and 2021. Direct costs were calculated using the Medicare/Medicaid charges-to-costs ratio for various visit types. Costs were estimated using generalized linear equations, accounting for confounders. RESULTS: A total of 297 children underwent tracheostomy at a median age of 0.94 years. The median follow-up was 2.5 years, resulting in 13,966 visits (mean = 41). The total cost was $321 million. The initial admission accounted for 72% ($231 million) of costs while other inpatient admissions added 24% ($78 million). Emergency department, observation, and outpatient visits comprised 4% of costs. The length of stay (LOS) was the primary cost driver for inpatient visits. Each additional hospital day increased costs by roughly $1195, and each extra admission added about $130,223 after adjusting for confounders. Respiratory failure and infections were the primary reasons for 67% of subsequent admissions. CONCLUSION: Pediatric tracheostomy care generated over $300 million in direct costs over 5 years. Inpatient stays constituted 96% of these costs, with the LOS being a major factor. To reduce direct health expenditures for these patients, the focus should be on minimizing admissions.

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Acta Otorrinolaringol Esp (Engl Ed). 2024 Jan 14:S2173-5735(24)00007-3. doi: 10.1016/j.otoeng.2023.06.011. Online ahead of print.

Tracheotomy versus tracheostomy, the need for lexicographical clarification.

Sánchez-Gómez S(1), Molina-Fernández E(2), Acosta Mosquera ME(2), Palacios-García JM(2), López-Álvarez F(3), Juana Morrondo MS(4), Tena-García B(2).

Author information: (1)Servicio de Otorrinolaringología, Hospital Universitario Virgen Macarena, Sevilla, Spain. Electronic address: sanchezsg@us.es. (2)Servicio de Otorrinolaringología, Hospital Universitario Virgen Macarena, Sevilla, Spain. (3)Servicio de Otorrinolaringología, Hospital Universitario Central de Asturias, Oviedo, Spain. (4)Servicio de Otorrinolaringología, Hospital Clínico Universitario de Valladolid, Valladolid, Spain.

In the healthcare field, the terms "traqueotomía" and "traqueostomía" are frequently used, often leading to confusion among professionals regarding the appropriate definition for each term or which one should be considered more correct in specific cases. A search was conducted for the terms "traqueotomía" and "traqueostomía" in general Spanish-language dictionaries such as the Dictionary of the Royal Spanish Academy (DRAE) and the Historical Dictionary of the Spanish Language of the Royal Spanish Academy (DHLE), as well as for the English terms "tracheotomy" and "tracheostomy" in English general dictionaries like the Oxford Dictionary, the Cambridge Dictionary, and the Collins English Dictionary. Additionally, searches were performed in medical dictionaries in both Spanish, specifically the Dictionary of Medical Terms of the National Academy of Medicine (DTM), and English, including the Farlex Dictionary. The terms were also explored using the Google search engine. Definitions were analyzed from both lexicographical and etymological perspectives. Definitions found in general dictionaries, in both Spanish and English, were found to be imprecise, limited, and ambiguous, as they mixed outdated indications with criteria that deviated from etymology. In contrast, definitions in medical dictionaries in both languages were more aligned with etymology. "Traqueotomía" strictly identifies the surgical procedure of creating an opening in the anterior face of the trachea. "Traqueostomía" identifies the creation of an opening that connects the trachea to the exterior, involving a modification of the upper airway by providing an additional entry for the respiratory pathway. "Traqueostomía" becomes the sole means of entry to the airway in total laryngectomies. Both terms can be used synonymously when a traqueotomía culminates in a traqueostomía. However, it is not appropriate to use the term "traqueostomía" when the procedure concludes with the closure of the planes and does not result in the creation of a stoma. Traqueostomas can be qualified with adjectives indicating permanence (temporary/permanent), size (large/small), shape (round/elliptical), or depth, without being linked to any specific disease or surgical indication. Not all permanent traqueostomas are the result of total laryngectomies, and they do not necessarily have an irreversible character systematically.

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Qual Health Res. 2024 Jan 9:10497323231217387. doi: 10.1177/10497323231217387. Online ahead of print.

"100 Things I Wish Someone Would Have Told Me": Everyday Challenges Parents Face While Caring for Their Children With a Tracheostomy.

Sherman J(1), Bower KL(2), Eskandanian K(1).

Author information: (1)Children's National Hospital, Washington, DC, USA. (2)Department of Human Development & Family Science, The University of Georgia, Athens, GA, USA.

Equitable access to appropriate care, emergency department services, and in-home support aids are needed to minimize the occurrences of adverse events that have a significant impact on families. However, many families of children with medical complexity (CMC) lack consistent care due to issues of health inequity. We conducted 11 qualitative interviews with primary caregivers who were asked about their experiences of providing care to children who have a tracheostomy and are supported by multiple life-saving machines at home. Guided by ecological systems theory, we identified three themes that contextualize the lived experiences of the participants who expressed needs that arose from poor interactions within the mesosystem. Findings convey participant frustrations that result from insufficient support, ineffective training, and inadequate healthcare coverage. Although each theme is organized systematically to emphasize specific concerns within the mesosystem, together these themes emphasize the inextricable relationship between daily needs with systemic barriers to care. We provide a discussion of these needs with a broader context that also impacts the perceived quality of care among families managing the needs of their children who are supported by life-saving technology. By addressing existing challenges and identifying opportunities for improvement within the healthcare system, we seek to contribute to the collective effort of advocating for ethical systemic change on behalf of CMC and their families.