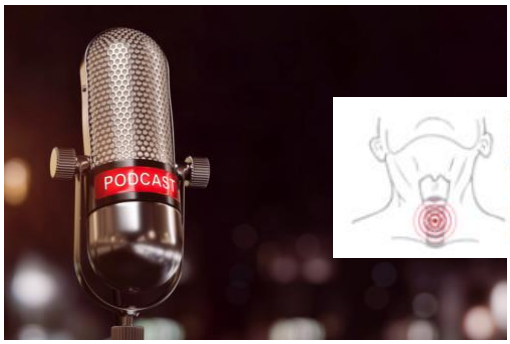

NTSP Podcast series

National Tracheostomy Safety Project

This month's top papers: February 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://twitter.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 twitter

This month's top papers

- High flow and PEEP via your trachy
- Emergency Cric vs Trachy in dogs
- Adapting global guidance for low- and middle-income countries
- Trachys on ECMO

How Much PEEP Does High Flow Deliver via Tracheostomy? A Literature Review and Benchtop Experiment.

Lay Summary:

High flow tracheostomy (HFT) is a way of supplying a mix of air and oxygen to patients with a tracheostomy (a tube inserted into the windpipe to help with breathing). This method is often used to help patients progress towards breathing without a machine. However, it's unclear if HFT helps maintain a positive pressure in the lungs, known as PEEP (Positive End-Expiratory Pressure), which can be crucial for patient recovery. In this study, researchers simulated a tracheostomy using standard equipment and different air flows to see if PEEP was produced. They found that while there was some PEEP, it was very small. Even though the PEEP increased slightly with higher flows of air, it likely isn't enough to help in weaning patients off ventilators.

Summary for Healthcare Professionals:

This abstract presents a study on the efficacy of high flow gas delivered via the tracheostomy (HFT) in generating Positive End-Expiratory Pressure (PEEP) and its implications for weaning patients from ventilatory support. Using a benchtop model with an uncuffed size 8 tracheostomy and Optiflow™ with Airvo 2™ humidifier system, researchers observed the PEEP produced at different airflow rates. The study concluded that although increasing the flow from 40 L/min to 60 L/min did result in a statistically significant increase in potential PEEP (pPEEP), the absolute values ranging from 0.3 cmH2O to 0.9 cmH2O were minimal. The findings suggest that the pPEEP levels achieved with HFT are not sufficient to confer a mechanical advantage in the weaning process, despite the system's ability to generate measurable PEEP.

Cricothyrotomy Is Faster Than Tracheostomy for Emergency Front-of-Neck Airway Access in Dogs.

Lay Summary:

A study involving veterinary students in their final year compared two different methods for creating an emergency airway in the necks of dog cadavers. They looked at a new method called cricothyrotomy (CTT) and a shorter form of tracheostomy (TT). The study aimed to see which was quicker, more successful, had fewer complications, was easier to do, and which method the students preferred. The results showed that CTT was much faster, with the first attempt taking over a minute less than TT, and the second attempt being about 30 seconds quicker. Both methods worked every time without significant complications or difficulty. Most students favoured CTT, suggesting it might be the better choice for emergency airway access in dogs

Summary for Healthcare Professionals:

This study assessed the performance of final year veterinary students in executing a novel cricothyrotomy (CTT) technique compared to an abbreviated tracheostomy (TT) technique on canine cadavers. The prospective, cross-over, block-randomised trial involved eight students who completed both procedures across 16 dogs, with a total of 32 procedures. The CTT method demonstrated a significant reduction in procedure time compared to TT, with mean times being 49.6 seconds faster overall. The time saved was greater during the first attempt (66.4 seconds) than the second (32.7 seconds). Both procedures had a 100% success rate with no significant difference in the damage score or technical difficulty. A majority of students preferred CTT over TT. These results suggest CTT as a viable primary method for emergency front-of-neck airway access in canine cases.

Tracheostomy and Improvement in Utilization of Hospital Resources During SARS-CoV-2 Pandemic Surge.

Lay Summary:

The SARS-CoV-2 pandemic has placed a huge strain on healthcare systems worldwide, leading to shortages of protective gear, medicines, and staff. The virus often causes serious lung problems that make it hard for patients to breathe, resulting in a high demand for ventilators. People with severe cases may need to be on a ventilator for a long time, which uses up a lot of hospital resources. Tracheostomy, which is a procedure to create a direct airway through an incision in the windpipe, can be helpful for patients who need long-term ventilation. Some research suggests that doing this procedure early on can shorten a patient's stay in the intensive care unit (ICU), help wean them off the ventilator, and reduce the need for drugs that keep them sedated. During times when many patients are being treated at once, if there is enough protective gear for the medical staff, early tracheostomy might be a good way to manage care. It could reduce the need for sedatives, which helps prevent shortages and keeps patients more awake for better communication with their doctors. Tracheostomy might also lower the risk of spreading the virus through the air, especially if patients need to be put back on a ventilator. It also requires fewer staff to monitor, which means less exposure to the virus for healthcare workers. To keep the risk low during the procedure, careful coordination is needed among the medical team. In the big picture, early tracheostomy may help hospitals use their resources more effectively and keep healthcare workers safer during the pandemic.

Summary for Healthcare Professionals:

The SARS-CoV-2 pandemic has exerted unprecedented pressure on healthcare infrastructures globally, precipitating significant challenges in the allocation of personal protective equipment (PPE), medication, and human resources. The pathophysiology of the virus frequently necessitates prolonged mechanical ventilation due to severe respiratory compromise characterized by bilateral lung infiltrates. Tracheostomy is often employed for patients necessitating extended ventilation. Early tracheostomy may confer advantages in the critical care setting, potentially reducing ICU stays, facilitating weaning from mechanical ventilation, and diminishing the requirement for sedative pharmacotherapy. In a surge scenario with sufficient PPE, early tracheostomy could optimize patient management, conserving sedatives for future exigencies, enhancing patient-staff communication, and reducing viral aerosolization, particularly if re-intubation is necessary. This procedure also allows for reduced staffing during patient monitoring, decreasing healthcare worker exposure. Strategic coordination during tracheostomy, involving an anesthesiologist or critical care physician and a surgeon, can further mitigate exposure risks. Consequently, early tracheostomy in severe SARS-CoV-2 cases should be considered a strategic intervention to minimize long-term viral aerosolization while optimizing sedative use, ICU throughput, and overall hospital resource management.

Controlled Apneic Tracheostomy in Patients with COVID-19.

Lay Summary:

A study was conducted to figure out the best way to perform tracheostomies, a surgical procedure to help patients breathe, on people with severe COVID-19. A special team of experts was put together to create new methods for managing patients with the virus. They looked at cases from a large hospital between April and June 2020, where they used a special method called induced apnea to do tracheostomies at the bedside. Out of 28 patients who had the procedure, most maintained good oxygen levels during the operation, and on average, they needed the ventilator for 11 more days afterward. Three patients passed away due to severe infection and organ failure, but all the others got better and were sent home, with most having the tracheostomy tube removed within about a month. Importantly, none of the healthcare workers who performed these procedures got sick with COVID-19. The study concluded that doing tracheostomies in COVID-19 patients can be safe and can help in their recovery and in managing ICU resources effectively, especially if done early. Setting up a dedicated team to manage such procedures for new diseases is also beneficial.

Summary for Healthcare Professionals:

This investigation was aimed at establishing a team-based institutional framework for managing COVID-19 patients requiring tracheostomy due to respiratory failure, and evaluating the safety and efficacy of these procedures. An interdisciplinary Task Force developed a protocol for a single-institution prospective non-randomized cohort study, involving bedside tracheostomies using an induced apneic technique at a tertiary care academic center. The study encompassed 28 patients between April 27th and June 30th, 2020. Results showed a median lowest procedural oxygen saturation of 95%, with a median of 11 ventilated days post-tracheostomy. The mortality rate was 11%, attributed to sepsis and multiorgan failure. Of the surviving patients, all were discharged, and 76% underwent successful decannulation, with a median of 26 days to decannulation. Crucially, there was no symptomatic COVID-19 transmission to healthcare personnel involved. The findings advocate that tracheostomy in patients with COVID-19 respiratory failure is beneficial and can be executed safely without health personnel infection. Early tracheostomy may enhance recovery and optimize ICU resource use. The establishment of a specialized Task Force is recommended as an effective strategy for novel disease management.

Pragmatic Recommendations for Tracheostomy, Discharge, and Rehabilitation Measures in Hospitalized Patients Recovering From Severe COVID-19 in Low- and Middle-Income Countries.

Lay Summary:

New information on how to treat COVID-19 is always coming out, but much of it comes from wealthy countries with lots of medical resources. These methods may not work well in countries with fewer resources. This report gives practical advice for doctors in these countries on how to handle tracheostomies (a procedure to help patients breathe), when to send patients home, and how to help them recover. It suggests doing tracheostomies in special rooms that keep the virus from spreading in the air, or in a normal room that's closed off. Doctors should use protective gear that fits well and do the procedure with as few people as needed to keep the virus from getting into the air. When patients get better, they should follow local rules about going home. If there aren't any rules, patients can go home based on how they feel instead of waiting for a test result. It's also important to make sure the person taking care of the patient at home can handle their emotional, physical, and thinking needs.

Summary for Healthcare Professionals:

Current research on COVID-19 predominantly arises from high-income countries, presenting challenges in applicability to low- and middle-income countries (LMICs) due to resource limitations. This report offers practical guidelines for tracheostomy procedures, patient discharge, and rehabilitation in the context of LMICs. For tracheostomy, it is recommended to conduct the procedure in a negative pressure environment or, if not feasible, in an isolated room with strict protocols to limit viral aerosolization. The most familiar and safest technique should be employed, alongside fit-tested enhanced personal protective equipment (PPE) and minimal personnel presence. Regarding discharge, adherence to existing local or national guidelines is advocated; in their absence, a symptom-based approach to deisolation and discharge is proposed, bypassing test-based strategies. Rehabilitation should account for the available support systems, ensuring caregivers are equipped to manage the convalescent needs of the patient, spanning psychological, physical, and cognitive rehabilitation aspects.

Tracheostomy while on Extracorporeal Membrane Oxygenation: A Comparison of Percutaneous and Open Procedures.

Lay Summary:

Deciding when to switch a patient from a breathing tube to a tracheostomy, which is a surgical opening in the throat for a breathing tube, is a difficult choice for doctors, especially for patients who are very ill and need extra support from a machine called ECMO. ECMO does the work of the heart and lungs for the patient. Researchers looked at the safety of two ways to do a tracheostomy: one is called percutaneous, which is less invasive and done at the bedside, and the other is an open surgery. They studied 27 patients on ECMO to see if there was a difference in serious bleeding or other big problems after the tracheostomy. They found that both methods had similar risks of serious bleeding and complications. This means that both ways of doing a tracheostomy can be considered safe for patients on ECMO, but it's still important to have a team of different healthcare professionals working together to lower the chances of any problems.

Summary for Healthcare Professionals:

The optimal timing for tracheostomy in critically ill patients, particularly those receiving extracorporeal membrane oxygenation (ECMO), remains debated. This retrospective cohort study compared the safety profiles of percutaneous versus open tracheostomy procedures in ECMO-supported patients. Covering data from July 2013 to May 2019, the study included 27 patients, examining primary outcomes related to major bleeding events within 48 hours post-procedure and secondary outcomes involving complications such as procedure-related mortality, ECMO decannulation, tracheal/esophageal injury, and pneumothorax/pneumomediastinum, as well as survival rates to hospital discharge.

No significant statistical differences were found in major bleeding events between the percutaneous (44%) and open (27%) groups. Additional procedure-related mortality or complications also did not differ significantly between the approaches. The findings suggest that with a thorough multidisciplinary strategy, both percutaneous and open tracheostomy techniques can be performed with a comparable safety margin in ECMO patients. The incidence of major bleeding, while present, did not correlate significantly with the method of tracheostomy employed. Hence, both approaches may be utilized with an understanding that they share similar risk profiles in this patient population.

Scientific abstracts and references

Crit Care Res Pract. 2021 Jan 13;2021:6036891. doi: 10.1155/2021/6036891. eCollection 2021.

How Much PEEP Does High Flow Deliver via Tracheostomy? A Literature Review and Benchtop Experiment.

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BACKGROUND: High flow tracheostomy (HFT) is a commonly used weaning and humidification strategy for tracheostomised patients, but little is known as to how much PEEP or mechanical benefit it offers. Patient anatomy and device characteristics differentiate it from high flow nasal cannula and the physiological effects observed. OBJECTIVES: (1) To review the available literature on the effects of HFT on airway pressure and indices of gas exchange. (2) To quantify PEEP generated by a HFT circuit. METHODS: A randomised benchtop experiment was conducted, with a size 8 uncuffed Portex tracheostomy connected to an Optiflow™ with Airvo 2™ humidifier system. The tracheostomy tube was partially immersed in water to give rise to a column of water within the inner surface of the tube. An air fluid interface was generated with flows of 40 L/min, 50 L/min, and 60 L/min. The amount of potential PEEP (pPEEP) generated was determined by the distance the water column was pushed downward by the flow delivered. Findings. Overall 40 L/min, 50 L/min, and 60 L/min provided pPEEP of approximately 0.3 cmH2O, 0.5 cmH2O, and 0.9 cmH2O, respectively. There was a statistically significant change in pPEEP with change in flows from 40-60 L/min with an average change in pPEEP of 0.25-0.35 cmH2O per 10 L/min flow (p value <0.01). Interpretation. HFT can generate measurable and variable PEEP despite the open system used. The pPEEP generated with HFT is minimal despite statistically significant change with increasing flows. This pPEEP is unlikely to provide mechanical benefit in weaning patients off ventilatory support.

DOI: 10.1155/2021/6036891 PMCID: PMC7817301 PMID: 33520312

Front Vet Sci. 2021 Jan 11;7:593687. doi: 10.3389/fvets.2020.593687. eCollection 2020.

Cricothyrotomy Is Faster Than Tracheostomy for Emergency Front-of-Neck Airway Access in Dogs.

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Objectives: In novice final year veterinary students, we sought to: (1) compare the procedure time between a novel cricothyrotomy (CTT) technique and an abbreviated tracheostomy (TT) technique in canine cadavers, (2) assess the success rate of each procedure, (3) assess the complication rate of each procedure via a damage score, (4) evaluate the technical difficulty of each procedure and (5) determine the preferred procedure of study participants for emergency front-of-neck access. Materials and Methods: A prospective, cross-over, block randomised trial was performed, where veterinary students completed CTT and TT procedures on cadaver dogs. Eight students were recruited and performed 32 procedures on 16 dogs. A generalised estimating equation approach to modelling the procedure times was used. Results: The procedure time was significantly faster for the CTT than the TT technique, on average ($p < 0.001$). The mean time taken to complete the CTT technique was 49.6 s (95% CI: 29.5-69.6) faster on average, with a mean CTT time of less than half that of the TT. When taking into account the attempt number, the procedure time for a CTT was 66.4 s (95% CI: 38.9-93.9) faster than TT for the first attempt, and for the second attempt, this was 32.7 s (95% CI: 15.2-50.2) faster, on average. The success rate for both procedures was 100% and there was no difference detected in the damage or difficulty scores ($P = 0.13$ and 0.08, respectively). Seven of eight participants preferred the CTT. Clinical Significance: CTT warrants consideration as the primary option for emergency front-of-neck airway access for dogs.

DOI: 10.3389/fvets.2020.593687 PMCID: PMC7829300 PMID: 33505998

Surg Technol Int. 2021 Jan 25;38:sti38/1389. Online ahead of print.

Tracheostomy and Improvement in Utilization of Hospital Resources During SARS-CoV-2 Pandemic Surge.

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The SARS-CoV-2 pandemic has affected millions across the world. Significant patient surges have caused severe resource allocation challenges in personal protective equipment, medications, and staffing. The virus produces bilateral lung infiltrates causing significant oxygen depletion and respiratory failure thus increasing the need for ventilators. The patients who require ventilation are often requiring prolonged ventilation and depleting hospital resources. Tracheostomy is often utilized in patients requiring prolonged ventilation, and early tracheostomy in critical care patients has been shown in some studies to improve a variety of factors including intensive care unit (ICU) length of stay, ventilation weaning, and decreased sedation medication utilization. In a patient surge setting, as long as adequate personal protective equipment (PPE) is available to minimize spread to healthcare workers, early tracheostomy may be a beneficial management of these patients. Decreasing sedative medication utilization may help prevent shortages in future waves of infection and improve patient-provider communication as patients are more alert. Tracheostomy care is easier than endotracheal intubation and may have decreased viral aerosolization risk, particularly if repeat intubation is necessary after a weaning trial. Additionally, tracheostomy patients can be monitored with less staff, decreasing total healthcare worker exposure to infection. To manage risk of exposure, coordination of ventilation controlled by an anesthesiologist or a critical care physician with a surgeon during the procedure can minimize aerosolization to the team. Risk management and resource allocation is of the utmost importance in any global crisis and procedures must be appropriately planned and benefits to patients, as well as minimized exposure to healthcare providers, must be considered. Early tracheostomy could be a beneficial procedure for severe SARS-CoV-2 patients to minimize long-term virus aerosolization and exposure for healthcare workers while decreasing sedation, allowing for earlier transfer out of the ICU, and improving hospital resource utilization.

PMID: 33494117

12. JTCVS Tech. 2020 Dec 7. doi: 10.1016/j.xjtc.2020.11.016. Online ahead of print.

Controlled Apneic Tracheostomy in Patients with COVID-19.

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Comment in JTCVS Tech. 2020 Dec 26;: JTCVS Tech. 2020 Dec 30;:

OBJECTIVE: The objective of this study was to develop a team-based institutional infrastructure for navigating management of a novel disease, to determine a safe and effective approach for performing tracheostomies in patients with COVID-19 respiratory failure, and to review outcomes of patients and healthcare personnel following implementation of this approach. METHODS: An interdisciplinary Task Force was constructed to develop innovative strategies for management of a novel disease. A single-institution prospective non-randomized cohort study was then conducted on patients with COVID-19 respiratory failure who underwent tracheostomy using an induced bedside apneic technique at a tertiary care academic institution between April 27th, 2020, and June 30th, 2020. RESULTS: 28 patients underwent tracheostomy with induced apnea. The median lowest procedural oxygen saturation was 95%. The median number of ventilated days following tracheostomy was 11. There were 3 mortalities (11%) due to sepsis and multiorgan failure; of 25 surviving patients, 100% were successfully discharged from the hospital and 76% are decannulated, with a median time of 26 days from tracheostomy to decannulation (range 12 - 57). There was no symptomatic disease transmission to healthcare personnel on the COVID-19 Tracheostomy Team. CONCLUSIONS: Patients with respiratory failure from COVID-19 disease may benefit from tracheostomy. This can be completed effectively and safely, without viral transmission to healthcare personnel. Performing tracheostomies earlier in the course of disease may expedite patient recovery and improve ICU resource utilization. Creation of a collaborative Task Force is an effective strategic approach for management of novel disease.

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Am J Trop Med Hyg. 2021 Jan 13:tpmd201173. doi: 10.4269/ajtmh.20-1173. Online ahead of print.

Pragmatic Recommendations for Tracheostomy, Discharge, and Rehabilitation Measures in Hospitalized Patients Recovering From Severe COVID-19 in Low- and Middle-Income Countries.

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New studies of COVID-19 are constantly updating best practices in clinical care. However, research mainly originates in resource-rich settings in high-income countries. Often, it is impractical to apply recommendations based on these investigations to resource-constrained settings in low- and middle-income countries (LMICs). We report on a set of pragmatic recommendations for tracheostomy, discharge, and rehabilitation measures in hospitalized patients recovering from severe COVID-19 in LMICs. We recommend that tracheostomy be performed in a negative pressure room or negative pressure operating room, if possible, and otherwise in a single room with a closed door. We recommend using the technique that is most familiar to the institution and that can be conducted most safely. We recommend using fit-tested enhanced personal protection equipment, with the fewest people required, and incorporating strategies to minimize aerosolization of the virus. For recovering patients, we suggest following local, regional, or national hospital discharge guidelines. If these are lacking, we suggest deisolation and hospital discharge using symptom-based criteria, rather than with testing. We likewise suggest taking into consideration the capability of primary caregivers to provide the necessary care to meet the psychological, physical, and neurocognitive needs of the patient.

DOI: 10.4269/ajtmh.20-1173 PMID: 33534772

J Extra Corpor Technol. 2020 Dec;52(4):266-271. doi: 10.1182/ject-2000027.

Tracheostomy while on Extracorporeal Membrane Oxygenation: A Comparison of Percutaneous and Open Procedures.

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Although the ideal timing of tracheostomy for critically ill patients is controversial, transitioning from an endotracheal tube can be beneficial. Concerns arise for patients under extracorporeal membrane oxygenation (ECMO) support. Studies have described percutaneous and open tracheostomy approaches for critically ill patients but, to our knowledge, have not compared the two specifically in ECMO patients. This study analyzed safety and aimed to identify if there was a difference in major bleeding or other tracheostomy-associated complications. A single-center retrospective cohort study of all patients who received tracheostomy while on ECMO from July 2013 to May 2019 was completed. The primary endpoint was a significant difference in the incidence of a major bleeding adverse event at 48 hours. Secondary endpoints included differences in the incidence of complications (e.g., procedure-related mortality, ECMO decannulation, tracheal/esophageal injury, and pneumothorax/pneumomediastinum) and survival to discharge. A secondary analysis separated the groups further by comparing those with bleeding events and those without. The study included 27 ECMO patients: 16 (59%) in the percutaneous arm and 11 in the open arm. The median number of ECMO days before tracheostomy was 10 vs. 13, respectively. There were no statistically significant differences between the two groups for major bleeding events (percutaneous 44% vs. open 27%, p = .45), procedure-related mortality, or procedure-related complications. Both percutaneous and open tracheostomies in patients on ECMO require a multidisciplinary approach to minimize adverse effects. Major bleeding does occur, but there was no statistically significant correlation between bleeding events and the type of the tracheostomy approach. Thus, both open and percutaneous tracheostomy approaches have a favorable safety profile.

DOI: 10.1182/ject-2000027 PMCID: PMC7728494 PMID: 33343028 [Indexed for MEDLINE]