



Paediatric tracheostomy management: a cross-sectional study on current Australian and New Zealand trends

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Background: Paediatric tracheostomies are complex undertakings for both clinicians and the patient's families, requiring a high level of support from staff, parents and carers for ongoing management. Our study aimed to establish the current trends in the management of paediatric tracheostomies in Australia and New Zealand and identify potential areas of improvement that need to be addressed in order to improve the delivery of care to children with tracheostomies and their families.

Methods: A cross-sectional survey was sent to all members of the Australia and New Zealand Society of Paediatric Otorhinolaryngology (ANZSPO). The survey encompassed various aspect of paediatric tracheostomy care including pre-operative preparation, postoperative care, emergency protocols, outpatient practices and long term care.

Results: Of the 26 respondents, the majority (57.7%) worked at institutions where >10 paediatric tracheostomies were performed each year. Less than half (46.2%) routinely held a multi-disciplinary team (MDT) meeting prior to tracheostomy placement and less than half (42.3%) offered to connect patients and their families with a tracheostomised patient prior to surgery. All respondents (100%) used a standardised postoperative care protocol and the majority (84.6%) utilised a bedside safety card. Less than a quarter of surgeons (23.1%) conducted weekly multidisciplinary reviews of paediatric patients following insertion of the tracheostomy. The majority (76.9%) required a minimum of two carers to be trained prior to discharge. Most surgeons (80.8%) reported that their institution provided a tracheostomy "Go-Bag" with emergency supplies, while over half (57.7%) also provided a carer emergency card. The majority (76.9%) recommended routine weekly changes of tracheotomy tubes. Most surgeons (53.8%) performed laryngotracheobronchoscopies only when indicated by clinical concerns, rather than for routine surveillance reasons.

Conclusions: Our study highlights the ongoing variability in the management of paediatric tracheostomies across Australia and New Zealand, especially in relation to the utilisation of the multidisciplinary model of care and the preparation of patients and families for ongoing management of the tracheostomy. These inconsistencies represent areas that warrant further review in order to develop improved models-of-care to better serve the needs of paediatric patients with tracheostomies and their families.

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Introduction

Placement of a paediatric tracheostomy comes with a complex series of challenges for patients and their family, both in terms of understanding the implications of the tracheostomy, as well as the ongoing tracheostomy care, through hopeful decannulation.

Complication rates of up to 56% have been reported following paediatric tracheostomy (1,2), with the majority of tracheostomy-related complication events thought to be potentially preventable. Moreover, the American College of Surgeons National Surgical Quality Improvement Program Pediatrics (NSQIP-P) demonstrated that the highest contribution in morbidity in otolaryngology is seen in children less than two years of age undergoing tracheostomy (3). There is therefore value in reviewing the current management practices surrounding paediatric tracheostomies in order to identify potential areas of optimisation.

The aim of our study was to establish the current Australian and New Zealand trends in the management of paediatric tracheostomy, and to identify potential areas of improvement that could be addressed, in order to improve the delivery of care to children with tracheostomies and their families. We anticipate that the results of our study will help inform the development of future paediatric tracheostomy quality improvement initiatives to help standardise the delivery of tracheostomy care across Australia and New Zealand. We present this article in accordance with the STROBE reporting checklist (available at <https://www.theajo.com/article/view/10.21037/ajo-23-62/rc>).

Methods

An electronic cross-sectional survey of 37 questions [Supplementary file ([Appendix 1](#))] was distributed via email to all members of The Australian and New Zealand Society of Paediatric Otorhinolaryngology (ANZSPO) through Australian Society of Head and Neck Surgery (ASOHNS). The study was conducted in accordance with the Declaration of Helsinki (revised in 2013). Ethics approval was obtained from the Hunter New England Local Health District Human Research Ethics Committee (approval 2023/ETH00874). Surgeons participated voluntarily in this survey without personal or financial incentive.

The survey encompassed multiple areas of paediatric tracheostomy practice including informed consent, postoperative care, staff and carer education and training,

emergency protocols, outpatient practices, decannulation protocol, and adverse events reporting. To maximise participant response, the questionnaire was open for four weeks, with a reminder email sent one week prior to questionnaire closure. A response to each question was required for the questionnaire to be successfully submitted. Participation was voluntary, and responses were confidential and de-identified. Descriptive statistics were used to summarize study results. Microsoft excel (Microsoft, Washington) was used for quantitative and qualitative data analysis.

Results

Respondent demographics

Twenty-six of 72 (36.1%) ANZSPO members responded. Demographics of otorhinolaryngologists included in the survey can be seen in *Table 1*. The majority (57.7%) worked at institutions where >10 paediatric tracheostomies were performed each year, while another 23.1% worked at institutions where between 6–10 paediatric tracheostomies were performed each year. None of the respondents worked at a hospital where percutaneous tracheostomies were performed in children.

Tracheostomy consent process

Respondents indicated that the otolaryngology (ENT) team (26/26; 100%) were always involved in preparing the family for a tracheostomy, while a tracheostomy clinical nurse consultant (CNC) (22/26; 84.6%) nursing staff (15/26; 57.7%), Intensive Care Unit (ICU) specialist (14/26; 53.8%) and speech pathologists (14/26; 53.8%) were also commonly involved (*Figure 1*).

Less than half (12/26; 46.2%) of respondents routinely held a multi-disciplinary team (MDT) meeting prior to placement of a paediatric tracheostomy. Similarly, less than half (11/26; 42.3%) routinely offered to connect patients and their families with a tracheostomised patient and their families prior to surgery.

Most (24/26; 92.3%) paediatric otolaryngologists reported that they were routinely involved in obtaining consent. Information for the consent process typically involves verbal delivery (25/26; 96.2%) and paper-based handouts (16/26; 61.5%). Videos and multimedia were used by 11.5% of respondents (3/26) while mannequins and models were used by another 11.5% of respondents (3/26).

Table 1 Demographics of otorhinolaryngologists

Demographics	No. of respondents (%)
No. of years in practice	
<5 years	6 (23.1)
5–10 years	8 (30.8)
>10 years	12 (46.2)
Fellowship in paediatric otorhinolaryngology	
Yes	23 (88.5)
No	3 (11.5)

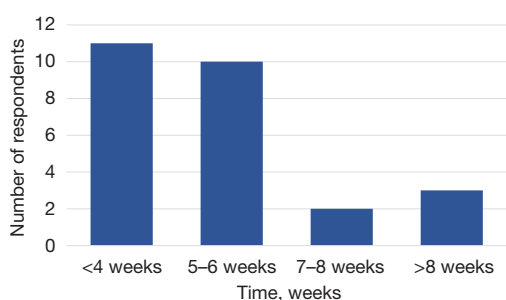


Figure 1 Average duration of admission following tracheostomy insertion.

Table 2 Equipment included in a typical “Go-Bag” or emergency bag

Equipment	No. of respondents (%)
Tracheostomy tube (same size)	26 (100.0)
Tracheostomy ties	26 (100.0)
Suction catheter	26 (100.0)
Tracheostomy tube (smaller size)	25 (96.2)
Suction unit	24 (92.3)
Tracheostomy dressing	22 (84.6)
Humid-vent/Swedish nose	22 (84.6)
Syringe for cuff deflation	21 (80.8)
Scissors	18 (69.2)
Normal saline	16 (61.5)
List of emergency contacts	15 (57.7)
Resuscitation bag and mask	11 (42.3)
Bulb syringe	7 (26.9)
Saturation monitor	6 (23.1)

Postoperative tracheostomy care practices

All respondents (100%) had a standardised postoperative care protocol. The vast majority (22/26; 84.6%) utilised a bedside safety card in the immediate postoperative period with information such as tube brand (90.9%), tube size (100%), cuff status (95.5%), suction depth (100%), laryngoscopy view (59.1%) and date of last tracheostomy change (59.1%) and date of next tracheostomy change (63.6%).

Carer education and training

The majority of respondents indicated that their institution required a minimum of two carers to be trained to care for a child with a tracheostomy tube (20/26; 76.9%) prior to discharge; a further 11.5% (3/26) required at least three carers. Half the respondents conducted the carer training exclusively in hospital (13/26; 50%).

Nearly all (25/26; 96.2%) respondents reported that there was a checklist of required observed skills for carers. Just over half of respondents (14/26; 53.8%) routinely surveyed the carers on their readiness for discharge.

Preparation for discharge

The majority of respondents (21/26; 80.8%) reported that their institution provided a tracheostomy “Go Bag” to standardize delivery of emergency supplies to children with tracheostomies. *Table 2* reports the equipment typically included in the “Go-Bag”.

More than half (15/26; 57.7%) of the respondents also reported that their institution provided a carer emergency card with information such as tracheostomy tube size. *Table 3* reports on the information provided on the carer emergency cards.

The majority (19/26; 73.1%) of paediatric otorhinolaryngologists recommended that patients have access to one replacement tube, as well as one a size smaller, at home; the remaining 26.9% (7/26) recommended access to more than two replacement tubes. None of the respondents recommended having just a single spare tracheostomy tube. Twenty-one (80.8%) of respondents reported significant supply chain issues in the last 6 months has affected the ability of patients and families to access tracheostomy tubes and other essential care supplies. *Table 4* summaries the access to consumables and equipment.

Table 3 Information on carer emergency cards

Carer emergency card	No. of respondents (%)
Information provided on carer emergency cards	15
Tracheostomy tube type	15 (100.0)
Tracheostomy tube size	15 (100.0)
Duration of tracheostomy	10 (66.7)
Reason for tracheostomy	12 (80.0)
Contact details for hospital team	14 (93.3)
Contact details for tracheostomy CNC	11 (73.3)
Emergency algorithm	11 (73.3)
No carer emergency card provided	11

CNC, clinical nurse consultant.

Table 4 Summary of access to consumables and equipment

Funding for consumables	No. of respondents (%)
State-based program	11 (42.3)
Hospital-based program	10 (38.5)
Self-funded	1 (3.8)
Unsure	4 (15.4)

Table 5 Summary of airway evaluation and long term care

Long-term care	No. of respondents (%)
Frequency of routine outpatient review	
Monthly	2 (7.7)
Every 2–3 months	9 (34.6)
Every 6 months	11 (42.3)
Annually	3 (11.5)
Variable	1 (3.8)
Frequency of routine laryngotracheobronchoscopy	
Every 6 months	4 (15.4)
Annually	7 (26.9)
Only if indicated	15 (57.7)

Airway evaluation and long-term care

Twenty of 26 (76.9%) of the paediatric otorhinolaryngologists recommended routine weekly changes of the tracheostomy

tubes; 5 (19.2%) recommended 4-weekly changes, while 1 (3.8%) recommended 6-weekly changes. The majority (16/26; 61.5%) advocated that patients can re-use the tracheostomy tube at 2–5 times before discarding it; 23.1% (6/26) recommended single use of the tubes only, while 3 of 26 (11.5%) advised that the tracheostomy tube can be re-used over 5 times. Manufacturers generally recommend the use of a tracheostomy tube for no more than 29 days, with some tracheostomy tubes being suitable for reprocessing up to 5 times within that period (4,5).

For children with stable, long-term tracheostomies, the recommended frequency of routine outpatient reviews and laryngotracheobronchoscopies is summarised in *Table 5*. The majority (20/26; 76.9%) of respondents had a standardised protocol for decannulation.

Discussion

This study describes the current trends in the management of paediatric tracheostomies amongst paediatric otorhinolaryngologists in Australia and New Zealand. Our data suggests that while otorhinolaryngologists were nearly always involved in the preparation, evaluation, and education of the patient and their families for a tracheostomy, there was substantial variation in the preoperative preparation of the family as well postoperative tracheostomy care practices and carer training.

Preoperative considerations

Appropriate preparation of the patients and families prior to the insertion of an elective tracheostomy is critical, as the ongoing care needs of a tracheostomised child results in a major change in family dynamics and places a high burden of responsibility on the family and/or any other associated caregivers (6,7). A recent study suggests that over 50% of parents reported regretting the decision to place a tracheostomy following surgery in their child, with parental perception of a lack of adequate information being a significant contributing factor (8).

In our study, respondents used paper-based handouts, videos, multimedia, as well as mannequins and models, to provide additional information during the consent process to make it as clear and transparent as possible. The routine use of multimedia adjuncts and visual aids during the consent process may help to improve parental knowledge and better prepare caregivers for a paediatric tracheostomy. Previous studies have shown improved

parental comprehension with the use of visual aids and multimedia adjuncts when obtaining informed consent for paediatric surgical procedures (9,10). A significant reduction in parental anxiety was also observed when multimedia adjuncts were used when compared with the conventional verbal and paper-based consent process (10-12). It is thought the provision of videos and multimedia adjuncts allows caregivers additional control to re-explore the information provided, as well as the ability to present the scenario in multiple ways to further the likelihood of understanding of this procedure to a lay audience. The use of visual aids and multimedia adjuncts should therefore be encouraged as it helps to better engage families and caregivers during the consent process.

In addition, fewer than half of all respondents in our study routinely offered to connect patients and their families with a tracheostomised patient and/or their carers prior to surgery. Although this is not a critical part of the consent process, the opportunity to meet a tracheostomised patient may allow parents to better understand the challenges of caring for a child with a tracheostomy and help set realistic expectations for patients and their caregivers.

Previous studies have suggested that parents are often inadequately counselled about the long-term negative consequences of having a tracheostomy, with the benefits of a tracheostomy emphasized more than risks (13,14). While seeing another family successfully manage a child with a tracheostomy may provide some parents with reassurances regarding their ability to acquire the skills and support necessary to care for a child with complex needs, witnessing the significant adjustments that are often required may dissuade other parents from proceeding with a tracheostomy. This decision not to proceed with a tracheostomy may be the more prudent decision for some families, considering the significant burden of care and well-recognised psychosocial impact associated with caring for child with a tracheostomy.

The opportunity to be introduced to another family who have faced a similarly difficult decision should therefore be offered to parents as it may help promote a more balanced discussion of risks and benefits, so that parents are better prepared for the ongoing management needs of their child and can make a fully informed decision about tracheostomy placement.

Although it is well reported in the literature that parents caring for children with a tracheostomy experience significant caregiver burden (6), it is interesting to note that

none of the respondents in our study routinely involved a psychologist when preparing families for a paediatric tracheostomy. This may be complicated by a lack of access and availability of suitably qualified mental health professionals, who are an essential member of an ideal team for a paediatric tracheostomy service. Parents caring for a child with a tracheostomy have reported an overall lower quality of life, and impaired family functioning, when compared to parents with non-tracheostomy dependent children (15). Furthermore, the quality of life has been reported to decrease over time with the complexity of caring for a child with a tracheostomy. The burden of overwhelming medical care, financial constraints, and the impact on caregiver psychosocial health have been cited as principal contributors to this decline (8). Our study also found that respondents do not routinely survey parents and carers on their readiness for discharge. This may leave families feeling unprepared for the transition to at-home care and feeling overwhelmed by the process. At present, there is no consistent, validated, tool for assessing parent/carer readiness for discharge after paediatric tracheostomy. It is therefore important to acknowledge the long-term psychosocial impact of caring for a tracheostomised child when preparing patients, and their families and caregiver communities, for a tracheostomy and to recognise the need to provide appropriate psychological and social support to patients and their families.

Postoperative care practices and carer education

A standardised approach to tracheostomy care has been advocated as a means to reduce the risk of adverse events and complications. Current recommendations from the American Academy of Otolaryngology-Head and Neck Surgery endorse formal education on tracheostomy care, the use of tracheostomy care protocols, and formal evaluation of carers in tracheostomy management prior to discharge (16).

Our study suggests that these recommendations have been widely adopted in Australia and New Zealand, with nearly all respondents reporting regular tracheostomy care education (92.3%), routine use of a standardised postoperative care protocol (100%) and a checklist of required observed skills for carers (96.2%).

This is consistent with the results from a national survey conducted in the United States where the majority (88.2%) of respondents reported the use of routine tracheostomy teaching protocols prior to discharge home from hospital (17).

Although the American Academy of Otolaryngology-Head and Neck Surgery Foundation (AAO-HNSF) consensus recommendations do not specify the number of required trained caregivers prior to discharge, the vast majority of respondents in our study required at least two carers be formally trained in tracheostomy care. This is similar to the practices reported in a Canadian study, whereby most respondents required at least two or more trained caregivers be present prior to discharging the patient home from hospital (18).

The majority of the respondents (84.6%) reported the routine use of a bedside safety card containing information such as tube brand, size, cuff status, and suction depth. This is in keeping with the recommendations published by the Paediatric Working Group of the National Tracheostomy Safety Project (19), and aligns with the consensus statement from the International Pediatric Otolaryngology Group (20). While it is encouraging that many institutions in Australia and New Zealand have implemented the routine use of a bedside safety card, the universal adoption of a bedside safety card may help to further reduce adverse events in the postoperative period.

The AAO-HNSF consensus statement also endorses the provision of a checklist of emergency supplies that should remain with the patient at all times (16). Kohn *et al.* (21) have expanded upon this concept by developing the use of “Go-Bags”; a standardised, compact bag containing all necessary supplies for a patient with a tracheostomy, in order to ensure all families have the necessary emergency equipment available at all times. They found that fewer tracheostomy related adverse events occurred in patients with a “Go-Bag” present when compared to those without; although the difference did not reach statistical significance, the authors suggested that the use of a standardised emergency “Go-Bag” was a simple intervention that may help educate caregivers and improve the quality of care for children with tracheostomies. The results of our study suggest that there has been widespread uptake on the use of “Go-Bags” in Australia and New Zealand, with the majority (80.8%) of respondents indicating that their institution utilised an emergency “Go-Bag”. This is highly encouraging, as caregiver preparedness, and ready access to emergency supplies, is critical for patient safety. Future initiatives may focus on standardising the contents of tracheostomy “Go-Bags” across institutions in Australia and New Zealand to ensure consistency across regions.

MDT approach

There is growing evidence in the literature that a MDT approach to tracheostomy care results in decreased morbidity and mortality, as well as reduces the average time to decannulation (16,22-25).

In our study, there was a wide range in the reported average duration of admission following tracheostomy (*Figure 2*), which may be related to the variation between the short- and long-term ventilated patients, as well as with associated co-morbidities.

A recent study by Abode *et al.*, found a significant reduction in the median length of stay following the implementation of an MDT program for children undergoing tracheostomy (26). Similarly, Chorney *et al.* (27) reported the outcomes following introduction of an MDT dedicated to the management of children with tracheostomies, and found a significant decrease in length of stay. Furthermore, the average time to initial caregiver education was reduced by an average of 12 days, which helped achieve caregiver competency; a known potential barrier to safe discharge home from hospital. McKeon *et al.* (28) also described their experience implementing a multidisciplinary tracheostomy program at a different tertiary paediatric referral hospital in the United States, and found a downward trend in tracheostomy-related adverse events, including accidental decannulation.

Despite such evidence supporting the benefits of a multi-disciplinary approach to tracheostomy care, less than half (46.2%) of the respondents in our survey routinely held a MDT meeting prior to placement of a tracheostomy in a child, and less than a quarter (23.1%) routinely conducted weekly reviews of paediatric inpatients with tracheostomies (*Figure 3*). This is in contrast to a Canadian study (18), where the majority of respondents (69.4%) held a multidisciplinary, inpatient, tracheostomy team discussion at their institution. Furthermore, less than two thirds of respondents (61.5%; 16/26) in our study had an outpatient multi-disciplinary outpatient tracheostomy service at their institution.

This may be related to a lack of resources available to deliver multi-disciplinary care on wards and in outpatient clinics, given that over one-third of respondents (8/22; 36.4%) reported barriers to securing funding to employ a tracheostomy clinical nurse coordinator. Future research to explore additional factors contributing to the relatively

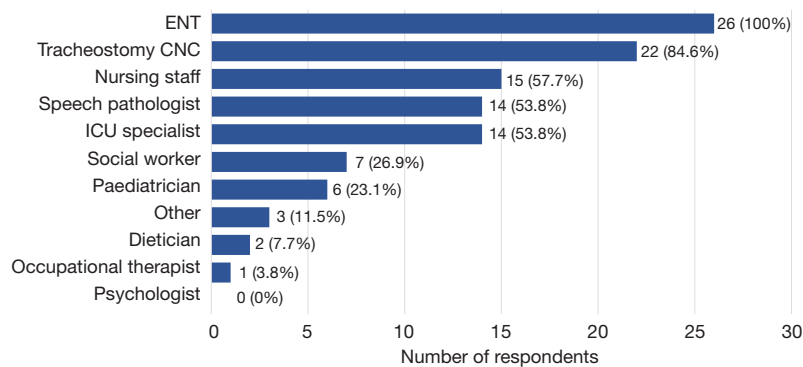


Figure 2 Health professionals involved in preparing the family for a tracheostomy. ENT, otolaryngology; CNC, clinical nurse consultant; ICU, intensive care unit.

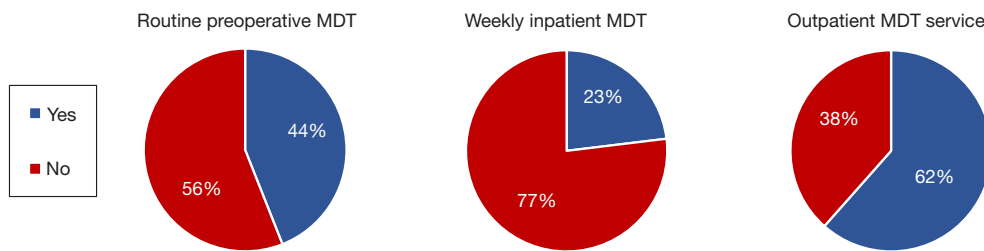


Figure 3 Comparison of preoperative, inpatient and outpatient MDT input into tracheostomy care. MDT, multidisciplinary team.

limited uptake of the MDT model of care in Australia and New Zealand may help identify other underlying issues that need to be addressed.

Airway evaluation and long-term care

The majority (76.9%) of paediatric otorhinolaryngologists surveyed in our study recommended weekly tracheostomy tube changes. However, there is a lack of consensus in the literature as to how often tracheostomy tubes should be changed, with previous studies reporting variable timeframes ranging from weekly (29) to every 3 weeks (30) to monthly (18). One of the main drivers behind the frequency of changes is thought to be the manufacturers’ recommendations. However there is no clear scientific evidence to support the respective recommended frequency of tube changes and there is clearly a wide variation in clinical practice.

Most respondents in our study performed laryngotracheobronchoscopies only when indicated by clinical concerns, rather than for routine surveillance.

Previous studies have suggested there was no difference in the clinical yield between early routine surveillance endoscopy compared to those who had a longer time between insertion of tracheostomy and subsequent endoscopic airway examination (31,32), suggesting that it is reasonable to perform routine laryngotracheobronchoscopies only when patients become symptomatic. However, one other study suggests that preoperative symptoms were not predictive for need for operative intervention, with up to 58% of asymptomatic children having suprastomal granulation tissue, airway stenosis, or inappropriate tracheostomy tube size on routine annual surveillance laryngobronchoscopy (33). As such, the AAO-HNSF and the International Pediatric Otolaryngology Group (IPOG) consensus statements do not make specific recommendations for routine laryngotracheobronchoscopies following insertion of tracheostomies (16,20). Further studies on the optimal timing between insertion of tracheostomy and surveillance laryngotracheobronchoscopies are thus required to help standardise long-term care of paediatric

tracheostomy patients.

Limitations

To our knowledge, this is the first Australian study reviewing the current practices surrounding paediatric tracheostomy care in Australia and New Zealand. However, there are limitations to our study. The retrospective nature of the study may introduce recall bias. Furthermore, the number of respondents, in absolute terms, was perhaps small. This is unsurprising given that the group of paediatric otorhinolaryngologists in Australia and New Zealand is rather small, and only a small subset of which will routinely manage complex paediatric airways. As such, the small numbers likely represents the majority of paediatric airway otorhinolaryngologists in Australia and New Zealand.

Our modest response rate (36.1%) is in keeping with previous online based surveys conducted through ASOHNS which ranged from 29–35% (34–36) and compares favourably to previous studies reviewing tracheostomy practice patterns where the response rate ranged from 22.3–35% (17,30,37). Although there is the potential for selection bias and limited generalisability of findings, our study nevertheless likely allows for a representative snapshot of current trends in paediatric tracheostomy care in Australia and New Zealand at such centres that care for advanced airway pathology, and may help identify areas of deficiencies that need to be addressed.

Conclusions

Overall, there is good concordance in the delivery of paediatric tracheostomy care in Australia and New Zealand. There is however, variation in practice during the consent process, utilisation of the MDT model of care and post insertion surveillance laryngotracheobronchoscopies. These variations represent possible targets to review and develop improved models-of-care to improve the delivery of care to paediatric patients with tracheostomies.

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Footnote

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Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at <https://www.theajo.com/article/view/10.21037/ajo-23-62/coif>). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). Ethics approval was obtained from the Hunter New England Local Health District Human Research Ethics Committee (approval 2023/ETH00874). Surgeons participated voluntarily in this survey without personal or financial incentive.

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References

1. Carr MM, Poje CP, Kingston L, et al. Complications in pediatric tracheostomies. *Laryngoscope* 2001;111:1925-8.
2. Mahadevan M, Barber C, Salkeld L, et al. Pediatric

- tracheotomy: 17 year review. *Int J Pediatr Otorhinolaryngol* 2007;71:1829-35.
3. Mahida JB, Asti L, Boss EF, et al. Tracheostomy Placement in Children Younger Than 2 Years: 30-Day Outcomes Using the National Surgical Quality Improvement Program Pediatric. *JAMA Otolaryngol Head Neck Surg* 2016;142:241-6.
 4. Hess DR, Altobelli NP. Tracheostomy tubes. *Respir Care* 2014;59:956-71; discussion 971-3.
 5. St-Laurent A, Zielinski D, Qazi A, et al. Chronic tracheostomy care of ventilator-dependent and -independent children: Clinical practice patterns of pediatric respirologists in a publicly funded (Canadian) healthcare system. *Pediatr Pulmonol* 2023;58:140-51.
 6. Hartnick C, Diercks G, De Guzman V, et al. A quality study of family-centered care coordination to improve care for children undergoing tracheostomy and the quality of life for their caregivers. *Int J Pediatr Otorhinolaryngol* 2017;99:107-10.
 7. Westwood EL, Hutchins JV, Thevasagayam R. Quality of life in paediatric tracheostomy patients and their caregivers - A cross-sectional study. *Int J Pediatr Otorhinolaryngol* 2019;127:109606.
 8. October TW, Jones AH, Greenlick Michals H, et al. Parental Conflict, Regret, and Short-term Impact on Quality of Life in Tracheostomy Decision-Making. *Pediatr Crit Care Med* 2020;21:136-42.
 9. Rosenfeld EH, Lopez ME, Yu YR, et al. Use of standardized visual aids improves informed consent for appendectomy in children: A randomized control trial. *Am J Surg* 2018;216:730-5.
 10. Shreyas K, Jadhav A, Goel AD, et al. Effect of Multimedia Teaching Tools in Parental Anxiety and Comprehension of Informed Consent Procedure in Pediatric Surgical Procedures: A Single Centre Randomized Control Trial. *J Pediatr Surg* 2023;58:2000-5.
 11. McEwen A, Moorthy C, Quantock C, et al. The effect of videotaped preoperative information on parental anxiety during anesthesia induction for elective pediatric procedures. *Paediatr Anaesth* 2007;17:534-9.
 12. Paton EA, Davis SK, Gaylord N, et al. Impact of a multimedia teaching tool on parental anxiety and knowledge during the informed consent process. *Pediatr Surg Int* 2018;34:1345-52.
 13. Hebert LM, Watson AC, Madrigal V, et al. Discussing Benefits and Risks of Tracheostomy: What Physicians Actually Say. *Pediatr Crit Care Med* 2017;18:e592-7.
 14. Nageswaran S, Golden SL, Gower WA, et al. Caregiver Perceptions about their Decision to Pursue Tracheostomy for Children with Medical Complexity. *J Pediatr* 2018;203:354-360.e1.
 15. Acorda DE, Jackson A, Lam AK, et al. Overwhelmed to ownership: The lived experience of parents learning to become caregivers of children with tracheostomies. *Int J Pediatr Otorhinolaryngol* 2022;163:111364.
 16. Mitchell RB, Hussey HM, Setzen G, et al. Clinical consensus statement: tracheostomy care. *Otolaryngol Head Neck Surg* 2013;148:6-20.
 17. Sioshansi PC, Balakrishnan K, Messner A, et al. Pediatric tracheostomy practice patterns. *Int J Pediatr Otorhinolaryngol* 2020;133:109982.
 18. Rai SK, Holler T, Propst EJ, et al. Tracheostomy care: Clinical practice patterns of pediatric otolaryngologists-head and neck surgeons in a publicly funded (Canadian) health care system. *Int J Pediatr Otorhinolaryngol* 2018;115:177-80.
 19. Doherty C, Neal R, English C, et al. Multidisciplinary guidelines for the management of paediatric tracheostomy emergencies. *Anaesthesia* 2018;73:1400-17.
 20. Strychowsky JE, Albert D, Chan K, et al. International Pediatric Otolaryngology Group (IPOG) consensus recommendations: Routine peri-operative pediatric tracheostomy care. *Int J Pediatr Otorhinolaryngol* 2016;86:250-5.
 21. Kohn J, McKeon M, Munhall D, et al. Standardization of pediatric tracheostomy care with "Go-bags". *Int J Pediatr Otorhinolaryngol* 2019;121:154-6.
 22. Arora A, Hettige R, Ifeacho S, et al. Driving standards in tracheostomy care: a preliminary communication of the St Mary's ENT-led multi disciplinary team approach. *Clin Otolaryngol* 2008;33:596-9.
 23. Cetto R, Arora A, Hettige R, et al. Improving tracheostomy care: a prospective study of the multidisciplinary approach. *Clin Otolaryngol* 2011;36:482-8.
 24. Garrubba M, Turner T, Grieveson C. Multidisciplinary care for tracheostomy patients: a systematic review. *Crit Care* 2009;13:R177.
 25. Hettige R, Arora A, Ifeacho S, et al. Improving tracheostomy management through design, implementation and prospective audit of a care bundle: how we do it. *Clin Otolaryngol* 2008;33:488-91.
 26. Abode KA, Drake AF, Zdanski CJ, et al. A Multidisciplinary Children's Airway Center: Impact on the Care of Patients With Tracheostomy. *Pediatrics* 2016;137:e20150455.
 27. Chorney SR, Brown AF, Brooks RL, et al. Pediatric Tracheostomy Outcomes After Development of a

- Multidisciplinary Airway Team: A Quality Improvement Initiative. *OTO Open* 2021;5:2473974X211045615.
28. McKeon M, Kohn J, Munhall D, et al. Association of a Multidisciplinary Care Approach With the Quality of Care After Pediatric Tracheostomy. *JAMA Otolaryngol Head Neck Surg* 2019;145:1035-42.
 29. Sherman JM, Davis S, Albamonte-Petrick S, et al. Care of the child with a chronic tracheostomy. This official statement of the American Thoracic Society was adopted by the ATS Board of Directors, July 1999. *Am J Respir Crit Care Med* 2000;161:297-308.
 30. Gluth MB, Maska S, Nelson J, et al. Postoperative management of pediatric tracheostomy: results of a nationwide survey. *Otolaryngol Head Neck Surg* 2000;122:701-5.
 31. Gergin O, Adil E, Kawai K, et al. Routine airway surveillance in pediatric tracheostomy patients. *Int J Pediatr Otorhinolaryngol* 2017;97:1-4.
 32. Smith MM, de Alarcon A, Meinzen-Derr J, et al. Timing of Initial Posttracheostomy Surveillance Endoscopy in Pediatric Patients. *Otolaryngol Head Neck Surg* 2020;162:362-6.
 33. Richter A, Chen DW, Ongkasuwan J. Surveillance direct laryngoscopy and bronchoscopy in children with tracheostomies. *Laryngoscope* 2015;125:2393-7.
 34. Anning R, Cope D, Treble A, et al. Tonsillectomy: does proximity from otolaryngology care influence the intra-operative or post-operative plan? *Aust J Otolaryngol* 2021;4:25.
 35. Lee TJ, Wood J, Ooi EH. Variation in management of post-tonsillectomy haemorrhage: a survey of Australian Society of Otolaryngology Head and Neck Surgery Consultants and Registrars. *Aust J Otolaryngol* 2022;5:21.
 36. You WS, Cooper L, Cronin M. Water precautions advice post grommet insertion: a cross-sectional study of current Australian trend. *Aust J Otolaryngol* 2022;5:22.
 37. Senders CW, Muntz HR, Schweiss D. Physician survey on the care of children with tracheotomy. *Am J Otolaryngol* 1991;12:48-50.

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Appendix 1 Australia & New Zealand Paediatric Tracheostomy Management Questionnaire

Participant Information

1. How many years have you been in practice?

- <5
- 1–10 years
- >10 years

2. Have you completed post fellowship paediatric training?

- Yes
- No

3a. How many paediatric tracheostomies do you perform per year?

- 1–5
- 6–10
- >10

3b. How many tracheostomies does your institution perform per year?

- 1–5
- 6–10
- >10

Consent

4. Do you routinely have an MDT meeting prior to placement of a paediatric tracheostomy?

- Only if indicated
- Yes in all cases

5a. What surgical risks do you discuss when completing consent?

- Death
- Tube dislodgement
- Bleeding—major/minor
- Granulation tissue formation
- Persisting tracheocutaneous fistula
- Impact on the family unit
- Other (please specify)

5b. Who is involved in educating/preparing the family for a tracheostomy?

- ENT
- ICU
- Social worker
- Psychologist
- Speech pathologist
- Dietician

- Tracheostomy CNC
- Nursing staff
- Paediatrician
- Occupational therapist
- Other (please specify)

5c. How is the consent information delivered?

- Verbal delivery
- Paper-based handout
- Video media
- Other (please specify)

5d. How often do you connect patients/families with a tracheostomised patient/family prior to the surgery?

- Never
- Sometimes but not routine offered
- Routinely offered

6. Who do you routinely involve in getting the consent?

- Consultant
- Accredited registrar
- Unaccredited registrar
- Resident
- Tracheostomy CNC
- ICU staff
- Other (please specify)

7. Do you have a standardised postoperative care protocol? (e.g., change ties day 3, first tracheostomy change at day 5)

- Yes
- No

8. Do you or does your hospital perform bedside percutaneous tracheostomies in paediatric patients <10 years of age?

- Yes
- No

9. Do you utilise a bedside safety card in the post-operative period?

- Yes
- No

9b. What information is included in your bedside safety card?

- Tube brand
- Tube size
- Cuff status
- Suction depth
- Laryngoscopy view
- Date of last tracheostomy change
- Date of next tracheostomy change
- Other (please specify)

Inpatient MDT

10. Do you conduct a weekly MDT of inpatient tracheostomy patients?

- Yes
- No

10b. Who participates in the MDT team?

- ENT surgeon
- ICU physician
- Paediatrician
- Respiratory technician
- Speech pathologist
- Dietician
- Occupational therapist
- Physiotherapist
- Social worker
- Nurse
- Other (please specify)

Staff education

11. Does your institution provide regular staff training for tracheostomy care (e.g., annually)?

- Yes
- No

Carer training

12. What is the usual duration of in-hospital carer training (relating to the tracheostomy care) for the patient/child prior to first discharge back out into the community?

(i.e., the average duration of admission following tracheostomy placement)

- <4 weeks
- 5–6 weeks
- 7–8 weeks
- >8 weeks

13. Who performs tracheostomy carer training

- ENT team
- Tracheostomy CNC medical team (ICU/Respiratory/Paediatrician)
- Nursing staff
- Other (please specify)

14. In what setting do you complete carer training?

Exclusively in hospital

- Mixed hospital and hospital based local accommodation (e.g., Ronald McDonald House)
- A combination of in-hospital and in-the-home education

15. What is the minimum number of carers you train?

- 1
- 2
- 3 or more

16. Do you have a checklist of required observed skills?

- Yes
- No

17. Do you routinely survey (questionnaire or feedback tool) patient/carer readiness for discharge?

- Yes
- No

Tracheostomy Go-Bag

18. Does your institution provide a tracheostomy “Go Bag”?

- Yes
- No

19. What is provided in the “Go-Bag” as standard? (If you answered “no” to Q18, please select from the following list, the equipment you would typically send home as standard)

- Tracheostomy tube (same size)
- Tracheostomy tube (smaller size)
- Suction catheter
- Tracheostomy dressing
- Tracheostomy ties
- Suction unit
- Syringe for cuff deflation
- Resuscitation bag and mask
- Normal saline
- Bulb syringe
- Scissors
- Heat-moisture exchange (HME) device
- List of emergency contacts
- Saturation monitor
- Other (please specify)

Emergency protocol card

20. Does your institution provide a carer emergency card?

- Yes
- No

20b. If yes to Q20, what information is provided on the emergency card?

- No emergency card provided
- Tracheostomy tube type
- Tracheostomy tube size
- Duration of tracheostomy
- Reason for tracheostomy

- ◊ Contact details for hospital team
- ◊ Contact details for tracheostomy CNC Emergency algorithm (e.g., call for help, remove speaking valve/cap, remove inner cannula, change tracheostomy tube)
- ◊ Other (please specify)

Consumables

21. How do your patients access consumables

- ◊ Online order
- ◊ Via tracheostomy CNC via outpatient clinic
- ◊ Self-purchased
- ◊ Unsure
- ◊ Other (please specify)

22. Who covers the cost of consumables?

- o State based funding (e.g., ENABLE, MASS) Hospital funding program
- o Self-funded
- o Unsure
- o Other (please specify)

Outpatient tracheostomy tube practices

23. How frequently do you recommend patients change their tracheostomy tube?

- o Weekly
- o 4 weekly
- o 6 weekly
- o >6 weekly

24. How many tracheostomy tubes do you recommend patients have access to?

- o One replacement and one size smaller
- o More than this
- o Less than this

25. How many times do you advocate that patients can re-use a tracheostomy tube before discarding it? (Assuming this is a paediatric tracheostomy and doesn't have an inner cannula)

- ◊ Once
- ◊ 2–5 times
- ◊ >5 times
- ◊ Other (please specify)

26. Does this differ for cuffed tubes?

- o Yes
- o No

27. Have you/your patient's experienced significant supply chain issues in the last 6 months affecting their access to tracheostomy tubes?

- o Yes
- o No

Outpatient review practices

28. How often do you recommend outpatient review for stable long-term tracheostomy patients assuming the cuff is still working?

- ◊ Fortnightly
- ◊ Monthly
- ◊ Every 2–3 months
- ◊ Every 6 months
- ◊ Annually
- ◊ Other (please specify)

29. Who routinely participates in the outpatient clinic services?

- ◊ ENT surgeon
- ◊ ICU physician
- ◊ Respiratory physician
- ◊ Paediatrician
- ◊ Tracheostomy CNC ENT clinic nurse
- ◊ Speech therapist
- ◊ Dietician
- ◊ Occupational therapist
- ◊ Social worker
- ◊ Psychologist
- ◊ Other (please specify)

30. Does your institution offer a multi-disciplinary outpatient service?

- o Yes
- o No

Elective laryngobronchoscopy surveillance

31. How often do you perform laryngobronchoscopy surveillance on the stable long-term tracheostomy patient?

- ◊ 6 monthly
- ◊ 12 monthly
- ◊ Only if indicated
- ◊ Other (please specify)

Tracheostomy CNC

32. Does your institution employ a tracheostomy CNC?

- o Yes
- o No

32b. Who funds their position?

- ◊ ENT Department
- ◊ Department of Surgery
- ◊ Respiratory Department
- ◊ Neurology Department
- ◊ Children's Hospital funded employee
- ◊ Joint funding between departments
- ◊ Unsure
- ◊ Other (Please specify)

32c. Did you experience barriers securing funding for this position?

- Yes
- No

32d. What barriers were experienced?

- ◊ No barriers experienced
- ◊ Securing funding
- ◊ Obtaining adequate FTE
- ◊ Determining roles and responsibilities
- ◊ Other (please specify)

Community support

33. Do you have a community tracheostomy support group associated with your institution?

- Yes
- No

33b. How do these members communicate?

- ◊ Regular meetings
- ◊ Social media
- ◊ Whatsapp
- ◊ Other (Please specify)

Decannulation protocols

34. Do you have a standardised protocol for decannulation?

- Yes
- No

Adverse event reporting

35. Do you have a reporting database for adverse events (that is in addition or separate from your departmental morbidity & mortality meetings)?

- Yes
- No

36. What outcomes are reported?

- ◊ No reporting database
- ◊ Length of hospital stay
- ◊ Length of ICU stay
- ◊ Ventilated hours
- ◊ Time to decannulation
- ◊ Accidental decannulation
- ◊ Tube obstruction
- ◊ Hypoxia/respiratory arrest
- ◊ Bleeding
- ◊ Tracheostomy associated ED presentations
- ◊ Trial of speaking valve
- ◊ Trial of capping
- ◊ Swallow function
- ◊ Other (please specify)

37. Is your institution partnered with the Global Tracheostomy Collaborative?

- Yes
- No

38. Would you or someone from your institution be interested in being involved in tracheostomy quality-improvement projects for Australia/New Zealand?

If yes, please enter best contact details (otherwise please skip the question)

Thank for taking the time to complete the questionnaire