System-Based Multidisciplinary Initiatives for Improvement in Tracheostomy Care and Safety:

Experience of an Academic Health Institution Hospital Network

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Introduction

Tracheostomized patients represent a unique patient population at risk of life-threatening airway compromise. There can be a presumption that these patients have a "safe" or low-risk airway. Clinicians and other care providers may be unfamiliar with both tracheostomy tubes and best practices for tracheostomy maintenance, assessment, and emergency triage or resuscitation.[1] A review of the highest-acuity emergency airway calls at our university hospital revealed that well over 20% of the emergencies that triggered these activations were in patients with existing tracheostomy tubes.[2,3] Further analysis of the tracheostomy-related airway emergencies at that time was very informative.

Under the auspices of our multidisciplinary airway safety committee, we developed a core tracheostomy-focused team and implemented numerous quality and safety initiatives. Here we present a focused review and discussion of tracheostomy-related clinical issues at the University of Pennsylvania Health System (UPHS) and a summary of quality and safety improvement efforts related to the care of tracheostomized patients based on responses to locally identified safety opportunities.

Our experience with tracheostomy-related quality improvement (QI) efforts led us to reach out to the Patient Safety Authority. The Pennsylvania Patient Safety Reporting System (PA-PSRS) data presented by Gardner et al. highlights the categories of airway-related events documented across a range of facilities in the Commonwealth of Pennsylvania.[4] We frame our efforts in the context of both the PA-PSRS data and international perspectives from the U.K. and highlight barriers to implementation and learnings from our iterative and interdisciplinary approach to tracheostomy-related challenges.

Clinical Setting and Scope of the Problem

UPHS consists of seven acute care hospitals. The majority of work presented here is focused on data and programs involving three acute care hospitals in the urban core of Philadelphia: the Hospital of the University of Pennsylvania (HUP, quaternary, 791-bed urban academic medical center), Penn Presbyterian Medical Center (PPMC, 375-bed urban academic Level I trauma center), and Pennsylvania Hospital (PAH, 496-bed urban community hospital). At the outset of our work, HUP was a Level I trauma center that has since moved to PPMC. Our programs and data only address tracheostimized or post-laryngectomy inpatients.

Approximately 400 tracheostomy procedures are performed annually at HUP and approximately 150 at PPMC. Our facilities also serve patients of varying ages who present to us with existing tracheostomy tubes inserted at other locations. Inpatients with tracheostomy represent approximately 5%–6% of the HUP and PPMC daily patient census.

Multidisciplinary Airway Safety Committee

The work described was carried out under the auspices of the HUP Multidisciplinary Airway Safety Committee over approximately the past five years. The scope and mission of the committee has evolved during this time frame. Tracheostomy work has taken on increasing significance and we needed to create workgroups to focus specifically on tracheostomy-related quality improvement projects. The committee, co-chaired by authors JHA and CHR, includes representation from all services that are likely to be involved in airway management, care, or rescue. This includes critical representation from respiratory therapy, nursing, and clinical emergency responders. We believe that breadth of perspective is critical to both identifying safety issues and developing effective responses. We have also found that diverse representation results in numerous "key contacts" across the health system for tracheostomy-related issues. This increased the likelihood that pertinent clinical issues will reach the committee.

Clinical Need

The PA-PSRS data presented by Gardner et al. frames tracheostomy-related safety issues from 84 facilities in the Commonwealth of Pennsylvania.[4] Data at the local practice level is complementary to aggregated state or national data, and is essential to identify safety issues, drive practice change, and track improvement. As we describe our experience with tracheostomy-related airway emergencies, it largely mirrors the picture painted by the PA-PSRS data. This reinforces the relevance of these issues to the broader care community and the importance of enhancing clinician awareness, training, and workflows around tracheostomy care.

Our work in tracheostomy safety was largely triggered by an audit by the Airway Safety Committee regarding high-acuity airway emergency activations (i.e., airway rapid response) at HUP from 2011 to 2014.[2] The data highlighted that nearly a third of the events involved a patient with a tracheostomy, and by 2020 it was 45%. We attribute the increase to our quality and safety improvement projects described herein that increased awareness among staff. A deeper analysis demonstrated the proximate causes of the emergencies to include similar themes to those in the PA-PSRS database: dislodgement/unplanned decannulation (n=16), mucus plug, bleeding, and ventilator problems.[3] While mucus plugging was somewhat more frequent in our hospital data compared with bleeding reported in the three-year data from the statewide population-based study, this difference may be attributable to the reporting mechanisms.

In addition, we found numerous surgical divisions performing tracheostomies at our institution that increased variation in technique, post-tracheostomy management, and documentation style. Occurrence of either mucus plugging or bleeding triggers an airway rapid response (ARR) in our institution and are important targets for safety initiatives. Decannulation—both intentional and "accidental"—remains a critical focus because it is relevant by itself as well as in connection with the other ARR triggers. Several targets of our safety initiatives and interventions also mirror the three most frequent identified actions in the PA-PSRS article: recannulation, code call, and suction. We noted one death during resuscitation that may have been related to mask ventilation through a dislodged tracheostomy tube with resultant severe subcutaneous emphysema. This event subsequently focused our attention on the need for a standardized algorithm for first responders to assess tracheostomy patency prior to ventilation. Similar to the PA-PSRS data, the two most frequent locations for safety reports are the intensive care units and the medical and surgical hospital floors. The majority of our efforts have targeted those areas.

Airway Rapid Response

Two of our facilities, HUP and PPMC, have a 24/7 ARR system that brings a team consisting of a clinician with the skillset to perform a bedside surgical airway or assess an in situ airway, anesthesiology, and other support teams such as a nursing coordinator, respiratory therapist, pharmacist, and intensivist directly to the bedside. The components of the team may vary by setting and available resources. These systems have been described in depth elsewhere.[2] Per policy, airway compromise in a tracheostomized patient triggers direct activation of this specialized team. This team has become a first-line intervention to reduce morbidity in tracheostomy emergencies. Whereas the system was initially designed to rescue the "can't intubate, can't ventilate" (failed intubation) scenario, our experience and that at The Johns Hopkins Hospital suggests that surgeon skillset to rapidly assess a tracheostomy or laryngectomy is equally important and relevant.[5] Implementation of an ARR requires substantial resource allocation, including making available advanced airway equipment such as a flexible fiberoptic scope and tracheostomy tray. The need for in-house 24/7 surgical airway experience can be a barrier for many centers. Providing advanced training to anesthesia or respiratory teams in tracheostomy assessment and interventions is one approach that may be viable for lower acuity centers.

The UK National Tracheostomy Safety Project

Our first tracheostomy projects involved local implementation of parts of the UK National Tracheostomy Safety Project.[6] The U.K. project was born out of findings similar to ours of trach-related airway problems across the U.K.[7,8] The project included development of multidisciplinary guidelines for the management of tracheostomy and laryngectomy airway emergencies.[9] A key component is use of a bedside tracheostomy information card (8.5"x11"). The card front includes the date of the tracheostomy, the type and size of the trach tube, and details regarding retaining sutures and airway difficulty. A standardized tracheostomy emergency algorithm is printed on the back of the card. The standardization is important to prevent issues, such as ventilation through a displaced tracheostomy, that might occur when less-experienced clinicians manage a tracheostomy emergency. The card is posted by the bedside and travels with the patient to procedures.

Initially we used a tracheostomy card with only minor modifications from the U.K. version. We quickly learned from clinician feedback that the terms used in the U.K. were confusing to clinicians in our local environment. Teams also felt that the emergency algorithm steps were not clear with respect to specific roles. To address this issue, we assembled a group of experts from our Airway Safety Committee and additional frontline clinicians with tracheostomy expertise to develop a new version of the cards (**Figures 1a** and **1b**).

After HUP implemented the optimized tracheostomy card, PPMC and PAH followed suit with minor local card modifications. We found a stepwise, hospital-based approach to be more manageable and amenable to rapid-cycle optimization than a systemwide deployment. We adopted this model for other interventions as well. Key lessons learned are summarized in **Table 1**.

Color-coded cards are used at our institution to differentiate between established, open (new), percutaneous (new), and post-laryngectomy tracheostomies. For advanced responders there are nuanced variations in the assessment and resuscitation of these different airways.

Figure 1. Tracheostomy Information Card (a. Front) and Emergency Algorithm (b. Back).

Figure 1a

Figure 1b
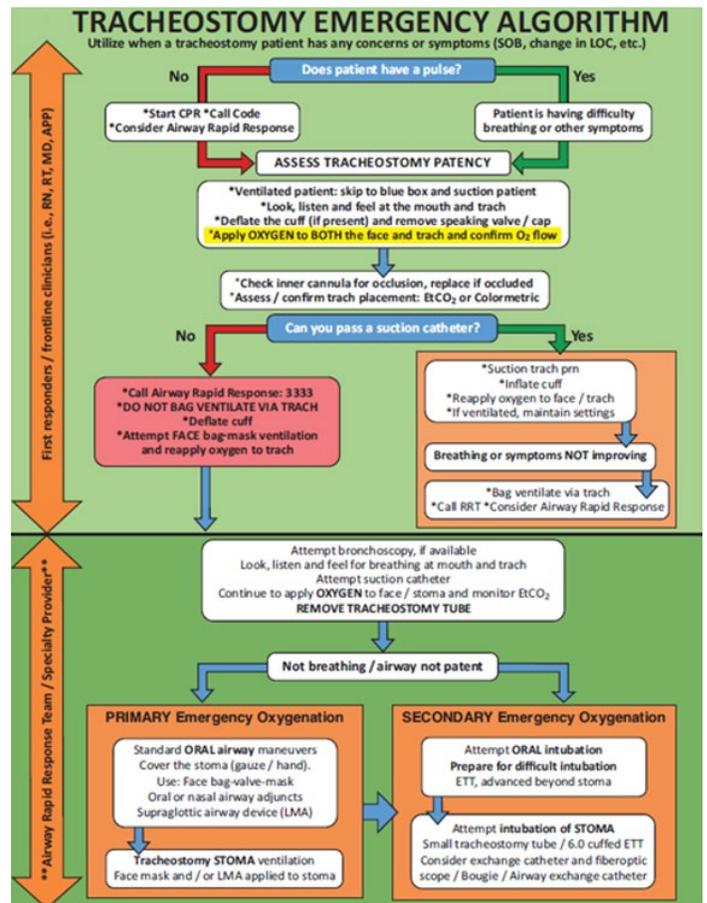
Multidisciplinary Grand Rounds and In Situ Simulations Focused on Tracheostomy Safety

We developed a novel approach to grand rounds by offering annual interprofessional, multidisciplinary, airway safety grand rounds available to staff at HUP, PPMC, and PAH (**Table 2**). The sessions used cases from our database to illustrate key opportunities to

Table 1. Key Lessons Learned in Tracheostomy Card Implementation

- Frontline teams must be fully educated in card purpose and process
- Use terminology that is clear, concise, and understood by teams in your facility
- Algorithm is improved by dividing responsibilities amongst first responders and ARR team
- A designated team member should incorporate card into emergency resuscitations
- Care teams came to rely on the card information and filed safety reports when it was missing
- Tracheostomy rounds were effective for staff education, Q&A, and audits
- Data from safety reports and trach census data provided motivation to implement
- Entities with low volume of tracheostomized patients chose not to adopt the card
- Integration with electronic health record would be optimal

Table 2. Multidisciplinary Airway Grand Rounds With Tracheostomy Topics

- **2016:** "Tracheostomies: The Unfamiliar & the Unexpected"
- **2017:** "We Need a Surgical Airway Now: Who, What and How?"
- **2018:** "Interdisciplinary Communication: Root Cause of Difficulty and Requirement for Success"
- **2019:** "The Multidisciplinary Critical Care Airway—Escalation and Coordination: A Case-Based Format"
- **2020:** "The Trach Tube Change: A Multidisciplinary Discussion About Assessment, Resources, Equipment, and Best Practices"

safety improvement, highlight new programs such as the trach card, and elicit frontline clinician input on new programs. Airway Safety Grand Rounds were complemented by in situ team-based simulation sessions focused on patients with tracheostomy. Similar to the experience of others, these allowed us to evaluate processes in the clinical unit and assess potential gaps in workflow or training that might need to be addressed.[1]

We also conducted simulation activities, including teaching learners how to perform a surgical airway using what we believe is the preferred technique, and appropriately activating the ARR.[11] Simulation is a specialized, resource-intensive endeavor that is likely to be limited in availability, but is potentially highly effective in identifying latent safety threats and building team skills for emergency management.[10,12] We endeavor to perform at least one in situ ARR simulation annually with our emergency teams that involves full activation of the emergency response. We also review the ARR process in other related simulation activities that involve airway management or clinical emergencies. Simulation remains a key component of QI activities in response to an incident or occurrence.

Tracheostomy Collaborative

The HUP Tracheostomy Collaborative is led by the Airway Safety Committee and focuses on tracheostomy-related education, policies, equipment, and safety within and across entities. The Collaborative is composed of nursing, anesthesiology, otolaryngology, general surgery, respiratory therapy, speech pathology, case management, and outpatient providers who meet regularly to discuss recent events and plan for future states in tracheostomy care. The Collaborative functions to integrate communication, quality, and safety programs related to tracheostomy across all clinical domains. For example, the Collaborative led the implementation and iterative optimization of the trach card program at HUP and across entities. The unit-based education process received excellent feedback from bedside clinicians and was used as the basis for implementation of multidisciplinary tracheostomy rounds. The Collaborative also serves as the integrating group for tracheostomy policy alignment across entities, and for tracheostomy-related new equipment evaluation, training and product rollouts.

Tracheostomy Rounds

The HUP Tracheostomy Collaborative implemented and manages the tracheostomy rounding program. Rounds serve to educate the patient, family, and/or primary team on new initiatives and trach care, monitor for safety concerns, and audit implementation of existing programs. The tracheostomy rounding team consists of nursing, respiratory, speech, and the primary team (i.e., nurse, therapist, advanced practice provider, and frequently anesthesiology house staff).

At HUP, the rounds are led by a tracheostomy coordinator in the respiratory therapy department. The tracheostomy coordinator is a funded 0.5 full-time equivalent position focused on tracheostomy education, quality, and safety. The team rounds two to three times a week. The team educate unit staff on the tracheostomy policies, the tracheostomy card emergency algorithm, and activation of the ARR for airway emergencies in tracheostomized patients. The team also audits tracheostomy card use and emergency equipment availability.

Rounds demonstrated that one year after implementation, trach cards were present in 93.4% of patients rounded on and increased to 98.3% in 2020. Rounds also identified latent safety issues. One issue identified policies for tracheostomy management that were not aligned with current best practice (e.g., specific guidance on type and size of bedside emergency backup tracheostomy tube). This concern was also noted in the PA-PSRS event data and policies were subsequently revised. Tracheostomy rounds enhanced patient and family-centered care while also helping the primary providers. We received feedback that rounding lessened provider anxiety of the unknown when it comes to the patient with a tracheostomy. This allowed patients with a tracheostomy to remain on the service line care teams associated with the primary medical condition, rather than being moved to a specialized tracheostomy unit.

Tracheostomy Safety Nets

Safety reporting affords staff the opportunity to take an active role in reporting safety issues, including near misses, that could result in patient harm. Penn Medicine has an electronic system-wide reporting system into which staff are encouraged to enter any items of concern regarding tracheostomy patients that arise during tracheostomy education session and rounds. A major limitation of safety nets is that reporting is voluntary and reports do not capture all aspects of a safety issue, but they can be useful to guide improvement interventions. A weekly tracheostomy event report was generated and distributed to a subset of the airway safety committee so that urgent issues could be addressed efficiently. IRB approval was granted with exemption for QI initiative to review the data from this system.

From July 1, 2018, through July 1, 2021, 607 reports were submitted, of which 201 were related to skin integrity issues. The primary indications for the reports to be filed are shown in **Figure 2** and described in **Table 3**. **Figure 3** shows the frequency of associated factors with each indication category. We see overlap in the types of issues highlighted by Gardner et al. based on the PA-PSRS reports.[4] One category of issue reported through

Table 3. Primary Indication of Safety Net

Primary Indication of Safety Net	# Safety Nets	% of Total
Skin integrity	201	33%
Communication issue	100	16%
Equipment missing or not available	87	14%
Trach dislodgement	67	11%
Desaturation	66	11%
Trach change	48	8%
Trach bleeding	17	3%
Missing trach card	13	2%
Trach occlusion	8	1%
Total Safety Nets	**607**	**100%**

Figure 2. Primary Indication of Tracheostomy Safety Nets July 2018–July 2021

Trach dislodgement 67 (11%)
Desaturation 66 (11%)
Trach change 48 (8%)
Equipment missing or not available 87 (14%)
Trach bleeding, 17 (3%)
Missing trach card, 13 (2%)
Trach occlusion, 8 (1%)
Communication issue 100 (17%)
Skin integrity 201 (33%)
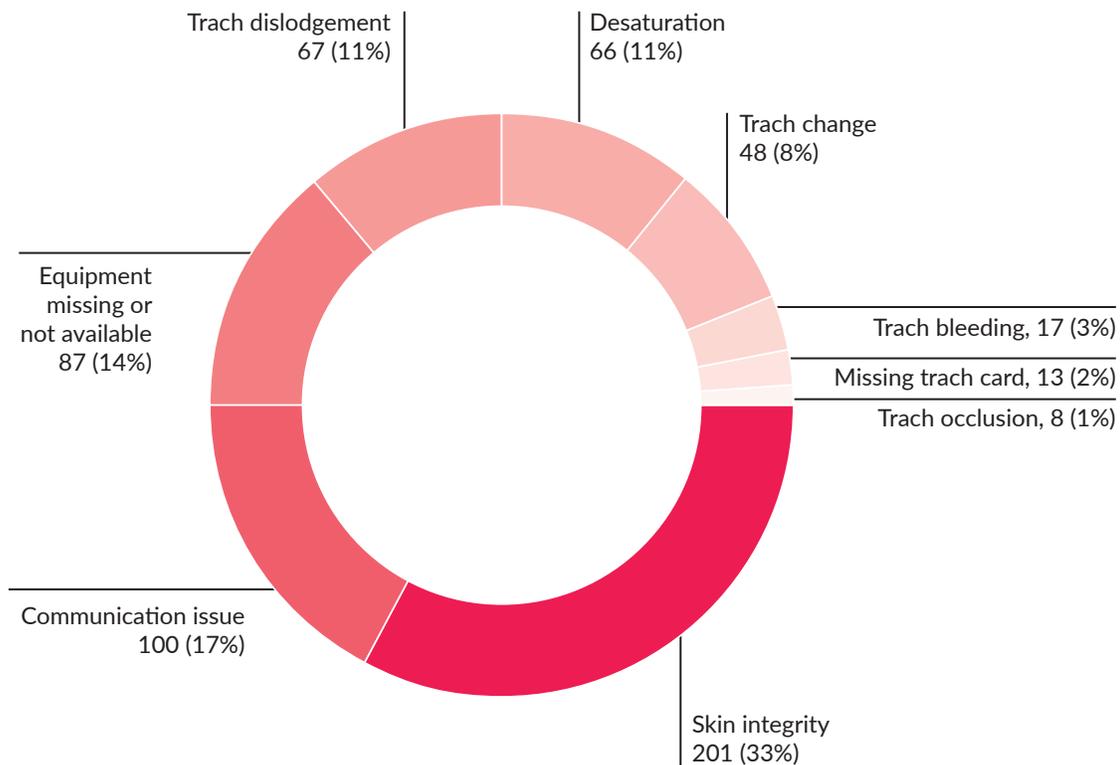
Figure 3. Primary Causes of Safety Nets With Associate Secondary Factors

Total Number of Secondary Factors

Legend:
- Skin integrity
- Trach occlusion
- Trach dislodgement
- Trach bleeding
- Missing trach card
- Desaturation
- Communication issue
- Equipment missing/not available
- Trach change

X-axis categories: Communication issue | Trach change | Missing equipment/equipment not available | Trach occlusion | Trach bleeding | Skin integrity | Missing trach card
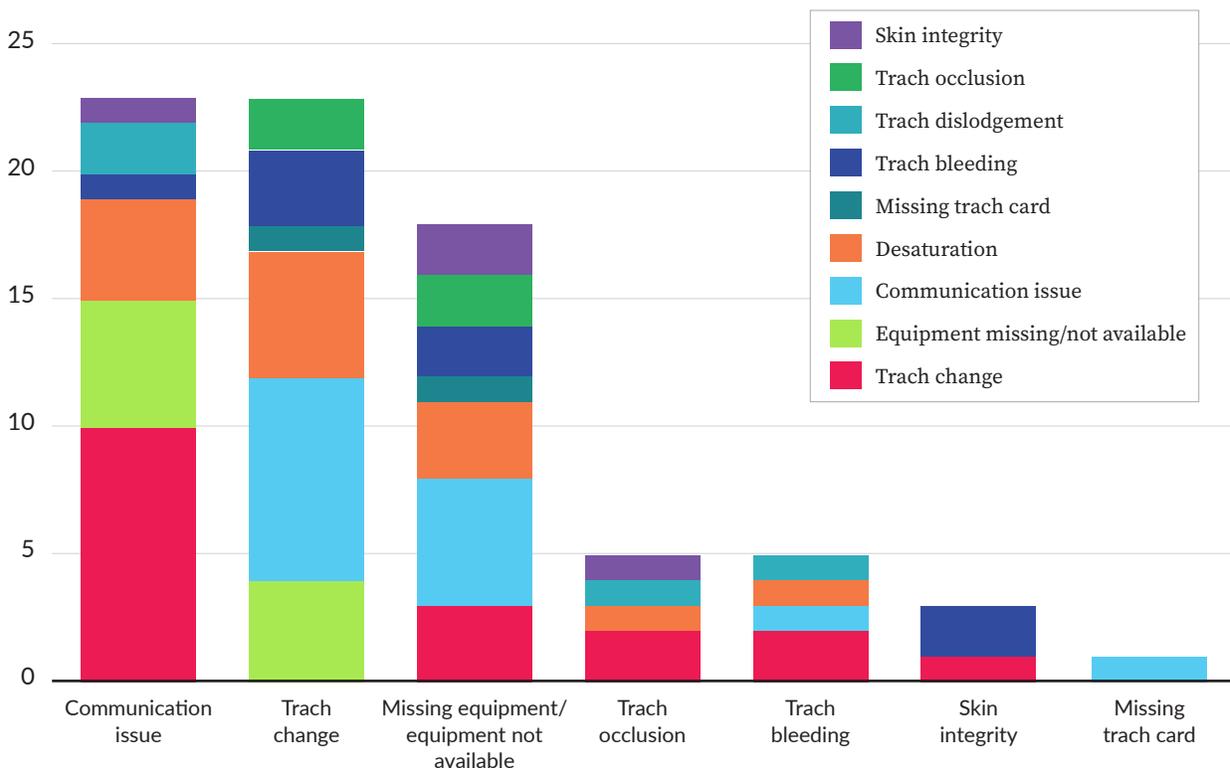
Primary Causes of Safety Nets

our system, but not identified in the PA-PSRS data, related to events during or after inpatient tracheostomy change. Reports revealed that communication issues, desaturation, and missing equipment were a component of some trach change reports. Communication issues included not only inadequate clinician-to-clinician communication at the time of the trach change, but also missing, incomplete, or difficult-to-locate documentation of the details of the trach change procedure. These type of documentation challenges related to overall tracheostomy care were also noted in the PA-PSRS data.

We conducted a Safe Table with the ECRI Institute. ECRI is the Penn Medicine patient safety organization (PSO). The Safe Table focused on tracheostomy, with an added emphasis on how to optimize tracheostomy change through a tracheostomy change protocol. We believe the peer-protected Safe Table is a viable structure to bring together key stakeholders across entities, departments, and disciplines to analyze a broader set of aggregate events on a single topic to fill in knowledge gaps, highlight patterns, and develop actionable QI plans. The information obtained from our review with the PSO was consistent with themes identified in safety nets. This allowed us to extrapolate our findings to the remaining hospitals in our healthcare system and provided a platform to drive a tracheostomy tube change guideline that could be utilized at all our practice locations. Our tracheostomy change framework is presented in **Figure 4**. We anticipate that the protocol, by making

key elements of planning, communication, and preparedness a good habit, may have ancillary benefits to other aspects of tracheostomy care. We are piloting the protocol at PPMC to elicit frontline clinician feedback for rapid cycle optimization prior to systemwide deployment. It is expected that only minor modifications will be required to apply this across the hospitals in the system.

Laryngectomy

A subset of events from PA-PSRS reported by Gardner et al. involved patients with a laryngectomy.[4] Because post-laryngectomy patients have no upper airway, nasal oxygen, non-rebreather, and bag mask ventilation cannot be used for oxygenation or ventilation. However, PA-PSRS event review and published reports suggest that this does occur in Pennsylvania and elsewhere.[13] We deployed two primary interventions to reduce this risk. The first was a bedside laryngectomy card that highlights in graphics and words that there is no way to provide oxygen by mouth or nose. The second was a brightly highlighted notation in the airway status board indicating the patient has a laryngectomy. The airway status board is displayed on the landing page in both inpatient and outpatient views.

Figure 4. Tracheostomy Tube Change Protocol
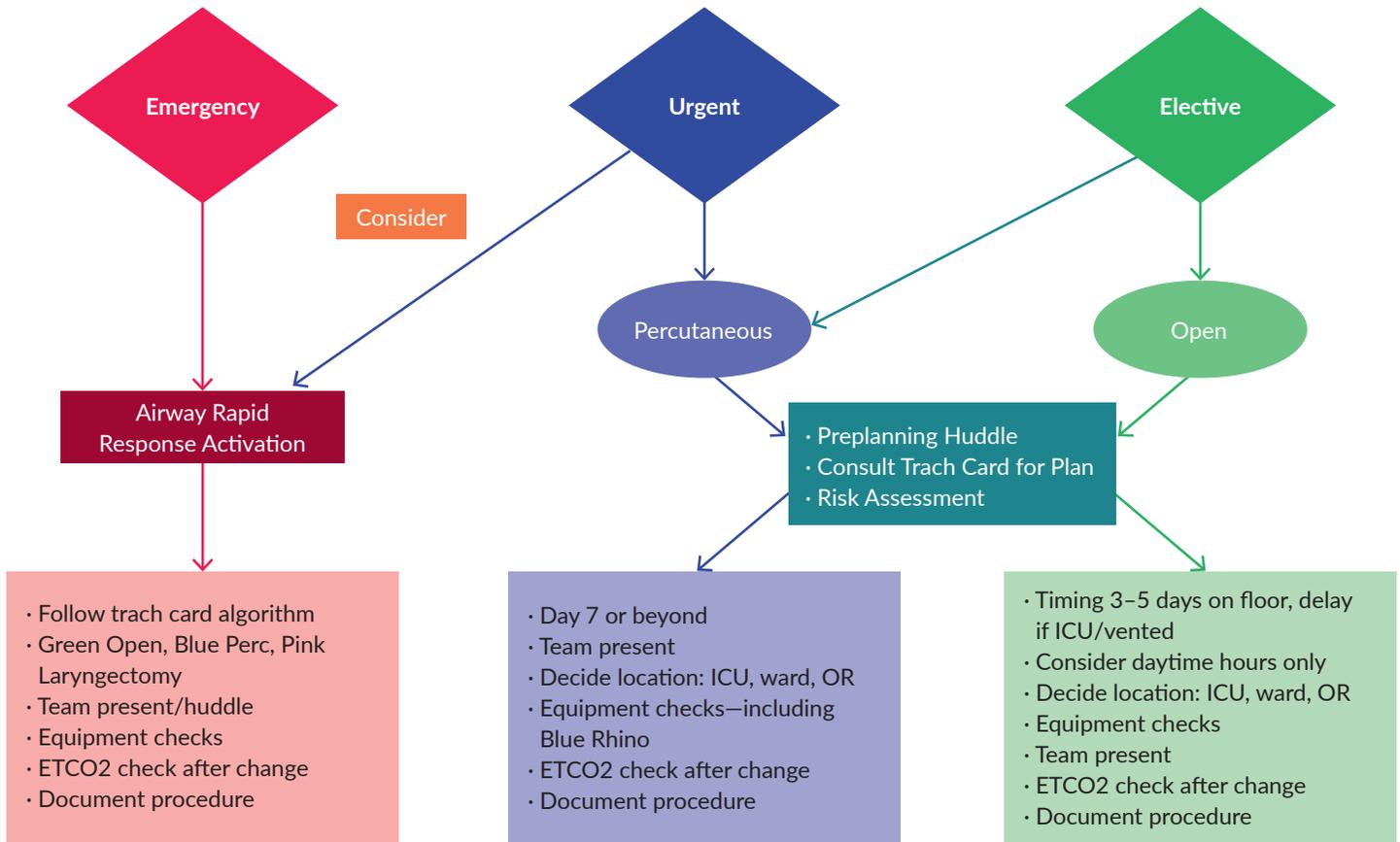
UPHS COVID-19 Task Force and Related Work

Our robust multidisciplinary team was able to rally early on during the COVID-19 pandemic and produce guidelines for safe performance of tracheostomy. As a result of our work in this area, leaders of the Global Tracheostomy Collaborative (GTC) took a great interest in our institution and asked us to participate in numerous projects, including multiple manuscripts and webinars. The most significant of these manuscripts was a multi-institutional global consensus paper authored by several peers in numerous European countries and China, who were recruited by the authors here (JHA and CHR). While we began discussions to formally join the GTC before the pandemic, the work of our task force was noticed by institutional leadership and hastened our entry into the group.

Global Tracheostomy Collaborative (GTC)

The GTC is an organization that collects data and helps hospitals improve their tracheostomy quality programs by providing peer data for comparison and offering bimonthly webinars on tracheostomy best practices.[14] Our QI efforts demonstrating the scope of challenges with tracheostomy care led us to join the GTC with the endorsement of health system leadership. We anticipate the data analysis process will help maximize the use of our resources and is predicted to improve quality of care while reducing cost to demonstrate value.

Summary

The experience of our health system and the PA-PSRS data from Gardner et al. provided evidence that tracheostomy-related airway problems are significant and necessitate a broad, multidisciplinary, and interprofessional approach to quality improvement.[4] The UK National Tracheostomy Safety Project, the Global Tracheostomy Collaborative, patient safety organizations such as ECRI, and hospitalwide system safety reporting systems are resources that can be used by quality and safety teams to assess these issues on a local basis to help focus improvement efforts. We describe a number of approaches to improvement integrated under the auspices of a widely representative Airway Safety Committee with a focused tracheostomy subgroup. Implementation challenges will always be significant and should be monitored.

Acknowledgements

References

1. Mehta K, Schwartz M, Falcone TE, Kavanagh KR. Tracheostomy Care Education for the Nonsurgical First Responder: A Needs-Based Assessment and Quality Improvement Initiative. *OTO Open*. 2019;3(2):2473974X19844993. Published 2019 Apr 24. doi:10.1177/2473974X19844993

2. Atkins JH, Rassekh CH, Chalian AA, Zhao J. An Airway Rapid Response System: Implementation and Utilization in a Large Academic Trauma Center. *Jt Comm J Qual Patient Saf*. 2017;43(12):653-660. doi:10.1016/j.jcjq.2017.07.002

3. Rassekh CH, Zhao J, Martin ND, Chalian AA, Atkins JH. Tracheostomy Complications as a Trigger for an Airway Rapid Response: Analysis and Quality Improvement Considerations. *Otolaryngol Head Neck Surg*. 2015;153(6):921-926. doi:10.1177/0194599815612759

4. Gardner LA, Jones R, Rassekh C, Atkins JH. Tracheostomy and Laryngectomy Airway Safety Events: An Analysis of Patient Safety Reports from 84 Hospitals. *Patient Saf*. 2022;4(1):26-39. doi:10.33940/data/2022.3.3

5. Hynes AM, Lambe LD, Scantling DR, et al. A Surgical Needs Assessment for Airway Rapid Responses: A Retrospective Observational Study [published online ahead of print, 2021 Jul 9]. *J Trauma Acute Care Surg*. 2021;10.1097/TA.0000000000003348. doi:10.1097/TA.0000000000003348

6. National Patient National Tracheostomy Safety Project. https://www.tracheostomy.org.uk/. Accessed September 1, 2021.

7. McGrath BA, Thomas AN. Patient Safety Incidents Associated With Tracheostomies Occurring in Hospital Wards: A Review of Reports to the UK National Patient Safety Agency. *Postgrad Med J*. 2010;86(1019):522-525. doi:10.1136/pgmj.2009.094706

8. Wilkinson K, Freeth H, Kelly K. "On the Right Trach?" A Review of the Care Received by Patients Who Undergo Tracheostomy. *Br J Hosp Med (Lond)*. 2015;76(3):163-165. doi:10.12968/hmed.2015.76.3.163

9. McGrath BA, Bates L, Atkinson D, Moore JA; National Tracheostomy Safety Project. Multidisciplinary Guidelines for the Management of Tracheostomy and Laryngectomy Airway Emergencies. *Anaesthesia*. 2012;67(9):1025-1041. doi:10.1111/j.1365-2044.2012.07217.x

10. Shah SJ, Cusumano C, Ahmed S, Ma A, Jafri FN, Yang CJ. In Situ Simulation to Assess Pediatric Tracheostomy Care Safety: A Novel Multicenter Quality Improvement Program. *Otolaryngol Head Neck Surg*. 2020;163(2):250-258. doi:10.1177/0194599820923659

11. McNiven ND, Pracy JP, McGrath BA, Robson AK. The Role of Scalpel-Bougie Cricothyroidotomy in Managing Emergency Front of Neck Airway Access. A Review and Technical Update for ENT Surgeons. *Clin Otolaryngol*. 2018;43(3):791-794. doi:10.1111/coa.13120

12. Raynor TP, Hopkins BS, Brenner MJ. Mitigating Tracheostomy-Related Latent Safety Threats Through In Situ Simulation: Catch Them Before They Fall. *Otolaryngol Head Neck Surg*. 2021;164(6):1357. doi:10.1177/0194599820977192

13. Brenner MJ, Cramer JD, McGrath BA, et al. Oral Intubation Attempts in Patients With a Laryngectomy: A Significant Safety Threat. *Otolaryngol Head Neck Surg*. 2021;164(5):1040-1043. doi:10.1177/0194599820960728

14. Brenner MJ, Pandian V, Milliren CE, et al. Global Tracheostomy Collaborative: Data-Driven Improvements in Patient Safety Through Multidisciplinary Teamwork, Standardisation, Education, and Patient Partnership. *Br J Anaesth*. 2020;125(1):e104-e118. doi:10.1016/j.bja.2020.04.054

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