IMPORTANCE Incidence of tracheostomy placement in children is increasing, and these children continue to have high incidences of morbidity and mortality. A multidisciplinary tracheostomy program may help improve the quality of care received by these patients.

OBJECTIVE To determine whether implementation of a multidisciplinary tracheostomy program can improve the care of children who received a tracheostomy through reduction in tracheostomy-related adverse events (TRAEs), improved tracheostomy education, and caregiver preparedness.

DESIGN, SETTING, AND PARTICIPANTS A prospective cohort study was conducted from January 2015 to June 2018 at a pediatric tertiary referral center in Boston, Massachusetts. The participants included 700 children who had received a tracheostomy, most of whom were aged birth to 18 years, but some patients with congenital disorders were much older.

EXPOSURES Institution of a multidisciplinary tracheostomy team (MDT) whose activities included conducting staff meetings, organizing outpatient clinics, conducting inpatient tracheostomy ward rounds, and conducting inpatient tracheostomy rounds at a local rehabilitation hospital. Quality improvement initiatives included monitoring standardized TRAEs and distributing standardized tracheostomy “go-bags.”

MAIN OUTCOMES AND MEASURES Reduction of TRAEs and improved caregiver preparedness through distribution of tracheostomy go-bags were assessed following the establishment of a multidisciplinary tracheostomy program.

RESULTS In total, 700 children who had received a tracheostomy during the study period were actively followed up by the MDT. Of these children, 378 (54.0%) were males and 322 (46.0%) were females; mean (SD) age was 4.1 (6.1) years. More than 60 new pediatric tracheostomies were performed annually at the referral center. Reported TRAEs were reduced by 43.0% from the first to the third year after the implementation of a standardized, closed-loop monitoring system (from a mean [SD] of 6.1 [5.2] TRAEs per 1000 inpatient tracheostomy-days in 2015 to a mean [SD] of 4.0 [2.5] in 2018). The most common TRAE was unplanned decannulation, which occurred 64 times during the study period. On average, 10 patients were seen in each monthly multidisciplinary tracheostomy clinic. Clinic interventions included continuing care (146 [52.5%]), communication enhancement (67 [23.6%]), plans for decannulation (52 [18.6%]), and referrals for comorbidities (13 [4.6%]). Approximately 19 inpatients were seen during biweekly rounds and 8 during monthly rounds at a local rehabilitation hospital. A total of 297 patients received standardized tracheostomy go-bags, and more than 70 positive bag checks were performed in the monthly MDT clinics. A positive bag check refers to the incidence when a family is given a go-bag and also uses it. In contrast, a negative bag check refers to when a family is given a go-bag but neither brings it to the clinic nor acknowledges that they use it.

CONCLUSIONS AND RELEVANCE This study’s findings suggest that a multidisciplinary tracheostomy program may be a powerful tool for enhancing patient safety and quality improvement. Ongoing studies will develop measurable pediatric tracheostomy outcome metrics and assess long-term outcomes.
Improvements in neonatal care have increased the need for long-term interventions, such as tracheostomy, in the pediatric population. Because children with a tracheostomy experience high morbidity and mortality, there is a need for more coordinated care for this growing complex pediatric population. In 2011 and 2012, studies reported that up to 14% of the patients who received a tracheostomy experienced perioperative or postoperative tracheostomy-related adverse events (TRAEs).¹ Up to 30% of tracheostomy admissions are associated with an airway-related adverse event.² A national survey³ indicated that patients who have received a tracheostomy experience 1 catastrophic event every 10 years, with about half of those events leading to either death or permanent disability. Multidisciplinary coordinated care has been shown to effectively reduce the occurrence of adverse events in patients with a tracheostomy.⁴ The following 5 key drivers of tracheostomy care have been established to help implement quality-driven care: standardization of care, broad staff education, patient and family involvement, monitoring of outcomes, and multidisciplinary collaboration.⁵ In 2015, Boston Children’s Hospital (BCH), Boston, Massachusetts, created a multidisciplinary tracheostomy team (MDT) to implement these key drivers.

Over the past decade, a growing cohort of institutions have reported positive outcomes after the coordination of MDTs.⁶⁻⁹ These teams comprise members from multiple specialties, including otolaryngology, pulmonary medicine, intensive care, respiratory therapy, nursing, and speech and language pathology. Primary outcomes established by tracheostomy MDTs include time to decannulation, length of intensive care unit and total hospital stays, frequency of adverse events, and speaking valve and/or swallowing trials.⁵⁻⁹ Many studies have shown improvement in 1 or more of these metrics with multidisciplinary care.⁶⁻⁹ However, quality metrics used in adult tracheostomy populations are not applicable in pediatric settings because the underlying indications for tracheostomy and feasibility of eventual decannulation are typically different in children. There is a sparsity of literature assessing the association between multidisciplinary tracheostomy care and the pediatric population. Accordingly, the present study aims to describe the development of a pediatric MDT program and reports the progress achieved after implementation with respect to improvement in patient care.

Methods

In this quality improvement study, an MDT was created at BCH in 2015, comprising the following 11 disciplines: otolaryngology, pulmonology, respiratory therapy, an augmentative communication program, feeding and swallowing team, inpatient and outpatient nursing, research and quality improvement staff, administrative staff, child life specialists, patient or family representative, and the critical care, anesthesia, perioperative extension (CAPE) team. All patients who received a tracheostomy at BCH from January 2015 to June 2018 were included in the analyses. Most patients were aged birth to 18 years, but some patients with congenital disorders were much older. Observational data were collected prospectively following the initial placement of the tracheostomy tube. Demographic data were obtained from the following 2 sources: a BCH-specific digital database to collect patient demographics including sex and age, and the Global Tracheostomy Collaborative biannual report to assess comorbid conditions across our patient population and the most common indications for tracheostomy at our institution. The Boston Children’s Hospital Institutional Review Board approved the study and waived the requirement for written informed patient consent as a part of a quality improvement initiative and because the data were deidentified.

Quality improvement initiatives of the MDT focus on standardized tracking of TRAEs and standardization of tracheostomy supplies, including the distribution of a tracheostomy go-bag (Geiger). The clinical components of the MDT include monthly team or staff meetings, a monthly multidisciplinary tracheostomy outpatient clinic, biweekly inpatient tracheostomy ward rounds, and monthly tracheostomy ward rounds at a nearby rehabilitation hospital (Box).

Quality Improvement Initiatives

Standardized TRAE Reporting System
In 2015, a “tracheostomy-related” category was incorporated into the hospitalwide adverse event reporting system. Information regarding each event was provided monthly to the MDT. Based on detailed event descriptions, the team determined the severity and preventability of each event and ensured that all appropriate follow-up procedures were undertaken. All TRAEs were standardized per 1000 inpatient tracheostomy-days, which was calculated automatically by a hospital-generated list each month.⁴ The standardized frequency of events was maintained in a running chart to track trends. The TRAEs were also categorized by event type to emphasize the most commonly occurring events and highlight areas for improvement. Follow-up was ensured via a closed-loop system of assessing events (Figure 1).⁴ The data collected were compared with benchmarks from July 2015 to December 2015. Because no prior baseline and initial data (ie, January 2015 to June 2015) were available, the staff was trained to use the reporting tool.

Distribution of Tracheostomy Go-bags
Tracheostomy go-bags are an important tool developed to standardize patient and family education, as well as prepare...
families for emergency tracheostomy events outside the hospital. Go-bags (Figure 2) were introduced at BCH in 2015 after several patients were encountered without the necessary emergency backup equipment. Tracheostomy go-bags helped standardize backup tracheostomy supplies for each patient and ensure their preparedness in handling emergency or adverse events. Patients received a go-bag at the time of the initial tracheostomy placement, or during an inpatient admission, or at the tracheostomy clinic if they had a long-standing tracheostomy placement. All go-bags were routinely reviewed in the tracheostomy clinic by our nursing team to confirm that backup supplies were present and up-to-date. Distribution of new go-bags and the review of existing go-bags were documented in a special form in the patient’s electronic medical record. The cost of these go-bags is approximately $5 per bag.

Clinical Components
Monthly Team/Staff Meeting
A monthly meeting was held with inpatient and outpatient MDT disciplines to review tracheostomy issues and discuss ways to further improve tracheostomy care. Monthly TRAE reports were reviewed at the meeting as a matter of priority. Other issues addressed included hospitalwide tracheostomy care training programs and best practices for tracheostomy care, including standardization of bedside signs and emergency responses.

Multidisciplinary Tracheostomy Outpatient Clinic
The monthly tracheostomy outpatient clinic comprised 3 otolaryngologists, 2 speech and language pathologists, otolaryngology nurses, and the CAPE home ventilation team. Associated personnel helped direct the workflow by ensuring that all patients were seen by each of their providers in an efficient manner. Research staff were also present to collect information regarding the number of patients seen, types of interventions implemented in the clinic, and family satisfaction. Interventions or changes in care were divided into the following categories: continuing care, plans for decannulation, referrals for comorbidities, and communication enhancement.

Inpatient Tracheostomy Ward Rounds
Inpatient tracheostomy ward rounds were held twice a month. Attendees included an otolaryngologist, tracheostomy specialist nurses from each unit with patients who had a tracheostomy, outpatient nurses, respiratory therapists, speech and language pathologists, child life specialists, and inpatient physician assistants. The team discussed each inpatient and reviewed tracheostomy-related medical and social needs of the patients. Administrative assistants attended to better facilitate the continuum of care for patients who were approaching discharge and to ensure that patients were not lost to follow-up. The number of inpatients who received a tracheostomy was tracked per 1000 inpatient tracheostomy days, and the number of bedside visits and/or interventions was documented. Family educational needs were discussed, and any indicated referrals for inpatient resources were coordinated.

Monthly Rounds at a Local Rehabilitation Hospital
In October 2016, the otolaryngology department established a system to conduct monthly tracheostomy rounds at a nearby rehabilitation hospital, where most patients who have received a
had or more comorbid systems. The most common indication was vascular (0.77% of patients (259 patients (65.0%)). Incorrect use of supplies was most frequently caused by the insertion of a tube that was the wrong size (eg, neonatal vs pediatric) (10%). Since March 2017, these events decreased from 0.5 per 1000 inpatient tracheostomy-days to 0.3 per 1000 inpatient tracheostomy-days. Seventy-nine events (65.2%) were determined to be preventable or possibly preventable.

In the first year of the program, reported TRAEs initially increased, most likely owing to increased awareness and subsequent reporting by hospital staff. Accordingly, biannual

tracheostomy at BCH and need ongoing care were discharged. The goal of this initiative was to reduce the need for special transport between the rehabilitation facility and the outpatient clinic and ensure that tracheostomy care remained standardized.

Statistical Analysis
No formal statistical analysis was conducted owing to the relatively small set of data being assessed. All statistics noted in this article were calculated using Excel (Microsoft Corp).

Results
In total, 700 active patients who received a tracheostomy at BCH between January 2015 and June 2018 were identified, of whom 378 (54.0%) were males and 322 (46.0%) were females. The mean (SD) age of these patients was 4.1 (6.1) years. More than 60 new pediatric tracheostomies were performed annually at BCH. Of the 700 patients who received a tracheostomy during the study period, 61 (8.7%) experienced an adverse event. This is consistent with recent literature that estimates that approximately 1% to 7% of patients who received a tracheostomy experienced a TRAE.1,3

The patients had a mean (SD) incidence of 2.5 (1.6) comorbid systems, the most common being respiratory (455 patients (65.0%)) and cardiovascular (259 (37.0%)) systems. A total of 77 patients (11.0%) had 5 or more comorbid systems. The most common indication for tracheostomy was the facilitation of ventilation, which was observed in 546 patients (78.0%).

Quality Improvement Initiatives
Standardized TRAE Reporting System
During the study period, 126 TRAEs were reported across 23 976 inpatient tracheostomy-days, with a mean (SD) of 5.25 (4.0) TRAEs per 1000 inpatient tracheostomy-days. Of these 126 TRAEs, most events occurred in intensive care units (63 (71.3%)) and on inpatient floors (24 (20.8%)). Events of minor severity (90 (78.3%)) were more common than those of moderate or greater severity (26 (21.7%)), and 10 events (8.3%) were categorized as “near misses.” No catastrophic events were reported during this period. The most common type of event was unplanned decannulation (64 TRAEs (52.5%)), followed by improper use of supplies (22 (18.0%)), change in respiratory status (10 (8.2%)), communication related (9 (7.4%)), and wound breakdown (5 (4.1%)). Incorrect use of supplies was most frequently caused by the insertion of a tube that was the wrong size (eg, neonatal vs pediatric) (45.0%). Since March 2017, these events decreased from 0.5 per 1000 inpatient tracheostomy-days to 0.3 per 1000 inpatient tracheostomy-days. Seventy-nine events (65.2%) were determined to be preventable or possibly preventable.
Figure 3. Trends in Tracheostomy-Related Adverse Events (TRAEs) per 1000 Inpatient Tracheostomy-Days (ITD)

The graph shows monthly rates of TRAEs, means across 6-month intervals, and the overall upper confidence limit (total mean +2 SDs). The monthly rate exceeded the upper confidence limit twice (in August 2015 and October 2016).a

Table. Demographic Characteristics of Inpatients Who Received a Tracheostomy and Rates of TRAEs per 1000 ITD

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<td>Age, median (IQR), y</td>
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<td>6 (2-12)</td>
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<td>Male, No. (%)</td>
<td>102 (59.6)</td>
<td>64 (67.4)</td>
<td>190 (61.7)</td>
<td>230 (58.4)</td>
<td>224 (60.7)</td>
<td>221 (55.1)</td>
<td>250 (57.9)</td>
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<td>Female, No. (%)</td>
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<td>47 (49.5)</td>
<td>118 (38.3)</td>
<td>164 (41.6)</td>
<td>149 (39.9)</td>
<td>180 (44.9)</td>
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<tr>
<td>No. of TRAEs per 1000 ITD*</td>
<td>5.15</td>
<td>7.09</td>
<td>4.94</td>
<td>5.52</td>
<td>6.31</td>
<td>4.64</td>
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Abbreviations: IQR, interquartile range; ITD, inpatient tracheostomy-days; TRAEs, tracheostomy-related adverse events. *The TRAE annual rates were 6.11 TRAEs per 1000 ITD for 2016, 5.24 TRAEs per 1000 ITD for 2017, and 4.03 TRAEs per 1000 ITD for the first 6 months of 2018.

Distribution of Tracheostomy Go-bags

A total of 297 tracheostomy go-bags were distributed to BCH patients who received a tracheostomy during the study period. Most go-bags (89 [35.0%]) were distributed in the inpatient setting by respiratory therapy staff, by the CAPE team during home visits (59 [23.0%]), and in the multidisciplinary tracheostomy clinic (55 [22.0%]). In addition to the 55 tracheostomy go-bags provided to patients at the clinic, outpatient nurses reviewed go-bags for supplies during 185 appointments, facilitating 26 new prescriptions for updated tracheostomy supplies. In addition, more than 70 positive bag checks were performed in the monthly MDT clinics. A positive bag check refers to the incidence when a family is given a go-bag and also uses it. In contrast, a negative bag check refers to when a family is given a go-bag but neither brings it to the clinic nor acknowledges that they use it.

Clinical Components

Multidisciplinary Tracheostomy Outpatient Clinic

Since July 2016, 209 multidisciplinary tracheostomy clinic appointments with 108 patients were recorded. Of these, 144 appointments (68.8%) used more than 1 discipline, and 39 (18.6%) used all 3 services (otolaryngology, CAPE, and augmentative communication program) at each appointment. On average, 10 patients were seen in each monthly multidisciplinary tracheostomy clinic. A total of 280 interventions were implemented during 22 months and comprised the following: continuing care (eg, stoma care, changes in prescriptions, or modified standard care instructions) (146 [52.5%]), plans for decannulation (eg, polysomnogram ordered, downsizing the tracheostomy tube, or speaking valve or capping trials) (52 [18.6%]), referrals for comorbidities (eg, neurology or gastroenterology appointments) (35 [4.6%]), and communication enhancement (67 [23.6%]). Of the communication-related interventions, 42 (62.3%) were for care coordination and outside referrals (eg, outpatient augmentative communication program services, community-based therapies, and school programs), 11 (16.9%) directly addressed augmentative communication strategies, 7 (10.4%) involved communication access methods, and 4 (6.5%) were assistive technology recommendations. Developmental speech and language communication concerns were also addressed. Approximately 6

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communication-related interventions (9.0%) included speaking valve trials. In addition, at each clinic the nurses were actively involved in preoperative education and in distributing or checking tracheostomy go-bags.

Inpatient Tracheostomy Ward Rounds
Since July 2016, 669 patients were reviewed in biweekly inpatient tracheostomy ward rounds with a mean (SD) of 19 (5.7) inpatients receiving a tracheostomy each day in the hospital. Inpatient tracheostomy ward rounds have facilitated 66 coordinated care decisions.

Monthly Rounds at a Local Rehabilitation Hospital
During a 20-month period, the otolaryngology department performed 109 consultations on 77 unique patients at Franciscan's Rehabilitation Hospital in Brighton, Massachusetts. Before these rounds were organized, patients from Franciscan's Rehabilitation Hospital constituted approximately 8.5% of patients in the monthly multidisciplinary tracheostomy clinic. To be seen at the clinic, each patient was provided special transport from the rehabilitation hospital and was accompanied by paramedics, respiratory therapy staff, and a nurse or clinical assistant. A mean (SD) of 5.7 (3.4) patients were seen during each ward round by our otolaryngologists. The rehabilitation hospital invested in flexible endoscopes to enable endoscopic examination of the airway at the bedside. Since October 2016, patients from Franciscan's Rehabilitation Hospital have represented 1.0% of clinic patients, an 84.0% reduction from that before these rounds were instituted. Not only has this reduced the burden on patients and staff at the rehabilitation hospital, but it also helped accommodate additional patients to be seen at each multidisciplinary tracheostomy clinic.

Discussion
Multidisciplinary care is important for the coordinated management of pediatric patients with complex conditions, especially those who have received a tracheostomy.5,12 In 2016, Abode et al13 found that the median length of stay following tracheostomy decreased with the implementation of a multidisciplinary care program for children who have received tracheostomy. Moreover, an MDT in this setting improves communication and may help decrease the risk of tracheostomy-related complications.5 We build on this literature by describing the implementation of our MDT and report quality improvement initiatives focused on improving the safety of children who have received a tracheostomy.

Barriers to implementing our MDT program included limitations to extracting representative inpatient data from the hospital database, lack of a collection tool for outpatient adverse events, and inability to isolate variables with the variability and complexity of this patient population. At our institution, data may be extracted to identify patients who have recently received a tracheostomy, but it is more challenging to extract specific characteristics from the medical record. Through close collaboration with the quality improvement department, we were able to establish a specific TRAE category in our hospitalwide adverse event reporting system. This allowed us to more reliably track our TRAEs. Another clear obstacle we encountered at the start of the multidisciplinary process was the numerous different specialties caring for tracheostomy-dependent patients in varying manners. It was necessary to educate all these specialties about the importance of multidisciplinary care and how it could improve the care we provide. The presence of a family member on our MDT helped reinforce this aspect.

One of the main focuses of our multidisciplinary program was to improve reporting and monitoring of TRAEs. During the 3-year period, unplanned decannulation (54.0%) and incorrect use of supplies (19.0%) were observed to be the most prevalent adverse events. The literature concurs, describing unplanned decannulation as the most common TRAE in patients who have received a tracheostomy.9 Comparison of standardized data from the beginning of the MDT in 2015 to recent data in 2018 showed a downward trend in the rates of preventable events of all types, suggesting either a direct or indirect (ie, through a Hawthorne effect) association of the MDT with TRAEs. Incorrect use of supplies was most frequently caused by the insertion of a tube that was the wrong size (eg, neonatal vs pediatric) (45.0%). To prevent such events from happening, the MDT worked to reinforce that all tracheostomy changes be treated like an implant, with mandatory time-outs prior to tube insertion. Since March 2017, these events have decreased from 0.5 per 1000 inpatient tracheostomy-days to 0.3 per 1000 inpatient tracheostomy-days.

As with any reporting tool, there are limitations. These include potential shifts in data collection with changing technology and variable training over time. The lack of true baseline data is a limitation of these analyses. The observed increase from the first 6 months (January to June 2015) to the second 6 months (July to December 2015) at our institution may be due to increased reporting secondary to awareness of adverse events driven by improved tracheostomy education.

The standardization of tracheostomy supplies using tracheostomy go-bags has helped improve emergency preparedness. Prior to the distribution of go-bags, care providers commonly witnessed patients traveling with limited and disorganized tracheostomy equipment. After distributing almost 297 go-bags, we observed that patients are more likely to travel with correct backup tracheostomy supplies that are up-to-date and in working condition.

The multidisciplinary tracheostomy clinic was established to reduce the time and financial burden on families caring for patients who have received a tracheostomy. Clinical interventions at the MDT clinic include changes in tracheostomy tube size, plans for decannulation, scheduling an operative procedure for airway evaluation, or management of stomal issues. Patients were also evaluated by an augmentative communication program to ensure referrals to outpatient resources or assistive technology, including communication device mounts, access tools, and customized software to improve communication access in the home and community environment. Speech-language pathologists and respiratory therapy staff evaluate patients for speaking valve readiness,
measure transtracheal pressures, and perform safe speaking valve trials in the clinic.

Inpatient tracheostomy ward rounds provide a discussion forum for inpatients who have received a tracheostomy. Often patients are transferred between units and the inpatient ward rounds ensure that care providers on each unit are familiar with each patient and the intricacies of their care. The initial discussion about all inpatients who have received a tracheostomy is followed by bedside evaluation of patients with active tracheostomy issues. Together, the inpatient care team could brainstorm innovative interventions for patients with obstacles to care. Interventions that were implemented during the past 2 years on ward rounds were related to continuing care (changing the dressing type, adjusting the frequency of tracheostomy tube changes, and scheduling an augmentative communication consultation) and plans for discharge (establishing clinic follow-up, determining discharge disposition). At each round, all potential upcoming tracheostomy procedures for the following week are also discussed.

Monthly rounds at the local rehabilitation hospital allow otolaryngologists to maintain ongoing standardized care for patients discharged from BH. In addition to reducing the burden of transporting patients with mechanical ventilation to the clinic, monthly rounds at the local rehabilitation hospital may also help reduce readmissions of these patients to the acute care hospital.

The Future

We are currently administering a patient/caregiver survey assessing the satisfaction level with the multidisciplinary tracheostomy clinic. The survey results will be used to improve the workflow of the clinic and address the specific needs of the patients with respect to tracheostomy care.

Limitations

These results are based on a quality improvement initiative. There is no baseline information available from our institution that could quantify the extent of these associations. Reports in the literature help provide context for the initiatives of the MDT. Successful formation of the MDT requires a time commitment from involved members. Time requirements outside of normal professional responsibilities are approximately 1 to 2 hours per week for meetings and rounds. Hiring a research assistant to record and track data was vital to the organization and assessment of outcome metrics. Cost analysis has not been conducted because the data collection tool used for this study does not presently collect financial information. However, we extrapolate that reducing the number of clinic appointments via multidisciplinary care and improving rates of TRAEs may have financial benefits for both patients and their families. Furthermore, eliminating the need for special transport between the local rehabilitation hospital and the multidisciplinary clinic has also improved the cost burden on patients.

Conclusions

We describe the experience of implementing a multifaceted MDT at our institution. The MDT uses interdisciplinary communication and collaboration across specialties to facilitate smooth transitions in care, which in turn was associated with a reduction of preventable TRAEs. It appears that development of educational strategies, such as with the use of tracheostomy go-bags, continues to enhance patient and family education and helps improve patient safety both within and outside the hospital.
The Multidisciplinary Tracheostomy Team
A Parachute for Tracheostomy-Dependent Children
Jeremy D. Prager, MD, MBA; Christopher D. Baker, MD

In their article “Association of a Multidisciplinary Care Approach With the Quality of Care After Pediatric Tracheostomy,” McKeon et al present their single-center experience of implementing a multidisciplinary tracheostomy team (MDT). Having taken the Global Tracheostomy Collaborative’s 5 key drivers for tracheostomy care to heart (standardization of care protocols, broad staff education, patient and family involvement, monitoring of outcomes, and multidisciplinary collaboration), the authors and their institution created an MDT in 2015. This MDT consists of clinicians from 11 disciplines involved in the care of patients with tracheostomies. The group meets regularly, communicating with and seeing patients in both inpatient and outpatient settings. The makeup of the multidisciplinary team and its activities are presented in Table 1 and the Methods section of the article. Patients at Boston Children’s Hospital who were tracheostomy dependent or who underwent tracheostomy placement during the study period were observed by the MDT prospectively. Data presented therein were collected from 2015 to 2018.

The article describes 2 main interventions or quality improvement initiatives of the MDT in detail: tracheostomy-related adverse event (TRAE) monitoring and the standardization of tracheostomy supplies, including the distribution of tracheostomy “go-bags.” The authors have previously described the creation of a TRAE monitoring system. When comparing the third year after implementation of the MDT with the first year, the authors report a 58% reduction in reported TRAEs. The authors also report improved caregiver preparedness and continuity of care, as well as improved collaboration between different specialties, as secondary outcomes.

This is an important study that demonstrates how an MDT may improve patient safety and quality of care. Other multidisciplinary programs have described how standardization of patient and family education and the discharge process can prevent complications and reduce overall length of stay for children undergoing tracheostomy placement. McKeon et al provide a detailed description of their MDT and its approach to care, including a detailed use of a reproducible TRAE monitoring method, which is a benefit for readers who have yet to implement multidisciplinary tracheostomy care at their own institutions.

This study has several important limitations. As a prospective quality improvement study, there was no control group, and results from a preintervention cohort of historical patients were not described. Second, many changes were made to care delivery at once, making it difficult to know which changes were responsible for the observed reduction in TRAEs. It is also unclear whether the findings are generalizable, that is, would similar interventions be effective at other institutions? Finally, it is challenging to measure how well teams function. As such, improved caregiver preparedness and team collaboration are more impressions than quantifiable data.

In presenting their work, the authors struggle to describe the experience of those who function in a complex work environment and in diverse teams. It is difficult to pinpoint the cause of an observed outcome when there are so many moving parts. Conveying this information can be challenging as well. However, what works at one center can be shared, then other centers can build on that foundation or modify the approach to meet the unique needs of different patient populations. The metrics being collected as TRAEs could be adopted by other institutions to more consistently measure adverse events, providing opportunities for shared quality improvement through multicenter collaboratives.

The effect of standardized tracheostomy care on financial data is another way of demonstrating the value created for patients and health care organizations by MDTs. A growing body of literature demonstrates financial benefits to the patients and their families when multidisciplinary care is coordinated. In addition, charges to insurers and costs to provide care may decrease as well, as we have noted in our own multidisciplinary aerodigestive program.

The safety of patients whose complex care poses implicit risk is a top priority for all. Patient care can be improved further by extending tracheostomy education to other community members (eg, school nurses, case workers, emergency response teams). Applying novel technologies such as telemedicine and advanced monitoring may increase our ability to identify adverse events with sufficient time to intervene. The worst outcomes such as accidental death fortunately occur quite infrequently. However, this makes determining whether improvements in care actually reduce these events quite challenging. In this context, multidisciplinary teams and quality collaboratives can work toward achieving greater safety, even in cases where randomized clinical trials are not appropriate.