

# Quality Improvement Initiative in Pediatric Critical Care

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**To cite this article:**

Miranda Marie Schmidt. Quality Improvement Initiative in Pediatric Critical Care. *American Journal of Pediatrics*. Vol. 8, No. 2, 2022, pp. 70-76. doi: 10.11648/j.ajp.20220802.14

**Received:** March 14, 2022; **Accepted:** April 6, 2022; **Published:** April 14, 2022

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**Abstract:** In a large academic pediatric medical center the formation of specialty care teams in the pediatric critical care setting led to the improvement in quality delivered to patients who had tracheostomies. Through frontline staff participation and interdisciplinary leadership – the team developed and strengthened processes that led to implementation of improvement strategies aimed at reducing hospital acquired pressure injury and decannulations. During this two-year time 150 nursing surveys and comprehensive literature reviews were completed to identify best practices and essential learning needs of the staff. The outcomes of these reviews helped to create improvement strategies which included developing educational initiatives focused on to support specific pathophysiologic issues impacting morbidity of patients leading to the quality metric goals. Upon completion of the educational and training initiatives led by the specialty care team, the incidence in tracheostomy decannulations and pressure injuries reduced significantly. Conclusions from this work highlight the importance of frontline staff as pivotal leaders in process change management and quality improvement changes. The teamwork among the interdisciplinary members allowed for enhanced collaboration in improving patient care outcomes and remains an active forum for evaluation of improvement in patient care. The efforts of the specialty care team provided sufficient data to support the implementation of specialty care teams that align efforts with that of organizational goals and aimed at reducing patient harm.

**Keywords:** Pediatric Critical Care, Nursing Education, Quality Improvement, Tracheostomy Decannulation, Pressure Injury Prevention

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## 1. Introduction

Specialty care teams were formed within the Pediatric Intensive Care Unit in a large academic medical center to provide concentrated improvement efforts in three specialty care areas: Transplant, Neurosurgical and Ear, Nose and Throat (ENT). After receiving volunteers, the unit leadership selected five nurses from respective shifts to support each specialty care team and represent frontline nursing staff. The ENT Specialty Care Team was the only team comprised of interdisciplinary care team members as it included Frontline Nursing, Nursing leadership, Medical Director and Surgeon provider, Respiratory Therapy, and Wound Care Nursing services.

Initially, the efforts were focused on a desire to continue to build upon the relationships between the ICU and the specialty service. However, by building these relationships and partnering on quality and training goals other outcomes achieved included an increased knowledge and skills of staff delivering patient care. The specialty care teams remain a

consistent forum for decision making on quality and process improvement within the frontline patient care environment. It is important to note that the staff within the specialty care teams were not assigned to the teams to specifically care for the patients within the chosen team. These individuals cared for any of the patients that were admitted to the pediatric critical care unit. These specialty care team members were meant to act as a resource and liaison between improved clinical practice and their colleagues.

Literature to support implementation and clinical effectiveness of specialty care teams provided a basis for the development of specialty care teams. To improve outcomes one center created a multidisciplinary specialty care team [1, 10]. Aspects of care were focused on improvement, optimization of initial hospital discharge and promoting effective communication between providers and caregivers; lastly, avoiding complications associated with tracheostomies. The focus of the ENT Specialty Care team was concerted on pressure injuries as well as unplanned extubations. Evidence that supports the team's efforts on unplanned extubations and the ultimate effect of patient stays

were lowered because of the development of a standardized approach to formal education to staff and an improved policy supporting practice improvements. [11, 12] Using a standardized approach to patient care addresses the importance of Nurse Care, specifically related to tracheostomies [8, 9] such as effective mobilization of secretions, suctioning [7]. Strategies to prevent complications and management of tracheostomy emergencies were identified as essential elements to improve patient safety and prevent complications. A group of researchers [3, 5] retrieved data on most commonly hospital acquired condition: the incidence of pressure induced injury. Following the data collection these researchers instituted a quality improvement program to target lower incidence of tracheostomy related pressure ulcers in pediatric patients.

Other research [10] discussed the importance of having specialty care teams in the setting of pulmonary embolism response teams that are focused on improving patient outcomes. The compilation of the supportive research and evidence provides substantial basis for the use of specialty care teams show dramatic improvement in care delivered to patients and more positive quality metric results. [13] While this literature is not specific to specialty care teams for tracheostomies, there is sufficient data to support the implementation of specialty care teams.

## 2. Methods

### 2.1. Overview

The specialty care team met to develop a process improvement plan following Kotter's ® change model [4] the projected time frame was to start in July 2017 and complete by December 2017. The preference was to start and finish prior to the organization opening a new inpatient building. During the teamwork, integrating other important collaborative stakeholders was a critical aspect of maintaining the sustainability of the changes desired. Additionally, the specialty care team served as key individuals to push change through organization and act as resources for information. i.e., Supplies education and personnel training. [10] The shared vision was an essential component in the process improvement and that all leaders supported the initiatives through staff scheduling or budgeting for education and training sessions.

### 2.2. Nursing Surveys

Through qualitative and quantitative research design, direct inpatient Nurse Survey [2] was given to all pediatric critical care Nurses; this survey was distributed to capture the trends and data obtained pre & post team interventions. Empowerment and barrier removal-identifying the risk factors or barriers that may hinder the change being implemented must be considered before beginning any step in the process were also carefully evaluated by the team. During the interventions, frequent and intermittent rewards to unit or individuals who are instrumental in process or change implementation. Lastly, the consistent and constant change are

crucial for success in a process change. Creating a conditioned response for change within the care environment is what completes the change and allows it to be still in practice.

#### 2.2.1. Nursing Interventions

The key initiatives that this team chose to implement and are still actively used (2022) include 1) Develop and discuss head of bed signs used for communication during emergencies; 2) Develop and discuss cards for Tracheostomy storage bags. 3) Promote stronger understanding of pathophysiology behind many conditions within the ENT Specialty 4) Provide the front-line staff with an in-service education activity to enhance the frontline staff competency in management of patients with tracheostomies. Lastly, the team wanted to create a complete and accurate discharge reference book and website to be used for families for education.

Additionally larger goals and initiatives were aimed at distribution of the practice changes via Shared Governance Nursing council and promote integration into house wide units for appropriate patient populations.

These interventions allowed the ENT Specialty Care Team members to act as leaders and develop them professionally in process change management; patient safety improvement strategies; evaluation of quality metric outcomes.

#### 2.2.2. Implementation Plan and Education

The team also provided frontline staff with education of the most common conditions on several different topics to enhance patient care delivery associated with different anatomic and pathophysiologic anomalies that can lead to pressure injury or unplanned decannulations. These topics included: through distribution of a Potty Press A: Stay Sutures (Up for approximately for 2 weeks 9/11/17-9/28/17); Potty Press B; Skin Pearls (Up for approximately 2 weeks 9/28/17-10/14/17); Potty Press C: Occurrence reports tip sheet (Up for approximately 2 weeks 10/15/17-10/30/17; Potty Press D: Trach Decannulation/occurrence reports (Discussed at monthly meetings to ENT Specialty Care Team) (11/1/17-11/14/17-post as Potty Press) as presented by the unit quality manager at 1 staff meeting per year; Potty Press E: Discharge criteria (11/15/17-11/30/17); Potty Press F: Mobility Readiness Clinical Pathway (12/1/17-12/14/17).

Several other initiatives supported the improvements in staff education and training they included: 1:1 In-Service education to Nurses about signs, including Epic® banner with advanced Airway note; valuable supplies and resources such as Critical Airway Cart in each ICU. Readily available for patients requiring unique airway re-intubation of cannulation. The cart was also placed in the Emergency Department. Each morning during selected months an ENT Surgeon would provide a five-minute huddle topic to allow for information sharing, questions to be answered and new processes for certain patients. These topics consisted of: October 2017 - Use of C-Collar with tracheoplasty; November 2017- Endoscopic Airway Reconstruction; December 2017- Vocal Cord injection laryngoplasty; January 2018- Botox Injections for Siallorhea; February 2018- Trach Change in-service; March 2018- Trach Capping and Decannulation trials; April 2018- [13, 14] OSA Surgeries; May 2018 - Cartilage Graft

Laryngoplasty: Single and Double Stage; June 2018 - Pharyngeal Flap; July 2018- Post Education survey and reassess Nurse learning needs. [6, 8] Lastly the team voted on placing a resource binder on unit at PICU main desk projected to be completed by January 2018. Perhaps one of the biggest initiatives was on creating a discharge book. To be given to families in learning how to care for a child with Tracheostomy.

### 2.2.3. Evaluation

Evaluations of the education and training initiatives were completed similarly to the pre-survey methodology. The use of an electronic survey captured the timely response from the front-line staff – nurses, respiratory therapists, and providers. This allowed for the specialty care team to capture their

efforts and areas of improvement.

## 3. Results

### 3.1. Pre-intervention Evaluations

During the survey time, front line nurses were surveyed on their years of experience as a Nurse. (Figure 1) This was relevant to the overall comfort in the Pediatric Intensive Care Unit and the ability of the nurse to acquire new skills. (Figure 4) Did they feel the facilitators provided the most valuable learning opportunity for them to increase their comfort in changing a tracheostomy (Figure 5). What other topics would they like to see for future education or in-service trainings (Figure 6).

### Q1: What is your experience with ENT patients?

Answered: 41 Skipped: 0

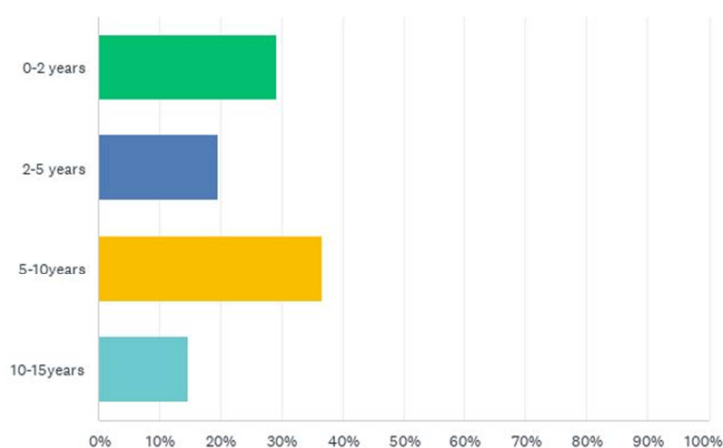


Figure 1. Overall experience in caring for patients with tracheostomies.

In general Nurses reported a varied level of experience, with limited number showing the experience of having ever changed a trach. As depicted in (Figure 1) the years of experience working with ENT patients approximately 12 Nurses (29.27%) of the staff rated themselves to have zero to two years'

experience with caring for these patients; Eight Nurses (19.51%) rated themselves as having two to five years' experience; 15 Nurses (36.59%) rated themselves as having five to ten years' experience; and six Nurses (14.63%) rated themselves as having 10 to 15 years' experience in caring for these patients.

### Q2: Have you ever changed a Trach?

Answered: 41 Skipped: 0

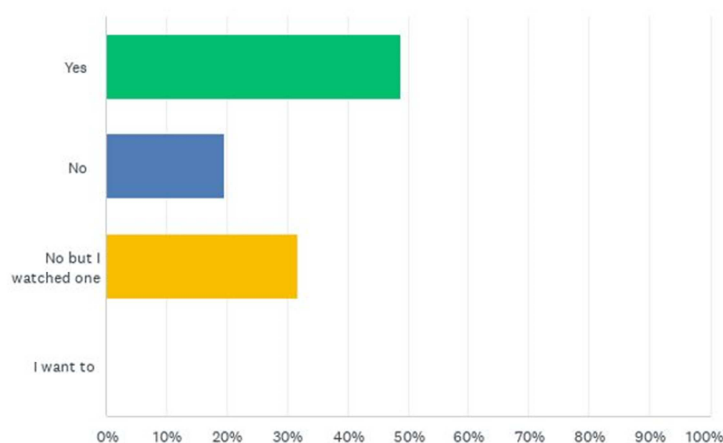


Figure 2. Overall experience in changing a tracheostomy.

Within the collection of survey of experience, the nurses were evaluated to what their experience was in changing a tracheostomy (Figure 2). 20 respondents (48.78%) stated that they had changed a tracheostomy. Eight (19.51%) stated that they had not changed a tracheostomy and 13 (31.71%) staff said they had not but watched one.

This data lends itself to show the need in providing frontline staff education and training on tracheostomy care and handling.

### 3.2. Post Intervention Evaluations

After the training was completed 100% of staff surveyed stated that they felt more comfortable in handling and changing a tracheostomy (Figure 3). This valuable data also supported the patient care outcomes to be discussed further in detail later.

#### Q3: Did this in-service increase your comfort with handling Tracheostomies?

Answered: 14 Skipped: 0

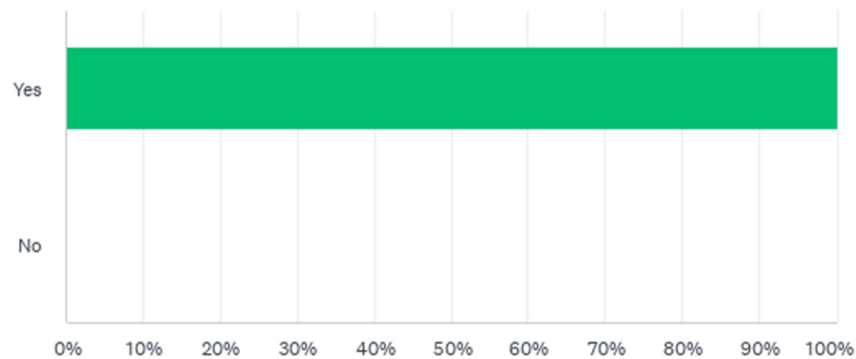


Figure 3. Quality in in-service education.

In evaluating staff comfort levels with the education received a Likert scale was used to review the quality of the education. Six nurses (46.86%) rated the education as a five –

being the best; seven nurses (50.00%) rated it as a four, and one nurse (7.14%) rated it as a three (Figure 4).

#### Q4: If yes to previous question please rate the level of comfort it helped1- Being NONE; 5- Being MOST

Answered: 14 Skipped: 0

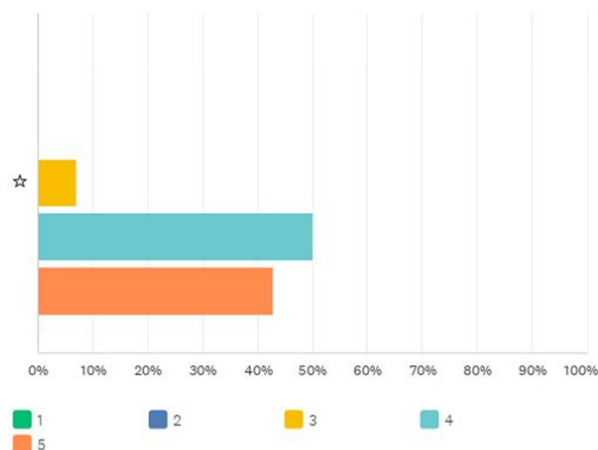


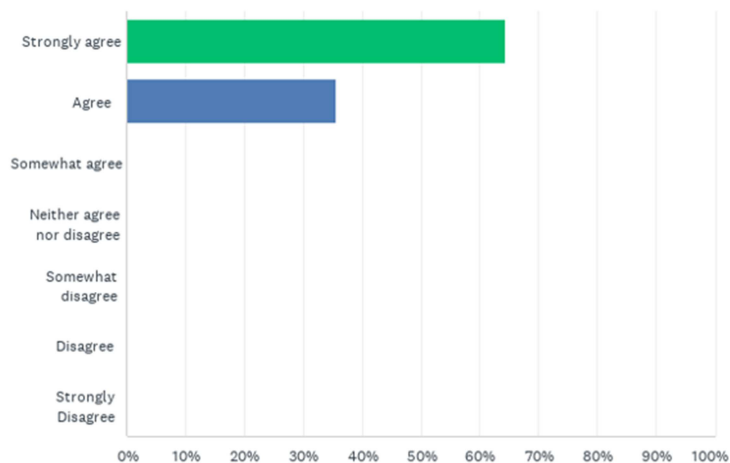
Figure 4. Post intervention comfort in changing tracheostomies.

The considerable efforts of the specialty care team to provide peer to peer coaching and feedback on care of patients with Tracheostomies was evaluated supported the improvement in practice through close collaboration and relationship development (Figure 5). Nine (64.29%) nurses

rated their peers by strongly agreeing that the facilitators were knowledgeable and consistent in their teaching. The remaining five nurses (35.71%) rated their peers by agreeing that they were knowledgeable and consistent with their teaching.

## Q6: Were in-service instructors knowledgeable and consistent in their teaching?

Answered: 14 Skipped: 0



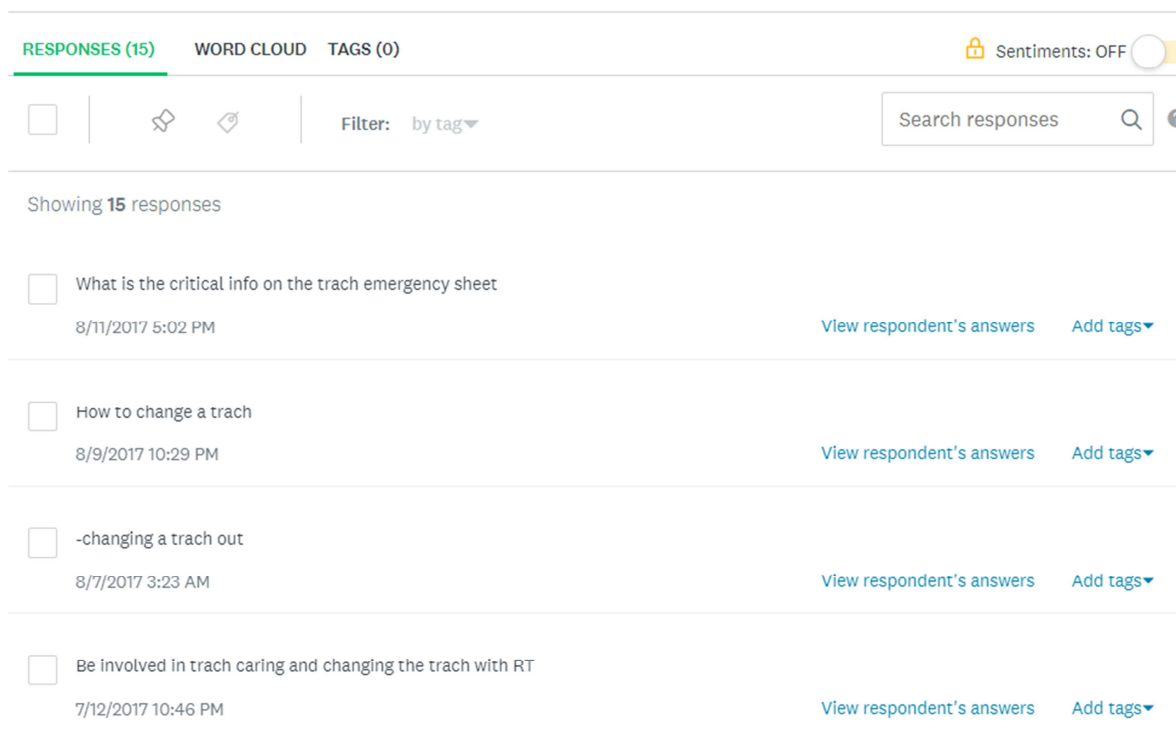
**Figure 5.** Rating of quality in instruction received.

Throughout the implementation of education and training, frontline staff developed stronger relationships with peers and created proactive and productive dialogues associated with improved practice. The transparency associated with vulnerability in learning created respect amongst peers and a collaborative approach to improving patient care outcomes. We examined the need for further topics and additional training

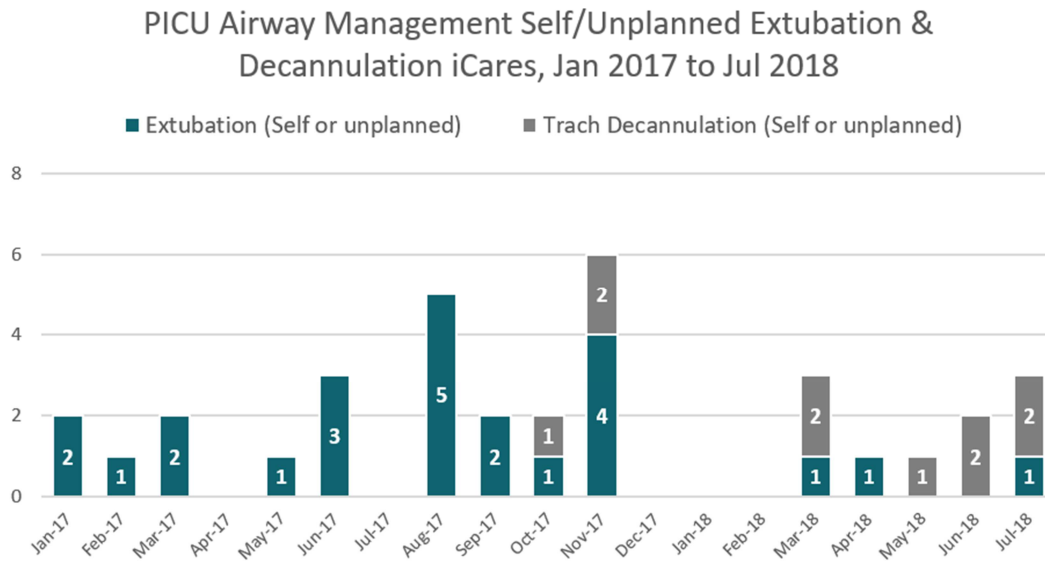
related to caring for Ear, Nose and Throat patients. Many nurses requested detailed components of care such as, “Stay sutures” or “Different Trach Brands” to higher level learning like “Tracheal Reconstruction Surgery.” As well as completing rounding with respiratory therapists Surveying these topics from the staff allows for frontline engagement and improvement in knowledge, skills, and attitudes in caring for patients. (Figure 6).

## What do you want to learn with caring for Trach patients?

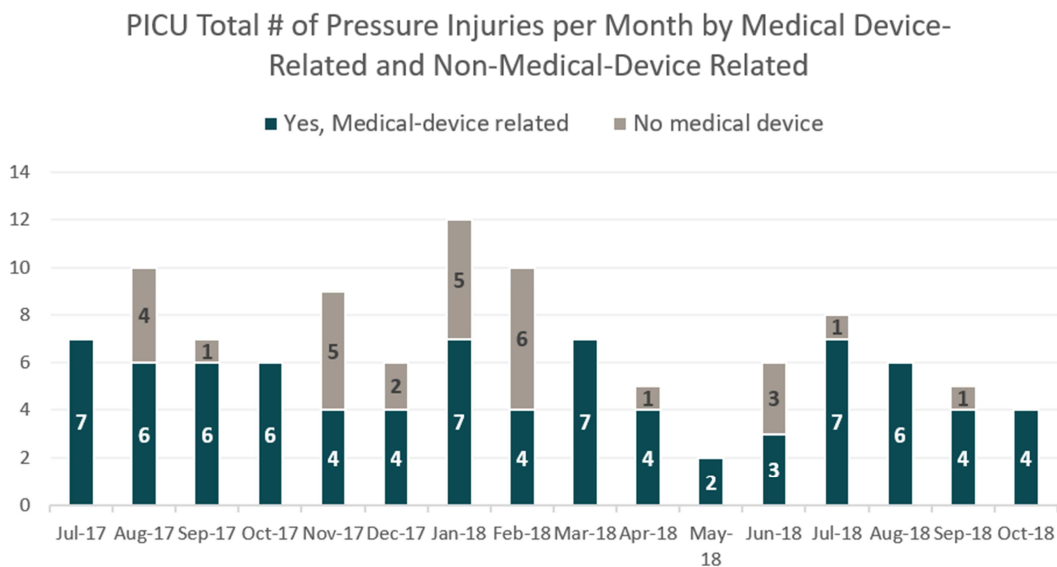
Answered: 15 Skipped: 26



**Figure 6.** Future Learning Needs Assessment.



**Figure 7.** Incidence of Decannulation 2017 – July 2018.



**Figure 8.** Incidence of Pressure Injuries 2017 to July 2018.

Patient care outcomes prior (December 2017) to the in-service efforts of the specialty care team providing education and training reflected an average of two decannulations or self extubations either by patient or unplanned, we implemented the tracheostomy education in-service in February 2018 at the time there was only one (twice by one patient on same day) occurrence of a decannulation that was in March and zero in April of 2018, these then lowered to zero unplanned extubations by patient or team until June 2018 where there was two occurrences. (Figures 7 & 8). With the in-service education, efforts were also focused on evaluation of the skin and site care of tracheostomies. Our data reflects a reduction in total number of incidences for the time frame of January to June 2018 in comparison to the prior six months in the PICU.

## 4. Conclusion

Over a year's time the combination of the development of

the team coupled with the separate in-service education led to the significant impacts on patient care outcomes. The institution of a Specialty Care Team with focus on specific patient care outcomes that are measurable, achievable and are specific lead to meaningful patient care outcomes and are shown as a valuable addition for any organization. These improvements were proven to be a strong beginnings of a Specialty Care Team's efforts aimed at advancing patient care outcomes. Ultimately, ongoing efforts surrounding education and training as well as front-line involvement with process improvement leads to sustainable and supportive initiatives that enhance quality patient care outcomes. Recommendations would be to evaluate whether a Specialty Care Team or focused educational activities are most beneficial in any organization. Areas for improvement include ensuring that all participants in the education and training completed the survey, to capture larger feedback and response to team efforts. Additionally, capturing data that is reflective of recent or

current trends would be valuable information to include to support the ongoing efforts of the Specialty Care Team.

## Acknowledgements

Special acknowledgement to the ENT Specialty Care Team members who helped to identify practice gaps, review literature and support implementation of new processes aimed at reducing harm to patients.

## References

- [1] Abode, K. A., Drake, A. F., Zdanki, C. J., Retsch-Bogart, G. Z., Gee, A. B., Noah, T. L. (2016). A multidisciplinary children's airway center: impact on the care of patients with tracheostomy. *Pediatrics*. 137 (2).
- [2] Ballangrud, R., Persenius, M., Hedelin, B., & Hall-Lord, M. L. (2014). Exploring intensive care nurses' team performance in a simulation-based emergency situation, - expert raters' assessments versus self-assessments: an explorative study. *BMC Nursing*, 13 (1), 1-22. doi: 10.1186/s12912-014-0047-5.
- [3] Boesch, R. P., Myers, C., Garrett, T., Nie, A. M., Thomas, N., Chima, et al., (2012) Prevention of Tracheostomy- related Pressure Ulcers in Children. *Pediatrics* 129 (3).
- [4] Chamberlain College of Nursing (2016) Kotter's Change Model ®. Eight steps to implementing change. Retrieved on March 25, 2016, from <http://my.chamberlain.edu>
- [5] Itamoto, C. H., Lima, B. T., Sato, J., Fujita, R. R., (2010) Indications and Complications of Tracheostomy in Children. *Brazilian Journal of Otorhinolaryngology*. 76 (3) 326-331.
- [6] McCaleb, R., Warren, R. H., Willis, D., Maples, H. D., Bai, S., O'Brien, C. E., (2016) Description of Respiratory Microbiology of Children with long-term tracheostomies. *Respiratory Care* 61 (4).
- [7] McClean, E. B., (2012) Tracheal suctioning in children with chronic tracheostomies: A Pilot study applying suction both while inserting and removing the catheter. *Journal of Pediatric Nursing* 27, 50-54.
- [8] Mok, Q., (2012) Tracheostomies in Pediatric Intensive Care: Evolving indications and Changing Expectations. *Arch Dis Child* 97 (858-859).
- [9] Morris, L., Whitmer, A., McIntosh, E., (2013) Tracheostomy care and complications in the intensive care unit. *Critical Care Nurse* 33 (5) 18-30 doi: 10.4037/ccn2013518.
- [10] Orr, R., Venkataraman, S., Seidberg, N., Dragotta, M., McCloskey, K., & Janosky, L. (n.d). Pediatric specialty care teams are associated with reduced morbidity during pediatric interfacility transport. *Critical Care Medicine*, 27 (1), A30.
- [11] Overman, A. E., et al., (2013) Tracheostomy for infants requiring prolonged mechanical ventilation: 10 years' experience. *Pediatrics*. 131 (5)
- [12] Rachman, B., Watson, R., Woods, N., Mink, R., (2009) Reducing Unplanned Extubations in a Pediatric Intensive Care Unit: A Systematic Approach. *International Journal of Pediatrics*. doi: 10.1155/2009/820495.
- [13] Serhal, M., et al., (2017) Review of decannulation of tracheostomies in children. *Nihon Kikan Shokudoka Gakkai Kaiho*, 66 (4) 255-261 doi: 10.2468/jbes.66.255.
- [14] Wilfond, B. S., (2014) Tracheostomies and assisted ventilation in children with profound disabilities: Navigating family and professional values. *Pediatrics* 133 (1).