



5-31-2017

Risk Factor Analysis for 30-Day Readmission Rates of Newly Tracheostomized Children

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Recommended Citation

Briddel, MD, Jenna; Strang, MD, Abigail; Levi, MD, Jessica; Barth, MD, Patrick; Chidekel, MD, Aaron; and Shah, MD, Udayan, "Risk Factor Analysis for 30-Day Readmission Rates of Newly Tracheostomized Children" (2017). *House Staff Quality Improvement and Patient Safety Posters*. Poster 62.

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RISK FACTOR ANALYSIS FOR 30-DAY READMISSION RATES OF NEWLY TRACHEOSTOMIZED CHILDREN

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ABSTRACT

Objectives: Pediatric patients undergo tracheostomy for a variety of reasons; however, medical complexity is common among these patients. Although tracheostomy may help to facilitate discharge, these patients may be at increased risk for hospital readmission. The purpose of this study was to evaluate our institutional rate of 30-day readmission for patients discharged with new tracheostomies and to identify risk factors associated with readmission.

Study Design: A retrospective cohort study was conducted for all pediatric patients ages 0-18 years with new tracheostomies at our institution over a 36-month period.

Methods: A chart review was performed for all newly tracheostomized children from 2013 to 2016. We investigated documented readmissions within 30 days of discharge, reasons for readmission, demographic variables including age and ethnicity, initial discharge disposition, co-morbidities, and socioeconomic status estimated by mean household income by parental zip code.

Results: 45 patients were discharged during the study time period. A total of 13 (28.9%) required readmission within 30 days of discharge. Among these 13 patients, the majority (61.5%) were readmitted for lower airway concerns, many (30.8%) were admitted for reasons unrelated to tracheostomy or respiratory concerns, and only one patient (7.7%) was readmitted for a reason related to tracheostomy itself (tracheostomal breakdown). Age, ethnicity, discharge disposition, co-morbidities, and socioeconomic status were not associated with differences in readmission rates. Patients readmitted within 30 days had a higher number of admissions within the first year.

Conclusion: Pediatric patients with new tracheostomies are at high risk for readmission after discharge from initial hospitalization. The readmissions are most likely secondary to underlying medical complexity rather than issues related specifically to the tracheostomy procedure.

BACKGROUND

Previous studies have shown that children with tracheostomy-dependence have high utilization of hospital resources, including overall number of unplanned admissions and amount of hospital charges per admission.² Tracheostomy-dependent pediatric patients have high rates of readmission within the first 6-12 months after tracheostomy-placement, reported to range from 40-63%.^{3,4} There are few studies evaluating 30-day readmission rates for tracheostomy-dependent pediatric patients. One single-institution study by Kun et al. reported a 17% rate of 30-day readmissions; however, this cohort included only ventilator-dependent patients and not all new tracheostomy patients.³ Another study by Gaudreau et al. examined 30-day readmission rates before and after the initiation of a tracheostomy education program for caregivers. Their results did not show a significant change in rates of readmission with the initiation of their education program, but the overall 30-day readmission rate was 26.7%.⁵

Nemours/Alfred I. duPont Hospital for Children is a free-standing tertiary care children's hospital in which medically complex patients are co-managed by the pulmonary, otolaryngology, and, in some cases, pediatric rehabilitation teams, prior to initial discharge from the hospital with new tracheostomy placement. If patients are discharged to home, families are required to complete structured tracheostomy training⁶ as recommended by the American Thoracic Society Guidelines.⁷ In addition, all patients discharged to home receive skilled nursing care that is coordinated prior to discharge. We sought to better understand risk factors associated with readmission in this population at our institution to improve care for patients and families and reduce unnecessary costs to the health care system.

METHODS

IRB approval obtained from Nemours/Wilmington, DE IRB.

- Retrospective chart review from June 2013 through June 2016 of all tracheostomized patients
- Excluded if they were decannulated or died prior to discharge, or if they were transferred to another inpatient institution
- Data collected:
 - Age at time of tracheostomy
 - BMI percentile
 - Co-morbidities
 - Demographics
 - Ethnicity
 - Sex
 - Discharge destination (home versus chronic care facility)
 - Home zip code (used to obtain an estimate of family income from U.S. Census Data.
 - Where they readmitted within 30 days of discharge
 - Primary reason for readmission
 - Number of readmission in the following year
- Data analysis performed to compare the group that required readmission with those that did not.
- Statistics calculated with Microsoft® Excel
 - Two-tailed Student's t-tests were used for continuous variables
 - Pearson's uncorrected χ^2 tests were used for categorical variables

RESULTS

- 45 patients included in the study
 - 28.9% (13/45) required readmission within 30 days of discharge

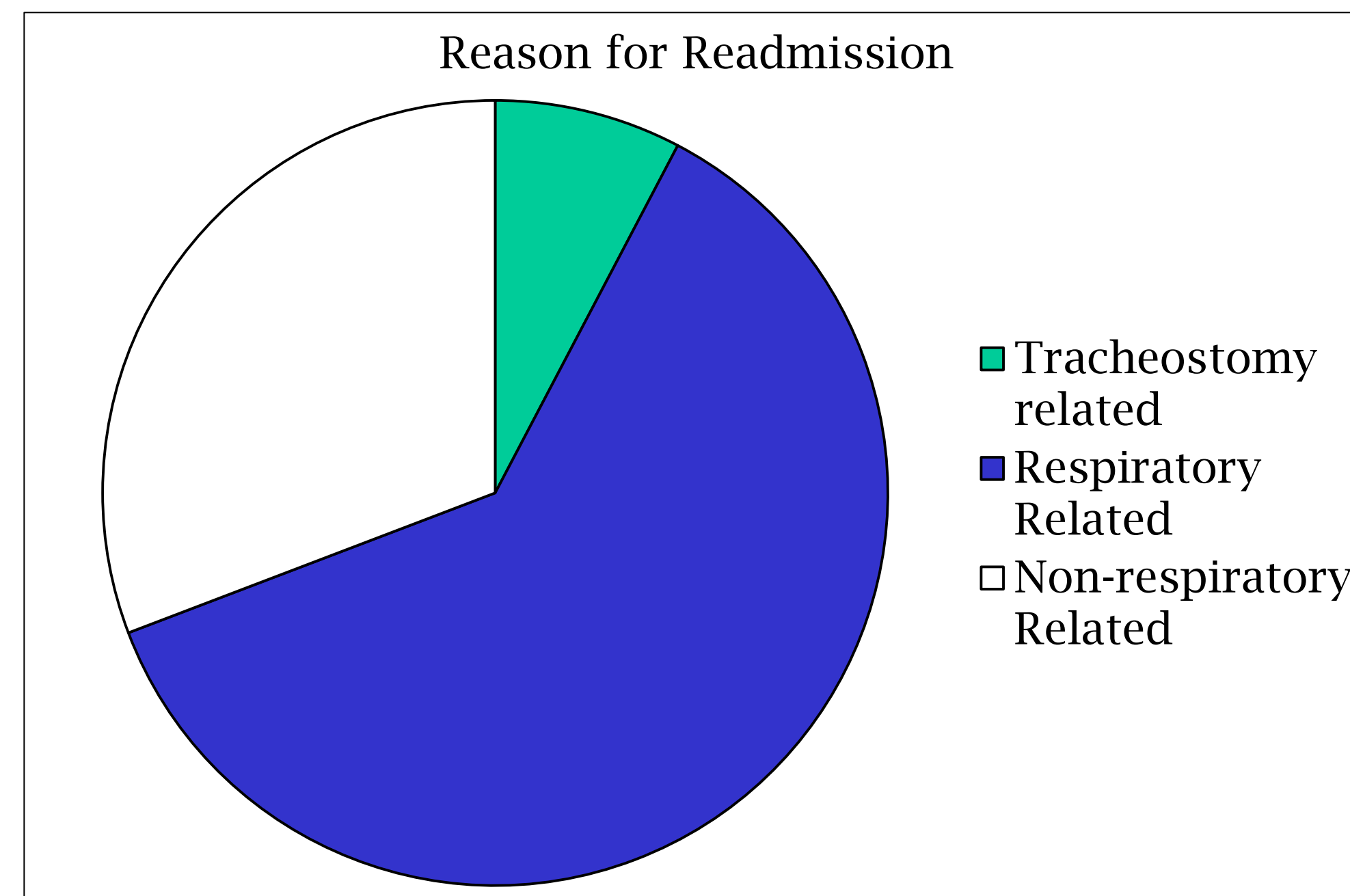


Figure 1: Percentage of patients requiring readmission within the first 30 days after discharge after tracheostomy by indication

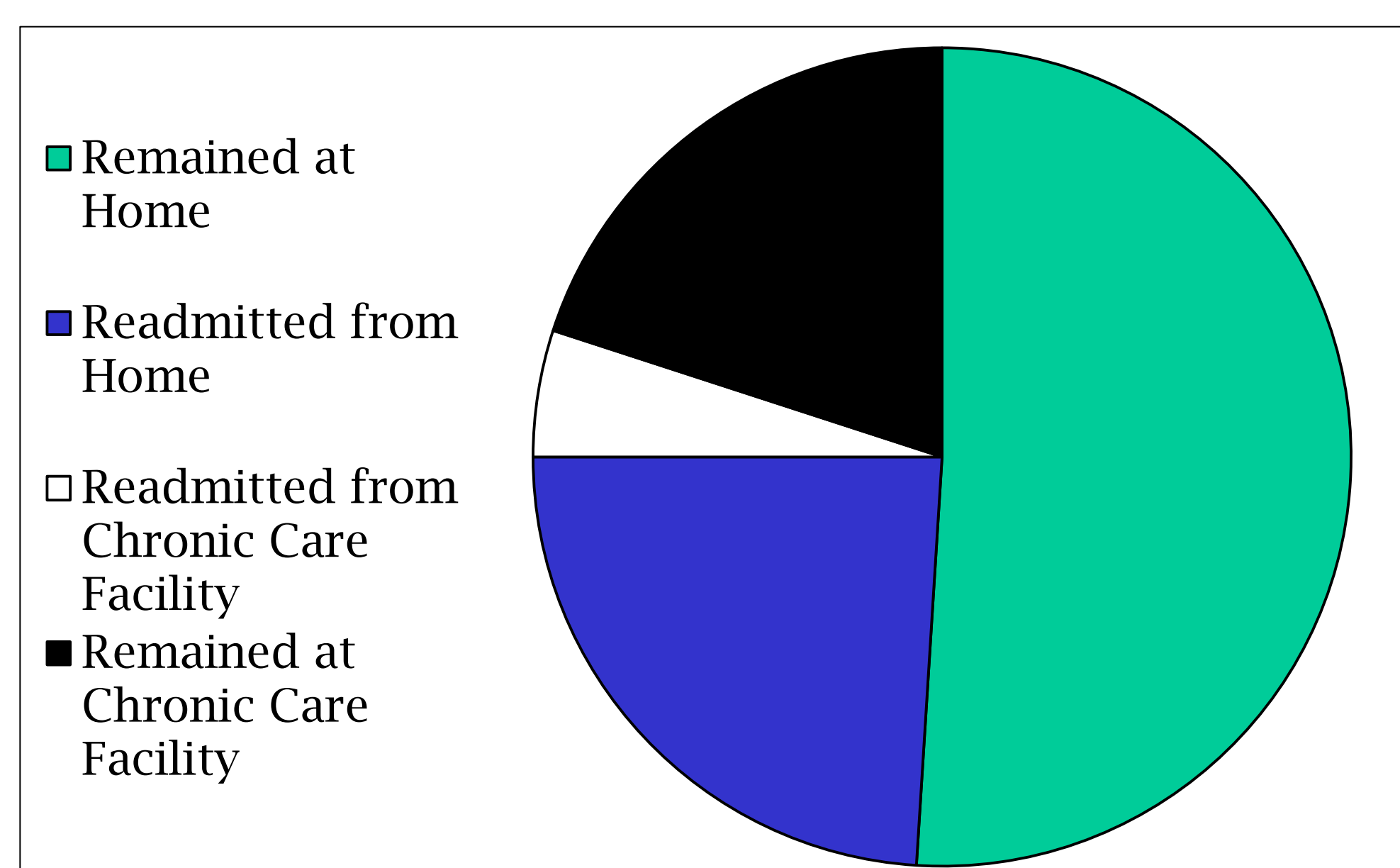


Figure 2: Percentage of patients discharged to home and to chronic care facilities, and which portion of those patients required readmission within 30 days.

Table 1. Comparison of demographic and clinical characteristics

	Readmitted N=13	Not readmitted N=32	t-test or χ^2 p-value
Mean age (months)	22.6	44.6	0.31
Sex			0.73
-Female	6/19 (31.6%)	13/19 (68.4%)	
-Male	7/26 (26.9%)	16/26 (61.5%)	
Ethnicity			0.27
-Caucasian	3/11 (27.3%)	8/11 (72.7%)	
-African American	9/24 (37.5%)	15/24 (62.5%)	
-Hispanic/other	1/10 (10.0%)	9/10 (90.0%)	
Mean household income (by zip code)	\$60,892	\$56,634	0.59
Discharge destination			0.37
-Home	11/34 (32.4%)	23/34 (67.6%)	
-Chronic care facility	2/11 (18.2%)	9/11 (81.5%)	
Mean co-morbidities per patient	2.08	3.00	0.02
-Overall	3.00	3.22	0.82
-Discharge to chronic care facility	1.91	2.91	0.02
-Discharge to home			
Admissions in the first year	3.58	1.23	0.002

Table 2. Comparison of co-morbidities between readmitted and non-readmitted patients

Co-morbidity	Readmitted N=13	Not readmitted N=32	χ^2 p-value
Neurologic	5/13 (38.5%)	22/32 (68.7%)	0.06
Chronic lung disease	6/13 (53.8%)	25/32 (78.1%)	0.103
Cardiac	4/13 (30.8%)	14/32 (43.8%)	0.42
Upper airway obstruction	4/13 (30.8%)	14/32 (43.8%)	0.42
Syndromic	4/13 (30.8%)	9/32 (28.1%)	0.86
Gastrointestinal	1/13 (7.7%)	2/32 (6.3%)	0.86
Renal	1/13 (7.7%)	3/32 (9.4%)	0.86
Orthopedic	1/13 (7.7%)	7/32 (21.9%)	0.26

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DISCUSSION

- Our readmission rate of 28.9% was consistent with Gaudreau et al., who found a 27% readmission rate in their patients.⁵
- Readmissions were rarely due to complications directly related to the tracheostomy itself and were more commonly associated with lower-airway concerns or other conditions associated with the medical complexity of the child. Often, these unplanned admissions were secondary to unavoidable causes such as new viral infections or issues unrelated to tracheostomy or respiratory concerns, such as a feeding tube issue.
- Age of tracheostomy placement, ethnicity, and sex were not associated with differences in rates of readmission in this population. While the age at tracheostomy placement was different between the two groups, this difference was not significantly different.
- Socioeconomic status measured by estimated household income was not associated with differences in readmission rates. Our findings do not support adult studies that have found socioeconomic status to be a factor in readmission.¹¹
- Children who require tracheostomy placement have high rates of medical complexity related to underlying medical conditions. Although it did not meet statistical significance in the current cohort, a numerical proportion of children with neurologic dysfunction had higher rates of readmission, which is similar to the finding by Berry et al., who found that children with neurologic impairment have higher rates of hospital resource utilization than those without.²
- Gaudreau et al. reported that children discharged to home were at higher risk for readmission than those discharged to chronic care facilities.⁵ In our cohort, among those going to chronic care facilities, the rates of readmission were lower than those going home, but this finding was not statistically significant.
- Children who were discharged to home with an increased number of co-morbidities had lower rates of readmission. This finding was unexpected as we hypothesized that the number of co-morbidities would increase rates of readmission. Patients with an increased number of co-morbidities may have closer follow-up with subspecialty providers or longer initial hospital stays.

QUALITY IMPROVEMENT

Reducing hospital readmissions is a nationwide goal. It has the potential to decrease costs as well as improve quality and even patient experience. The group requiring readmission in the first 30 days had significantly more admissions in the year to come. Thus, if we can identify factors that prevent 30-day readmission rates, we may be able to prevent future readmissions as well.

No factors were identified that increased a tracheostomized child's risk of readmission within 30 days of initial discharge except that children who were discharged to home with an increased number of co-morbidities had lower rates of readmission. We are currently performing further quality improvement investigation to see why seemingly more complex children are less likely to be readmitted.

We plan to look at:

- Tracheostomy training received prior to discharge
- Amount of home nursing received
- Number of outpatient visits
 - Pulmonology
 - Otolaryngology
 - General Pediatrics
 - Pediatric practice specializing in medically complex children

CONCLUSIONS

Pediatric patients with new tracheostomies are at high risk for readmission after discharge from initial hospitalization. However, these readmissions are rarely related to issues directly related to the tracheostomy itself and more likely related to underlying medical complexity and other medical conditions. Although our study identified trends and was unable to identify statistically risk factors for readmission, our results suggest that outpatient care may have more of an impact on the rate of readmission over intrinsic factors such as co-morbidities and demographics. Given the recent attention and interest on 30-day hospital readmissions rates as a marker of hospital outcomes, this study is important as it establishes a baseline for this complex population after this procedure allowing for comparison with other institutions. As these patients have high levels of complexity and risk, their readmission rates are not comparable to healthier children undergoing other surgical procedures.

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