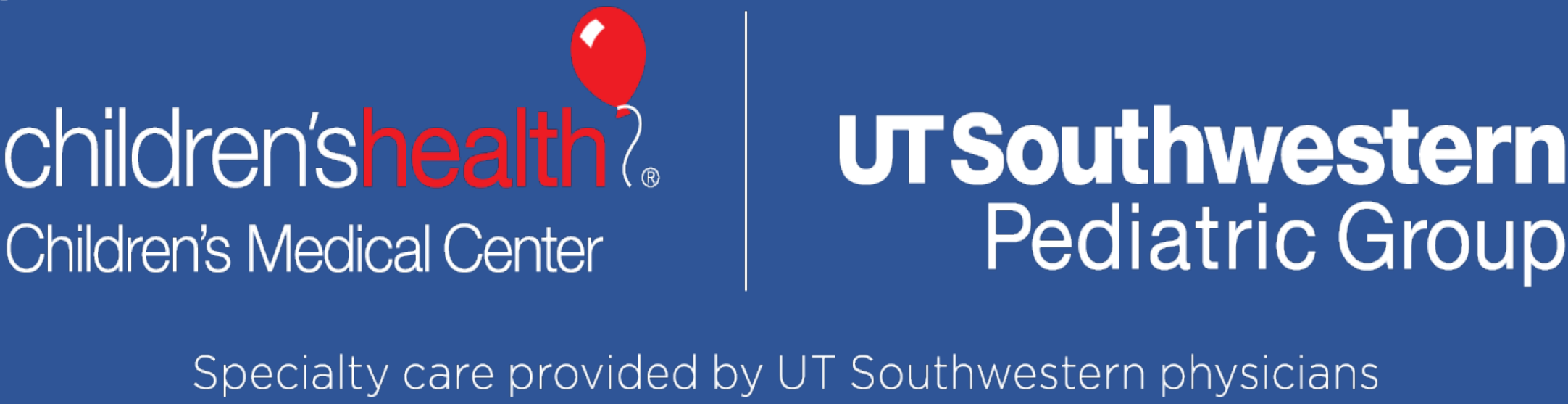


The Roles of Infection Risk and Caretaker Education in Reducing Emergency

Department Readmissions Among Pediatric Tracheostomy Patients

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Abstract

Objectives: To determine factors associated with frequent emergency department (ED) visits and hospitalizations among pediatric tracheostomy patients.

Methods: A longitudinal cohort of children with tracheostomies were followed for the first 24 months after index discharge. Multiple logistic regression analyses identified associated factors for frequent health care utilization (≥ 4 visits in 24 months).

Results: 239 children requiring 1285 total visits to the ED or hospital after index discharge were included, with 112 children (46.7%) having four or more visits. Respiratory-related illness was the most common indication (N=699 visits, 54%), followed by gastrostomy tube issues (N = 119, 9.3%). Variables predicting frequent utilization on regression analysis included Black race (OR = 2.01, 95% CI = 1.18 – 3.70), mechanical ventilation (OR = 2.74, 95% CI = 1.35 – 5.59), and Spanish language (OR = 3.86, 95% CI = 1.47 – 10.11). There were no predictors of visits for tracheostomy-related complications, which accounted for 4.8% of all encounters. A sub-analysis showed that Hispanic race and gestational age predicted visits for respiratory failure.

Conclusion: 47% of pediatric tracheostomy patients necessitate frequent ED and hospital utilization in the first two years after placement. Strategies related to reducing respiratory- and gastrostomy-related admissions may have the most impact given their high frequency. The significance of primary Spanish language and mechanical ventilation may emphasize the importance of quality caretaker education prior to patient discharge.

Introduction

- The American Academy of Otolaryngology–Head and Neck Surgery Foundation (AAO-HNSF) highlighted the need for research on factors associated with ED visits and hospitalization after tracheostomy.
- Tracheostomy patients are often medically complex, have several comorbid conditions, and are susceptible to high complication rates.
- The primary objective is to define risk factors for ED visits and hospital readmissions in children with a tracheostomy.

Methods and Materials

- A longitudinal cohort study included all pediatric tracheostomy patients under 18 years of age between 2015 to 2019.
- All ED visits and hospital readmissions were captured during the first 24 months after tracheostomy placement.
- Patients with high utilization (≥ 4 visits) were compared to those with to low utilization (< 4 visits).
- A multiple logistic regression analysis was performed for variables with strong association for revisits.
- Sub-analysis was performed of the most common reason for overall for visits regardless of admission type (ED, observation, or inpatient).
- Caregiver quality of life was assessed using the PedsQL™ survey to determine if psychosocial stressors predicted high utilization.

Variable	< 4 visits	≥ 4 visits	Total	P value
Patients, n (%)	127 (53)	112 (47)	239 (100.0)	
Age at trach, mo., median (IQR)	0.62 (7.2)	0.50 (1.7)	0.55 (3.5)	.05
Male sex, n (%)	62 (49)	58 (52)	120 (50)	.65
Race, n (%)				
Asian	7 (5.6)	1 (0.9)	8 (3.4)	.04
Black	36 (29)	46 (41)	82 (35)	
Hispanic	32 (25)	33 (30)	65 (27)	
White	43 (43)	24 (21)	67 (28)	
Other	8 (6.3)	8 (7.1)	16 (17)	
Tracheostomy Indication, n (%)				
Respiratory	79 (62)	83 (74)	162 (68)	.20
Obstruction	32 (25)	22 (20)	54 (23)	
Secretions	8 (6.3)	4 (3.6)	12 (5.0)	
Other	6 (6.3)	3 (2.7)	11 (4.6)	
Area Deprivation Index, mean (SD)	62 (27)	62 (25)	62 (26)	
Ventilation at Index Discharge, n (%)	92 (72)	99 (88)	191 (80)	.002
Complex Patient, n (%)	53 (42)	68 (61)	121 (51)	.003
LOS, median (IQR)	90 (121)	114 (113)	102 (115)	.01
Severe Disability, n (%)	73 (59)	78 (70)	151 (64)	.05
Current Status, n (%)				
Alive	65 (51)	69 (62)	134 (56)	.01
Decannulated	27 (21)	30 (27)	57 (24)	
Died	25 (20)	12 (11)	37 (16)	
Lost	10 (7.9)	1 (0.9)	11 (4.6)	

Table 1. Demographics of Pediatric Tracheostomy Patients by Revisit Groups, N= 239

Variable	< 4 visits	≥ 4 visits	Total	P value
No. of visits (%)	257 (20)	1028 (80)	1285 (100)	
Tracheostomy-related, n (%)	7 (2.7)	55 (5.4)	62 (4.8)	.08
Gastrostomy-related, n (%)	15 (5.8)	104 (10)	119 (9.3)	.03
Organ System, n (%)				
Respiratory System	125 (47)	574 (56)	699 (54)	.04
Cardiovascular System	3 (1.2)	21 (2.0)	24 (1.9)	.35
Nervous System	12 (4.7)	35 (3.4)	47 (3.7)	.33
Gastrointestinal System	27 (11)	148 (14)	175 (14)	.10

Table 2. Reasons for ED Visits or Hospitalizations Among Pediatric Tracheostomy Patients

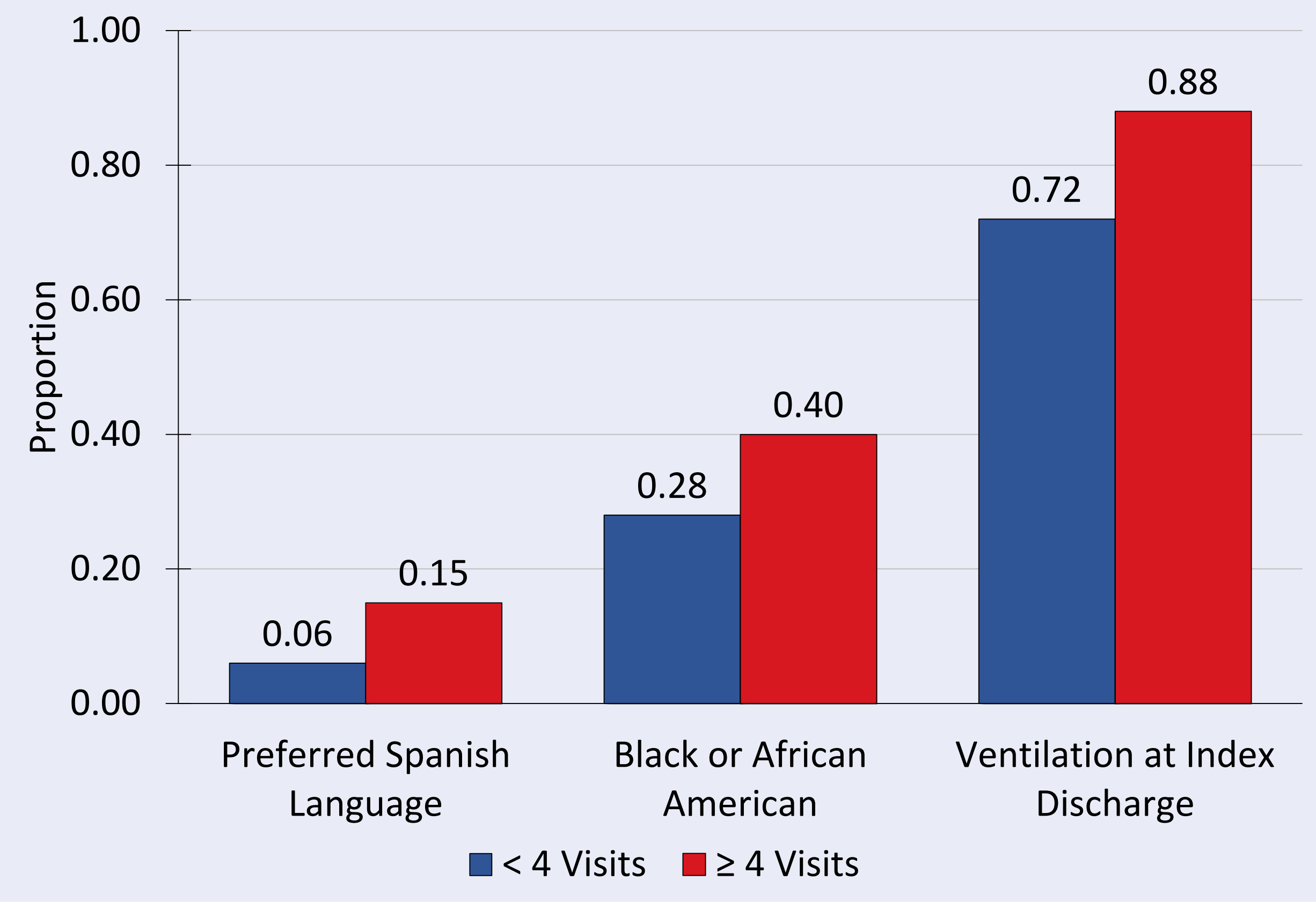


Figure 1. Proportion of Revisits by Significant Characteristics on Logistic Regression

Variable	Coefficient	P Value	OR	95% CI
Black race	.073	.01	2.01	1.18 – 3.70
Spanish Language	1.35	.006	3.86	1.47 – 10.11
Mechanical Ventilation	1.01	.006	2.74	1.35 – 5.59
Intercept	-1.33	-	-	-

Table 3. Multiple Regression Analysis of Odds of ≥ 4 visits after Pediatric Tracheostomy

Results

- A total of 239 children met inclusion, with 47% (N=112) having 4 or more revisits in the first 24 months after tracheostomy (**Table 1**).
- Respiratory illnesses accounted for 699 (54%) of all visits (**Table 2**).
- Gastrostomy tube issues accounted for 119 (9.3%) of revisits (**Table 2**).
- Gestational age (OR = .94, 95% CI = 0.93 – 0.97, $P < .001$) and Hispanic ethnicity (OR = 1.57, 95% CI = 1.22 – 2.02, $P < .001$) were associated with respiratory related visits.
- Black race (OR = 2.01, 95% CI = 1.18 – 3.70, $P = .01$), Spanish language (OR = 3.86, 95% CI = 1.47 – 10.11, $P = .006$), and ventilation at discharge (OR = 2.74, 95% CI = 1.35 – 5.59, $P = .006$) were associated with high utilization (**Table 3, Figure 1**).
- No psychosocial domains on PedsQL™ predicted the association of overall high ED visits and hospital stays.

Discussion

- Respiratory-related events most commonly necessitate a revisit, with one-third due to respiratory failure (acute or chronic).
- Development of a care algorithm including infection prophylaxis and caretake protocols may greatly reduce these readmissions.
- The second most common reason was gastrostomy-related issues.
- Recent studies have demonstrated the importance of antibiotic prophylaxis and early refeeding to prevent complications.
- High utilization was seen among Spanish language patients suggesting communication barriers contributing to revisits.

Conclusions

- In this large cohort study of pediatric tracheostomies, 47% of children necessitated frequent ED visits or hospital readmission in the first two years after placement.
- Strategies to anticipate and decrease respiratory-related admissions may have the most impact given their high frequency.
- Seeking to reduce gastrostomy tube issues may also result in greatly decreased readmissions.
- The significance of primary Spanish language and mechanical ventilation may emphasize the importance of quality caretaker education prior to patient discharge.

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References

- Mitchell RB, Hussey HM, Setzen G, et al. Clinical consensus statement: tracheostomy care. Otolaryngol Head Neck Surg. 2013;148(1):6-20. doi:10.1177/0194599812460376
- Pettitt-Schieber B, Mahendran G, Tey CS, Prickett KK. Risk factors for return visits in children discharged with tracheostomy. Int J Pediatr Otorhinolaryngol. 2021;150:110860. doi:10.1016/j.ijporl.2021.110860, 10.1016/j.ijporl.2021.110860
- Davidson C, Jacob B, Brown A, et al. Perioperative Outcomes After Tracheostomy Placement Among Complex Pediatric Patients. Laryngoscope. 2021;131(8):E2469-E2474. doi:10.1002/lary.29402
- Yagiela LM, Pfarr MA, Meert KL, Odetola FO. Posthospitalization follow-up recommendations after pediatric critical illness due to respiratory failure. Pediatr Pulmonol. 2021;56(6):1745-1753. doi:10.1002/ppul.25343
- Portillo EN, Stack AM, Monuteaux MC, Curt A, Perron C, Lee LK. Association of limited English proficiency and increased pediatric emergency department revisits. Acad Emerg Med. 2021;28(9):1001-1011. doi:10.1111/acem.14359
- Johnson RF, Brown CM, Beams DR, et al. Racial Influences on Pediatric Tracheostomy Outcomes [published online ahead of print, 2021 Sep 3]. Laryngoscope. 2021;10.1002/lary.29847. doi:10.1002/lary.29847