



# Return to System within 30 days of Discharge following Pediatric Tonsillectomy and Adenotonsillectomy

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## INTRODUCTION

**Objective:** Hospital returns and readmissions have been a growing measure of quality and cost control. Adenotonsillectomy occurs commonly in the pediatric population and accounts for a significant portion of healthcare resources. This study examines the rates of readmission and reoperation following adenotonsillectomy in a high-volume hospital system to further elucidate associated factors.

**Study Design:** Retrospective cohort study of children undergoing tonsillectomy/adenoidectomy between January 1, 2010 and December 31, 2013 at a single institution with multiple hospitals. Clinical events within 30 days following discharge were reviewed. The following events were analyzed for risk factor associations using multivariate logistic regression: return to the emergency department, all-cause readmission, and related readmissions and reoperations.

**Results:** Of the 9,444 index visits for adenotonsillectomy/tonsillectomy, 10,969 tonsillectomies with or without adenoidectomy were performed on 9,444 index visits between January 1, 2010 - December 31, 2013. The rate of all-cause readmission was 2.0% (n=193). Of the readmissions, 154 were related to the index procedure resulting in a related readmission rate of 1.6%. There were 73 patients that returned to the OR post-operatively for control of bleeding (0.8%). Patients were more likely to return to the ED and be readmitted if their native language was not English (OR= 1.69, p= 0.027) and if the length of stay during their index visit was greater than or equal to 2 days (OR= 2.47, p= 0.001).

**Conclusions:** The all-cause readmission rate following either tonsillectomy/adenotonsillectomy was 2.0%. There was a 0.8% rate of related reoperation for control of post-operative bleeding. Determining the preventability of readmissions warrants further investigation into both site-specific practice patterns and into clinical factors that influence post-surgical admissions after planned outpatient tonsillectomy.

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Adenotonsillectomy is one of the most common surgical procedures in the pediatric population

Over 500,000 outpatient tonsillectomies are performed each year in the US<sup>1</sup>

Pediatric outpatient tonsillectomy has an overall complication rate of 8.8% with an unplanned admission rate of 8.0%<sup>3</sup> and average 2.0% post-tonsillectomy bleed rate<sup>4</sup>

Recent emphasis on quality improvement and cost effectiveness has encouraged physicians and administrators to further assess procedures

Prior studies looked at complication rates in outpatient tonsillectomy but none have included unplanned admissions in a multi-hospital setting

We analyzed outcomes of adenotonsillectomies & tonsillectomies performed in a 4-year time period at a single institution encompassing two major pediatric hospitals

## METHODS AND MATERIALS

### Inclusion and Exclusion Criteria

10,969 tonsillectomies with or without adenoidectomy were performed on 9,444 index visits between January 1, 2010 - December 31, 2013

Procedures completed at a single pediatric institution with two major hospital systems

Patients scheduled for outpatient surgery but then admitted for observation post-operatively were included

Primary outcome measures used include ED returns, readmission, and reoperation within 30 days of discharge

### Data Fields

Demographic, socioeconomic, and clinical factors were collected: age, race/ethnicity, primary language, payer status, and zip code

Readmissions and reoperations were further subcategorized based on whether they were related to previous adenotonsillectomy

### Statistical Method

Statistical analysis was performed with IBM SPSS Statistics

Associations between dichotomous variables were analyzed and binary multivariate logistic regression analysis was used to assess whether or not significant risk factors independently contributed to the increased hazard of dependent variables

A two-tailed *P* value <0.05 was considered statistically significant

## RESULTS

Continuous variables	Mean +/- std dev	Range
Age (years)	6.27 +/- 3.59	5 days – 20 years
Length of stay (days)	1.07 +/- 0.80	1-57
Procedure length (minutes)	21.3 +/- 12.8	3-207
Median household income per zip code (\$)	57,271	12,084 – 114,674
Categorical Variables	Yes (%)	
English as primary language	8,540 (90.4)	
Caucasian	6,140 (65.0)	
Atlanta metropolitan zip codes	5,035 (53.3)	
Medicaid/Medicare as primary payee	3,922 (41.5)	
PICU admission	206 (2.2)	
Length of stay > 2 days	313 (3.3)	
Procedure length > 34 minutes	971 (10.3)	
Index surgery at Scottish Rite	8,323 (88.1)	
Index surgery start before 7am/after 3pm	283 (3.0)	
Unplanned admission after index outpatient surgery	2,379 (25.2)	

**Table 1.** Patient characteristics and other variables associated with index visits for Tonsillectomy (n=681) or Adenotonsillectomy (n=8,763).

### Study Cohort and Patient Characteristics

Rate of unplanned admission after surgery was 25.2%

Descriptive statistics of index surgeries and patient cohort in Table 1

### Sources of Readmissions within 30 Days of Discharge

Summary of the sources of readmission and clinical events in Figure 1

All-cause revisit rate was **9.3%** (875/9,444)  
All-cause readmission rate was **2.0%** (193/9,444)  
Related readmissions were **1.6%** (154/9,444)

### Events after Readmission

Total rate of related reoperations for post-operative control of bleeding was **0.8%** (n=73/9,444).

### Risk Factors Associated with Patient Subgroups

Multivariate analysis performed to determine the clinical and demographic risk factors

Result are summarized in Table 2

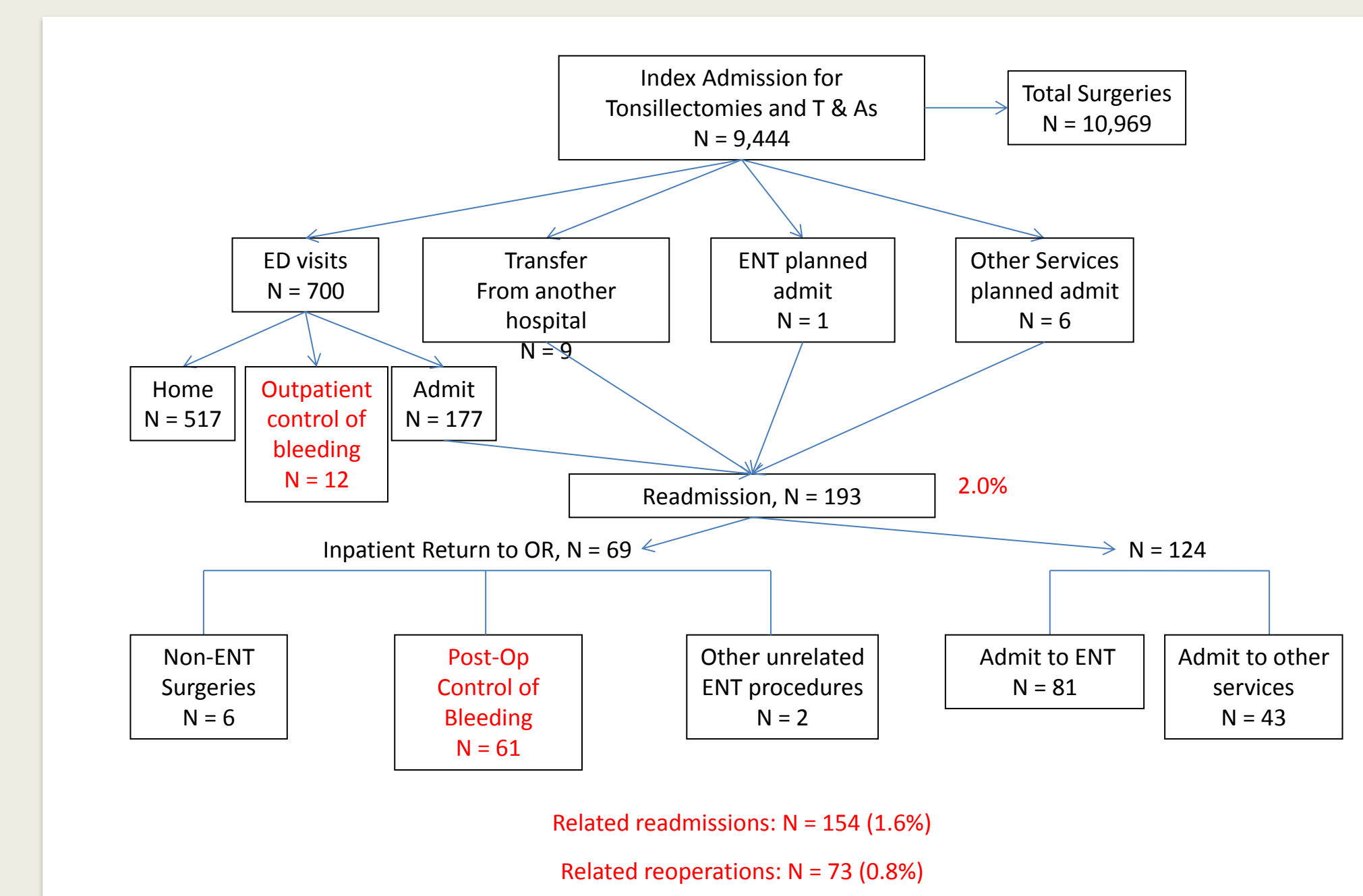
With return to ED as a dependent variable, risk factors:

- Age
- Non-English speaking, and
- City (Atlanta) zip code
- Admission ≥ 2 days\*

\*Patients were *not* more likely to undergo reoperation (Table 2)

Dependent Variables	Identified Risk Factors [odds ratio (confidence interval), p-value]
Return to ED (n=700)	Visit start age (months) [OR 0.998 (0.99-1.00), p=0.025] Non-English speaking [OR 1.57 (1.23-2.00), p=0.000] Non-Caucasian [OR 0.792 (0.66-0.95), p=0.010] ATL zip code [OR 1.23 (1.05-1.44), p=0.011] Length of stay ≥ 2 days [OR 1.69 (1.15-2.48), p=0.007] Index Surgery at SR [OR 0.732 (0.58-0.93), p=0.011]
All-cause readmissions (n=193)	Admitted after outpatient surgery [OR 1.82 (1.29-2.58), p=0.001] Length of stay ≥ 2 days [OR 2.47 (1.42-4.29), p=0.001] Non-English speaking [OR 1.69 (1.06-2.68), p=0.027] Non-Caucasian [OR 0.544 (0.38-0.77), p=0.001] Index Surgery at SR [OR 0.616 (0.41-0.93), p=0.021]
Related readmissions (n=154)	Admitted after outpatient surgery [OR 1.64 (1.11-2.43), p=0.014]
Otolaryngology non-surgical readmissions (n=81)	Non-Caucasian [OR 0.582 (0.35-0.98), p=0.043] Index Surgery at SR [OR 0.381 (0.21-0.68), p=0.001]
Related reoperations (n=73)	Visit start age (months) [OR 1.01 (1.00-1.01), p=0.049] Non-English speaking [OR 2.42 (1.15-5.11), p=0.020] Index Surgery at SR [OR 4.92 (1.16-20.94), p=0.031]

**Table 2.** Statistically significant risk factors from multivariate analysis associated with various clinical endpoints after index tonsillectomy and adenotonsillectomy



**Figure 1:** Return to system after tonsillectomy/adenotonsillectomy

## DISCUSSION

The highest independent risk factor for return and readmission was non-English speaking (OR 1.57, 1.69, respectively)

Language barriers with preoperative counseling or postoperative instructions

Insurance status did not affect revisit or reoperation

Other studies have shown education level and income strongly associate with ED<sup>7</sup>

Unclear if finding is related to access to care issues or to inability to capture post-operative visits to other hospital systems

Surgery at one of the sites led to a higher rate of readmission

Multifactorial: more complex comorbidities, residents involvement

Reoperation rate equivalent between hospitals

Limitations: no control for patient comorbidities, return to outside facilities, includes patients prior to implementation of NCH guidelines on admission, outpatient vs inpatient

## CONCLUSIONS

All-cause readmission rate following tonsillectomy/adenoidectomy was 2.0%, with 0.8% rate of reoperation for bleeding

Being admitted after planned outpatient surgery ≥2 days, age, non-English speaking, and living in the city were all risk factors for return

Implementation of Nationwide Children's Hospital guidelines on admission after adenotonsillectomy is an effort to reduce readmission: young age is an indication for admission

Recognizing patients that will benefit from inpatient observation and ensuring appropriate post-operative instructions, regardless of language, are essential at preventing future return visits.

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