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## Presentation and management of nasal foreign bodies at a tertiary children's hospital in an American metro area

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## ABSTRACT

**Objectives:** To examine rates of otolaryngology intervention in children presenting to our emergency department with nasal foreign bodies, factors associated with otolaryngology involvement, rates of complications, and details on nasal button battery exposure.

**Methods:** All patients presenting with a nasal foreign body to Children's Hospital Colorado from 2007 to 2012 were identified. Factors leading to referral to otolaryngology and operative intervention were examined, as well as complications.

**Results:** 102 patients were included. 36 (35%) patients were referred to the otolaryngology clinic, of which 58.9% required operating room intervention. 66 (64.7%) children had their nasal foreign bodies removed in the emergency room, however 30 (45%) of these were removed by an otolaryngology resident or attending physician. Overall, 64.7% of nasal foreign bodies required removal by otolaryngology. Of the 15 objects removed in the operating room, six were button batteries. No septal perforations occurred as a result of nasal button battery exposure. Multivariable logistic regression showed two significant predictors of OR removal: age and disc shaped objects.

**Conclusion:** While emergency department providers are comfortable attempting removal of nasal foreign bodies, there was a high rate of otolaryngology intervention. Based on this data, there is a need to educate emergency room providers on nasal anatomy and techniques for nasal foreign body removal.

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### 1. Introduction

Foreign bodies in the ear and nose in children are relatively common complaints in both the otolaryngology clinic and the emergency department. In the clinical setting, otolaryngologists are often faced with repeating a procedure that was unsuccessful in the emergency department. This can be traumatic for children and their families, not to mention the additional costs associated with multiple visits. This study was undertaken to help clarify why emergency room attempts at removal of nasal foreign bodies are sometime ineffective and to elucidate if any steps can be taken to improve success. In the case of ear foreign bodies, many studies have looked at risks for complications, referrals and need for

operating room intervention [1–4]. Previous reports note that nasal foreign bodies are more commonly managed in the Emergency Department setting than their ear counterparts [1,2,5]. This has to do with the proximity of the ear canal foreign body to the delicate tympanic membrane and ossicles and risks associated with their removal. Historically, nasal foreign body removal is not associated with major complications [6]. There is a theoretical risk of aspiration but there are only a handful of anecdotal reports. More commonly reported complications include local inflammation, ingestion of the foreign body and epistaxis [7]. With the common use of disc-shaped or “button” batteries in everyday electronics, there is an increased risk of children encountering these objects and inserting them into the nose. It is well known that button battery exposure has an increased risk of complications such as widespread necrosis and septal perforation [8]. This study also evaluates our institution's management of nasal foreign bodies with emphasis on button battery exposure.

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## 2. Materials and methods

### 2.1. Chart review

Following IRB approval, a retrospective chart review was performed for patients presenting to the emergency department at our institution from the years of 2007–2012 with nasal foreign bodies. Our hospital is a tertiary pediatric referral center for a large metropolitan area with a population of over three million and the only freestanding children's hospital in our state. Demographic and clinical data were collected including: sex, age at time of ED presentation, race/ethnicity, symptoms, and history of nasal foreign bodies. Unusual or unexpected complications were examined, with specific focus on complications related to button battery exposure. Factors leading to the need for referral to otolaryngology as well as operative intervention were examined. An additional medical record search was performed to identify children who were treated for nasal button batteries but did not come through our ED.

### 2.2. Statistical analysis

Demographic and clinical characteristics of the study cohort were reported using summary statistics, such as mean, standard deviation, and range for continuous variables and rate or percentage for categorical variables. Logistic regression analysis was performed to assess association between categorical outcome variables and demographic characteristics. Analyses were performed in SAS 9.3 (SAS Institute, Cary NC). P-value < 0.05 was considered statistically significant. A Spearman Correlation was used to test for association between time of button battery in the nasal cavity and number of operating room interventions. The significance level was set at 0.05. R version 3.2.4 software (R foundation for Statistical Computing, Vienna, Austria) was utilized.

## 3. Results

### 3.1. Demographics

Over the five-year period we identified 102 patients who presented with a nasal foreign body to the emergency department at our institution. The average age was 3.90 years with a range of 0.78–15.24 years and a normal distribution (Fig. 1). There were 56 males and 46 females. Nasal foreign bodies were divided into general categories: globular (round), foam/paper, organic, disc-shaped (including button batteries), and random shapes. The categorization of objects was necessary to determine if size or shape were predictive of difficulty removing or operating room intervention (Table 1). While this classification is subjective, studies have shown that in the ear, foreign bodies with a globular shape resulted in a higher likelihood for complications.<sup>6</sup>

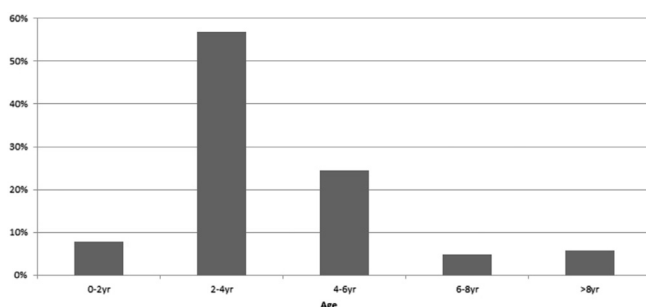


Fig. 1. Age distribution at time of presentation.

**Table 1**  
Type of nasal foreign body.

Class of object, No. (%) <sup>a</sup>	
Disc	15 (14.7)
Foam/paper	25 (24.5)
Globular	21 (20.6)
Organic	11 (10.8)
Random	33 (32.4)

<sup>a</sup> Multiple options may have been selected.

### 3.2. Characteristics of foreign body removal

Thirty-six (35%) patients of the 102 who presented to the ED were referred to the otolaryngology service. Twenty-one of these referrals (20.6% of the total) had their nasal foreign bodies removed in the otolaryngology clinic after unsuccessful attempts in the ED and 15 patients (14.7% of the total) required removal of the foreign object in the operating room (Fig. 2). Of patients seen in the otolaryngology clinic, 41.7% required operating room intervention.

Sixty-six (64.7%) of children had their nasal foreign bodies removed in the emergency room. Upon further examination of the medical record, 30 (45.5%) of these patients were treated by an otolaryngology resident or attending physician. Overall, 64.7% of nasal foreign bodies required removal by otolaryngology.

Of the 15 objects removed in the operating room, six were button batteries. There were an additional 7 children who had intranasal button batteries that were removed in the ED: 4 by the otolaryngology service and 3 by ED staff. No complications occurred in their removal. After chart review, the other children who required operating room intervention included 2 with globular foreign bodies, 2 with random shaped foreign bodies, 2 with large organic matter, 1 pair of magnets, 1 piece of foam, and a pair of pennies.

There was one case of nasal septal perforation. This resulted from pressure necrosis between two high-powered magnets that a child placed in the nose. These were removed in the emergency room by an otolaryngology resident.

### 3.3. Data analysis

Multivariable logistic regression was carried out to assess the association between the removal of the object in OR with age, sex, and class of object. Univariable analysis was carried out first to evaluate the appropriate functional form (continuous or categorized) of age for the association. Model fitting criterion AIC (Akaike's Information Criterion) suggested that age dichotomized

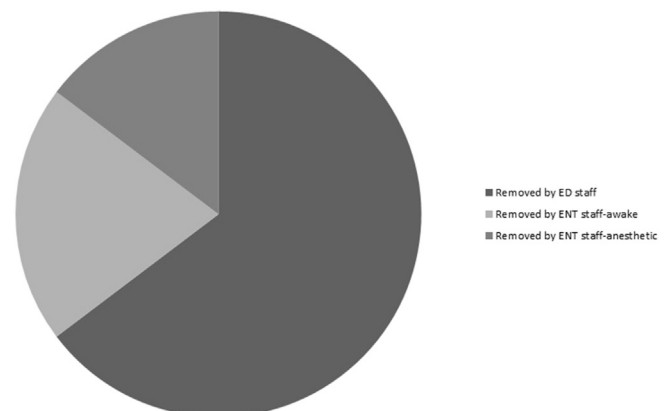


Fig. 2. Ultimate management of nasal foreign bodies.

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