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Otolaryngology-Specific Emergency Room as a Model for Resident Training

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Abstract

Objectives—There is a paucity of data on junior resident training in common otolaryngology procedures, such as ear debridement, nasal and laryngeal endoscopy, epistaxis management, and peritonsillar abscess drainage. These common procedures represent a critical aspect of training and are necessary skills in general otolaryngology practice. We sought to determine how a dedicated otolaryngology emergency room (ER) staffed by junior residents and a supervising attending provides exposure to common otolaryngologic procedures.

Study design—Retrospective review.

Methods—Diagnostic and procedural data for all patients examined in the Massachusetts Eye and Ear Infirmary ER between January 2011 and September 2013 were evaluated.

Results—A total of 12,234 patients were evaluated. A total of 5,673 patients (46.4%) underwent a procedure. Each second year resident performed over 450 procedures with the majority seen Monday through Friday (75%). The most common procedures in our study included diagnostic nasolaryngoscopy (52.0%), ear debridement (34.4%) and epistaxis control (7.0%)

Conclusions—An otolaryngology-specific ER provides junior residents with significant diagnostic and procedural volume in a concentrated period of time. This study demonstrates utility of an unique surgical education model and provides insight into new avenues of investigation for otolaryngology training.

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Keywords

Residency education; emergency care; otolaryngology; training

Introduction

The Accreditation Council for Graduate Medical Education (ACGME) mandates that otolaryngology residents “perform a sufficient number, variety and complexity of surgical procedures to ensure education in the entire scope of the specialty”.¹ The Residency Case Log Database has provided valuable insight into national resident training experience, particularly for “key indicator cases”.^{2,3} Key indicator cases span fourteen categories and are designated by the Otolaryngology Residency Review Committee (RCC) as most representative of otolaryngology surgical education and fundamental to current resident operative training.

While key indicator case volume has been studied previously, there is limited discussion in the literature on resident experience with minor procedures, such as ear debridement, nasal and laryngeal endoscopy, epistaxis control and peritonsillar abscess drainage.⁴ Otolaryngology program directors agree these skills should be mastered at a junior training level.⁴ Residents typically learn basic otolaryngologic procedures on a consult service or in specialty clinics during the early years of training.⁵ An optimal teaching environment for essential otolaryngology-specific procedures has neither been identified nor well studied.

At the Massachusetts Eye and Ear Infirmary (MEEI), a dedicated otolaryngology emergency room (ER) is staffed with second year otolaryngology residents and a supervising otolaryngology attending or fellow during weekday hours. The MEEI ER provides specialty care to any patient with otolaryngologic complaints twenty four-hours per day, 365 days per year. There is full nursing and ancillary staff that facilitate routine diagnostic care and assist with minor procedures. Each second year resident is assigned to an equivalent of a three-month rotation and is responsible for seeing the majority of patients between the hours of 6AM and 7PM. From 7PM to 6AM, an on call senior resident evaluates patients in the MEEI ER.

To examine a potential unique venue for procedural training, we aim to 1) quantify junior resident experience in basic procedures in a dedicated otolaryngology ER, and 2) describe implications for ER-based otolaryngology training during residency.

MATERIALS AND METHODS

Institutional review board approval from the Massachusetts Eye and Ear Infirmary Human Studies Committee was obtained. Electronic medical records of patients who registered for otolaryngologic care and received a diagnosis in the ER between January 2011 and September 2013 were extracted from an electronic administrative database. Patients that eloped and duplicate patient entries were not included in the data extraction. In this database, patient diagnosis is recorded using International Classification of Diseases, Ninth

Revision, Clinical Modification (ICD-9CM) codes and procedures recorded using Current Procedural Terminology (CPT) codes.

Primary diagnoses were grouped into thirteen categories according to functional system or anatomical location. These categories included auditory and/or vestibular, nasal and/or sinus, oral cavity, pharyngeal and/or esophageal, laryngeal and/or tracheal, cutaneous and/or orthopedic, trauma, neck, face and/or glands, neurological, post-operative complication, ocular and other. Similar or identical procedures with different CPT codes were grouped together into seven categories based on frequency. These included nasolaryngoscopy (rigid and flexible), ear debridement, including cerumenectomy, epistaxis control, drainage of peritonsillar abscess, incision and drainage of lesion, removal of foreign body and all other procedures. Control of epistaxis was defined as the diagnosis or further management of nasal bleeding based on diagnostic and procedural CPT codes. The pediatric population was defined as age less than or equal to 18 years.

Descriptive analysis was performed to characterize patient demographics, diagnostic and procedural frequency between 2011 and 2013. The most common diagnoses associated with each procedure were tabulated. Average annual procedural case volume per resident was calculated using 2011 and 2012 data by dividing the total number of procedures by the total number of residents rotating through the ED per year, based on standard resident rotations. Cases included in these calculations were restricted to all patients arriving between 6AM and 7PM when only a single second year resident and supervising attending or fellow are present in the ER. Comparison of means was performed using a one-way ANOVA test and comparison of proportions was performed using a chi-square test. All data manipulation and analysis were performed using STATA v.13 (StataCorp LP, College Station, TX).

RESULTS

During the study period, we identified 12,234 patient visits. A total of 5,673 patients (46.4%) underwent a procedure in the ER. Of these patients, the average age was 47.6 years, 47.7% were female, and the majority were adults (92.6%) (Table 1). Over 75% of procedures were performed on a weekday (Monday to Friday) during daytime business hours (6AM to 7PM) (Table 1). Average monthly procedural volume in 2011 and 2012 was 180.5 procedures per month (SD=16.4) and ranged from a minimum of 149 procedures in January to a maximum of 207 in November. There was no significant difference in mean volume per month ($P=0.9818$). On average, each rotating junior resident performed 479 procedures per year.

The six procedural categories included diagnostic nasolaryngoscopy (52.0%), ear debridement (34.4%), management of epistaxis (7.0%), irrigation and drainage of lesion (1.7%), drainage of peritonsillar abscess (1.7%), non-operative removal of foreign body (0.8%) and other (1.8%) (Table 2, Figure 1). The most common diagnostic categories associated with procedural intervention were complaints related to the auditory/vestibular (49%) and nasal/sinus (20%) systems (Figure 2). On average, each second year resident performed over 250 diagnostic nasolaryngoscopies, over 160 ear debridements, controlled

over 30 nosebleeds, and drained seven peritonsillar abscesses. Average annual procedural volume per resident by type of procedure is listed in Table 3.

When stratified by type of procedure, control of pharyngeal bleeding, including management of post-tonsillectomy hemorrhage, was the only procedure that occurred more frequently during the evening hours (47.7% during the day) (Figure 3). The majority of procedures occurred during the weekday (Monday to Friday).

There were differences in the type and frequency of procedures performed in pediatric and adult patients. The proportion of incision and drainage, peritonsillar abscess drainage, foreign body removal and control of pharyngeal bleeding procedures performed in the MEEI ER was significantly greater in pediatric patients as compared to adult patients ($P<0.05$) (Figure 4, Table 4).

DISCUSSION

A dedicated otolaryngology emergency room provides junior residents with significant diagnostic and procedural experience early during residency. Over the course of a three-month rotation, each junior resident was exposed to a wide range of acute and non-acute otolaryngologic diagnoses and performed over 450 procedures. Procedural volume was relatively constant throughout the year and predominantly occurred during the week versus weekend. Procedures occurred in both the pediatric and adult patient population. To our knowledge, this is the first quantitative assessment of emergency room-based diagnostic and procedural training in junior level otolaryngology residents.

The optimal setting for providing training in fundamental otolaryngologic procedures is not well studied. Residents typically learn basic otolaryngologic procedures on a consult service or in specialty clinics during the early years of training.⁵ However, duty-hour restrictions and increased pressure for clinical efficiency may limit adequate procedural training in these settings.^{6,7} Recent studies have also demonstrated that resident clinics may be less educationally valuable and overly burdened by non-clinical tasks.⁸

There are numerous theoretical advantages to a dedicated, otolaryngology emergency room educational model. First, due to assessment of the “undifferentiated” patient, residents develop fundamental diagnostic and management skills at an early time-point in their training. Residents also have the ability to efficiently diagnose and treat a patient in a single visit in contrast to an outpatient setting where tests, such as CT or MRI, may be performed over several visits and residents are therefore unable to participate in the subsequent diagnosis and care of the patient. Second, procedural volume in the ER is constant throughout the year, allowing all rotating residents to perform a substantial number of office based procedures in a concentrated period of time. Third, as there is a wide range of acuity in diagnoses, junior residents learn how to independently assess and triage patients. Specifically, management of emergent otolaryngologic issues, such as epistaxis, peritonsillar abscess and airway management is consistent. Finally, a dedicated otolaryngology ER model establishes a strong framework for both independent consult work and time management skills.

We recognize that it is neither practical nor feasible for most programs to implement a dedicated otolaryngology ER. In most other communities, an otolaryngology-specific ER is not available and patients with similar complaints and otolaryngologic emergencies present to a general ER. Therefore, it is conceivable that otolaryngology residents may potentially augment basic otolaryngologic diagnostic and procedural skills in a general ER setting. Currently, the ACGME mandates that PGY1 residents spend one month in the ER during their intern year. Interns are primarily expected to learn general principles of emergency medicine. A further refinement of the goals of the current ED rotation or dedicated exposure to ED patient population later in residency beyond sporadic consults may also be an opportunity to allow otolaryngology residents to focus on the basic and urgent otolaryngologic conditions in the emergency room setting. We recognize that the present study was not designed to assess a hospital-based ER as a venue for basic skills training and further studies should quantify resident exposure to common otolaryngological skills in this setting.

Looking forward to new educational developments on the horizon, proficiency in basic otolaryngologic procedures will be necessary to document as part of the upcoming Milestones Project, an ACGME-initiated, graduated competency assessment tool which will be used to review residents every six months as they progress through training.^{9,10} This new framework of competency-based developmental outcomes will allow programs to consistently assess trainee development of competency as they progress through residency.⁹ Importantly, the Milestones model invites program directors to innovate in their training programs and find new ways to enrich resident education. To this end, simulation centers and “simulation boot-camps,” have been described.^{11–13} For example, Boston-based otolaryngology residents participate in a simulation day at the beginning of the PGY-2 year at Boston Children’s Hospital that focuses on basic otolaryngology skills, such as epistaxis management, cerumenectomy, and foreign body retrieval. Another innovation may be development of an ER-based curriculum for junior level residents that encompasses acute and non-acute otolaryngology diagnoses and procedures.

Other surgical specialties have investigated the potential of an emergency room-based education model. The “Emergency Surgical Service (ESS)” has been proposed as a new general surgery service, based on the traditional trauma service model, but designed to manage non-trauma emergencies that present to the Emergency Room. The institution of this service was found to improve general surgery resident training experience by increasing the volume of surgical procedures performed on that rotation.^{14,15} Ahmed et al report that this educational model resulted in a significantly greater resident exposure to more common surgical procedures such as laparoscopic appendectomy and cholecystectomy.¹⁴ Although our otolaryngology procedures are office-based, we have noticed that our specialty specific emergency room model similarly allows otolaryngology residents to perform basic procedural skills by exposing them to a large volume of undifferentiated patients who require procedures and diagnostic exams in an expeditious fashion.

Finally, our study also provides baseline data about basic otolaryngologic procedures performed early during residency training. The principle national archive for otolaryngology trainee procedural data is the Otolaryngology National Resident Report. This operative case

log is primarily used to record the number of surgical procedures performed in the operating room while office-based procedures are not typically logged. This report is important at both the individual and training program level. In the Next Accreditation System model, residents will no longer be assessed for competency based on achievement of a minimum number of surgical procedures. Nevertheless, minimum numbers for key indicator cases have been set which will ensure that each institution is providing an adequate educational experience for training. Given that there are limited data on the basic otolaryngology procedures reviewed in this study, our study may also serve as a potential comparator for establishing minimum number requirements to ensure adequate exposure to basic procedures during residency training.

We acknowledge several significant limitations of our study. As stated previously, our study is not directly generalizable to other residency programs without a dedicated otolaryngology ED. Further, it is also unclear from our study the educational and experiential differences between an otolaryngology-based ED and a resident clinic. While a head to head quantitative comparison to a resident clinic would be ideal, this type of comparison is both challenging and may not be fair as triage and management goals in the ER are unique. In addition, procedural experience in the management of more acute problems, such as epistaxis or peritonsillar abscess, may be less likely to present to an outpatient resident clinic setting. Future studies aim to pilot an objective structured assessment of skills for these basic and emergent procedures performed by junior residents in the emergency room to better quantify the development of competence during the early years of training.

CONCLUSION

An otolaryngology-specific ER provides junior residents with significant diagnostic and procedural volume in a concentrated period of time. Our study provides insight into contemporary otolaryngology training in one type of surgical education model and potential avenues for future investigation of the role of an ER in otolaryngology training.

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Figure 1.
Procedural frequency (%) for all patients (2011–2013) (N=5,637).

Figure 2.
Diagnostic categories (%) associated with patients who underwent a procedure (N=5,637).

Figure 3.

Percentage of procedures, stratified by type of procedure, performed during daytime business hours (6am to 7pm) versus overnight (8pm to 5am).

Figure 4. Percentage of procedures, stratified by type of procedure, performed in children (age < 18 years) versus adults (age > 18 years).

Table 1

Demographic characteristics for patients who underwent a procedure in the emergency room (2011–2013).

Characteristic	All patients N=5,673
Age, mean (SD)	47.6 (20.9)
Age, median	49
Age, range	2 – 97
Pediatric (≤ 18 years), No. (%)	418 (7.4)
Adult (> 18 years), No. (%)	5,255 (92.6)
<i>Gender</i>	
Male, No. (%)	2,968 (52.3)
Female, No. (%)	2,705 (47.7)
<i>Day of visit</i>	
Weekday (M-F), No. (%)	4,292 (75.7)
Weekend (S-S), No. (%)	1,381 (24.3)
<i>Time of visit</i>	
6a–7p, No. (%)	4,999 (88.1)
8p–5a, No. (%)	674 (11.9)

Table 2

Procedural frequency.

Procedure	All patients (N=5,673)
Diagnostic nasolaryngoscopy, No. (%)	2,949 (52.0)
Cerumen disimpaction, No. (%)	1,949 (34.4)
Management of epistaxis, No. (%)	395 (7.0)
Drainage of peritonsillar abscess, No. (%)	96 (1.7)
Incision and drainage of lesion, No. (%)	95 (1.7)
Removal of foreign body, No. (%)	45 (0.8)
Control of pharyngeal bleeding, No. (%)	44 (0.8)
Other, No. (%)	100 (1.8)

Table 3

Annual procedural volume per PGY-2 resident (2011 and 2012)

Procedure	Annual average # cases/resident (SD)
Diagnostic nasolaryngoscopy	252.5 (13.1)
Ear debridement	167.6 (56.4)
Management of epistaxis	32.5 (5.7)
Incision and drainage of lesion	7.8 (2.3)
Drainage of peritonsillar abscess	7.3 (0.7)
Removal of foreign body	2.40 (0.2)
Control of pharyngeal bleeding	1.6 (0.2)
Other	7.0 (0.7)

Table 4

Procedural frequency for pediatric versus adult patients. P-value denotes level of significance for comparison of proportion of each procedure performed in adults and children.

Procedure	Pediatric (Age 18 years) (N=418)	Adult (Age > 18 years) (N=5,255)	P-value
Diagnostic nasolaryngoscopy, No. (%)	148 (35.4)	2,801 (53.3)	<0.0001
Cerumen disimpaction, No. (%)	144 (34.5)	1,805 (34.4)	0.966
Management of epistaxis, No. (%)	31 (7.4)	364 (6.9)	0.705
Drainage of peritonsillar abscess, No. (%)	14 (3.4)	82 (1.6)	0.006
Incision and drainage of lesion, No. (%)	17 (4.1)	78 (1.5)	<0.0001
Removal of foreign body, No. (%)	20 (4.8)	25 (0.5)	<0.0001
Control of pharyngeal bleeding, No. (%)	28 (6.7)	16 (0.3)	<0.0001
Other, No. (%)	16 (3.8)	84 (1.6)	0.001