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# Current Experience of Ultrasound Training in Otolaryngology Residency Programs

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## Abbreviations

AAO-HNS, American Academy of Otolaryngology–Head and Neck Surgery; ACS, American College of Surgery; SRF, Section for Residents and Fellows in Training

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**Objectives**—The applications of using ultrasound for the evaluation and management of otolaryngologic diagnoses are expanding. The purpose of this study was to evaluate the current experience of ultrasound training in otolaryngology residency programs.

**Methods**—All allopathic and osteopathic otolaryngology residency programs in the United States were surveyed online via an e-mailed survey link to the resident representatives of the Section for Residents and Fellows in Training of the American Academy of Otolaryngology–Head and Neck Surgery. We present a descriptive analysis of the survey results.

**Results**—A total of 110 responses were obtained from resident representatives at MD and DO otolaryngology residency programs, representing a response rate of 94.8%. Forty-four percent of residents reported that they would not feel comfortable with performing ultrasound-guided procedures after residency; 43% reported that they do not perform ultrasound procedures as a part of their residency training; and 60% of those trainees performing ultrasound procedures do not log the procedures. Twenty-three percent of residents did not have access to an ultrasound machine. Most respondents (71%) desired more exposure to diagnostic and/or interventional ultrasound training during residency.

**Conclusions**—Although current experience is variable, there is a strong interest in increasing resident skill acquisition in ultrasound training among otolaryngology residents. Some barriers to these goals may be a lack of trained faculty members using ultrasound and insufficient recording mechanisms for residents performing ultrasound procedures.

**Key Words**—clinical competence; internship and residency; medical education; otolaryngology; resident education; ultrasound

Ultrasound is an increasingly used imaging modality that has many applications for an otolaryngologist. It can assist in the assessment of thyroid and parathyroid disease, characterize neck masses, guide fine-needle aspiration biopsies of cervical lymph nodes and other neck masses, and even identify the presence of lesions, including calculi, within the salivary glands. Over the last few decades, ultrasound has established itself as a key diagnostic and therapeutic tool in the hands of the otolaryngologist.<sup>1</sup> Many advantages to clinician-performed ultrasound examinations are recognized, including real-time, dynamic/interactive imaging, integration of clinical information with the

differential diagnosis, improvements in the efficiency of the evaluation and treatment planning, monitoring of responses to therapy, and enhanced patient convenience and education.

Despite the increasing use of ultrasound in otolaryngology, it is not known to what extent ultrasound is being taught to otolaryngology residents across the United States. There is no standardized ultrasound curriculum required of American otolaryngology residency programs, and ultrasound competence among graduating residents likely varies according to the exposure and practice opportunity provided during residency training. This study was designed to (1) describe the types of ultrasound training otolaryngology residents receive, (2) identify which ultrasound techniques residents have performed, (3) understand residents' satisfaction with ultrasound exposure, and (4) identify barriers for residents to incorporate ultrasound into their future practices.

## Materials and Methods

Data were generated in collaboration with the American Academy of Otolaryngology–Head and Neck Surgery (AAO-HNS) Section for Residents and Fellows in Training (SRF). The SRF resident representatives, who are nominated by each residency program for a 1-year term, were contacted via e-mail and prompted to complete an online survey via Google Forms ([www.google.com/forms](http://www.google.com/forms)) on behalf of the residency program as a snapshot in time of current ultrasound practices in each residency program. The survey was created de novo to ascertain trainee perceptions and training experiences regarding ultrasound use and exposure to ultrasound during residency training. Questions were based on domains of program structure and equipment, comfort with basic ultrasound techniques, reporting/recording practices, faculty engagement in ultrasound, and the types of instruction provided during training. Demographic information regarding the resident postgraduate year level was also obtained. Responses were collected from October 2015 until January 2016. Further details regarding survey administration by the AAO-HNS SRF have been previously published.<sup>2</sup> This study was a quality improvement project; therefore, Institutional

Review Board approval was not required. Data were analyzed with descriptive statistics, using the mean for reporting.

## Results

### **Respondents**

Of the 116 resident representatives who were surveyed, 110 returned responses, yielding a response rate of 94.8%. There were 7 residents who were postgraduate year 1 (6%); 22 were postgraduate year 2 (20%); 35 were postgraduate year 3 (32%); 41 were postgraduate year 4 (37%); and 5 were postgraduate year 5 (5%). Demographic information and survey responses are summarized in Table 1.

### **Ultrasound Training**

Five residents (5%) reported attending an American College of Surgery (ACS) ultrasound course or the AAO-HNS Annual Meeting course, whereas 22 (20%) respondents reported attending some other, unspecified course. Most residents had never attended a formal ultrasound course (76%).

### **Comfort Level**

Respondents were queried on their perceived comfort level in performing ultrasound procedures after completion of residency training. Although 39% of residents reported anticipating a high level of comfort in performing ultrasound procedures after residency, 44% would not feel comfortable performing ultrasound procedures after training, and 17% were neutral. Notably, 78% of residents reported a desire for more exposure to diagnostic or interventional ultrasound during residency.

### **Barriers to Training**

In an attempt to further understand the training environment, respondents were asked how many faculty members in their training program currently perform ultrasound procedures. A fifth of resident representatives reported this number as 0 (19%); 46% reported 1 or 2 faculty; 27% reported 3 or 4 faculty; and 7% reported greater than 4 faculty members at their residency program who currently perform ultrasound procedures. On inquiring about the accessibility of ultrasound equipment, 23% reported no availability of

an ultrasound machine to trainees; 35% reported access to an ultrasound machine at limited sites; and 43% reported access to an ultrasound machine at all or most clinical sites.

Residents were asked whether the ultrasound procedures performed during training are documented. Of those residents performing ultrasound procedures, 60% do not currently log either diagnostic or interventional procedures in a reportable mechanism, such as

the Accreditation Council for Graduate Medical Education case log.

## Discussion

This survey of otolaryngology residents in the United States demonstrates that, although the current level of experience is variable, there is a strong interest in increasing resident skill acquisition with regard to ultrasound training in the otolaryngology residency curriculum. We were surprised to find how few otolaryngology residents had performed various ultrasound examinations. Furthermore, a minority of residents were satisfied with their degree of ultrasound education during residency.

Ultrasound is an imaging modality with many unique and beneficial features. It is low cost, provides real-time feedback to the clinician, and does not expose the patient to radiation. For the academic otolaryngologist, it may serve as a unique medium through which to teach anatomy to residents and medical students.

Ultrasound education for the otolaryngology resident comes in different settings. Formal instruction may be obtained from a variety of sources, including a head and neck–directed course sponsored by the ACS. In recent years, the AAO-HNS has provided a full 1-day course in conjunction with its Annual Meeting: the AAO-HNS Hands-on Otolaryngologic Ultrasound Course. Participation in these courses may be preceded by completion of the CD-based ACS Basic Ultrasound Course. Other opportunities for didactic instruction may exist at large-scale national scientific meetings and locally within each otolaryngology department. However, the most common way residents are exposed to ultrasound on an ongoing basis is by informal mentorship instruction.

There have been several barriers in the past for clinicians to incorporate ultrasound into their practices. A few decades ago, the poor resolution of ultrasound images, bulkiness of machines, increased cost, perceived steep learning curve, and absence of training opportunities inhibited otolaryngologists from incorporating ultrasound into their practices.<sup>3</sup> However, recent changes in all of the above items have facilitated greater ultrasound competence among

**Table 1.** Results of Ultrasound Needs Assessment in Otolaryngology Residency Programs

Characteristic	Frequency, n (%) (N = 110)
Resident level	
Postgraduate year 5	5 (5)
Postgraduate year 4	41 (37)
Postgraduate year 3	35 (32)
Postgraduate year 2	22 (20)
Postgraduate year 1	7 (6)
Attended ultrasound course	
Yes, ACS	4 (4)
Yes, AAO-HNS	1 (1)
Yes, other	22 (20)
No	83 (76)
Comfortable with performing ultrasound procedures after residency	
Strongly agree or agree	43 (39)
Neutral	19 (17)
Disagree or strongly disagree	48 (44)
Currently perform ultrasound procedures as part of training	
Yes, for procedures such as ultrasound-guided needle biopsy	50 (46)
Yes, for diagnostic procedures only	13 (12)
No, not included in training	47 (43)
Currently log ultrasound procedures (n = 68)	
Yes, diagnostic and interventional	14 (21)
Yes, only interventional	13 (19)
No, I do not log them	41 (60)
Access to an ultrasound machine in residency	
Yes, at all or most sites	47 (43)
Yes, but limited	38 (35)
No	25 (23)
No. of faculty who regularly perform ultrasound procedures	
None	21 (19)
1–2	51 (46)
3–4	30 (27)
>4	8 (7)
Desire more exposure to diagnostic and/or interventional ultrasound in residency	
Agree or strongly agree	78 (71)
Neutral	21 (19)
Disagree or strongly disagree	11 (10)

otolaryngologists. In a similar 2011 study, an assessment of future ultrasound practice patterns from senior otolaryngology residents (postgraduate years 4 and 5;  $n = 63$ ) revealed that 36.5% of respondents planned to use ultrasound in their future practice; 26.9% did not plan to use ultrasound in their future practice; and 36.5% were unsure. At that time, the largest perceived barriers to incorporating ultrasound into a future practice included an inability to perform ultrasound procedures (50.8%), costs of owning an ultrasound machine (39.7%), and concerns about ultrasound billing (34.9%) and credentialing (31.7%). Those most likely to use ultrasound were those planning on completing a head and neck fellowship (56.3%), no fellowship at all (48.8%), or an unspecified type of fellowship (61.5%).<sup>4</sup> In our study, there seem to be substantial barriers to performing ultrasound procedures during residency, including limited access to an ultrasound machine and limited access to faculty performing ultrasound examinations. These areas need to be addressed if the use of diagnostic or interventional ultrasound techniques is to become more widespread in otolaryngology residency graduates. One suggestion might be regional training programs to consolidate resources and learning opportunities for both trainees and faculty. Such training should incorporate the entire spectrum of clinical ultrasound, such as how to formulate a business plan, selection of an ultrasound machine, setting up a clinical work space, and how to determine internal quality control. There are also developing technologies in virtual reality and augmented reality for teaching ultrasound-guided procedures. These simulation models are portable, have a low interval cost, and are safe but translatable learning environments. Simulation symposiums held at national or regional forums might elect to prioritize such models in an effort to increase the awareness of ultrasound. Last, online webinars, such as those sponsored by the American Institute of Ultrasound in Medicine, should continue to be promoted and available to current and potential sonographers of all training levels.

One step to begin standardizing ultrasound training across otolaryngology residencies would be to require the reporting of ultrasound examinations, just as residents log surgical cases. Our data suggest that even those trainees performing ultrasound procedures are not consistent in logging these procedures. This

finding may be secondary to the possibility that trainees do not understand the importance of case logs for future postgraduation credentialing and are unaware that an ultrasound examination is a procedure that can be logged in the same way as thyroidectomy or laryngoscopy.

In 2009, the American College of Emergency Physicians issued a policy statement that outlined guidelines for resident ultrasound education, suggesting that each resident perform 150 ultrasound examinations for competence.<sup>5</sup> A follow-up study in 2010 showed that 64% of emergency medicine residency programs required more than 150 ultrasound examinations for competency, which was a considerable improvement from previous reports before the American College of Emergency Physicians statement.<sup>6</sup> Recent literature regarding general surgery training calls for an urgent need for a standardized ultrasound curriculum such as inclusion in the Accreditation Council for Graduate Medical Education Milestones Project.<sup>7,8</sup> Currently, most residents who are exposed to diagnostic or interventional ultrasound in otolaryngology do not log or track these procedures in a formal way. Encouragement of such a mechanism may be vital to legitimize and potentially credential our trainees as competent in performing ultrasound procedures. Furthermore, directors of resident boot camps in otolaryngology, general surgery, and endocrinology may wish to incorporate diagnostic and interventional ultrasound as a skills station. Early awareness of these techniques in our trainees will undoubtedly foster more comfort and open eyes toward future applications.

This study had several limitations. The data more heavily represent the experience of postgraduate year 2 and 4 residents. This factor is a consequence of the respondents' having been nominated by their residency programs to complete such surveys during a 1-year term as SRF resident representatives. It is also likely that the experiences of the SRF resident representatives do not fully reflect the experience of all trainees. Therefore, these data should be considered a snapshot into the trainee experience and not reflective of all otolaryngology residents. Furthermore, the data regarding course attendance should be interpreted with caution, as the question asked an individual respondent about having attended a course, but it may not represent the experience of all residents

currently in training. Nonetheless, most respondents had never attended an organized ultrasound course.

Last, the experience of residents likely parallels the experience of faculty, and some institutions lack faculty who are proficient in or interested in ultrasound. These factors are obvious barriers to resident education. Only within the last decade or so have academic faculty in the United States had opportunities for training and certification, mainly through ACS-based courses, including at the ACS Clinical Congress and the AAO-HNS Annual Meeting. Therefore, some senior-level residents may have had fewer years to accumulate experience than their more junior colleagues, based on faculty exposure and practice. Although it is only a snapshot in time of the current exposure to ultrasound training in otolaryngology residency and hence difficult to generalize, we are hopeful that this information will promote continued advancement of an ultrasound-focused curriculum.

In conclusion, otolaryngology residents in the United States have a variable amount of exposure to ultrasound training. Fewer than half of senior residents have performed many basic ultrasound skills. The biggest perceived impediment to future ultrasound use among prospective otolaryngologists is an inability to perform ultrasound procedures. Less than half of otolaryngology residents feel that their exposure and training in ultrasound are adequate.

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