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Otolaryngology Boot Camps: Current landscape and future directions

Running title: Otolaryngology Boot Camps

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Abstract

Objectives: Simulation-based boot camps have gained popularity over the past few years, with some surgical specialties implementing mandatory national boot camps. However, there is no consensus in Otolaryngology on boot camp timing, learner level or curriculum. The purpose of this study is to examine the current landscape and gather opinions regarding future curriculum and standardization of boot camps in Otolaryngology.

Methods: A survey was developed to examine current resident participation and boot camp content while also seeking opinions regarding improving boot camp enrollment and standardizing curriculum. A cross-sectional survey of all Otolaryngology residency program directors in the United States and Puerto Rico was performed via SurveyMonkey. Responses were collected anonymously and results were analyzed by descriptive statistical analysis.

Results: Of the 45% (48/106) who responded, 76.6% reported their residents participate in boot camps. The most common skills taught were basic suturing and airway management skills. The majority (95%) was likely to send residents to a local boot camp with 56% favoring early post-graduate year (PGY)-1 participation and 42% favoring a one-day boot camp. Subsidized expenses, improved regional access and supplementary boot camp information would help the

program director in their decision to send residents to boot camp. Only 32% felt boot camps should be standardized and 27% felt they should be mandatory.

Conclusion: Many Otolaryngology residency programs participate in boot camps. Additional data on the benefits of boot camps, improved access and reduced financial burden may improve participation. Further discussion of ideal timing, PGY level and standardized curriculum should occur in conjunction with the Otolaryngology academic societies and oversight from accreditation and certifying bodies.

Keywords: Otolaryngology, Residency, Medical Education, Boot Camps, Patient Simulation, And Surgical Education

Level of Evidence: N/A

Introduction

Over the last two decades, regulatory requirements and societal pressures have had a major impact on medical and surgical education. The Accreditation Council for Graduate Medical Education's (ACGME) focus on competency-based training coupled with restricted duty hours has forced educators to explore innovative teaching methods. At the same time, a growing emphasis on quality and safe care has made it difficult for the clinical environment to be the principal venue for the acquisition of skills.

Evidence suggests an increased rate of mortality and reduced efficiency in hospitals with the annual turnover of house staff; as senior resident physicians graduated, they were replaced with an inexperienced group of doctors[1]. More recent studies have further explored the "July phenomenon". Across different surgical subspecialties including general surgery, cardiothoracic surgery, and neurosurgery, nationwide studies have investigated medical errors due to intern inexperience and have failed to observe a "July phenomenon[2-5]." This has not been extensively examined in Otolaryngology with the exception of a study that looked specifically at the outcomes of head and neck cancer patients, which also showed a lack of a "July effect"[6]. Rather, novice trainees can be anxious about their new role as first responders and may lack confidence in their management knowledge and skills[7-9]. A recent study in pediatrics demonstrated an increased reporting of medical errors by new interns in the month of July in a

hospital-wide database despite a lack of increased adverse events in patient outcomes[10]. In response, the academic community and medical educators have advocated concentrated training to occur early in the academic year and believe simulation can play a vital role.

Simulation-based training has gained popularity in residency programs as they introduce important principles and skills to residents during various phases of learning[9,11]. Boot camps, in particular, are short but intensive learning experiences that offer residents a unique opportunity to gain knowledge, skills and behaviors using a variety of simulators and real-life scenarios without any risk to patients. Typically offered early in the academic year, boot camps provide incoming novice residents with a foundation and hands-on practice in basic skills so they are better prepared for patient care.

A number of medical and surgical specialties have invested in developing regional boot camps with standardized curricula to ensure broad availability and a uniform experience for their trainees[9,12-15]. Some report near 100% participation with an overwhelmingly positive response by both residents and faculty, who participated in the courses[9].

While several Otolaryngology-specific boot camps have been described, there is no consensus on timing, length or uniform curricular goals for these courses[7-8,16-19]. Furthermore, considering

the limited availability and scattered distribution of Otolaryngology boot camps, participation is restricted to a fraction of Otolaryngology residents. To better understand the current landscape and possible future directions of Otolaryngology boot camps, we queried Otolaryngology residency program directors to evaluate the residency programs' involvement in boot camps, to identify fundamental knowledge, skills, and behaviors expected of all residents and to determine opinions regarding regionalization, standardization of curricula, and mandating of boot camps in Otolaryngology.

Materials and Methods

A survey was developed to evaluate boot camps within the specialty's residency programs (Appendix 1). A combination of multiple choice, select all that apply and open-ended questions were employed. The survey was composed of four sections: (1) current landscape, (2) ideal fundamental content, (3) optimal timing and location, and (4) potential obstacles and limitations.

Participants in this study included the 106 program directors at ACGME-accredited Otolaryngology-Head and Neck Surgery residency programs in the United States and Puerto Rico during the 2016-2017 academic year. The survey was distributed electronically via email using SurveyMonkey.

Anonymity was maintained by eliminating the collection of the participants' IP addresses during survey completion. The Georgetown University Institutional Review Board approved this study.

Results

Current landscape

A total of 48 responses were received from 106 Otolaryngology residency program directors resulting in a 45% response rate. Of the program directors that responded, 77% indicated that their residents currently participate in simulation-based boot camps. The distribution of post-graduate years in which Otolaryngology-Head and Neck Surgery residents currently participate is presented in Figure 1. Multi-institutional boot camps were more common (58%) followed by single institution boot camps (20%) (Figure 2). Of those programs participating in boot camps, the most common skills included were tracheotomy/cricothyrotomy (92%), endotracheal intubation (81%), and epistaxis control (70%). Table 1 depicts a list of skills currently taught as components of a boot camp curriculum.

Ideal fundamental content

The most important procedural skills (Table 2) that program directors strongly agreed should be incorporated in a boot camp curriculum include tracheotomy/cricothyrotomy (85%) and endotracheal intubation (73%). Necessary basic management skills (Table 3) that should be included were managing the difficult to intubate patient (80%), the patient with a neck hematoma (59%) and an airway fire (59%). Most PDs (76%) did not think behavioral skills (i.e. breaking bad news, teamwork) were important to incorporate into a boot camp curriculum.

Optimal timing and location

In terms of boot camp timing, 41% of program directors who responded to the survey indicated that 1 day would be the optimal duration while 32% felt that 2 days would be more appropriate. Less than 13% of responders felt that the boot camp should last 4 days or more. Most responders (56%) thought that boot camps should be scheduled during the first few months of the PGY-1 year. 17% of responding program directors indicated that the implementation of a boot camp prior to the start of PGY-1 year would be beneficial to residents while another 17% felt that a boot camp after interns were able to complete the first 6 months of their PGY-1 year would be more appropriate. Less than 10% of responders felt that a boot camp should be implemented in the PGY-2 year or further along in residency.

The vast majority of program directors (95%) were likely to send their residents to boot camp if it was local. Subsidized expenses (85%) and improved regional access (66%) would help in the decision to send residents to a boot camp.

Obstacles and limitations

Programs that do not send residents to boot camps identify cost as the most common reason for not participating in boot camps (64%). Access (55%), scheduling difficulties (46%), a lack of interest in boot camps (18%), and scheduling conflicts (45%) are other constraints. Most program directors from the non-participating group expressed a desire to participate in future boot camps (60%).

Of the responding program directors, 39% responded no, 31% responded yes, and 30% had no opinion when asked whether residency boot camps should be standardized for residents. The majority (49%) felt boot camps should not be mandatory while 27% responded yes and 24% had no opinion. Seven responders skipped both of these questions.

Discussion

Many ACGME-accredited Otolaryngology-Head and Neck Surgery residency programs participate in simulation boot camps. Residents are engaged in these educational activities earlier in the academic year, which understandably prepares residents for patient and consult encounters throughout the remainder of their residency. They gain exposure and basic information related to some of the necessary technical skills to perform routine and sporadic procedures. Residents also learn the non-technical skills to work effectively within teams to manage clinical situations.

Multi-institutional boot camps are more common and this is likely due to the resource intensive nature of these educational activities. Otolaryngology is a small specialty and many departments cannot support single institution efforts, as these courses require content expert faculty and an appropriately equipped simulation center. These potential limitations have steered residency programs towards a combined multi-institutional approach whereby pooling faculty, simulation assets and organizational efforts allows for a wider engagement of learners. Other benefits of multi-institutional boot camps include the networking opportunity between residents and faculty from different programs. Residents are able to connect and learn from each other while having access to the teaching methods of various attending physicians and educators as well as the resources of multiple programs.

Popular skills in the current landscape of boot camps center on airway and bleeding emergencies and consist of tracheotomy/cricothyrotomy, endotracheal intubation, fiberoptic laryngoscopy, direct laryngoscopy and epistaxis control. The incision and drainage of facial or neck abscesses and closed reduction of nasal fractures were not included. It is unclear if these topics are considered less important or more than likely due to the absence of a simulation model for these skills. Program directors agreed these same skills should be incorporated in the ideal fundamental curriculum of boot camps. Although discussions on the management of common airway and bleeding emergency scenarios were thought to be important aspects of a boot camp course, many did not advocate for the inclusion of other basic patient management skills such as urinary retention and chest pain. However, with Otolaryngology residents spending less time on general surgery rotations, these skills may become more important for Otolaryngology educators to address in the future.

At the same time, it may be reasonable to suggest that these basic management skills should be taught in medical schools prior to starting internship. One program director touched on the subject that incorporating the teaching of standard management of principles such as chest pain, dehydration, and altered mental status should remain the responsibility of the medical school preparing the new physician for residency. Medical schools across the country have

implemented pre-graduation boot camps for fourth year medical students specifically entering surgical specialties with hopes to better equip them with the clinical and technical skills necessary to be a new surgical intern. In general, these boot camps seem to be overwhelmingly effective at improving subjective confidence of those medical students who completed the boot camps[20-24]. However, outcomes are not frequently assessed during the internship year or in the actual clinical environment, suggesting that it is still unclear if medical school boot camps are truly effective in preparing an intern for the clinical realm[20]. The majority of these medical school boot camps have developed curricula that include anatomy dissections and reviews, and simulations including line placement and intubations. Unique experiences to only a small number of medical school boot camps included hands-on experience in the emergency department, performing pre-anesthetic evaluation on surgical patients and mock codes or mock nursing page simulation exercises[22]. It is reasonable to suggest that basic management skills such as urinary retention and the management of the dehydrated patient should be taught during these medical school experiences, but these endeavors should be supported by data that they do in fact improve the competencies of practicing residents during their intern year.

With respect to optimal timing and locations, the program directors were in favor of one-day courses that would occur during the first few weeks of residency at either a local or regional

facility. An interesting discrepancy lies between the actual PGY-level of boot camp participation and program director recommendations based on the survey results. While most programs currently send PGY-2 residents to boot camps, 56% of responders indicated future boot camps should be scheduled in the first few months of the PGY-1 year. This may be related to the recent curriculum change in Otolaryngology residencies, which now allows residents to participate in six months of Otolaryngology rotations in the PGY-1 year. It is likely that the majority of established boot camps have been geared toward PGY-2 residents in the past because it was during that year of residency that resident physicians were experiencing their first true exposures to the world of Otolaryngology.

Interestingly, only 60% of responding program directors whose residents do not participate in boot camps expressed interest in future participation. Of the responding program directors, many indicated cost and scheduling difficulties, specifically maintaining adequate workforce numbers at the home institution, play significant roles in why their residents do not currently participate in boot camps and why they might not be interested in them in the future. Lack of access exacerbates the issue.

It is necessary to further investigate these limitations and to understand how other subspecialties that have developed mandatory boot camps have circumvented the issue. A study conducted in 2015 explored the cost of surgical skills boot camps, focusing on both

technical and non-technical skills including suturing, basic laparoscopic skills, and the general management of chest pain, dehydration, falls, and altered mental status[15]. It was estimated that for approximately 40 surgical interns, the cost of the program would amount to just under $20,000, or about $455 per subject[15]. Suggestions to help drive down costs included utilizing already established simulation facilities, utilizing web-based virtual patient scenarios rather than hiring professional medical actors, and using both residents and volunteer faculty to help teach the course. Ultimately, the budget for a surgical skills boot camp was outlined, but true cost-effectiveness can only be determined when the benefits of the course are explored through post-course evaluations and observation of interns on the wards.

Surgical subspecialties like Neurosurgery and Plastic surgery rely heavily on industry funding and grants from the participating institutions[13-14]. At both the national Neurosurgery meeting and a similar Plastic Surgery boot camp, the course was free to all applicants and programs with the exclusion of travel. Neurosurgery further elucidates the cost of their course including printing, facility rental fees, meals, transportation and housing and reporting a price of $625 dollars per resident while residency programs reported only a $215 travel cost average[13]. If there is consideration of a nationwide boot camp in Otolaryngology, further investigation into a possible budget, educational grants, industry sponsors, and donations from the participating institutions will need to occur. The ultimate goal would be a cost-effective boot camp, where

both technical and non-technical skills learned were invaluable and positively impacted the education of Otolaryngology interns.

Of the program directors who responded, the majority indicated that future boot camps for Otolaryngology-Head and Neck Surgery residents should not be standardized. In the open-ended questions, one program director indicated that not all boot camps should be the same, but that “ideas and tools should be shared” across different boot camps. Another stated that “best practices, guidance and pre-built scenarios would be more beneficial to the education of residents” rather than the standardization of the boot camps themselves. The same responder indicated “simulation is most beneficial when a resident can do it with the equipment they would normally use.” Conversely, others commented that a standardized curriculum would assist interns by “starting off on a good footing and that every Otolaryngologist should have these skills”. These sentiments suggest that rather than developing uniform boot camps across the country, a boot camp curriculum composed of a basic set of skills that also allows programs the opportunity to select from various additional skills may be ideal. This structure would encourage programs to utilize local resources and involve healthcare colleagues who typically interact with residents on a daily basis whether in the operating room, in the emergency department or in the clinic. Several program directors suggested developing “best practices” of boot camps related to the basic set of skills and the content details should be left to the

discretion of the program director to customize their own regional boot camps based on their specific program needs.

The first Otolaryngology boot camp was developed in 2009 and focused on preparing novice residents for common bleeding and airway emergencies. The resident participants reported improved knowledge, skills and confidence that persisted 6 months post-boot camp[7-8]. Since then, Otolaryngology boot camps have multiplied across the United States and Canada[25-30]. Unfortunately, as illustrated by this survey, boot camp opportunities are available only to select programs. Of the program directors that participated in the survey, 23% indicated that their residents do not participate in boot camps and cited cost, difficulty scheduling, and access to boot camps as primary reasons that have kept their residents from participating. Furthermore, there are inconsistencies in the boot camp curricula resulting in varied resident experiences. For example, one responder described their boot camp as incorporating the following: "facial trauma evaluations, free flap failure recognition, difficult infant intubations, CSF leak management, carotid blow-out management, tonsil bleed management, and patient hand-offs" in addition to more commonly incorporated skills such as direct laryngoscopy, flexible and rigid bronchoscopy, epistaxis management and incision and drainage of a peritonsillar abscess. Another responder indicated their boot camp focused primarily on urgent/emergent airway

situations and included “direct laryngoscopy, bronchoscopy, esophagoscopy, cricothyrotomy/tracheostomy and removal of ear/nose/airway foreign bodies.”

Many medical and surgical specialties have also recognized the benefits of simulation-based boot camps and have made significant efforts to provide this valuable educational opportunity to their trainees. For example, in 2010, The Society of Neurological Surgeons developed a national fundamentals curriculum for Neurosurgery residents focused on skills, knowledge, and attitudes that promote quality, patient safety and professionalism. This standardized course, taught at 6 regional centers, is mandatory for all PGY-1 Neurosurgical residents. There has been an overwhelmingly positive response in the Neurosurgical academic community on the standardized boot camp. Both residents and faculty, who participated in the courses, felt that the boot camp increased the residents’ knowledge and skills, which ultimately improved patient care[9,12-13]. This has led Neurosurgical residency programs to make this boot camp a program requirement. If first year residents do not complete the boot camp, they are not permitted to practice without direct supervision. Additionally, Neurosurgery programs have even developed another supplementary national boot camp for PGY-2 Neurosurgery residents because of the first year boot camps success.

From this information, the Otolaryngology academic community could consider undertaking the exploration of similar educational opportunities to provide broad access with uniform and consistent teaching to all our trainees. Future efforts could potentially focus on the development of a fundamental curriculum that teaches a systematic core of skills, knowledge and behaviors but also allows for added customization to meet the specific needs of individual programs. Ideally, this effort would occur in collaboration with the Otolaryngology academic societies with oversight from accreditation and certifying bodies.

Recent medical education reform coupled with political and societal pressures for quality and safe care have fueled the exponential growth and use of simulation. Simulation-based medical education and boot camps have become one of several effective means of preparing junior residents and can be a valuable component of residency training. The Otolaryngology community may consider providing affordable and accessible boot camps to all our residents in the future.

Limitations of this study include a 45% response rate. Therefore, the conclusions from this group of responders may not reflect the opinions of the majority. It is also possible that a large portion of program directors did not respond to the survey because they do not participate in boot camps or have no opinion regarding the establishment of boot camps within the specialty.

Additional limitations are the risk of survey bias with respondents being more interested in boot camps. However, 23% of responders do not participate in boot camps. Furthermore, some program directors did not reply to all the survey questions; this could be due to the survey design not requiring responses, the program director did not perceive the question as pertinent, confusion about the question or that the survey was time consuming.

Conclusion

Simulation-based boot camps can be a significant and valuable component of residency training. Providing affordable and accessible boot camps to all Otolaryngology residents should be our goal. Although some Otolaryngology residency programs participate in boot camps, additional data on the benefits of boot camps, improved access and reduced financial burden may improve participation. Further discussion of ideal timing, PGY level and standardized curriculum should occur in conjunction with the Otolaryngology academic societies and oversight from accreditation and certifying bodies.

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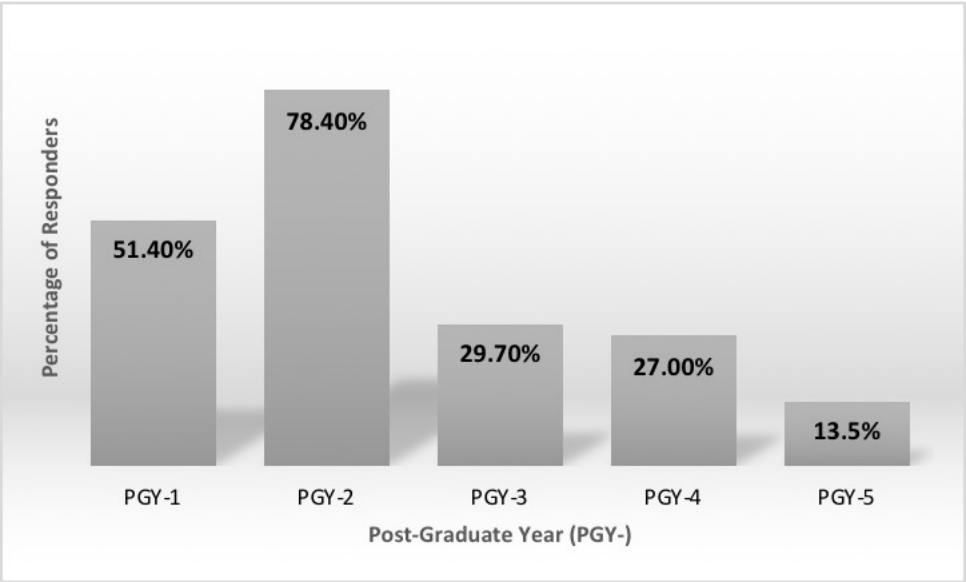
Figure Titles and Captions

Figure 1. The distribution of residents currently participating in Otolaryngology-Head and Neck Surgery boot camps.

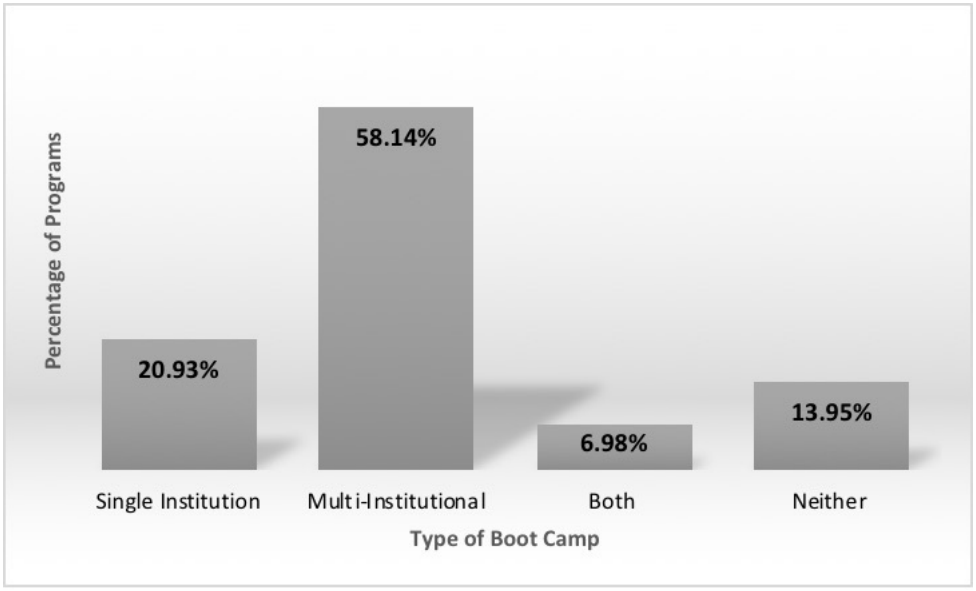
Figure 2. The types of boot camps in which residents currently participate.

Appendix Titles and Captions

Appendix 1. Otolaryngology/Head and Neck Surgery Program Director Boot Camp Survey



BootCamp_Figure 1.jpg



BootCamp_Figure 2.jpg

Table 1. Procedural Skills Currently Taught at Boot Camps

Types of skills being taught	Percentage of Programs
Tracheotomy/Cricothyrotomy	91.89%
Endotracheal intubation	81.08%
Epistaxis Control	70.27%
Fiberoptic laryngoscopy	64.86%
Direct laryngoscopy	64.86%
Rigid bronchoscopy	62.16%
Basic suturing	59.46%
Bag mask ventilation	56.76%
Fiberoptic intubation	54.05%
Drainage of Peritonsillar Abscess	45.95%
Myringotomy	45.95%
Rigid esophagoscopy	35.14%
FB Removal	35.14%
Flexible bronchoscopy	24.32%
Microscopy	18.92%
Auricular hematoma drainage	16.22%
Lateral canthotomy	16.22%
Flexible esophagoscopy	13.51%
Other	13.51%
Reduction of nasal fracture	8.11%
Drainage of neck abscess	8.11%

Table 2. Procedural Skills that Program Directors (PD) Feel Should Be Included in Boot Camps

Skills To Be Included	Percentage of PDs that strongly agree
Tracheotomy/Cricothyrotomy	85.37%
Endotracheal intubation	73.17%
Fiberoptic laryngoscopy	63.41%
Epistaxis Control	63.41%
Fiberoptic intubation	56.10%
Bag mask ventilation	53.66%
Direct laryngoscopy	53.66%
Drainage of Peritonsillar Abscess	53.66%
Basic suturing	51.22%
Rigid bronchoscopy	39.02%
Myringotomy	34.15%
Foreign Body Removal	29.27%
Microscopy	26.83%
Lateral canthotomy	26.83%
Flexible bronchoscopy	21.95%
Reduction of nasal fracture	17.07%
Rigid esophagoscopy	14.63%
Auricular hematoma Drainage	14.63%
Drainage of Neck Abscess	14.63%
Central line insertion	7.32%
Arterial line insertion	7.32%
Flexible esophagoscopy	4.88%

Table 3. Basic Management Skills that Program Directors (PD) Feel Should Be Included in Boot Camps

Skills to Be Included	Percentage of PDs that strongly agree
Difficulty intubating	80.49%
Neck hematoma	58.54%
Airway Fire	58.54%
Flap Compromise	39.02%
JP drains	39.02%
Altered mental status	31.71%
SSNHL	31.71%
Septal hematoma	29.27%
Dehydrated patient	26.83%
Chest pain	26.83%
Temporal bone Fractures	17.07%
Urinary Retention	14.63%