

A current render of pediatric otolaryngology in the United States

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Introduction

Complex pediatric otolaryngology can be generally regarded as a subspecialty within otolaryngology focusing on the care of children with complex diseases of the head and neck and aerodigestive tract, or in some cases more common diseases in this anatomical region in otherwise medically complex children. This concept of the specialty was succinctly articulated by Charles Bluestone in 1995 when he wrote pediatric otolaryngologists treat “special problems or special children, or both”.¹ Increasingly, this care is delivered by multi-disciplinary pediatric health care providers working at highly specialized tertiary care centers for children. This review will briefly cover the historical evolution of the specialty's origins, along with its current state of graduate medical education training and sub-certification efforts.

History of pediatric otolaryngology

The development of pediatric surgical sub-specialties was spawned from the creation of tertiary pediatric hospitals caring for medically complex children in an environment of multi-disciplinary pediatric subspecialty health delivery. In this context, the earliest work in developing complex pediatric otolaryngology as a formal specialty can be traced to pioneer surgeons in the 1950's such as Blair Fearon, Seymour Cohen, and Charles Ferguson working at leading Children's Hospitals.² Subsequently, formal groups of thought leaders such as the aforementioned Charles Bluestone and Sylvan Stool working under the

auspices of the American Academy of Pediatrics (AAP) in the 1970's worked to develop a formal section for pediatric otolaryngology within the AAP.¹ In 1985, 56 otolaryngologists from the United States and Canada founded the American Society of Pediatric Otolaryngology (ASPO), creating an organization to help foster and disseminate research, knowledge and scientific interest in pediatric otolaryngology as well as to gather further respect and recognition from the American Academy of Otolaryngology–Head and Neck Surgery.³ To this end, ASPO annual meetings became a part of the formal Combined Otolaryngologic Society Meetings in 1991. Over the years, ASPO has grown from its initial 56 charter members in 1985, to 385 members in 2010, to a current roster of 650 members in 2019— along the way evolving into the principal academic pediatric otolaryngologic society in North America. The current mission of ASPO is to foster excellence in the care of children with otolaryngologic disorders by promoting education and collaborative research, and to share and disseminate advances and innovations in patient care through the Annual Meeting and other venues.⁴

Advancement of fellowship training in pediatric otolaryngology

The first pediatric otolaryngology fellowships were formed at Children's Hospital of Pittsburgh, Cincinnati Children's Hospital, and Boston Children's Hospital in the 1970's. Other pediatric hospitals soon followed suit, with

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approximately 20 fellowships existing in 1995. Given this broad proliferation of fellowship programs, in many cases offering widely divergent training experiences, efforts were undertaken to standardize the educational curriculum across programs. In 1995, the Accreditation Council for Graduate Medical Education (ACGME) developed criteria for accrediting pediatric otolaryngology fellowships, with guidelines/program requirements first being made public in 1996. Subsequently, the first four programs to garner accreditation from the ACGME were Cincinnati Children's Hospital, Texas Children's Hospital/Baylor Medical College, the University of Iowa, and Children's Hospital of Pittsburgh. Over the years, the ACGME has refined criteria for complex pediatric otolaryngology in terms of training program requirements, didactic curriculum, index surgical cases, and minimum case numbers for successful completion of training (Table 1). In 2005, the ASPO board espoused the goal of a uniform and transparent application process through a fellowship match, with the subsequent goal of universal ACGME accreditation for all fellowship programs, many of which were still offering unaccredited training positions. Given this directive, the number of accredited training positions available through the match increased from four accredited programs offering nine of the 14 total fellowship positions in the match in 2001 to 22 accredited programs offering 34 of the 45 total fellowship spot positions in the match in 2015.^{5,6} In 2019, the ACGME listed 29 accredited pediatric otolaryngology fellowship programs,⁵ with less than 5 programs remaining in the US not under ACGME accreditation. By these metrics, one would conclude that ASPO efforts were indeed successful in prescribing

the standardization of pediatric otolaryngology training through the ACGME.

In parallel to this standardization, interest in pediatric otolaryngology fellowship training has seen remarkable growth. The yearly number of registered applicants for the pediatric otolaryngology fellowship match increased from 13 in 2001 to 50 in 2018 (Figure 1), with the 2018 fellowship match having the highest number of registered applicants ever.⁷ Despite this, the recent past has seen somewhat of a plateau in applications to pediatric otolaryngology. The number of unfilled positions remaining after the 2019 fellowship match was 30.6%, the highest in the past ten years (Figure 2). It may be that the number of fellowship training spots has finally exceeded the number of interested applicants to pediatric otolaryngology. How this trend continues to evolve over the next 5 years will be interesting.

As training in pediatric otolaryngology has increased, concerns exist that as more and more pediatric otolaryngology fellows graduate, there will be a saturation of the workforce market, and as such less trainees will be working—as originally intended by the specialty's founders—at a tertiary setting and rather entering a general private community based practice.^{8,9} Workforce data addressing whether this concern has validity is lacking. Notably, however, studies show that a higher proportion of fellows trained in accredited programs currently work in academic centers or hospital based practices as opposed to those trained in non-accredited programs.¹⁰ Further, a survey of recently fellowship trained pediatric otolaryngologists, more graduates in accredited programs felt prepared for a career in academic medicine than those

TABLE 1 Pediatric otolaryngology training key indicator case minimums, 2019

Category	Minimum Number
Congenital Anomalies	
Branchial cleft anomaly excision; Thyroglossal duct cyst excision; Dermoid cyst/ glioma/ encephalocele excision; Hemangioma, lymphatic or vascular malformation excision; Ranula excision	20
Head and Neck Surgery	
Drainage deep neck abscess (age < 3 years or ASA risk status > II); Excision angiofibroma or other nasopharyngeal tumor; Parotidectomy; Submandibular gland excision; Thyroidectomy	12
Otology	
Mastoidectomy; Ossicular reconstruction; Cochlear implant; Osseo-integrated implant	30
Closed Airway Procedures	
Tracheostomy (age < 3 years)	5
Open Airway Procedures	
Thyrotomy (laryngofissure); Laryngoplasty/ laryngotracheoplasty; Cricotracheal/ tracheal resection and repair	8
Endoscopy with Intervention	
Laryngoscopy and intervention; Bronchoscopy and intervention; Esophagoscopy and intervention	50
Rhinology	
Sinonasal endoscopic (age < 13 years or ASA risk status > II); Endoscopic sinonasal; Repair choanal atresia	40
Facial Plastics	
Otoplasty 69300 Cleft repair – lip; Cleft repair – palate; Pharyngoplasty / pharyngeal flap; Mandibular osteotomy; Placement mandibular craniofacial distraction device; Reconstruction microtic ear, any stage; Repair complex lacerations (all sites, including intraoral)	5

ASA, American Society of Anesthesia

trained at non-accredited programs.¹¹

Sub-certification in complex pediatric otolaryngology

The issue of certification in pediatric otolaryngology has been long recognized and advocated by ASPO with efforts dating as far back as 1992 regarding the pursuit of a certificate of added qualification for pediatric otolaryngology.¹² Sub-certification allows for individuals with additional training beyond residency and a practice focused in complex pediatric otolaryngology to demonstrate their knowledge and skills in this area and be publicly recognized for such. Upon formal requests from ASPO leadership, and after extensive investigation and consultation with invested stakeholders, the American Board of Otolaryngology–Head and Neck Surgery (ABOHNS) decided in the late 2010’s upon moving forward with the development of board sub-certification in complex pediatric otolaryngology.¹³ As part of these efforts, it is anticipated that the ABOHNS will

develop a technical report which will describe the scope of knowledge covered by the subspecialty, describe the development process for the exam blueprint, and include details regarding both written and oral examinations. It is estimated the first certification examinations will be available in the early 2020’s.

Future

The practice of complex pediatric otolaryngology will continue to evolve over the next 50 years. Exciting refinements in minimal invasive surgical techniques, such as increased application of endoscopic interventions for complex laryngeal pathologies,¹⁴ integration of robotic surgery both for pharyngeal and upper airway lesions,¹⁵ perinatal and fetal airway surgical interventions,¹⁶ and robotic assistance in minimalistic cochlear implant surgery¹⁷—to name a few—have all been described in the recent past and will continue to expand into the future. Moreover, research in the area of 3D tissue printing and bioengineering is likely to open a whole new arena of

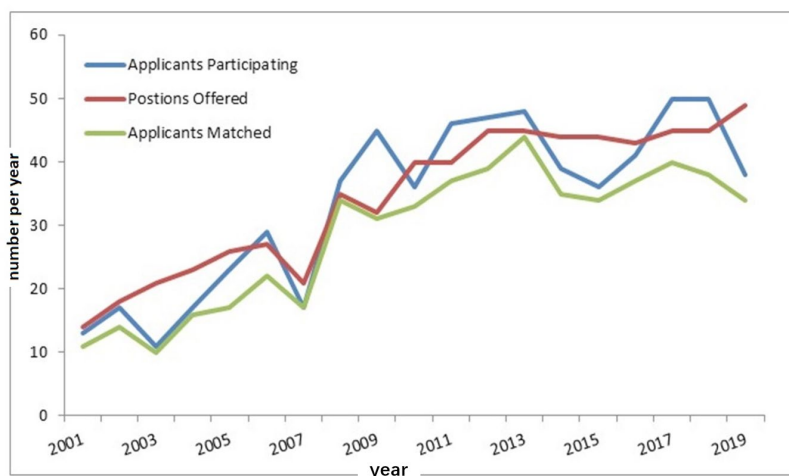


FIGURE 1 Pediatric otolaryngology match data from 2001–2019. Data from SF Match.

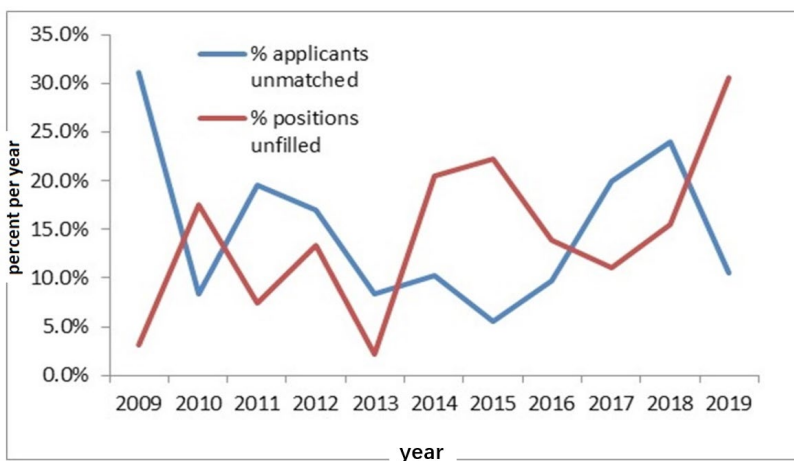


FIGURE 2 Percentage of unmatched applicants versus unfilled positions in the pediatric otolaryngology match from 2009–2019. Data from SF Match.

pediatric airway surgical reconstruction.¹⁸ Advances in genomics, precision medicine, deep machine learning and artificial intelligence are likely to influence the practice of pediatric otolaryngology from otitis media diagnosis to hearing loss treatment.^{19,20} Integration of simulation into surgical training and competency assessment will predictably increase over time.^{21,22} In order to stay at the forefront of these advances and to meet the demand of increasingly complex health systems, pediatric otolaryngology practices will likely continue to increasingly move towards hospital-based multidisciplinary team medicine models.²³

Conclusions

In conclusion, complex pediatric otolaryngology has evolved into a mature sub-specialty over the past 50 years. This process has included the organization of complex practices within tertiary pediatric centers, the development of standardized fellowship training programs accredited through ACGME and finally the implementation of board certification by ABOHNS. Given these exiting advances, the specialty is well-positioned to meet the complex needs of children with otolaryngologic disorders into the future.

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CONFLICT OF INTEREST

None.

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