

## Career Resources

# Pediatric surgery: a career resource

### KEYWORDS:

Pediatric surgery;  
Surgical subspecialty;  
Career development;  
Residency training

**Abstract.** Pediatric surgeons provide care to neonates and children with a unique range of congenital, oncologic, infectious, and traumatic disorders. This unique surgical subspecialty continues to recruit outstanding trainees, despite the additional training required. This career resource guides the interested medical student and physician through the pathway to a practice in pediatric surgery. It includes a discussion of training requirements, research opportunities, board certification, and continuing education.

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Nearly 75 years ago, pediatric surgery began an evolution into its own specialty because of increasing awareness that “children are not just little adults.” From congenital defects to variable physiology, neonates and children have distinctive constellations of problems and complex surgical needs rarely seen in adults. The surgical treatment of the child requires a love of children, patience with their families, understanding of their unique physiology, and delicate surgical technique. Pediatric surgery is sometimes described as the “last bastion of the true general surgeon” because the pediatric surgeon typically performs the gastrointestinal, thoracic, vascular, transplant, and trauma care of the patient; there is much less division into the organ specific subspecialization seen in the management of adult surgical patients.

There are an estimated 800 practicing pediatric surgeons in the United States, although they compose less than 2% of all surgeons.<sup>1</sup> Women, minorities, and international graduates are an important component of the pediatric surgical workforce. According to the American Medical Association, 19.1% of full-time active pediatric surgery faculty are women, whereas 30.7% of pediatric surgery residents are women. Just under 5% are international medical graduates.<sup>2</sup> A wide range of practice settings are available to the surgeon including provision of care in a full-service adult hospital with a pediatric unit, a freestanding Children’s Hospital, or even an urban community hospital. Because of the volume of births and children needed to sustain an exclusively pediatric practice, these subspecialists are unlikely to be found in a rural setting. Although many pursue

academic careers with research and significant educational commitments, others explore small group or private practice with strictly clinical responsibilities. Although the vast majority are in full-time practice, a small number practice part-time or serve as locum tenens.

## Medical Students

Medical students with an interest in pursuing pediatric surgery should strongly consider an elective in the subspecialty during the fourth year of medical school. Students at medical schools not offering rotations in the specialty will find that most pediatric surgeons at other institutions are happy to have them rotate if the appropriate administrative arrangements are made. Although not mandatory, the elective may allow the trainee to determine if the field is a “good fit” for his/her personality, and it may impact his/her choice for a general surgery training program. Attending a general surgery program with a pediatric surgery fellowship is not mandatory, although some residencies provide more or less exposure to the subspecialty and residency choice may impact the availability of mentors for career development. A series of excellent interviews from 15 different pediatric surgeons is available on the web site of the American Medical Student Association and provides some insight on the training, challenges, and rewards of a pediatric surgery career.<sup>3</sup>

## Residency Requirements

The completion of a full residency in general surgery remains a requirement for entering a residency in pediatric

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surgery. Interviews for pediatric surgery residency generally occur from January through April in the year before the anticipated start of training. As such, most applicants have made their decision to pursue subspecialty training no later than the start of the fourth year of general surgery training. There are now 44 ACGME-approved training programs distributed between the United States and Canada, although some of the programs only accept 1 fellow every 2 years.<sup>4</sup> The traditional format of online application through the Association of American Medical College's Electronic Residency Application Service followed by a period of interviews and a subsequent match day is used. Occasionally, programs may elect not to enter the match and select a promising candidate directly.

Unlike many other surgical subspecialties, the number of applicants for pediatric surgery residency continues to exceed the number of available training positions. Competitive applicants will have letters of recommendation describing excellent clinical judgment, strong technical skills, a high degree of professionalism, good work ethics, and effective personal skills. Most, although not all, spent a period of time in research endeavors and showed success in writing, presenting, and publishing.

Candidates who do not match in pediatric surgery but are committed to a career in pediatric surgery may elect to spend an additional period of time in either research or further clinical training. For these trainees as well as interested general surgery residents, a number of programs have been developed for concentrated clinical training in specific areas of pediatric surgery. Current offerings include extracorporeal membrane oxygenation (ECMO), endosurgery, critical care, fetal surgery, and vascular malformations. Although some have been evaluated and approved by the ACGME, none of these positions count toward the 2-year requirement for pediatric surgery residency training. Acceptance of these positions provides clear exposure to working pediatric surgeons and an opportunity to see firsthand the challenges and rewards of pediatric surgery. A full listing of the available positions is posted on the APSA web site by the Association of Pediatric Surgery Training Program Directors.<sup>5</sup>

## Residency

Residency in pediatric surgery consists of 2 years with focus on "congenital, neoplastic, infectious, and other acquired conditions" of the abdomen and thorax. Exposure to the operative and nonoperative management of pediatric multisystem trauma remains an integral component of training. Residents are expected to develop minimally invasive and endoscopic skills for the evaluation and treatment of both the respiratory and gastrointestinal tracts. Components of training will also focus on care of the critically ill infants and children with understanding of ventilator management, nutrition, cardiopulmonary resuscitation, and ECMO.

To better achieve these requirements, a standardized core curriculum has been developed, including a series of basic science lectures for pediatric surgical trainees. To supplement the experience at the individual training program, several resident training sessions with focus on advanced laparoscopic techniques, colorectal procedures, and other uniquely pediatric disorders are held nationally. Individual programs may also include training in pediatric transplantation, obesity surgery, urology, and even limited cardiovascular procedures. In January of each of the 2 years of residency, an in-training examination is administered through the American Board of Surgery (ABS) to monitor the progress of the trainee's knowledge acquisition.<sup>6</sup>

Like general surgery residency, pediatric surgical training complies with the ACGME 80-hour workweek and the requisite days free of training responsibilities. Because pediatric surgery residents are already fully trained as general surgeons, most programs allow a greater degree of independence in the management of patients and decision making. Most fellows will find the training of general surgery residents and medical students to be an important component of their responsibilities. At the completion of the program, residents are expected to have performed at least 800 major pediatric surgical cases and overseen the nonoperative trauma management of 90 children, although most will exceed these minima. A plethora of job opportunities in a wide variety of practice settings remain available to those who complete their training, and a sampling can be seen on the APSA web site.<sup>5</sup>

## Board Certification

In addition to the completion of training and board certification in general surgery, pediatric surgeons may also earn a Certificate of Special Qualification in Pediatric Surgery. Since 1973, the ABS has granted the additional certification to those who complete a 2-year, ACGME-approved pediatric surgery residency and successfully pass both the qualifying (written) and certifying (oral) examinations in the specialty.<sup>7,8</sup> Just under 1,000 pediatric surgeons have achieved board certification in the specialty as of January 2008.<sup>6</sup>

After certification or recertification, pediatric surgeons are now enrolled in the new ABS maintenance of certification programs. Surgeons must document programs of continuing medical education above and beyond state licensing requirements. All must take a self-assessment examination every 3 years in addition to participating in an outcomes database or program to assess quality of care. Finally, a secure written examination in pediatric surgery must be passed every 10 years. Pediatric surgeons are not required to maintain general surgery certification, although it is highly encouraged.

## Research Fellowships and Grant Funding

Pediatric surgeons have long promoted themselves as true surgical scientists with a higher emphasis on basic science and translational research than found in other surgical subspecialties. As such, a number of research positions studying a broad range of diseases are available to trainees with an interest in pediatric surgery. Many of these positions include funding for those who also accept clinical call responsibilities, whereas others have opportunities, although not requirements, for moonlighting. A large number of these available positions are listed on the APSA web site. Some general surgery residencies will fund the salaries of their resident during the research years. Additional funding opportunities are available through surgical organizations including the American College of Surgeons, the American Academy of Pediatrics, and the Association of Women Surgeons.

Although the 2-year clinical residency in pediatric surgery rarely provides opportunity for basic science investigation, it is common for clinical papers and case presentations to come to fruition. A number of the more research-oriented training programs will also offer financial support for a year or more before or after the actual clinical residency for the developing pediatric surgeon to establish a foothold in basic science research at the beginning of his/her career. For the very talented budding surgical scientist, some residency programs have even supported the pursuit of a PhD degree at the completion of clinical training.

The APSA has also developed an Outcomes and Clinical Trial Center within the American College of Surgeons to assist in the organization of outcomes research, the promotion of active projects, and the collection of data. A number of prospective, randomized, multicentered trials in progress through the center can be reviewed on the APSA web site.<sup>6</sup>

## Lifelong Learning

Even after the completion of all training and entry into the workforce, pediatric surgeons remain dedicated to the pursuit of optimal care of the child. Organizations such as APSA, the Surgical Section of the AAP, and the American College of Surgeons support continuing medical education through annual conferences, forums, and journal. In addition, some pediatric surgeons develop a particular area of practice within the field including trauma, transplantation, ECMO, and minimally invasive techniques and additional memberships in related organizations supplement ongoing education.

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