

## EDITORIAL

# A PARADIGM SHIFT IN VASCULAR TRAINING AND ITS IMPACT IN THE UNITED STATES

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In the United States, vascular surgery became a distinct specialty of surgery on March 17, 2005. A Primary Certificate in Vascular Surgery was permitted when the American Board of Surgery (ABS) received approval from the American Board of Medical Specialties (ABMS) and removed the requirement for 5 years of training and certification in general surgery. The ABS is an independent, nonprofit organization which certifies surgeons who have met a defined standard of education, training, and knowledge. The ABS certifies graduates of the Residency Review Committee (RRC) approved programs through a process of written (qualifying) and oral (certifying) examinations. The Accreditation Council for Graduate Medical Education (ACGME) has been created to oversee the administrative, policy, and business aspects of the accreditation. The RRC monitors their performance<sup>(1)</sup>.

The rapid expansion of endovascular therapies in the early 2000s led to formalization of the training criteria and eventual progression to a two-year accredited Vascular Fellowship, previously only one year. The 7-year commitment extended post-graduate training leaving concerns about recruitment among trainees of delay in the ability to repay school loans and poor lifestyle. In 2004 and 2005; there were not enough applicants to fill training positions leaving some unfilled. The development of shorter training programs was spurred by an interest in expanding the qualified applicant pool. The aging of the population and concerns about the increased demand for Vascular Surgeons became a focus. This then facilitated the development of different training paradigms for a certificate in vascular surgery. Various different options exist including the original 5 + 2 year (Vascular Fellowship), 0-5 year (Integrated) and 4+2 year (Early Specialization) programs.

In 2008, the 0-5 integrated residency pathway increased to 9 programs as the number of positions in the 5-2 pathway remained stable, with approximately 120 positions available each year<sup>(2)</sup>. In 2009, Schanzer et al. assessed the applicant pool and found that the number of integrated vascular resident applicants increased dramatically, with 152 applicants seeking to match into 19 available positions. The fact that 88% of integrated vascular residency applicants did not match, while 16% of traditional fellowship positions went unfilled demonstrated that this new paradigm was much needed and encouraged the expansion of the training programs to meet this need<sup>(3)</sup>. Other institutions and nationwide data have independently confirmed that this trend towards interest in the 0-5 vascular surgery residency training paradigm continues to significantly increase. Zayed, et al. felt that there is a significant difference between the cohorts of 0-5 residency and 5-2 fellowship program applicants at the completion of medical school; suggesting that 0-5 integrated vascular surgery residency program attracts a different type of medical student population to the specialty<sup>(4)</sup>.

Further data was needed to determine if this novel training program would produce equally well-trained vascular surgeons compared to the Traditional Pathway. A review of recent literature looked at the 5+2 Fellowship as compared to the integrated (0-5) vascular surgery training programs with respect to case volume. Integrated trainees were finishing with higher total case volumes in particular among endovascular procedures while open case numbers remained similar<sup>(5,6)</sup>. These authors also analyzed published data regarding trainees from these 2 different types of programs. There were expected differences in training residents fresh out of medical school compared to those who had already completed five years of general surgery residency. Differences in age, having rotated on a vascular service, having a vascular mentor as well as more vascular publications were all identified as significant differences attributed to the integrated 0-5 cohort. The three most common reasons noted for pursuing integrated vascular training rather than a traditional fellowship were the desire for a more focused training, interest in catheter-based therapies, and preference of a shorter training period<sup>(6,7)</sup>. Another study found that the integrated programs attracted a higher percentage of females, applicants with secondary degrees, higher standardized testing scores, and applicants who were more often in the top quartile of their medical school class compared to their fellow counterparts<sup>(4)</sup>.

One 0-5 resident described his training experience as adequately preparing him for vascular practice. He also commented that although he was new graduate, he was often called in to assist on emergencies for other services such as otolaryngology, neurosurgery, trauma surgery, colorectal surgery, surgical oncology, and breast and endocrine surgery. He was well received and treated with respect despite being younger. However, he wisely noted that the further out from training these surgeons were, the more inexperienced they were with problems outside of their own specialty<sup>(8)</sup>.

Survey data in 2013 from 2 cohorts of trainees, 0-5 and 5-2, was evaluated with respect to job search experiences. Eleven integrated residents and 25 traditional fellows were queried with an 81% response rate. Similar to prior studies, there was no significant difference between residents and fellows in the operative experience obtained as measured by the number of open and endovascular cases logged. Most graduates were extremely satisfied with their training and had described positive experiences during their job searches. This included starting salaries, numbers of offers, and desired practice type. In this small group, more integrated residents chose

academic and mixed practices over private practices compared with fellowship trained graduates<sup>(9)</sup>.

As of 2021, there are 77 traditional training programs which includes 5 years of general surgery followed by 2 years of vascular fellowship. There were 136 applicants for 129 positions. The applicant number is stable with a slight increase of 2% from the previous year. However, the number of programs has increased to 100 in 2021. In comparison, the number of applicants for the 0-5 Integrated Vascular Residency has increased greatly with the number of programs increased by five over two years to 79 in 2020 with 181 applicants; 94 of which are US MD graduates<sup>(10)</sup>. The 0-5 program accepts applicants directly from medical school. The integrated residency must be at least 60 months in duration, and in both training pathways the trainees must perform more than 250 major vascular reconstructive procedures<sup>(2)</sup>.

More recently, a web based curriculum, approved by the American Board of Surgery, called VSCORE (Vascular Surgical Council on Resident Education) has been formulated to standardize vascular trainee education. Links to academic resources are present with each topic. Learning is assessed annually through a written Vascular Surgery in Training exam. Each program additionally provides clinical and basic science lectures based upon the Association for Program Directors of Vascular Surgery (APDVS) curriculum, journal club, and simulation opportunities for open and endovascular skills.

The APDVS is now encouraging awareness about burn out. Efforts are being made to minimize burnout during surgical training. Trainees and practicing vascular surgeons are being educated about noted symptoms, importance of mentorship, self-care, and access to resources for stress reduction. In addition, mechanisms for maintaining a positive outlook and a sense of meaningful work are described including faculty entrustability, receptive leadership, celebrating small wins, and recognition that resiliency is a skill that can be developed<sup>(11)</sup>. Limitations of work hours and a well-organized education curriculum have helped in the reduction of burn-out.

In conclusion, vascular training in the United States is positively evolving paradigm. A unified effort to streamline education in an efficient and effective manner is underway to produce confident, skilled surgeons and decrease training time to facilitate well-being. The 0-5 training paradigm has been very successful from the trainee and program director's perspective. The shortened training has increased the quality and number of applicants for vascular training.

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