Training in Structural Heart Interventions

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Over the last decade, there have been tremendous advances in our ability to treat valvular heart disease and anatomic cardiac defects utilizing catheter-based approaches. At the same time, the number of patients with acquired valvular heart disease or adult congenital heart disease who may benefit from these procedures has grown at a rapid pace—and will continue to grow with the aging population. These rapidly progressing structural heart interventions include transcatheter aortic valve replacement, percutaneous mitral valve repair, septal defect closures, shunt interventions, paravalvular leak closures, balloon aortic valvuloplasty, and left atrial appendage closure. As a result, there is an immediate and growing need for operators trained in these highly complex procedures. Although the curriculum for Accreditation Council for Graduate Medical Education (ACGME) programs, providing training in coronary and peripheral interventions, is well defined with set expectations, there are no ACGME-accredited training programs for structural heart disease in the country. Therefore, there are unique challenges and opportunities facing both the trainees seeking structural heart disease training as well as the programs establishing dedicated structural interventional fellowships.

Some of the challenges currently facing those seeking structural heart disease training include variable volume of the procedures performed; senior operators with limited experience with novel technologies and procedures; new devices being limited to patients enrolled in clinical trials, and therefore, restrictions on who can implant those devices; and a small number of centers experienced enough in these procedures to provide adequate training (1,2).

However, there are also tremendous opportunities to help shape the future of training for structural heart disease interventions, and this future can largely be shaped by the needs and desires of fellows seeking that training. On one end of the spectrum, it is great timing for our generation of trainees, as we can continue with fellowship without interruption and get trained in these “new” procedures early in our careers. On the other end, the field is relatively new, experts are still trying to set the curricula, and there are not many institutions in the country that offer these programs. The Society for Cardiovascular Angiography and Interventions (SCAI) surveyed program directors from 137 interventional cardiology programs. From the 50 that responded, only 9 institutions offered a dedicated year of structural training (3). A similar survey in Canada identified only 3 programs in the country that offered a dedicated year of training in structural heart interventions after completion of the coronary interventional year (4). Furthermore, the process of finding a position in a structural interventional fellowship can be accompanied by dilemmas and challenges.

DEDICATED FELLOWSHIP VERSUS TRAINING AS A JUNIOR FACULTY. The duration of medical training is already long, and the addition of another year can be challenging. From a trainee standpoint, it might sound appealing to join a program as a junior faculty member and work as a part-time interventional cardiologist, as one can generate revenue for the hospital and enjoy a higher salary, and the hospital agrees to provide training in these structural heart interventions. This option might address the issue of funding for these structural fellowships and also let the individual cardiologist maintain his or her core coronary interventional skills. However, this type of on-the-job training should be considered with great caution as the days can fill very quickly with routine cases, and there is often not enough time to concentrate on learning structural

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procedures. The scope of structural heart interventions is very broad, encompassing many different types of procedures each requiring different skills. At the same time, there is much to learn with regard to the rapidly evolving evidence behind each procedure, technical aspects in the laboratory, detailed understanding of the anatomy, understanding of multimodality imaging, and mastering hemodynamic assessments. To be fully trained in structural heart interventions, we believe it requires one's full attention, time, and dedication without the distractions of junior faculty/partner responsibilities.

BREADTH OF TRAINING. Some of the more commonly performed procedures are intracardiac echocardiography, transeptal puncture, patent foramen ovale and atrial septal defect closure, balloon aortic valvuloplasty, and transcatheter aortic valve replacement. Training in these procedures appears to be achievable during coronary interventional and structural heart fellowship. But, what about the rest of the procedures that are not so commonly performed, such as balloon mitral and pulmonic valvuloplasty, transcatheter pulmonic valve replacement, MitraClip (Abbott, Santa Ana, California), patent ductus arteriosus occlusion, left atrial appendage occlusion, ventricular septal defect closure, paravalvular leak closure, and coronary fistula occlusion? No single institution can provide adequate training in all of these, as most places have a limited volume of these rare cases. Short, well-organized rotations at centers with high volumes of given procedures might be difficult practically, but certainly can be of great educational benefit.

Multimodality imaging has become an integral aspect of structural heart interventions. Although many providers rely on colleagues with dedicated imaging experience, it is paramount that the next generation of structural interventionalists become facile with 3-dimensional reconstructed imaging modalities, such as echocardiography and computed tomography. Training in these imaging modalities could potentially start early. Fellows considering structural heart interventional training in the future could possibly spend a little bit of extra time in the echocardiography laboratory or the imaging suite to build experience in these skills.

DURATION OF TRAINING. What are the benefits of 3 months versus 6 months versus 1 year? Although short courses might be reasonable for senior faculty members to learn a particular technique or a procedure, a longer duration might be best suited for fellows who desire to learn a large variety of procedures.

In the SCAI survey (3), most fellowship directors agreed that 1 year of dedicated training might be required to gain proficiency in structural heart interventions. A question worth debating might be: do we need a background of interventional fellowship, or can we directly proceed to a 1- to 2-year training program in structural interventions? Whereas a direct 2-year structural program may give more time to learn some of the infrequent procedures, doing a coronary interventional year first may provide a great opportunity to finesse basic catheterization laboratory skills and master hemodynamics, which are of extreme importance in any advanced procedure. After the fellowship training, finding a job with purely structural responsibilities might be difficult. Barring a few high-volume academic institutions, most structural job profiles might require some degree of nonstructural (coronary/peripheral) work; hence, this skill set might prove to be useful.

APPLICATION PROCESS. Because these fellowships are in their infancy, the application process for structural heart disease fellowships is not streamlined and can be very frustrating to the trainee seeking a position. The list of institutions for most ACGME-accredited training programs in other specialties can easily be located online, for example, on the American Medical Association’s website. However, there is no unified directory or posting that lists programs offering structural heart training. This may be in part because most of these positions are filled internally or by word of mouth.

We have seen explosive growth in the area of structural heart interventions in the last few years, and there is no doubt that this will continue. With an increasing number of programs starting to offer structural training, we will likely see an organized fellowship process like we currently have for cardiovascular disease and interventional cardiology. If we are going to shape our own future, it will be up to fellows-in-training to help shape what it is we want from structural heart disease fellowships. For now, it might be a great start just to have a unified listing of the programs in the country that could be listed on a web page for the American College of Cardiology or SCAI. The future of structural heart disease training is in our hands; let us work together as fellows-in-training to help shape what it will look like.

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**REFERENCES**


**RESPONSE: The Future: From “Teacher to Student” to “Learner to Learner”**

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The future of structural heart disease interventions has arrived, and with it, new opportunities continue to unfold. These are new opportunities for improving patient care: providing care to patients either previously unable to be treated or who faced very high-risk interventions, providing alternatives for less invasive procedures, and providing totally new procedures to treat old disease in a wider mix of patients. This future also brings with it an enhanced professional growth at all levels and new practice opportunities. The specific procedures in future structural heart practice vary considerably, require new and differing skill sets, and include multiple disciplines. This latter aspect has the advantage of breaking down silos that have been artificially erected between specialties and subspecialties, including between cardiology and cardiac surgery, adult cardiology and pediatric cardiology, interventional cardiology and electrophysiology, cardiology and vascular surgery, and interventional cardiology/cardiovascular surgery and cardiac imaging specialists. It also has the advantage of established professionals—the “old dogs”—learning new procedures along with fellows-in-training, moving the relationship from teacher-to-student to a relationship of learner-to-learner. That is one of the most important advantages, and its cross-pollination has great creative downstream implications.

For each of these specific applications in this current and future world, there are challenges: How do we train “old dogs” to learn “new tricks”? How do we raise the level of training for all? How do we manage turf wars and scheduling? How do we maintain expertise in these specialized procedures? How do we monitor outcomes? How do we structure practice for these procedures? Perhaps most important to fellows-in-training is the question: how should we provide structural heart training to fellows when the teacher is at the same level of learning? With limited learning opportunities, the fellows are frequently far down the queue, despite their great thirst.

New programs are being developed that emphasize interdisciplinary heart teams. These programs require new innovative approaches including new curricula, new ways of learning with simulators, and new approaches to data analysis. Through these programs, this field also will involve closer interaction with industry and regulators, as well as closer collaboration between professional societies. There are multiple stakeholders and many moving parts. The future is now. As Drs. Yadav, Halim, and Vavalle conclude, “the future of structural heart disease training is in our hands.” We could modify that to say “the future of structural heart disease is in all of our hands.” Let us work together as professional societies, established physicians, industry, regulators, and fellows-in-training to shape what it will look like and where we will go.