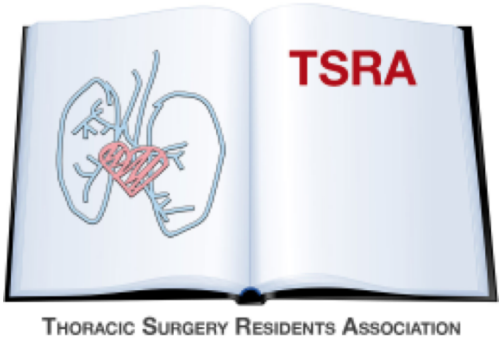
TSRA POCKET MENTOR:

A Manual for Cardiothoracic Surgery Trainees



July 2017

Compiled by: Xiaoying Lou (Emory University)
Edited by: Xiaoying Lou (Emory University) and Elizabeth Stephens (Columbia University)

With significant contributions from the following TSRA Executive Committee Members:
Andrew Goldstone (University of Pennsylvania), Panos Vardas (Indiana University), Vakhtang Tchantchaleishvili (Mayo Clinic), Brendan Dewan (University of Colorado), and Amy Fiedler (Massachusetts General Hospital)

As well as the following residents:
Christina Saikus (Emory University), Michael Kayatta (Emory University), Bogdan Kindzelski (Cleveland Clinic), Clauden Louis (University of Rochester), Ioannis Loumiotis (Montefiore Medical Center), and Sahar Saddoughi (Mayo Clinic)

With contributions from the following faculty members:
Ara A Vaporciyan (MD Anderson Cancer Center), Richard Lee (Saint Louis University), Edward P Chen (Emory University), and Ravi K Ghanta (Baylor)

Thank you to all who contributed! Please refer to the online version at http://www.tsda.org/resources/resources-for-residents/ for periodic updates and opportunities to contribute further to this manual.

TABLE OF CONTENTS

INTRODUCTION

The goal of training is to build the foundation necessary to become an excellent cardiothoracic surgeon. Embarking on a residency program initiates what will be a lifelong journey to master the clinical knowledge, technical skills, and surgical decision-making paramount for a successful career in cardiothoracic surgery.

This manual is meant to serve as a guide for navigating through residency training and beyond, supplemented with advice from current residents, faculty, and program directors.

CLINICAL KNOWLEDGE

General Study Habits

The rapid pace of cardiothoracic surgery training and extent of clinical responsibilities can overwhelm even the most skilled of learners. Studying must often occur in interrupted fragments of time that compete with both service and patient obligations. Therefore, you must be efficient, strategic, and proactive in your approach. In preparing for Boards, you will need to ensure thorough and adequate coverage of all aspects of the Thoracic Surgery Directors Association (TSDA) curriculum.

By this point in your training, you have likely developed a study method that works best for you. Some residents learn best by reading texts, some through lectures and question banks, others by participating in mock oral exams. Figure out what works best for you and stick to it.

Regardless, there are a few pointers that may be helpful to keep in mind:
Every trainee should own and use at least one standard surgical text and atlas. Review every surgical diagnosis and procedure you encounter in these texts.

It goes without saying that you should always read before you go to the OR. Even if you are doing the same case, use every case and patient interaction as an opportunity to learn a different approach. Prepare for every case as best you can by reading before and afterwards to review what you have learned - your hands-on experience and the repetition will help with retention. Focus on the indications for the procedure, the conduct of the operation, critical steps, the risks and complications of these steps, and the strategies for dealing with them.

Knowledge acquisition is an active process; it requires attending to and encoding the information presented, storing information from working memory to long-term memory, and retrieving the information from long-term memory when it is needed. Therefore, it is important to create an environment for deep learning. You need to be alert, focused, and avoid distractions. If you find that you are too tired to read or re-reading sentences over and over again without comprehending it, you may be better off taking a break and getting some sleep so that you can use your time more efficiently.

Research in memory retention has also shown that you need to be actively doing something with the information you have read to facilitate recall. This can involve highlighting, underlining or jotting notes, writing key points in a notebook to review later – whatever it takes to stay actively engaged in the process of mastering the information you have read. It may also help to discuss the material with fellow residents and faculty to facilitate repetition and clarify your understanding.

Some general study tips from current residents follow:

· "I study on mornings on the weekends. I also try to find time between cases, on call, and on slow days."

· "Try to schedule a routine 30-45 minutes of focused and dedicated reading time every night (turn off your phone and stay away from the TV or couch). Some nights will not work, try to recover the next morning by waking up earlier."

· "Carry pocket copies of a major text or use audiobooks or podcasts loaded on your phone to review when there is downtime."

· "Formulate a reading program to ensure adequate coverage of the TSDA curriculum, set a goal for reading for the week and stick to it."

· "Pick one journal and read it every month. Read through abstracts or summaries, and if time permits, read the articles. Have the table of contents of certain journals (i.e., JTCVS, ATS) sent to your email for you to select articles of interest."

· "Case-based scenarios can be very helpful. Multiple choice questions can be used as a starting point to identify deficient knowledge."

In addition to the broad curriculum outlined by the TSDA, it is useful to have a good grasp of the following topics:

· **Imaging:** Review every image obtained on your patients. Try to correlate what you see to what the radiologist sees. Whenever possible, review the CT scan yourself first, then look at the read to see if you missed anything. When appropriate, review imaging with the radiologist directly - in person is best but even over the phone can be helpful. For cases of lung cancer, try to make a habit to clinically stage the patient based on imaging and before you read an oncology note. This exercise will pay back on your In-Service and Boards.

Prior to cardiac cases, it is crucial to look through all caths, preferably before reading the report. Early on, this may be useful to do with a senior resident/fellow or your attending. Try to identify the view and angle (e.g., LAO, cranial) as well as all the vessels. You should get in the habit of being able to describe the lesion location and degree of stenosis in words - without using your fingers to point. Decide what you think needs to be bypassed and where and what conduit you would use. Understand FFR and IVUS use and cut-offs. It may also be helpful early on in your training to review normal caths (i.e., patients undergoing straight forward AVRs) for practice. Locate coronary ostia and identify whether there is a low-lying RCA that could be problematic for instance. Know whether a patient is left or right dominant prior to mitral valve cases. For valve cases, review the preop TTE ahead of time, identifying valvular pathology and possible repair techniques. Remember under anesthesia there is a significant decrease in the degree of MR and TR. After the case, it may be helpful to re-review the images to correlate them with what you observed in the OR.

· **CT Anesthesia and TEE:** Pay attention when coming on and off pump. Talk with the anesthesia team during the case. They can be excellent teachers. Learn their tricks for placing lines and floating PA catheters. Review the TEE before and after the case. Have them show you pertinent TEE views, anatomy, and line placement. Ask about specific changes in anesthetics for high risk patients (e.g., those with severe aortic stenosis, low EF, pulmonary hypertension, GERD/reflux, known difficult airway).

· **Cardiopulmonary Bypass:** Learn how the pump works: early in your training, spend a few cases working with perfusion to understand the pump, all the connections, and their flow. The University of Washington CPB Bypass Primer is a good resource for the basics and is available as a free download from iTunes: https://itunes.apple.com/us/book/cardiopulmonary-bypass-primer/id1024775439?mt=11. Specifically, focus on the cases with the perfusion team that have unique perfusion strategies, e.g., total arches with selective antegrade perfusion (unilateral or bilateral) or retrograde cerebral perfusion, as well as how to troubleshoot potential problems that are at risk for occurring in certain cases, e.g., difficulty cannulating venous with dual stage RA cannula (can try smaller dual stage, metal right angle, or light house, with last resort switching to groin or bicaval); or strategies for perfusion for an aortic dissection on aortic cannulation; or getting into significant bleeding on a re-op case.

· **Adjuncts to CT surgery (EP, Heart Failure, Cath Lab, Interventional Cardiology and Pulmonology, Vascular Surgery):** It is a good idea to be familiar with what other services can offer for the cardiothoracic patient – building a good relationship with these teams comes in handy to more efficiently coordinate care as well as helps you decide when you need to refer a patient to Interventional Pulmonology for an endobronchial ultrasound-guided biopsy for instance versus a mediastinoscopy. When there is downtime, spend some time in the cath lab (some programs offer specific rotations in cath) and go through angiograms or echos with the cardiologists. See if you can scrub on some TAVRs or diagnostic caths on patients going to the OR. Try to talk to cardiologists preoperatively to understand the decision for cardiac surgery vs. stenting or if it is a hybrid case, why this is the best approach and understand the timing of the intervention. On your vascular rotations, get as much experience as you can with gaining vascular access, and work on your wire skills.

For trainees in the integrated CT surgery programs, some tips on getting through the general surgery curriculum and ABSITE preparation:

· Scrub as many cases as you can. In particular, focus on vascular anastomoses and wire skills on vascular rotations. Spend some time on your laparoscopy skills, especially if you are interested in thoracic cases.

· Focus on the basic principles of general surgery - you have a limited amount of time and will not be able (or expected) to learn all of general surgery in the short time you have available to spend on general surgery rotations. Helpful resources:

SCORE curriculum (includes questions and reading material):
https://www.surgicalcore.org/
TrueLearn question bank: https://truelearn.com/general-surgery/
Fiser, SM, The ABSITE Review

· Invest equal energy learning cardiac and thoracic topics. Gain a grasp for guidelines for treating common conditions (trauma, breast cancer, colon cancer, biliary disease, etc).

· Your general surgery years are a great time to focus on your scope skills - get comfortable with EGDs and bronchoscopies.

· Learn as much ICU care as you can – you can never get enough experience taking care of critically ill post-operative patients and will do so throughout your career.

CT surgery board and oral exam preparation resources:

· Practice doing multiple choice questions (SESATS, TSRA Multiple Choice App, TSRA Review, TSRA clinical scenarios), and follow the TSDA curriculum.

· Flashcards can be helpful.

· Know your ACC/AHA guidelines.

· During cases, ask your attendings oral based questions based on your case and/or possible complications. For example, if there is concern for coronary sinus injury from retrograde cannulation, then discuss with the attending what the board answer is for management of a coronary sinus injury. To prepare for oral boards, you may find it helpful to do mock orals with a partner or two.

· Case-based pimping from attendings should not be shied away from. It can be very effective and will get you ready for an oral exam setting.

Recommended Reading:
The following is not all-encompassing but is a compiled list of suggestions that current trainees have found useful.

ICU:

Bojar R. Manual of Perioperative Care in Adult Cardiac Surgery, 5th edition (2010)
Marino P. Marino's The ICU Book, 4th edition (2013)
Elefteriades, JA, et al. The House Officer's Guide to ICU Care: Fundamentals of Management of the Heart and Lungs, 3rd edition (2013)
Sidebotham D. Cardiothoracic Critical Care, 1st edition (2007)

Cardiothoracic Surgery Textbooks:

Sabiston and Spencer: Surgery of the Chest, 9th edition (2016)
TSRA Review and Multiple Choice App (great for overview)
TSRA Clinical Scenarios (great for studying based on patient scenarios)
Franco KL and Thourani V. Cardiothoracic Surgery Review, 1st edition (2012)
Kaiser L, Kron I, Spray T. Mastery of Cardiothoracic Surgery, 3rd edition (2014)
Chikwe J, Cooke D, Weiss A. Cardiothoracic Surgery, 2nd edition (2013)

Echocardiography:

Vegas A. Perioperative Two-Dimensional Transesophageal Echocardiography: A Practical Handbook (2012)
Otto C. Textbook of Clinical Echocardiography, 5th edition (2013)
Echo app: iASE
Helpful echocardiography website for the basics: http://pie.med.utoronto.ca/tee/
Kaddoura S. ECHO Made Easy, 3rd edition (2016)

Cardiac Surgery Anatomy Atlas:

Doty D and Doty J. Cardiac Surgery: Operative Technique, 2nd edition (2012)
Berdajs D and Turina MI. Operative Anatomy of the Heart (2010)
Wilcox's Surgical Anatomy of the Heart, 4th edition (2013)

Valve Surgery Atlas:

Carpentier A. Carpentier's Reconstructive Valve Surgery, 1st edition (2010)

Cardiac Surgery Techniques:

Townsend E. Atlas of Cardiac Surgery Techniques, 1st edition (2010)
Khonsari S and Sintek C. Cardiac Surgery: Safeguards and Pitfalls in Operative Techniques, 5th edition (2007)

Cardiac-Specific Textbooks:

Cohn L. Cardiac Surgery in the Adult, 4th edition (2017)
Moorjani N, Viola N, Walker W. Key Questions in Cardiac Surgery, 1st edition (2010)

Thoracic-Specific Textbooks:

European Society of Thoracic Surgery: http://www.ests.org/textbook/

Moorjani N, Viola N, Walker W. Key Questions in Thoracic Surgery, 1st edition (2016)

Shields K. General Thoracic Surgery, 7th edition (2009)

Sugarbaker D. Adult Chest Surgery, (2009)

Ferguson MK. Difficult Decisions in Thoracic Surgery, An Evidence-Based Approach, 3rd edition (2014)

General Surgery Textbooks:

Sabiston: Textbook of Surgery, 20th edition (2016)

Cameron J. Current Surgical Therapy, 11th edition (2014)

Schwartz's Principles of Surgery, 10th edition (2015)

Lawrence P. Essentials of General Surgery, 5th edition (2012)

Vascular Surgery Atlas:

Wind G, Valentine R. Anatomic Exposures in Vascular Surgery, 3rd edition (2013)

Congenital Heart Surgery:

Mavroudis C and Backer C. Pediatric Cardiac Surgery, 4th edition (2013)

Jonas R. Comprehensive Surgical Management of Congenital Heart Disease, 2nd edition (2014)

Mavroudis C and Backer C. Atlas of Pediatric Cardiac Surgery,1st edition (2015)

Echo/anatomy app for congenital heart disease: Heartpedia (Cincinnati Children's Hospital)

Miscellaneous:

Lee, ME. Near Misses in Cardiac Surgery (2009)

TECHNICAL SKILLS

Before you get to do the main parts of a case, you will spend a lot of time watching and first-assisting or even second-assisting.

When watching expert surgeons, try to be an “active observer”. After every case, you want to be able to leave the case having learned throughout. A universal characteristic of the best technical surgeons is not necessarily speed but economy of motion: speed will come with proficiency. Observe the overall flow of the case, when and what instruments are asked for and how they are used. Try to anticipate and memorize needle angles. Watch how the surgeon uses his or her non-dominant hand (often said to be the hallmark of a master surgeon).

Observe how the anastomosis is set up and take mental notes. Identify differences in how different surgeons set up the case. Think ahead to anticipate complications. For example, in a patient with mild-moderate aortic regurgitation in whom you are giving antegrade cardioplegia and the left ventricle becomes distended, what can you do?

Jot down your observations after every case and know how each surgeon in your institution likes to do the case. Often drawing pictures is key - even if you are not a great artist, it will jog your memory later. Also consider taking photos of certain things you want to remember (particular cannulas, case setups, etc). You may not be able to learn everything in one case, but with repetition and review of your notes, you can get pretty close. Always review your pertinent notes before each case and update your notes to review for next time. Share your notes with other residents in your program - some programs have “guides” for each surgeon and each procedure. The more you can prepare for and anticipate next steps, the better assistant you will be and the more you will get to do.

What should you aim to do at each stage of training? [this will vary considerably based on your program...but just to get an idea]

For integrated residents:
PGY1: Basic suturing skills. Handling of various types of tissue. Operative setup. First assisting. Perfecting sternotomy -- i.e., finding midline in deep chests. Begin to put in wires/close chest. Work on placing central lines, arterial lines, pleural taps, and get familiar with using ultrasound for guidance.
PGY2: Open and close chest with supervision (sternotomy and thoracotomy). Start to work on proximals. Start cannulating and placing IABPs.
PGY3: Open and close independently. Learn when “bleeding” is sufficiently controlled to close and when more time, blood products, or topical agents are necessary. Start taking down mammary. Cannulate with assistance. Continue to work on proximals, and perhaps start some distals. Begin doing components of simple valves. Begin learning to be efficient in the OR.
PGY4: Improve speed of mammary harvest. Cannulate independently. Be able to perform proximals and distals. You should now be comfortable knowing when a chest is ready to close. Become comfortable coming off pump and controlling the pump during the case. You should be

starting to do straight-forward cases skin-to-skin for CABG and AVR. Learn how to open redo cases.
PGY5: Be able to do a straight forward CABG or AVR skin-to-skin (with assistance). Work on mitral techniques and redo cases. You should be doing more advanced cases such as multi-component cases and multi-arterial grafting skin to skin. Should be comfortable managing the pump without prompting. Be able to place patients on ECMO in the ICU and manage complex patients. With assistance, start to do some circulatory arrest cases and be familiar with cannulation strategies.
PGY6: Function nearly independently on routine cases. Improve speed and efficiency. You should be able to perform most surgical cases including straight forward transplants/VADs, valve repair, aortic surgeries and redo surgeries.

For traditional-track CT fellows:
Year 1
Open and close independently. Take down mammary and be able to cannulate independently within first few months. Know when "bleeding" is sufficiently controlled to close and when more time, blood products, or topical agents are necessary. Become comfortable coming off pump and controlling the pump during the case. Work on proximals first, but you should be able to do distals and major parts of simple valve cases by the end of the year. For thoracic track, be able to do a lobectomy skin to skin. Begin learning to be efficient in the OR.

Years 2-3
Be able to do a straight forward CABG or AVR skin-to-skin (with assistance). You should be doing more advanced cases such as multi-component cases and multi-arterial grafting skin to skin. Should be comfortable managing the heart lung machine without prompting and be able to place patients on ECMO in the ICU and manage complex patients.

With assistance, start to do some circulatory arrest cases and be familiar with cannulation strategies. Depending on your program (whether two or three year), you should be learning redo cases and be comfortable with most cases including straight-forward transplants/VADs, valve repair, aortic surgeries and redo surgeries by the second half of the year.

For thoracic track, be able to do an esophagectomy skin to skin. Work on robotic lobectomies, minimally invasive esophagectomies - if such training is available at your institution. If you have time for elective training, pick the area you want to invest more training in or you feel less comfortable with – you may be able to do this outside of your home institution as well.

Simulation:
Simulation-based learning has the potential to provide training and practice outside of the OR, in an era where patient safety concerns, comparative outcomes and work hour limitations have become paramount.

The benefit of simulation is that you can do it outside of the OR - during downtime between cases or while watching TV at night. Use gloves to practice with. Start by gripping and un-gripping needles with a castro, rolling your wrist, and learning the proper trajectory of the needle through tissues at all angles. Needle angles should be memorized so you only position your needle once in the OR for routine stitches. Delicate handling of fragile tissues is an important skill that needs to be mastered on your own time in order to be able to "perform" when given the opportunity in the OR. Be comfortable with the tension to maintain when tying 7-0 and 8-0 prolene. When practicing, try to simulate the deep chest (can use a box or something similar to simulate).

Try sewing on some fabric (cuffs of sweatshirts, soft fabric, even tissue paper wrapped into a cylinder). If your program has fake vessel anastomosis kits, use those. Visualize yourself in the OR in a particular part of the case as you practice. Try to identify stitches you may have had difficulty with in your last case, try to figure out what made it difficult and simulate that.

Performing mental exercises can be a helpful adjunct to technical skill simulation. Prepare for potential pitfalls in each step of a case, and have a strategy to deal with each pitfall. Run the scenarios over and over again so that if you encounter them in the OR, you know what to do. Often, you will not have sufficient time to think in the OR. For example, what is your plan if you are having trouble cannulating, or if you cause a dissection during cannulation or if you have an air embolus?

On the night before a big case: go through each step in order, think about what suture you will use, which instruments you will ask for and when, and what needle angles you will use. For example, when doing a distal on an OM in a deep chest, what is the needle angle for the first bite on the coronary? When prepping for an AVR, go over the needle angles for each annular stitch.

If you have a tremor, try practicing with extra-long needle holders and simulate a deep chest, and keep your elbow against your body. If you find yourself getting nervous as an attending stares at you suturing, practice imagining him or her watching you and focus on your breathing.

In the OR...
- Be a team player. It should go without saying that you should be respectful to all members of the team in and outside of the OR. There is no excuse to be condescending or rude to anyone. Your reputation is all you have, it will follow you, and it can be shattered in a moment. If you find your temper rising, take a deep breath and count to 10 in your head before responding.
- When you are first starting out as the junior resident, you should generally do as you are told. If you see something that you can do to help and not be in the way, do so. If you notice a

problem that no one has identified, notify the appropriate person. If a case is going badly, pay close attention. If you get yelled at, remain calm and try to correct whatever it is you are doing wrong. Do not take it personally and fall apart. Take a deep breath, tell yourself to remain calm and remember that your first obligation is to the patient. Usually it is best to keep silent and just listen until the situation calms down.

- Aim to be the best second or first assistant. Think about the next step, then anticipate what you will need in your hands to get it done. Find a job for both of your hands. There are no good one-handed surgeons.
- If you are not scrubbed in or cannot see: ask questions (why this valve, why this order, etc.). Ask to use the TEE. Ask to see how the pump works.
- Take notes and review them. Find a system of note-taking that works for you. Some like using a binder with loose-leaf paper so they can amend/add to their "master guide"; others use pre-bound notebooks. Others prefer a word document that is updated. Make a system so you can find what you need when you need it. You may want to create a table of contents with procedures organized by specialty and a separate guide for each attending – it may be helpful to read dictated operative notes from each attending. Also be aware of the steps for when you are the surgeon vs. when you are first-assisting - as well as how the setup will look from either side of the table. Review your notes before cases and update them after.

Some thoughts on note-taking...

Make note of each surgeon's habits and idiosyncrasies. Even remembering simple things like having the draping EXACTLY the way an attending likes it shows you care and pay attention, and it will further instill their confidence in you. Below are some things to take note of that can be attending-specific:

- Draping techniques
- Setup of cardiopulmonary lines, suction, and bovie, camera setup in VATS cases
- Cannulation technique (suture type, location of arterial cannulation, purse-string sequence), retrograde technique
- Once cannulated, how the lines are positioned to stay out of your way
- Case specific techniques (how the heart is positioned in CABG cases to identify specific coronary lesions, where aortotomy is performed in AVR cases, where port placement is made in VATS cases, etc.)
- How anastomoses are performed - where the suture is started, forehand or backhand, what type of needle driver, and so on
- Sequence of coming off cardiopulmonary bypass
- Closure technique (types of wires, figure of 8 vs. double vs. butterfly technique, how many layer fascial/soft tissue closure)

Advice on eliciting & incorporating feedback and strategies for improvement:

- Get out of your comfort zone and ask for honest feedback after every case
- Keep a case log. In addition to the above technical notes, it may be helpful to keep personal notes to reflect on what you did well, what you want to improve on, what you wish you had done differently.

· At the end of each case and/or end of the day, take time to debrief. What went well in the OR? Why did it go well? What did not go well? How can you improve?
· Once you have gained proficiency, keep track of how long it takes for you to do certain things during a case. Obviously, safety trumps speed especially when you are first starting out, but you should always be aiming towards becoming more efficient.
For example, for a CABG, record:

- Time from incision to placement of mammary retractor
- Mammary take-down time
- Time from incision to when the patient is on cardiopulmonary bypass
- Cardiopulmonary bypass and aortic cross clamp times
- If able, attempt to get distal and proximal coronary anastomosis times
- Once off bypass, time to closure (decannulation, chest tube/wire placement, drying up)

SURGICAL DECISION MAKING and PROFESSIONALISM

Developing excellent surgical decision-making is a consequence of actually making decisions, observing the results, and learning from both successes and failures. Especially early on in your training, it is critical to be complete and disciplined in your work-ups. Quality trumps speed. If an operation is indicated, decide which one, the ideal timing, and any additional studies needed, as well as alternatives. Never stop thinking. Follow-up on autopsy results. Review radiographs with the radiologists, go to the path lab and view specimen slides.

Not all the attendings you work with will exhibit perfect professional behavior at all times, in fact, many of them may not. Do not take it personally. Everyone has their bad days and you are allowed to be sad, upset, and angry - we are all human. But if you find yourself in this situation, the mature thing to do is to acknowledge your emotions and take a moment to collect yourself. Do not take it out on others. Identify the characteristics of the surgeons you most admire and the attendings you enjoy working with and strive to develop these traits in yourself. Learning to control your emotions and focus on the task at hand takes maturity and is an integral part of training as well.

At all times, aim to display an attitude of calm, confidence, efficiency, attentiveness, enthusiasm, thoughtfulness and respect for others - including dealing with nurses, support staff, students, and other residents in addition to your patients and superiors. Keep a team mentality and learn from every situation you encounter, even if it is learning what not to do. Particularly note people who are good team leaders during emergencies. How did they lead when things were going south?

Know what motivates each member of your team. Include everyone and illustrate how each member is important by their involvement. This may simply mean acknowledging the efforts of the anesthesiologist on getting a tough line or noticing something on TEE. Try to take an interest in the members of your team personally. Ask about their family and hobbies. Following up on previous conversations shows that you care about them as a person, not just the work they do.

Cardiothoracic surgery is a high stakes endeavor, and tensions run high. You are going to be yelled at and criticized - sometimes for things you did not do or have no control over, often when you are already exhausted, and sometimes unfairly. When this happens, think about whether it was warranted and helpful. If not, suck it up and ignore it. Stay calm, and do not yell back and escalate the situation, especially if you are in the OR and a patient is on the table.

If you did make a mistake, avoid being defensive and hostile. Do not make excuses, just take care of the issue and prevent the problem from recurring if possible. Never cover up your mistakes. You do not want to be known as the resident who hides mistakes. Get help, tell the truth as you know it. State only facts, do not offer excuses or try to blame. Accept responsibility when it lies with you but do not let others dump it on you if you were not really involved. Ask for an explanation if you do not understand what you should have done differently and why. You

will convert the doubters only by going about your business and doing your best possible work. Learn from your mistakes but do not dwell on them. Process the information, formulate a plan to incorporate the feedback and move on.

Remember that your weakest moment will be the one that defines you. You are under constant evaluation and will be throughout your career. Always be at your best. Never gossip, and think before you speak or act. Do not burn any bridges. Keep any problems in your personal life outside of the hospital. Set the mentality that when you are in the hospital, you are there to perform at your very best and take care of your patients.

ADJUNCTS TO TRAINING

MENTORSHIP

Mentors are essential during training and for career advancement. They can offer advice on acquiring technical skills and solving challenging clinical situations. Additionally, they can be a source of inspiration and guidance throughout your career. Keep in mind that not one mentor may fulfill all of your needs. You may have one mentor for research, one for your clinical skills development, another for personal and leadership development.

Tips for finding a mentor:

- Seek out surgeons with qualities that you admire, find faculty that think like you and enjoy working with you. Alternatively, you can also learn a lot from mentors who think completely differently from you as long as your personalities are compatible.
- The relationship should be mutually beneficial. If you are good, it will reflect well on them as well. Be cognizant of your mentor's time, and show your appreciation. When meeting with your mentor, be prepared and have an idea of what you are hoping to get out of the meeting beforehand. You should have something to offer to the relationship as well. Think about what you can do support your mentor. Take part in writing book chapters, working on research projects, and the like. Identify what motivates him or her. Promote your mentor when you can - support them for teaching awards and acknowledge their contributions in a public setting.
- At least one of your mentors should be a more senior faculty member with a solid reputation in your institution or at a national level. He or she should have strong contacts within the national societies and may be actively involved in research - this is particularly important if you are planning an academic career. Cardiothoracic surgery is a small world, and career advancement can be highly dependent on networking and strong personal relationships just as much as on your abilities and what you can offer clinically. In fact, some would argue that there is nothing more important than references when it comes to getting a job. This is why your reputation, which is created and built on a daily basis, is so important.

Become a mentor:

As you progress along your own career, take it upon yourself to be a mentor as well. The field of cardiothoracic surgery was built on a long history of mentorship that continues to move it forward; it is likely because of role models and mentors you met early in your training who inspired you to pursue this field. Do the same for those coming behind you. Let students come shadow you at work or in the OR. Show them the joy of caring for sick patients and what an amazing field it is.

Make an effort to teach younger residents, medical students, nurses, and staff - the more they know, the more they will be able to take on an active role in caring for patients. Find what motivates your mentees, what they hope to learn, and what they are looking for in a mentor. Use techniques appropriate to teach them and try different approaches if one does not work. Along those lines, treat your junior residents fairly, be the type of role model that you look up to. Lead by example.

RESEARCH

The ability to conduct and publish scientific investigation is considered the cornerstone to building a career in academics. If you are interested in pursuing this route, you should consider doing a research fellowship and set aside protected mentored time to learn how to critically review the literature, develop scientific projects, compete for grants, and write and present papers. This is much more difficult to take on as a practicing surgeon.

Your goal during this time is to learn specific research methodologies, including how to ask and address relevant and specific scientific questions, gain skills in writing, publishing, and presenting original scientific work, and learn lab techniques or build a knowledge base in statistical analysis, epidemiology, clinical trials and methodology as well as database management.

How to get started:

- Find an attending who publishes a lot or in an area you are interested in. Offer to help with existing projects. Initially, you will start with projects that he or she may already have in mind; as you progress and gain more knowledge and experience in a particular topic, you will be able to find your own projects and questions to pursue.
- Basic stats knowledge is enough for most. Work with a statistician for anything more complex. Before you sit down with the statistician, template out the tables and figures you want, and think about what questions you are actually trying to answer. This will save you valuable time and help the statisticians perform the type of analyses you want.
- Specify time for research and time for writing. You need to set time limits and a timeline (i.e., set mini goals to get the job done) or you will fall behind. Find a good reference manager or way to write (some people like EndNote, which integrates with Word). It may be helpful to keep a running research word document that highlights main points from articles you gather broken up by section.
- Invest time into reading original research articles. The more papers you read, the better of an idea you will have about what has been published already. It will help you identify the “gaps in knowledge” in which to invest your future efforts. Additionally, the process of critically analyzing the literature will help you develop a rough plan for designing your own projects and figuring out what type of analyses to do.
- Keep track of all your current projects and what stage they are at in a separate document (i.e., data collection phase, abstract submitted, paper in review, etc). If you do not get published the first time, take the reviewers’ feedback and submit to another journal. Especially when you are first starting out, many papers will require more than one submission prior to publication. Do not get discouraged! It takes time, practice, and a whole lot of patience to successfully take a project from conception to publication.

Taking time off from clinical training for research can be very helpful for getting an academic position but is not required; many successful academic surgeons to not have advanced training in research. However, if you want a career that involves basic science research or if you want to partake in large clinical outcome projects, it is generally a good idea to take time off to be

competitive. You can always consider collaborating with a research scientist if that is what you wish to do in the future.

Additional degrees like a PhD, Masters of Public Health (MPH), or Masters of Clinical Research (MSCR) degree may be helpful depending on what type of research you want to do. The degree itself may not be as important as the knowledge and experience you gain. Talk to faculty who know you, who you admire, and whose careers you would like to emulate, and gather their thoughts.

Opportunities/awards to attend regional and national meetings:

There are many opportunities to join national organizations as a candidate member in residency:

Society of Thoracic Surgeons, STS (http://www.sts.org/residents-students)
Southern Thoracic Surgical Association, STSA (http://stsa.org/membership/)
Women in Thoracic Surgery, WTS (http://wtsnet.org/about-wts/becomeamember/)
American College of Cardiology, ACC (http://www.acc.org/membership/sections-and-councils/fellows-in-training-section/membership/become-a-member/surgeon-fit) As a CT surgeon fellow in training you are eligible for FREE membership to the ACC. Applying is straightforward and gives you access to a wealth of resources related to CT surgery, cardiology, and fellowship training. One particularly excellent benefit is free print subscriptions to *Journal of the American College of Cardiology* (JACC), JACC: Imaging, JACC: Interventions, and JACC: Heart Failure.

AATS Member For a Day Program

Provides an opportunity for North American medical students, general surgery residents, up to third year integrated cardiothoracic surgery residents (I-6) and members of the American Physician Scientists Association (APSA) to accompany an AATS Member Mentor, along with a resident member of the Thoracic Surgery Residents Association (TSRA) during portions of the AATS Annual Meeting. The program is designed to offer insight into the specialty and to provide an opportunity to network and build relationships within the cardiothoracic surgical community. Up to 30 medical students, general surgery residents, and I-6 cardiothoracic residents (within their first three years) will be selected to participate in this program. Successful candidates will receive complimentary hotel accommodations for a minimum of three and a maximum of four nights in an AATS Annual Meeting hotel. Additionally, at the conclusion of the meeting each successful candidate will receive a $250 stipend from the AATS to offset the cost of meals and an additional stipend of up to $500 USD to help offset the cost of travel.
http://aats.org/aatsimis/AATS/Scholarships/AATS/Scholarships/Scholarships.aspx?hkey=3c2381d0-79fe-4a98-b2bd-343293086872

AATS Resident Poster Competition

Provides an opportunity for senior cardiothoracic surgery residents and/or congenital heart surgery fellows from around the world to represent their institution by presenting a scientific poster of their clinical/investigative research at the AATS Annual Meeting. Once committed, residents/fellows must provide the Cardiothoracic Residents Committee with a brief abstract regarding the research on their posters. Posters may include research that has been previously presented and/or published. Residents/fellows' institutions will receive a stipend of $500 to help offset the cost of travel and hotel accommodations at the Annual Meeting.

STSA Hawley H. Seiler Residents Award
Presented for an outstanding paper by a cardiothoracic or general surgery resident. It is bestowed upon the resident excelling in the following categories regarding their abstract submission: quality of abstract as well as manuscript and oral presentation. The award is named after STSA Past President and founding member, Hawley H. Seiler, MD.
http://stsa.org/seiler/

STSA Resident Scholarship
Seeks to identify and encourage general surgery residents, who are committed to pursuing a career in cardiothoracic surgery, to travel to the STSA Annual Meeting. The Scholarship includes one round-trip, coach-class airfare to attend the STSA Annual Meeting; three nights' hotel accommodation; tickets to attend the President's Mixer and the Awards Dinner; and an assigned STSA mentor to assist in planning a schedule of educational programming, answer questions and facilitate introductions.
http://stsa.org/stsa-residents-scholarship/

STS Looking to the Future Scholarship (integrated residents are eligible to apply)
Scholarships include complimentary registration for the STS Annual Meeting, a three-night stay at an STS-designated hotel, participation in exclusive events, and reimbursement of up to $500 in related travel expenses.
https://www.sts.org/misc/looking-future

The **American College of Cardiology (ACC)** surgeon section also sponsors resident travel awards to attend national meetings: https://www.acc.org/membership/member-benefits-and-resources/award-programs/travel-awards

Opportunities to consider in basic/translational and clinical research for residents:
The Thoracic Surgery Foundation has many funding opportunities available for current residents: **http://thoracicsurgeryfoundation.org/awards/**

TSF Resident Research Fellowship Award
This award provides up to $30,000 per year for up to two years to support the research fellowship of a resident who has not yet completed cardiothoracic surgical training. During the fellowship, the resident will work in a cardiothoracic surgical clinical or laboratory research program. Application Open: July, Deadline: mid-October

Nina Starr Braunwald Research Fellowship Award
Nina Starr Braunwald, MD was the first woman to be certified by the ABTS and the first woman to conduct open heart surgery. This award in her name supports up to $30,000 per year for up to two years for a woman resident working in a cardiac surgical clinic or laboratory research program who has not yet completed cardiothoracic surgical training. Since its inception, fellowship recipients have gone on to become established leaders within the field. This is widely recognized as one of the specialty's most prestigious research fellowships.
Application Open: July, Deadline: mid-October

American College of Surgeons Clinical Scholars Program
Offers 2 year onsite fellowships in surgical outcomes research, health care policy, and health services research. Assigned mentors from the ACS, may also earn a master's degree in clinical investigation, health care quality and patient safety, or health services and outcomes research.
https://www.facs.org/quality-programs/about/clinical-scholars-program/details

American College of Surgeons Research Scholarships
These are two-year resident research scholarships. Eligibility for these scholarships is limited to the research projects of residents in surgery or a surgical specialty. Supported by the generosity of Fellows, Chapters, and friends of the College, to encourage residents to pursue careers in academic surgery. Funding period begins July 1st. https://www.facs.org/member-services/scholarships/resident/acsresident

Association for Academic Surgery Trainee Fellowships
Basic Science/Translational and Clinical Outcomes/Health Services/Educational Research fellowship are available. The intent of these awards is to provide an eligible resident or fellow who has completed at least two years of postgraduate training in a surgical discipline the opportunity to spend one year in a full-time basic research position with an AAS member. The award of $20,000 for one year per award may be used for salary support or for the direct-cost expenditures of the research. The award is to be expended solely for the purpose of the sponsored research. The funding period for this award begins July 1st.
http://www.aasurg.org/awards/fellowship_award_research.php

American Heart Association Fellowships
https://professional.heart.org/professional/MembershipCouncils/AwardsLectures/UCM_322102_Early-Career-Council-Awards.jsp

Additionally, support for institution-specific research opportunities and Ruth L Kirschstein National Research Service Award Research Training Grants (T32) may be available depending on your institution and area of research interest. Grant deadlines often start a year before you enter the lab so be thinking about the grant and what you need to do to be competitive 1.5-2 years beforehand.

AFTER RESIDENCY

Additional Training: Fellowships

Further training after residency may be advantageous in the current era of specialization. Consider whether it would be in line with your career goals - this may take some personal reflection, and you may need to elicit advice from your mentors. There are many additional training opportunities available to recent graduates including in robotics, VADs/transplant, transcatheter-based technologies, aortic surgery, and minimally invasive cardiac and thoracic surgery techniques; there are even opportunities to go abroad. If this is something you are interested in pursuing, think carefully about how the fellowship would enhance your resume and make you more marketable in the job market, and remember that it is not a free for all. You will most likely still need to take call, and it does mean another 1-2 years before you can enter the job market and make an attending salary.

If you do decide to pursue additional training after residency, choose a marketable niche, an institution with a recent track record of placing people into positions you want and whose faculty is heavily represented in leadership positions in the field or those with a national reputation.

Entering the Job Market: choosing academic versus private practice

Most of us only have experience with the academic-track pathway, because that is all we get exposed to during training. Additionally, we may feel pressured by our role models and mentors to pursue academic cardiothoracic surgery. However, the decision must ultimately be your own, and you need to consider what the best fit is for you and your family and what is in line with your personal and career goals. Keep in mind that there are also “hybrid” positions that blend the two tracks and may provide opportunities to do research while practicing in a private hospital environment. However, success in both tracks hinges on the same core elements, so setting yourself up to be in a position to pursue either option after training is beneficial regardless. There are significant administrative duties regardless of which track with increasingly heavy scrutiny of outcomes.

Some thoughts on the benefits and drawbacks of each track follow:

Academic-track

- Provides opportunities to teach if that is what you enjoy, however you must also take responsibility of closely supervising residents.
- May be less time spent personally operating, however, you will likely have a more complex case volume and establish a niche area.
- May be a “publish or perish” mentality - very few CT surgeons are able to be successful clinically and in research. If you are doing research, publish in your clinical niche so you can kill two birds with one stone, set up protected time, and seek startup funds early (i.e., start grant writing on day 1, many grants are only available in early career).
- Environment encourages collaboration with other disciplines and facilitates innovation, and it may be easier to work with industry and get involved with clinical trials at a national-level.

● May be more opportunities for advancement in leadership and name recognition at a local and national level, but on the flip side of this, can also be greater hierarchy and bureaucracy for advancement.

Private Practice-track

● Greater autonomy, freedom, and flexibility.
● You get to do the cases, however they will be mostly bread and butter cases - less likely to be complex cases and you may have to do both cardiac and thoracic, and possibly some vascular surgery as well.
● May be less prestige associated with the position - less name recognition if you desire advancement within national societies.
● May be more efficient and less dependent on politics than in an academic setting - however with hospital-based employment, you will be an employee who reports to an administrator and practice may be more susceptible to changes in healthcare environment.
● Greater geographic freedom and pay is generally more competitive than academic track.
● Practice may be more dependent on number of referrals, marketing, level of insurance reimbursement, and overall financial climate of the region. If you choose this route, be sure to look for a practice that is going to be committed to getting you up and running. For some groups, there is a more senior surgeon who will scrub with you or be available as needed when you first start. Look for groups who want you to succeed.

Strategies for Early Career Success:

● Be “able, affable, and available”.
● Set goals early - personal, financial, and professional.
    a. Ask yourself: Where do you want to be in 5 or 10 years? Location, position, another degree, academic track, niche area, interest in administrative role/politics/education/industry?
    b. Network with people, keep your CV updated and accessible, participate in activities/committees that help you achieve your next step - say “no” to the others, maintain balance, re-evaluate your goals and actions frequently.
    c. Years 1-3 post-grad: take Boards, establish research/career focus, join impactful societies, build professional reputation
    d. Years 4-6 post-grad: seek leadership roles and expand reputation from regional to national
    e. Understand CME and MOC requirements, keep your case log up to date.
● Market yourself. Do not turn away an opportunity to present or give a talk - it is one of the best ways to advertise and promote your skillsets and contributions. Have two or three canned talks to present your skills, interests, and abilities, stay current, partner with local centers of excellence early, build a referral base and establish good working relationships with your referring physicians (call them to update them about your joint patients, be respectful and courteous) so that they will keep referring patients to you. Initially, your caseload may consist of cases deferred to you by your more experienced partners, but gradually, if you are good and you maintain strong contacts, you will be able to build your own “brand” and gain referrals yourself.

● Keep in touch with everyone you have trained under, and look within and outside of your department for mentors/collaborators. You will always need a strong network of those who know your strengths and work ethic and can support you by making a phone call and recommending you for certain positions. They may also know about open positions in the job market before they become advertised.

Funding opportunities for early career:

TSF Research Award

Operational Support of original research efforts by cardiothoracic surgeons who have completed their formal training, and who are seeking initial support and recognition for the research program. Awards of up to $40,000 per year for up to two years are granted to support the work of an early-career cardiothoracic surgeon (within seven years of first faculty appointment at time of application deadline). Application Open: July, Deadline: mid-October

STS Research Award

Operational Support of original research efforts by cardiothoracic surgeons who have completed their formal training, and who are seeking initial support and recognition for the research program. Awards of up to $40,000 per year for up to two years are granted to support the work of an early-career cardiothoracic surgeon (within seven years of first faculty appointment at time of application deadline). The STS Research Award designation is given to the highest-ranking TSF research application awarded by TSF based on merit as judged by a rigorous peer review process. Application Open: July, Deadline: mid-October

Nina Starr Braunwald Research Award

Nina Starr Braunwald, MD was the first woman to be certified by the ABTS and the first woman to conduct open heart surgery. This award in her name provides operational support of original research efforts by women cardiac surgeons who have completed their formal training, and who are seeking initial support and recognition for their research program. Since its inception, award recipients have gone on to become established leaders within the field and this award is one of the specialty's most prestigious research grants. Awards of up to $40,000 per year for up to two years are made each year to support the work of an early-career woman cardiac surgeon (within five years of first faculty appointment). Application Open: July, Deadline: mid-October

Southern Thoracic Surgical Association (STSA) Research Award

Provide operational support of original research efforts by cardiothoracic surgeons who have completed their formal training and who are seeking initial support and recognition for their research program. Awards of up to $25,000 for one year will be granted to support the work of an early-career cardiothoracic surgeon (within seven years of first faculty appointment at the time of application deadline). STSA membership is not required; however, applicants must meet STSA membership eligibility requirements. Application Open: July, Deadline: mid-October

American Heart Association (AHA)/STS Research Award

Provides support to investigators conducting research related to cardiothoracic surgery. Interested parties should submit an application directly through the AHA website, where award details can be found. Application Open: July

Michael J. Davidson Fellowship Award
Michael J. Davidson, MD was an outstanding cardiothoracic surgeon and teacher, who was murdered in January of 2015 at Brigham and Women's Hospital in Boston. This award in his name will provide annual support of $25,000 for a deserving young early-career cardiothoracic surgeon (within seven years of first faculty appointment at the time of application deadline) committed to the vision of innovative and collaborative cardiovascular care that Dr. Davidson helped pioneer. Application Open: July, Deadline: mid-October

Carolyn E. Reed Traveling Fellowship Award
Carolyn E. Reed, MD was a thoracic surgeon, an educator and successful researcher, who died early while still in her prime. She served as the first female Chair of the ABTS and was also President of the STSA and STS. This award in her name provides support of up to $10,000 for a clinically-established woman thoracic or cardiac surgeon, or woman resident in her last year of cardiothoracic surgery residency, to travel to another institution for the purpose of learning a new skill or technology. Application Open: July, Deadline: mid-October

TSF/Edwards Lifesciences Foundation "Every Heartbeat Matters" Award
TSF, through the generosity and philanthropy of the Edwards Lifesciences Foundation via its Every Heartbeat Matters Campaign, is offering support of up to $37,500 for qualified surgeons who conduct charity work in underserved regions/populations. This award is designed to provide support for programs that educate, screen and/or treat underserved populations to reduce the global burden of heart valve disease, or to support other programs that advance health care and address underserved populations. It is anticipated this program will lead to treatment of hundreds of valve patients and diagnosis of thousands of valves in an effort to ultimately help Edwards Lifesciences reach their goal of treating one million valve patients. Application Open: July, Deadline: mid-October

The Levi Watkins Innovation and Leadership Development Scholarship
Levi Watkins, MD was an accomplished cardiothoracic surgeon and social activist at Johns Hopkins Medical Center, and made medical history by working with innovative physicians and engineers to implant the first automated internal cardiac defibrillator in a human-being. The Watkins Scholarship will provide a training and/or development grant to support travel to a center of excellence to acquire additional clinical, translational or leadership training to enhance skills and practice in an area of innovation or surgical significance. This award in his name will provide support of up to $5,000 for up to two weeks for cardiothoracic surgeons who are within seven years of first faculty appointment. Application Open: July, Deadline: mid-October

Robert L. Replogle Traveling Fellowship Award
Robert L. Replogle, MD was a talented pediatric cardiac surgeon as well as an educator, researcher, and national leader in cardiothoracic surgery. The purpose of the Replogle Fellowship is to facilitate the continuing education of a deserving young faculty surgeon committed to the treatment of congenital heart disease in neonates, infants, children, and adults. The award will be used for travel to another institution for the purpose of learning a novel technique, adapting innovative technology, and or fostering collaboration between surgical investigators in order to further the progress of congenital heart surgery at the recipient's home institution. This award in Dr. Replogle's name will provide support of up to $10,000 for up to two weeks for congenital heart surgeons who are within seven years of completion of an ACGME-accredited congenital heart surgery fellowship (or its equivalent). Application Open: July, Deadline: mid-October

TSF Alley-Sheridan Scholarship

Ralph Alley, MD was a Founding Member of The Society of Thoracic Surgeons, and served as President from 1975-1976. David Sheridan was an inventor and close friend of Dr. Alley who held more than 50 patents for innovations that have improved health care. Moved by his collaborator and friend's commitment to thoracic surgery, Sheridan created the Alley-Sheridan Fund, which provides the following educational opportunities for cardiothoracic surgeons:

1. Leadership Program in Health Policy Management: TSF offers up to ten partial scholarships of $2,500 towards the $5,600 cost to attend the Leadership Program at the Heller School of Public Policy and Management at Brandeis University. Application Deadline: early-Feb
2. Surgeons as Educators: TSF will support up to two scholarships of $2,500 towards the cost of tuition to attend the Surgeons As Educators Course hosted by the American College of Surgeons.

Steps to getting your first job:

(modified from presentation given by Dr. Ravi Ghanta, Baylor College of Medicine, STS 2017)

a. Write a good CV
    a. Must be clearly formatted, concise, relay relevant information, error-free
    b. Include education/residency/fellowship, board certifications/licenses/awards, publications/patents, "special skills"/certifications, unique life experiences and outside interests
    c. Do not include irrelevant past experiences or anything before medical school (unless particularly impressive)
    d. Get feedback from faculty members
2. Writing a cover letter
    a. Must be concise, highlight strengths
    b. 3 paragraphs of 3-4 sentences
    c. 1st paragraph: I am interested in position A starting in B. My specific clinical interests are C. My research interests are D.
    d. 2nd paragraph: Summarize your CV
    e. 3rd paragraph: Highlight what you can bring to the position
3. Find and target opportunities
    a. Think about your interests/goals, strengths/weaknesses, make a draft of a 5 year plan, discuss with family, speak with recent graduates
    b. Be proactive and be aware of the interview calendar, meet with mentors at start of academic year, consider private and academic positions, find jobs by word of mouth/alumni network/job site and use networking at national meetings
4. Ace first interview
    a. Get to know the surgeons and important physicians
    b. Learn about the area
    c. Prepare a list of questions
    d. Remember the basics: dress and act professionally, be confident and enthusiastic, maintain eye contact
    e. It is rare to be offered a job on this interview, do not discuss salary - it is more a fact-finding process for both parties
    f. Assess whether the position would be a good fit for you

5. Determine interest level
    a. After first interview, collect your thoughts and impressions
    b. Discuss the opportunity with your family
    c. Call/email primary contact 1-2 days later to thank them and relay your interest
    d. Send out thank-you notes
    e. Wait and keep cultivating other opportunities
6. Ace 2nd interview
    a. Second interview means you are seriously being considered for the position
    b. Spouses are usually invited to see the area
    c. Often meet with a realtor
    d. More comfortable interview and usually a group dinner is involved
    e. Often an offer will be discussed - it is reasonable to discuss salary/benefits
7. Get offer & negotiate
    a. Talk to recent graduates and mentors
    b. Compare your offers
    c. You can and should negotiate
8. Get your job!

Factors and questions to consider when hunting for your first job:
(adapted from Dr. Ara Vaporciyan, MD Anderson Cancer Center)
Practice
1. Call: How much do you take? How flexible is it?
2. Rounding: Frequency, coverage on weekdays, weekends, holidays?
3. Consults: Direct or equally allocated?
4. Operating room: How do cases get posted? How many rooms are available and on which days? Block time available? How does equipment get requested? Who is on your team (residents, PA's, NPs?) Who pays for staff? What are your interactions with other specialties (anesthesia, perfusion, the rest of the surgery department, interventional cardiology and pulmonology, pathology, radiology, etc.)
5. Clinical practice concerns: Do you have access to an assistant, access to electronic system and supplies, how do medical records/transcription services/billing work? Who codes (yourself, an office coder, a department coder, an institutional coder)? Typical expectations of referring M.D.s - how much communication, how is it done, who does it, etc.? How do clinics run?
6. Administrative responsibilities: Licensure requirements? How is promotion achieved within the department? Consider capital equipment, bond rating, business plans for region, liquidity, faculty retention, marketing, primary care networks, HMO penetrance, how costs are measured, legislative agendas.
7. Research opportunities: What type of lab support and space are there? Is seed money available? How is time protected for research? What resources do you have available (personnel, data management, space, library/tech support, funds)? Is database participation available?

8. Teaching: If it is an academic environment, what is the reputation of the school? What are your teaching requirements? What conferences are there (M&M, Journal Club, etc.)?
9. General considerations: Do you like the team you will be working with? Do you mesh well with the personalities within the department? Are there senior partners who are willing to support you and who could potentially bail you out of serious problems if you get into any trouble when first starting out? Can you find a good neighborhood to live in nearby? If you have a family and young children, how are the schools in the area? What is the cost of living? Are there opportunities to pursue personal hobbies and leisure activities that you enjoy?
10. Work/Life balance: salary, vacation days, how are you paid ("eat what you kill" vs. salary), benefits (401K, loan payoffs, etc.), expectation of number of cases

Building a successful clinical practice:
(modified from presentation given by Dr. Edward Chen, Emory University, STS 2017)
When you are first starting out on your own, it is important to focus on two areas in particular:

1. Acquiring/gathering resources within your institution
    a. Infrastructure (OR rooms sufficient to handle growth/surgical volume, ICU/tele beds, blood bank, cath lab/echo lab, bronch/endo suites)
    b. Staffing (experienced anesthesia personnel available?, intraoperative TEE experience, ability to have team approach for catheter-based interventions, cards and pulm services, critical care services, support staff and perfusion availability)
    c. Scheduling (OR block time available?, if you are new, do not expect equivalent treatment to your senior partners - increased block time beyond initial allotment is earned by demonstrating need over time, is dedicated clinic time available?)
    d. Preference Lists - start gathering your favorite attendings' lists and figure out your own
    e. Adapt to your new environment
2. Your professional behavior and interactions with professional colleagues and hospital support staff
    a. Approach to patient care: work hard, care about your patients - they are your top priority, above all else - the patient comes first
    b. Approach to self: start with routine operations but do not be afraid to take on tough cases, know your limits, be confident yet humble in your skill set - asking for advice or assistance from a senior partner is a sign of good judgment not weakness, maintain a positive attitude at all times, protect your family time, embrace your new location, avoid drama and negativity - it will take away from what you can offer
    c. Approach to referring physicians: promote yourself tastefully, stay humble and let your work and outcomes do the talking, be available and flexible in providing service, always communicate with referring providers, never say "no" when a referring physician asks you to accept a patient
    d. Approach to support staff: treat everyone around you with respect and courtesy as an equal, you are under constant scrutiny as a new surgeon - everything you say and do is being watched and your reputation can be built and ruined quickly

e. Approach to introducing change: do not expect to change the world overnight, success is measured in terms of months and years not days and weeks - be patient
f. Thoughts on leadership: Value/embrace everyone on the team (can be as simple as calling them by their name), maintain composure and constant encouragement/positivity at all times, empower individuals to be the best they can be. Realize that everyone, no matter how high up they are, needs to feel appreciated. Great leaders are not threatened by the success of individual team members - they instead applaud any and all triumphs. Pick the best people to be a part of your team. Own your own mistakes and avoid blaming others.

ACHIEVING BALANCE

Choosing a career in cardiothoracic surgery is infinitely rewarding but comes with personal sacrifice. The expectations in the field are tremendous and often overwhelming. Complete devotion to patients and the training process necessitates keeping emotions and personal problems in check.

Burnout is a syndrome of emotional exhaustion, depersonalization, and a decreased sense of personal accomplishment leading to decreased effectiveness at work. It is more common than you may think with 40% of surgeons meeting criteria for burnout in a recent survey by the American College of Surgeons. Realize that it is not a sign of weakness but of emotional maturity, and seek help when you need it. The unspoken tolls of burnout can have negative repercussions on yourself, families, colleagues and patients.

The first step to management of burnout is recognition. During training, there is a mentality of perpetual delayed gratification in one's personal and professional life. Personal as well as professional goal-setting is one way to combat this. This involves identifying your values, career shaping/optimization, identification and management of practice-specific stressors, achieving balance between personal and professional goals, and nurturing personal wellness strategies.

Reflect on your personal values and priorities. Make a list of personal values and priorities, and rank them in order of importance. Make a list of professional values and priorities, and rank them in order. Integrate the two lists. Identify areas of conflict between the two, and determine how conflicts should be managed. Also identify areas of your work that are most meaningful to you, and strive to focus on these areas. Periodically assess and reflect on what you most enjoy about your work.

Protect and nurture your relationships outside of the hospital. Nurture religion and spirituality practices if they are important to you. Develop hobbies and use your vacations to encourage non-medical interests. Ensure adequate sleep, exercise, and nutrition. Define and protect time for personal reflection at least monthly.

Identify short breaks that are energizing for you. Do some jumping jacks or yoga in the call room. Watch a silly video. Enjoy a cup of tea or coffee in the middle of the day when you get a chance. Go for a walk outside. Make time to call a friend or family member while on call.

Taking care of yourself – strategies for maintaining balance in and outside of the hospital from other residents:

- When you are off, take some time to be completely off. Have dedicated study time and dedicated relaxation time. This is hardest in the first few years.
- Sleep should be a priority.
- If you are on call in house, it may be helpful to briefly round on the floors and talk to nurses to address any patient issues that may be arising before your go to call room, talk

with the charge nurse and request that he or she screen calls to avoid inappropriate questions overnight.
- If you are on call at home, try to get to bed a little earlier than normal, a few hours of uninterrupted sleep can make a big difference.
- Prepare healthy snacks and food for yourself – plan ahead of time so it is less tempting to buy junk when you are on call or swamped.
- Pack some non-perishables in your pocket so you have something to eat if there is no time to go to the cafeteria or grab lunch.
- Catch up on fluids at the end of the day.
- Make time for exercise when you can, even if it is a few jumping jacks in the call room and take the stairs when you can.
- Make a list of activities you enjoy and try to do at least one of those things daily. Try meditating or yoga to get some perspective.

Time Management Tips:
- Plan your time as best you can - often this is not possible as we are at the whim of schedules that we have no control over, but try to set goals for yourself for the week so you can make steady progress on your to-do list during downtime.
- Know your deadlines (e.g., conferences, abstract submissions, grant proposals, presentation dates). Break down your time before major deadlines and set manageable goals for yourself so you stay on track.
- Learn to say “no”. Choose opportunities that are worthy of your time (e.g., in line with your goals and help you develop certain skillsets). Say “no” to projects that are not, and do not let anyone make you feel guilty for doing so!
- Work on multi-tasking. Think about what can be accomplished in small bursts of time to maximize productivity (e.g., while waiting for a case to start, in between clinic patients, etc.).
- Get enough rest - you cannot be focused and productive if you are falling asleep.
- Block out distractions, eliminate time wasters as best you can.
- Apply the 80/20 rule to your work. This does not apply to sick patients (cannot take shortcuts there!), but know what needs to be done perfectly and what just needs to be done for completion sake. A discharge summary should be complete but it does not necessarily need to be perfect - no need to go overboard on details that will not alter the patient’s care. You do not need to write a novel.
- Delegate when you can. Find tasks appropriate for the medical student to do - dressing changes, obtaining records, etc. and in return, take the time to teach them. Find jobs for everyone on your team, delegate dispo planning to the social workers.

Maintaining relationships outside of the hospital – advice on staying sane and still having family and friends when training is over:
- Try to make friends early on in training who are not residents. Their schedules make them available when you are off.
- If you can afford it, pay someone to take care of others tasks at home such as cleaning and washing, laundry services, grocery delivery, etc.

- If you have a day off coming up, remember to schedule something fun and let people know you are available. Friends and family may assume you are too busy – nothing worse than having a day off and nothing to do!
- Make time to call family, friends, significant others, or to write them a quick note from time to time to show you care. Make an effort to be mentally present when spending time with them (turn off your phone and pager if not on call).

TSRA RESOURCES, visit www.tsranet.org/resources:

TSRA Podcasts
https://soundcloud.com/tsrapodcast

TSRA Review of Cardiothoracic Surgery, 2nd edition
Authored and edited by thoracic surgery residents in North American training programs, this review provides a summary of critical information in general thoracic surgery, adult cardiac surgery, congenital cardiac surgery, and cardiothoracic trauma and critical care. Perfect for board review - especially when used with multiple choice app (see below)! Available in print or as an e-book for Kindle on Amazon.

TSRA Multiple Choice Review of Cardiothoracic Surgery
This app allows the user to test their knowledge base by answering multiple choice questions in general thoracic surgery, adult cardiac surgery, congenital cardiac surgery, and cardiothoracic trauma and critical care. Questions derived directly from the TSRA Review 2nd edition. Available for download as an app on iTunes.

Cardiopulmonary Bypass: A Primer
Created by surgeons, perfusionists, anesthesiologists, and nurses from the Division of Cardiothoracic Surgery at the University of Washington Medical Center in Seattle, WA, this guide provides key information on the use of cardiopulmonary bypass through an interdisciplinary perspective. Available as a free download with iBooks on your Mac or iOS device.

TSRA Primer of Cardiothoracic Surgery
An integrated educational resource produced by residents for residents illustrating fundamental concepts for new learners just entering the field of cardiothoracic surgery. Available on iTunes iBookstore.

TSRA Clinical Scenarios in Cardiothoracic Surgery
Designed for the application of decision-making, surgical technique, and knowledge within the clinical setting. Within the context of high-yield clinical scenarios, each chapter highlights important points regarding the workup and treatment of a patient, from chief complaint and H&P to operative steps and pearls/pitfalls. Available in print or as an e-book for Kindle on Amazon.

TSRA Journal Club
Provides a listing of key literature in the field, providing summaries of over 200 articles with links to Pubmed. Available for download as an app on iTunes and Android.

Operative Dictations in Cardiothoracic Surgery
Provides a review of major steps of key operations in cardiothoracic surgery in the form of operative reports. Perfect for reviewing before and after a case. Available in print or as an e-book for Kindle on Amazon.

Fighting Fatigue: A Guide for Cardiothoracic Surgery Residents
Available as a free download with tips to help cardiothoracic residents navigate the longs days and nights of training.