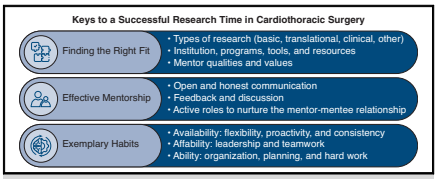
Having a successful dedicated research time in cardiothoracic surgery

Fernando M. Juarez-Casso, MD, Alejandra Castro-Varela, MD, Anita Nguyen, MBBS, John M. Stulak, MD, Kevin L. Greason, MD, Juan A. Crestanello, MD, and Hartzell V. Schaff, MD

Dedicated research time in cardiothoracic surgery is a full-time commitment usually protected from unrelated surgical, clinical, or academic duties. This provides trainees a unique opportunity to gain knowledge and exposure to our specialty, develop valuable aptitudes for the future, and build important professional relationships. Some trainees may participate in research during medical school or surgical residency, although time constraints and clinical or academic responsibilities often take priority. Protected time allows trainees to focus on their research productivity, and this is best accomplished soon after the trainee develops an interest in a career in cardiothoracic surgery.[1,2] So, what are the essential elements of dedicated research time and how should trainees approach such opportunities? In this Young Surgeon's Note, we provide insights from research fellows, surgery residents, and staff cardiothoracic surgeons.

The purpose of taking a dedicated research year (or years) is to promote academic growth, although it may alter the trainee's personal and professional timeline. Further, in the current era of subspecialization, many cardiothoracic surgical residents anticipate additional fellowship training in clinical areas such as congenital heart surgery, aortic procedures, minimally invasive techniques, or thoracic organ transplantation. The potential disadvantage is that delaying entrance to a full-time surgical practice may hinder the ability of trainees to pay off high-interest debts or contribute to their life savings.[3] Additionally, some trainees may be concerned that stepping away from clinical practice for 1 or more years may lead to some decrement in operative skills placing them behind peers at the next level of residency.[4-6]

Despite its potential downsides, dedicated research time can benefit a trainee in many ways. Although research is not required to obtain residency or fellowship positions,[7] a productive research experience may significantly increase the chances of securing clinical training. Moreover, time in research improves the trainee's likelihood of obtaining faculty appointments and research-related awards and grants,[8] and may lead to lifelong academic careers.[9] Research also can provide the trainee with practical knowledge that can be translated later into better patient care,[1] especially if the research position allows trainees to attend academic conferences and clinical meetings. Besides the potential academic and professional advancement that can be achieved during these research years, dedicated research time also allows trainees to develop useful time-management skills and gives them the opportunity for reflection and personal growth. Above all, one of the most impactful advantages



Keys to a successful research time in cardiothoracic surgery.

CENTRAL MESSAGE

Finding the right fit, building an effective mentor-mentee relationship, and developing long-lasting exemplary habits are essential for a successful dedicated research time in cardiothoracic surgery.

PERSPECTIVE

Dedicated research time in cardiothoracic surgery allows trainees to gain exposure to the field, acquire knowledge-building skills, and develop career-defining relationships. The aspiring trainee can benefit greatly from a productive research time despite additional time in training. This article describes what we believe are the key elements that lead to a worthwhile and successful research experience.

From the Department of Cardiovascular Surgery, Mayo Clinic, Rochester, Minn.

Disclosures: The authors reported no conflicts of interest.

The *Journal* policy requires editors and reviewers to disclose conflicts of interest and to decline handling or reviewing manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

Received for publication April 25, 2023; revisions received June 30, 2023; accepted for publication July 5, 2023; available ahead of print Aug 1, 2023.

Address for reprints: Hartzell V. Schaff, MD, Department of Cardiovascular Surgery, Mayo Clinic, 200 First St SW, Rochester, MN 55905 (E-mail: schaff@mayo.edu).

JTCVS Open 2023;15:355-8
2666-2736

https://doi.org/10.1016/j.xjon.2023.07.002

of dedicated research time lies in the lifelong relationships developed with mentors and fellow mentees in the field. Over time, these individuals turn into colleagues who not only open doors for future collaborations but also cultivate a culture of continuous support that extends beyond the research experience.

For trainees committed to a successful research experience, efforts must be made to maximize productivity and transform the dedicated research year(s) into a worthwhile investment. We believe there are 3 fundamental aspects of a successful investigative experience (Figure 1): (1) finding the optimal (best fit) research position, institution, and mentor according to the interests and goals of the trainee; (2) building close and effective mentor-mentee relationships; and (3) developing long-lasting exemplary habits.

FINDING THE RIGHT FIT

Trainees who decide to pursue dedicated research time must define their long-term personal and academic goals and search for the appropriate opportunities. Research in cardiothoracic surgery is incredibly broad, ranging from basic molecular science and physiology to clinical trials or outcomes research. Basic, translational, and clinical research form a research loop that transforms fundamental scientific discoveries into practical actions in the form of new surgical techniques, treatments, diagnostic tests, and cutting-edge devices.

Basic medical research may be the most time-consuming type of research and most often involves joining an ongoing basic science laboratory. Translational research focuses on taking basic biological or technical discoveries into clinical practice to directly benefit patient health. This encourages multidisciplinary collaboration among basic and clinical investigators and may involve clinical trials that result in new methods of treatment of cardiothoracic diseases. Clinical research includes prospective and retrospective studies as well as quality assurance measures.

Other fields of increasing interest are health disparities and educational research. Health disparities research focuses on understanding and addressing unequal distribution of resources and outcomes in health care, whereas educational research in surgery is crucial for enhancing training, bridging theory and practice, and advancing innovation. Although each of these areas is equally important for the continued evolution of the specialty, each type of research may suit individual trainees differently, depending on personal interests.

The right fit for a surgical trainee interested in a dedicated research experience involves not only the type of research but also the resources and expertise of the institution. This is especially important for surgical investigators who may rely heavily on the assistance and collaboration of other investigators. Trainees also may consider academic institutions based on their available tools and resources, as well as the opportunities to participate in their educational programs, attend academic and clinical meetings, or even pursue additional postgraduate degrees. Additionally, research positions are a great way to know more about an institution's work environment by allowing the trainee to meet people with similar interests and thus develop opportunities for future work or collaboration. Of note, through research, trainees may find mentors who can guide them as they embark on a career in cardiothoracic surgery.

Finding a suitable mentor who aligns with the trainee's interests is probably the most crucial component for a worthwhile dedicated research time and a prosperous career. Effective mentorship is key to success in the cardiothoracic surgery field.[10] Interested trainees should define the qualities they seek in a mentor, because mentorship will play a fundamental role in their professional and personal lives. In addition to guidance in research, important characteristics of a mentor are willingness to provide career counseling, clinical advice, interview assistance, and networking opportunities.[11] Other aspects may be taken into account, such as personality, work habits, management or mentoring style, research environment, funding, and so forth.[12]

Another relevant aspect to consider is the mentor's authorship generosity and his/her genuine focus on the mentee's development. Fortunately, many senior cardiothoracic surgeons who offer research positions have already achieved significant success in the field. As a result, they may prioritize the growth and success of their mentees over accumulating personal publication credits. These

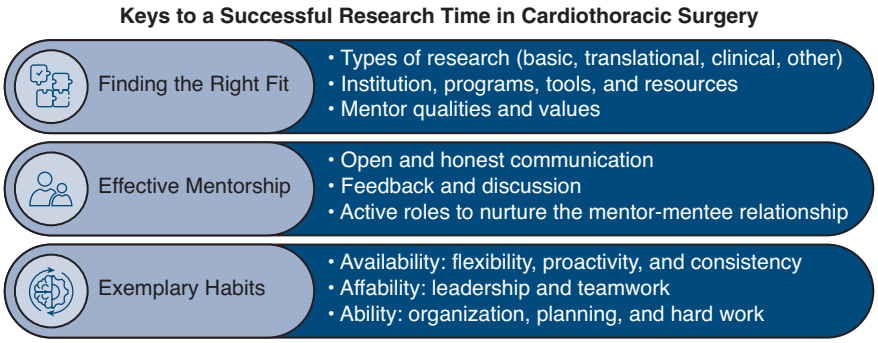


FIGURE 1. Keys to a successful research time in cardiothoracic surgery.

mentors possess maturity, confidence, and established expertise, and are willing to take on roles as counselors, goal-setters, and evaluators.[13] Therefore, it is important for trainees to seek one or multiple mentors who possess the essential qualities needed to effectively support their goals, understanding that their needs will evolve throughout the different stages of their careers.

BUILDING AN EFFECTIVE MENTOR-MENTEE RELATIONSHIP

Because mentorship plays an integral role in professional development, it is crucial for trainees to establish and cultivate this relationship early on. Trainees initially may identify a prospective mentor based on professional reputation and common interests, but before engaging him or her it is wise to explore whether the person has a history of mentoring and is available to take on new research trainees. Whenever possible, the aspiring trainee should reach out to current or former fellows for insight into their research experience and to answer important questions such as, What led you to this mentor and institution? Do you feel that your time was productive? Were you able to meet regularly with staff for guidance?

Trainees should approach potential mentors with openness and a genuine desire to learn and grow. Even informal interactions are helpful in starting meaningful relationships because they are organic and genuine, and can naturally evolve into substantial and long-lasting relationships. Such relationships are a 2-way street; therefore, the obligations of mentors toward their mentees should not be overlooked. Ideally, mentors should make themselves available for regular meetings, maintaining an open-door policy that encourages open communication, feedback, and discussion. This creates an environment where the mentee can freely ask questions, share ideas, and receive constructive criticism. Furthermore, good mentors should not only provide research guidance but also support their mentees in pursuing their career aspirations. If a mentor fails to fulfill these responsibilities, the relationship becomes 1-sided and fails to offer meaningful assistance to the mentee.

Actively maintaining the mentor-mentee relationship is also the responsibility of the mentee. Research trainees should reach out to their mentors regularly while being mindful of their time. Scheduling regular meetings, ideally once a week, helps keep both parties on track and provides opportunities for mentees to update their mentor on their progress and receive feedback. Further, mentees can support their mentors by being flexible and available, which is especially helpful for mentors with busy schedules. To be successful, mentees should take an active role in research projects, seek to understand their weaknesses, actively ask for feedback, and be open to constructive criticism. Trainees should strive to bring value to the relationship and continuously work toward personal growth and successful publications.

DEVELOPING LONG-LASTING EXEMPLARY HABITS

The success of a surgical trainee is often attributed to the "3 A's of availability, affability, and ability."[14] These traits refer to being present, friendly, and skilled. Similar habits can be developed during dedicated research time and will benefit trainees in their future clinical practice.

Availability involves finishing tasks and meeting deadlines; being proactive loses its value if trainees do not follow through and successfully deliver on their responsibilities. Be a finisher, not just a starter. Consistency is key to demonstrating reliability and interest. Otherwise, trainees can fall into the vicious cycle of falsely overpromising and ultimately underdelivering.

Affability helps trainees become team players and establish relationships with colleagues, including those who do not work directly with them. This leads to teamwork, collaboration, and professionalism. Trainees should always strive to make a positive and long-lasting impact on any team they work on. Leadership skills should be developed early, because they are going to be necessary for the trainee's future surgical practice.[15] Additionally, leadership has been associated with better graduate performance.[16] Further, trainees should never overlook the value of connecting with their peers, because together, they are going to be forming and changing the future of the cardiothoracic surgery field.

Ability in research involves acquiring a variety of skills through study, hard work, and practice. These skills include developing research questions, conducting literature searches, designing studies, collaborating with team members, having a solid understanding of clinical and biomedical statistics, and writing and critically reviewing manuscripts. Trainees should plan ahead for submissions to journals by getting acquainted with submission requirements and the review process. By gaining these skills and developing a deeper understanding of the research process, trainees can enhance their ability to analyze and understand literature, ultimately benefiting the patients in their future practice.

Overall, when working on research, trainees should develop a plan that outlines the steps needed to successfully complete the project and include a timeline, milestones, and a budget (if necessary). The trainee also should stay organized and keep track of all the data, documents, emails, and notes that are collected during the project development, because they may be useful in the future. Of note, online tools, such as virtual meeting software (Zoom, Microsoft Teams, Google Hangouts, Skype) and data-sharing platforms (Google Drive, DropBox, OneDrive), are extremely helpful for collaboration, organization, and productivity (depending on the preferences of the primary investigator and the rest of the team).

By being open-minded, trainees can contribute new ideas and approaches to their research, which may lead to new discoveries and help trainees achieve their goals more effectively. After each project, trainees should take some time to

reflect on their experiences and consider what worked well and what could be improved in future projects. Trainees also should plan ahead for the end of their dedicated research time, taking into account important deadlines and setting realistic timelines. Trainees should anticipate the possibility of handing over the project in case they are leaving the institution at the end of the research year(s).

Finally, trainees should never forget about celebrating their successes along the way. This can help to stay motivated and focused on their goals, taking time to reflect on what they have accomplished and what is still left to achieve. By the end of a productive dedicated research year(s), trainees should have been able to work on one or multiple research projects, submit abstracts for publication or presentation, and connect with individuals, both mentors, and peers, who share the same passions and interests.

CONCLUSIONS

Young trainees aspiring to pursue a career in cardiothoracic surgery should consider a dedicated research experience because of the substantial benefits that it can provide. Trainees should contemplate research topics that interest them the most, search for an institution that aligns with their values and provides them with the proper tools to better approach their goals, and connect with mentors who assist them in developing their full potential. Diligence and leadership are skills that should be developed early on, because they are essential not only for a productive dedicated research time but also for a successful career as a cardiothoracic surgeon.

Ultimately, by following these steps, trainees can contribute to the growth and evolution of the field of cardiothoracic surgery, while achieving their goals and learning from their accomplishments. The benefits of undergoing dedicated research time are limitless. Trainees can get as much out of this time as they put into it. The definition of a successful research experience may differ for each trainee, but we hope that the points discussed in this article are helpful in achieving each trainee's professional goals in cardiothoracic surgery.

References

1. Schaff HV, Nguyen A. Importance of research in the training of thoracic surgeons. *Braz J Cardiovasc Surg*. 2019;34:I-IV. https://doi.org/10.21470/1678-9741-2019-0290
2. Smood B, Nguyen SN, Kelly JJ, Han JJ. Integrated cardiothoracic surgery: developing a successful residency application. *J Thorac Cardiovasc Surg*. 2020;160:167-74. https://doi.org/10.1016/j.jtcvs.2019.09.161
3. DeWane MP, Thomas DC, Longo WE, Yoo PS. Paying the price: understanding the opportunity cost of dedicated research time during surgical training. *Am Surg*. 2018;84:1723-6. https://doi.org/10.1177/000313481808401125
4. D'Angelo ALD, D'Angelo JD, Rogers DA, Pugh CM. Faculty perceptions of resident skills decay during dedicated research fellowships. *Am J Surg*. 2018;215:336-40. https://doi.org/10.1016/j.amjsurg.2017.11.018
5. Orkin BA, Poirier J, Kowal-Vern A, Chan E, Ohara K, Mendoza B. Effect of protected research time on ABSITE scores during general surgery residency. *Am J Surg*. 2018;215:322-5. https://doi.org/10.1016/j.amjsurg.2017.11.001
6. Mikhail A, Connor AA, Ahmed N. Impact of research training on performance in general surgery residency. *J Surg Educ*. 2022;79:342-8. https://doi.org/10.1016/j.jsurg.2021.10.006
7. Rajesh A, Asaad M, AlJamal YN, Enger TM, Farley DR. Value of research years for international medical graduates applying to general surgery residency. *J Surg Educ*. 2020;77:1350-6. https://doi.org/10.1016/j.jsurg.2020.04.008
8. Andriole DA, Klingensmith ME, Fields RC, Jeffe DB. Is dedicated research time during surgery residency associated with surgeons' future career paths?: a national study. *Ann Surg*. 2020;271:590-7. https://doi.org/10.1097/SLA.0000000000003015
9. Onyekaba G, Mauch JT, Barrero C, Mellia JA, Diatta F, Card E, et al. Does dedicated research time during residency predict resident academic productivity and a future academic career? *Ann Plast Surg*. 2022;88:S293-5. https://doi.org/10.1097/SAP.0000000000003187
10. Kron IL. Surgical mentorship. *J Thorac Cardiovasc Surg*. 2011;142:489-92. https://doi.org/10.1016/j.jtcvs.2011.05.017
11. Stephens EH, Goldstone AB, Fiedler AG, Vardas PN, Pattakos G, Lou X, et al. Appraisal of mentorship in cardiothoracic surgery training. *J Thorac Cardiovasc Surg*. 2018;156:2216-23. https://doi.org/10.1016/j.jtcvs.2018.06.046
12. Evaluating potential mentors. Office of Intramural Training & Education at the National Institutes of Health. Accessed July 1, 2022. https://www.training.nih.gov/evaluating_potential_mentors
13. Alberton LF, Rudersdorf PD, Herrmann JL. How I found a mentor. *J Thorac Cardiovasc Surg*. 2017;154:1345-7. https://doi.org/10.1016/j.jtcvs.2017.04.003
14. Kapadia MR, Kieran K. Being affable, available, and able is not enough: prioritizing surgeon-patient communication. *JAMA Surg*. 2020;155:277-8. https://doi.org/10.1001/jamasurg.2019.5884
15. Schaff HV. Leadership and scholarship in thoracic surgery. *J Thorac Cardiovasc Surg*. 2021;161:2138-44. https://doi.org/10.1016/j.jtcvs.2021.01.138
16. Purdy AC, Smith BR, Amersi F, Calhoun KE, Tolles J, Dauphine C, et al. Characteristics associated with outstanding general surgery residency graduate performance, as rated by surgical educators. *JAMA Surg*. 2022;157:918-24. https://doi.org/10.1001/jamasurg.2022.3340