

# Cardiac Surgery Summer Immersion Experience

## *Proposal for Summer 2025*

Surya Sanjay,<sup>a</sup> & David Nordsletten<sup>b</sup>

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Now more than ever, the hurdles to become a physician are quickly rising. Students at earlier stages in the medical path are increasingly seeking opportunities to evaluate the field while also improving theoretical competency. It has also been noted that interest in cardiac surgery amongst students is decreasing. We propose CSSIE—the Cardiac Surgery Summer Immersion Experience—as a way to capitalize on the needs of today’s pre-medical student to increase interest in the specialty.

<sup>a</sup>**BS 2025**, Department of Biology, University of Michigan, Ann Arbor, MI 48104. **MS 2026**, Department of Computational Medicine and Bioinformatics, Michigan Medicine, Ann Arbor, MI 48104. Email: ssanj@umich.edu.

<sup>b</sup>**Professor**, Department of Biomedical Engineering, University of Michigan, Ann Arbor, MI; **Professor**, Department of Cardiac Surgery, Michigan Medicine, Ann Arbor, MI.

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The bar is higher than ever before for pre-medical students. Factors which may have previously been ‘optional’ are now required for admission, resulting in the popularity of gap years after the completion of an undergraduate degree today.<sup>1</sup> As a result, students may be more interested in seeking experiences that evaluate and reaffirm their intended path of pursuing a career as a physician.

At the same time, it has been suggested that cardiac surgery will experience a large increase in demand due to an aging population alongside a decrease in surgeons over the next couple of decades.<sup>2</sup> The number of thoracic surgery certifications awarded per year has been declining,<sup>3</sup> at least in part due to medical students’ perceived shortcomings with the track, including concerns of work-life balance<sup>4</sup> and lack of job security.<sup>5</sup> Some healthcare practitioners go out of their way to advise against a career in cardiac surgery out of a perceived notion that interventional cardiology will completely usurp the roles of the surgeon in the next few decades.<sup>c</sup>

As Sood and Reddy state, the pre-clinical years of medical school may turn students away from cardiothoracic surgery, and thus mentoring efforts targeted towards pre-medical students may be a more efficient approach to increasing interest in the specialty.<sup>6</sup> Mentoring efforts may be more effective when they involve experiential learning: a program at Johns Hopkins’s medical school afforded students the opportunity to observe operations, participate in research, and present at national meetings, leading to significantly higher interest<sup>d</sup> in surgical specialties.<sup>7</sup>

As such, we propose a summer program—the “Cardiac Surgery Summer Immersion Experience,” or CSSIE—that allows interested students in the pre-medical track to shadow cardiac surgeons in the operating room and acquaint themselves with theory through case reviews.

## Mission

CSSIE would be designed to (1) increase interest amongst undergraduate pre-medical students in cardiac surgery, and (2) provide an easy route for those students to be able to explore a career in cardiac surgery.

Although it is difficult to suggest what might increase interest in cardiac surgery, a number of studies suggest that observership,<sup>8</sup> simulation exercises,<sup>9</sup> research,<sup>10</sup> and mentorship from residents and physicians alike<sup>11</sup> increase interest and/or matriculation in surgical specialties. Conveniently, there is a framework that can be used to measure whether a program may fit the goals of a pre-medical student: the [AAMC core competencies](#). The most attainable competencies would be ‘Oral Communication,’ ‘Teamwork and Collaboration,’ [knowledge of] ‘Living Systems,’ ‘Scientific Inquiry,’ and ‘Written Communication.’

## Precedents

At Michigan Medicine itself, there exists such a program for neurosurgery called the *Ramnath Student Fellowship*, which functions similar to a one-month elective clinical rotation for undergraduate students who apply. They

<sup>1</sup>Rashid & Kibble, 2021.

<sup>2</sup>Moffatt-Bruce et al., 2018.

<sup>3</sup>Moffatt-Bruce et al., 2014.

<sup>4</sup>Coyan et al., 2020.

<sup>5</sup>Vaporciyan et al., 2009.

<sup>c</sup>I (Surya) have personally received this advice from medical students.

<sup>6</sup>Sood & Reddy, 2012.

<sup>d</sup>52% vs. a national average of 16%.

<sup>7</sup>Haggerty et al., 2014.

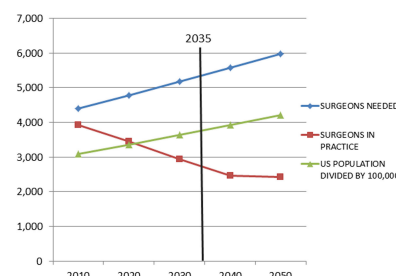


Figure 1: **The Demand for Cardiac Surgeons will Rise.** Moffatt-Bruce et al. (2018) projects a 121% increase in caseload for the average cardiac surgeon between 2010–2035.

<sup>8</sup>Elfaki et al., 2023; Haggerty et al., 2014; George et al., 2017.

<sup>9</sup>Tesche et al., 2010.

<sup>10</sup>Allen et al., 2009; Haggerty et al., 2014.

<sup>11</sup>Elfaki et al., 2023; George et al., 2017.

aim to expose students to the specialty through operating room shadowing experiences (generally one student per OR), as well as informal mentorship from residents. Students follow a different team every week, joining morning rounds once a week. Undergraduates stay at the hospital from the beginning of the first morning case until 4-7pm (their discretion).

Jason Heth, the director of the program, says that undergraduates are allowed in the OR and adequately prepared to navigate the OR environment through YouTube videos and a pre-program orientation:

*“There is a visitor policy that covers visitors in certain capacities[, covered in depth in “Logistics: Shadowing”]. [...] I also train up the undergraduate students on etiquette, the surgical process, when to interact, etc. [...] They co-rotate with a bunch of fourth year medical students and it’s a season where there is a lot of student teaching, so our residents are very helpful about teaching students different things. [...] I have grown to really enjoy this program and we are writing up our experiences right now as a matter of fact.”*<sup>e</sup>

<sup>e</sup>Personal communication, via email.

The program itself has involvement from all members of the department, ranging from medical students on rotation to attendings. However, low but widespread oversight from all members keeps it sustainable: it does not interfere much with existing responsibilities, yet it allots space for learning for undergraduates, as well.



Figure 2: **The Cardiothoracic Surgical Skills and Education Center (CSSEC) Summer Internship at Stanford.** High school students (pictured) practice fundamental surgical skills. Image accessed on 23 May 2024 from <https://med.stanford.edu/cssec.html>.

Outside of Michigan, most shadowing programs for pre-medical students are for sporadic visits, structured in the same way that an unorganized pre-medical shadowing experience might already be structured. One exception, however, is the Cardiothoracic Surgical Skills and Education Center Summer Internship at Stanford (see Figure 2). At this program, high school students are provided with surgical skills training and a review of theory, though no observership. This goes one step ahead in increasing confidence in practical skills,<sup>12</sup> but conceivably requires more department involvement.

<sup>12</sup>Bajaj et al., 2024.

## Overview

Therefore, the CSSIE program can derive some characteristics from existing programs for pre-medical and medical students.

We propose an approach that handles three aspects: shadowing, theory, and mentorship. The program can be split into two halves, wherein the first half is structured like an elective clinical rotation (exclusively in an observership role), and the second half involves guided study of a procedural technique. In this way, CSSIE can maximize increase in student interest while also allowing students to gain experiences necessary for medical school matriculation. At the same time, the program would be structured similar to existing programs for medical students (i.e. rotations), meaning fewer extra considerations would be required.

Further, as is done in the Ramnath program, the shadowing block may be split into two parts, involving two weeks with the congenital team and two weeks with the adult team. Due to the lengthy duration of the program (approximately 8-10 weeks), we recommend allotting one day each week for seminar (described below). This structure could allow up to four participating students per summer.<sup>a</sup>

<sup>a</sup>This assumes that each team can only supervise one student at a time, and two students can work together on a guided study.

## Logistics

### *Shadowing*

According to §04-06-061 of the Michigan Medicine/University of Michigan Health Services Policy, undergraduate students have non-participatory observership roles and therefore are subject to general visitor guidelines. Only undergraduates over the age of 18 are allowed in the operating room. Requirements for students include:

- › Written (paper or electronic) approval of the hosting department or Chief of Staff (or designee).
- › Visiting Observer Request Form must be completed.
- › The Visiting Observer must complete the online HIPAA Training and print the certificate of completion for the department.
- › The Visiting Observer must report to the Key and ID Office [...] to receive a Visiting Observer Badge[, ...and o]n completion of the visit [...] must return the Visiting Observer Badge to the sponsoring department.
- › The Visiting Observer must sign a Code of Conduct Attestation.
- › The Visiting Observer must be supervised by a sponsoring University of Michigan employee during any patient interactions or discussions about patient care.<sup>b</sup>
- › The patient must be informed and give verbal consent before permitting the Visiting Observer to interact with any patient.
- › Written and dated confirmation of approval from a designated representative from the unit (eg. Operating Room) will be obtained prior to the anticipated visit.
- › All visiting observers must provide proof of immunity to COVID-19, measles, mumps, rubella, varicella, pertussis, and influenza[, ...as well as p]roof of a tuberculosis test [...] within the past year.

<sup>b</sup>This aspect may be the most logistically difficult. Jason Heth says, "[t]ruthfully though, none of us has enough time to monitor anybody's attendance, so it[']s up to the students to breath[e] in as much of the experience as they can or want." *Dedicated* supervision is not required, but will naturally be provided as long as the student is in the operating room, on rounds, or visiting a patient with a faculty member, resident, or medical student.

Therefore, shadowing in the operating room is expressly allowed by UMHS, but, due to the lengthy list of requirements, documentation should

be completed well in advance for any participating students.

Following the precedent of the Ramnath program, only allow one undergraduate student per OR, and provide scrubs in advance. We also suggest providing resources with information on surgical procedures before students observe, in order to maximize engagement.<sup>c</sup>

### Guided Study

Guided study would be anything that classifies as an in-depth study of the theory of cardiac surgery. We propose that students take this on by writing up a review of interesting cases they observed under the mentorship of a resident. Alternatively, students could assist any residents or faculty with ongoing research projects during the time allotted.

Following this guided study, students can present their work at a cardiac surgery department meeting (or an alternative forum like MI-AORTA), to provide more opportunities for engagement with faculty.

### Seminar

'Seminar' is a term used here loosely to describe any supplementary activity of the student's choice. This may include but not be limited to: attending case discussions, rounds, or clinic visits; attending conferences and cardiac surgery-related forums; and mentorship.<sup>d</sup>

### Planning

Whereas the department will do most of the planning, I (Surya) plan to start a cardiovascular medicine-focused student organization on campus to increase interest amongst undergraduate students, and I'd be happy to devote a team to reduce the burden on the department in any way by helping manage CSSIE-related activities.

### Evaluation

To evaluate the success of the program, students can be tested for competency in the basics of theory and perceived interest before and after the program. Physicians and residents can also be surveyed for their perceptions of students' growth over the course of the program.

## Appendix

The AAMC Premed Core Competencies include:

- › Commitment to Learning and Growth
- › Cultural Awareness
- › Cultural Humility
- › Empathy and Compassion
- › Ethical Responsibility to Self and Others

<sup>c</sup>[Surya] From personal experience, guides like the STS E-Book and Harlan's *Manual of Cardiac Surgery* go a long way in explaining a procedure, even for undergraduate students. Though we will inevitably have doubts, some exposition always helps. Students have free access to both through <https://www.lib.umich.edu>.

#### Type B Aortic Dissection

Nicasius Tjahjadi, MD, Arnoud V. Kamman, MD, PhD, Himanshu J. Patel, MD, Joe D. Morris

#### Pathophysiology and Epidemiology of Aortic Dissection

Aortic dissection is characterized by disruption of the intimal layer of the aortic wall with subsequent separation of the layers of the wall. Entry tears in the intima allow for blood flow into the wall, creating a two-barrel aorta, with a true and a false lumen separated by an intimal flap (Figure 1).

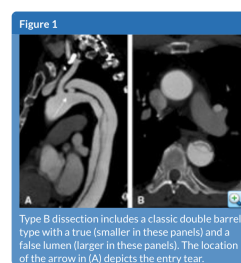


Figure 3: A page from the STS E-Book.

<sup>d</sup>We suggest that all students have a one-hour session with a resident or physician before and after the program to discuss their career goals and interests.

- › Interpersonal Skills
- › Oral Communication
- › Reliability and Dependability
- › Service Orientation
- › Teamwork and Collaboration
- › (Knowledge of) Human Behavior
- › (Knowledge of) Living Systems
- › Critical Thinking
- › Quantitative Reasoning
- › Scientific Inquiry
- › Written Communication

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