



A Surgeon Led Clinically Focused Anatomy Course Increases Student Selection of General Surgery As a Career

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OBJECTIVE: This study aims to identify program-specific critical factors in a student's path to general surgery and how different factors contribute to our high rate of matriculation.

DESIGN: Semi-structured interviews were conducted focusing on critical factors in student's decision processes to pursue general surgery. Three investigators independently evaluated the transcripts and identified recurring themes based on phenomenological qualitative methods until saturation was achieved. Inter-rater reliability was determined.

SETTING: The study took place at Tulane University School of Medicine, an academic medical center in New Orleans, Louisiana.

PARTICIPANTS: Current fourth-year students from our medical school, applying into general surgery, were interviewed for the study.

RESULTS: Twelve of 21 students were interviewed. The most common factor cited was the positive effect of clinically based anatomy and of having surgeons in anatomy (81%). Other factors mentioned included interest before medical school, clerkship experience, and mentor interactions; Kappa was 0.76 or higher for each theme.

CONCLUSIONS: A clinically focused anatomy course led by surgeons at our institution has a significant impact on a general surgery career choice. With the constant evolution of the medical field, understanding what guides students toward a career in general surgery will better assist medical education planners in providing resources that

will positively impact future classes. (*J Surg Ed* 76:694–699. © 2018 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: general surgery, anatomy education, surgical education, survey, decision points

COMPETENCIES: Professionalism, Systems-Based Practice, Medical Knowledge

INTRODUCTION

The field of medicine is broad and diverse, with numerous career pathways and opportunities. For a medical school senior, the decision to apply into a specific specialty best suited to his or her professional and personal goals is a multifactorial process and embodies the final coalescence of premedical and undergraduate medical education. In general, students choose between 2 broad categories of medical careers: surgical vs nonsurgical specialties. The average percentage of a US medical school class applying into general surgery obtained from publicly available National Residency Matching Program match data is 5.3% from 2014 to 2018,¹⁻⁵ with a documented decrease in the number of students expressing interest in the field beginning in 1987.⁶⁻⁸ Literature suggests many common factors in the decision for a medical student to pursue a general surgery residency including interest in surgery prior to medical school,^{9,10} access to preclinical and positive clerkship surgical experiences,¹¹⁻¹³ involvement in preclinical research,^{14,15} and positive interactions with surgical role models and mentors.¹⁴⁻¹⁷ Lifestyle has also been identified as a significant factor,^{7,14,17-19} with general surgery, orthopedic surgery,

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and obstetrics and/or gynecology identified as perceived poor lifestyle specialties.⁷ In addition, changes in the length of the standard work per week,²⁰ student temperament,²¹ and indebtedness considerations¹⁴ may play into a student's final decision. Tulane University School of Medicine is unique, with yearly averages ranging from 10% to 12% of students at our institution applying into general surgery, from 2014 to 2018.²²⁻²⁶ A greater percentage of the student body has applied into other surgical specialties within the same timeframe. In 2018, our institution saw the largest number of individual students select a career in general surgery, with a total of 21 students. This study aims to identify the critical decision points in student's career paths to general surgery and if unique factors contribute to the greater than average matriculation rate.

METHODS

Recently graduated US seniors, all of whom matched into general surgery, were interviewed using an open ended, semi-structured interview regarding individual decision points to pursue general surgery. The study was approved prior to obtaining data by the Institutional Review Board for Tulane University. The semi-structured questions spanned premedical, preclinical, and clinical years in order, and were written to allow the interviewee to elaborate on as much or as little as they pleased. Questions were phrased to be as free of leading as possible and were standardized on a final interviewer script (Fig. 1). Interviewers were instructed to allow conversations to evolve freely, but for consistency of the study, ensure that each critical topic was answered by the interviewee. The interviews, were conducted and recorded over the phone or in person, transcribed and deidentified by an outside transcription team. Grounded theory was used to analyze the deidentified transcriptions. Using a phenomenological process,

Specific	Open Ended
"When did you start thinking you might choose surgery as a career?"	"Was the decision to pursue surgery gradual or sudden? Explain."
"When did you firmly decide on surgery?"	"Did your experience in gross anatomy have any effect on your choice of surgery as a career? Can you elaborate?"
"When you started your clerkships, were you undecided on a career choice?"	"Did the presence of surgeons in anatomy have any impact? Explain."

FIGURE 1. Scripted interview questions.

emergent themes were identified by coding teams. A constant comparative analysis was used to assess new themes against those already established. Analysis continued until saturation was achieved. Upon completion of independent coding of the transcripts, teams met to identify the common themes. Themes were agreed upon, confirmed with direct support from the interview transcription text, tabulated, and documented. Fleiss Kappas were calculated for each identified theme, and those with a Kappa greater than 7—the limit set for inter evaluator significance—were used as final results and for data interpretation.

RESULTS

Twelve of a total of 21 possible students were interviewed for the project, and all 12 transcripts were used. These data acquired from the coding teams are best divided into 4 categories: initial thought for surgery, final decision for surgery, quality of decision, and specific influencers.

Initial thought for surgery was assessed as the time-frame that the student initially had for considering the career and was defined as premedical, preclinical, and during clinical training. Predominantly, student's initial thought for surgery occurred before medical school (58%), "I applied into medical school knowing I wanted to go into surgery," with most of the remaining students identifying their interest during preclinical years with an emphasis on gross anatomy (33%), as shown in Figure 2. "When I got into medical school and was in the anatomy lab, I (felt) like this is where I'm supposed to be. . . it definitely influenced my (career) choice positively."

Final decisions were defined as student-identified moments of certainty in their career path. Most students identified their surgical clerkship as the final decision

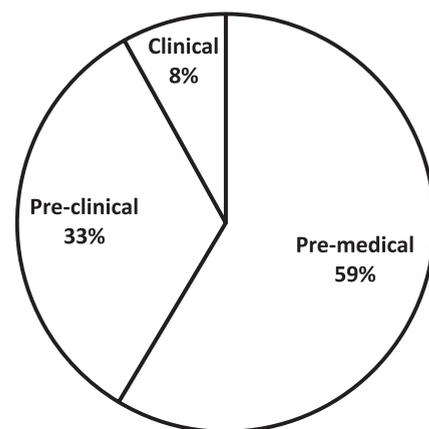


FIGURE 2. Initial thought for general surgery as a career.

point (67%), “It was after my surgical clerkship that I knew I wanted to go into general surgery.” Postcore clerkships (17%) was also identified as a common time for final decisions, “I firmly decided (on general surgery) the month after my last rotation.” The remaining students identified preclinical experiences (8%), “(Before medical school) my grandfather passed away all of a sudden from colorectal cancer, so I decided to pursue general surgery. . . I decided after he was readmitted,” and unspecified (8%) as their final deciding factor.

Quality of decision to choose general surgery as a career was defined as gradual or sudden and was directly asked during the interview if students believed it was a progressive decision (gradual) or if a specific defining moment (sudden) was responsible for students choosing surgery as a career. The majority of students stated that their decision was gradual (75%). “As I was doing anatomy I was thinking this was something I would like, but at the same time I didn’t know what I was going to do before third year.”

Specific influencers were defined in this study as faculty, clinical experience, or course-related factors that are repeated within multiple transcripts and can readily be cited by multiple coding teams. Each factor to be considered valid for this study must have met a minimum Fleiss Kappa of 0.7, represent the majority of interviewees—greater than 50%—and have ample text to examine it. **Figure 3** shows the most substantial specific influencers identified in this project.

As is shown, the majority of students (89%) stated that their clerkship experience was a significant specific influencer to their decision to pursue general surgery. “When I was on my surgery clerkship, that was my final decision.”

A unique finding in our cohort is the influence of having surgeons lead anatomy, with 81% of students stating this as a significant factor for their interest in pursuing general surgery. “People who love surgery are the people who love anatomy. . . I had (two surgeons at our institution) during anatomy.” Most interviews addressed this topic with direct questioning on the impact of surgeons in anatomy, but it was noted that the topic was brought up spontaneously by the interviewee in 25% of the transcripts. Fifty-eight percent of the students referred to their experiences in gross anatomy more than once throughout the duration of the interview.

To a lesser extent, students’ experiences with clinical shadowing, faculty mentorship, and resident teams also influenced their decision to pursue general surgery. “I think it was the combination of experiences and the people I worked with that kind of all solidified it for me.”

Other factors noted that were not representative of our population include research opportunities, surgical clubs, extracurricular surgical activities, and family members in surgical fields.

DISCUSSION

The addition of having a surgeon led gross anatomy course at our institution is a significant factor leading to the higher than average general surgery matriculation rate at our institution. Present in many of the transcripts are statements expressing the significance of having surgeons in anatomy, and how this led prospective surgical applicants to choose general surgery over other

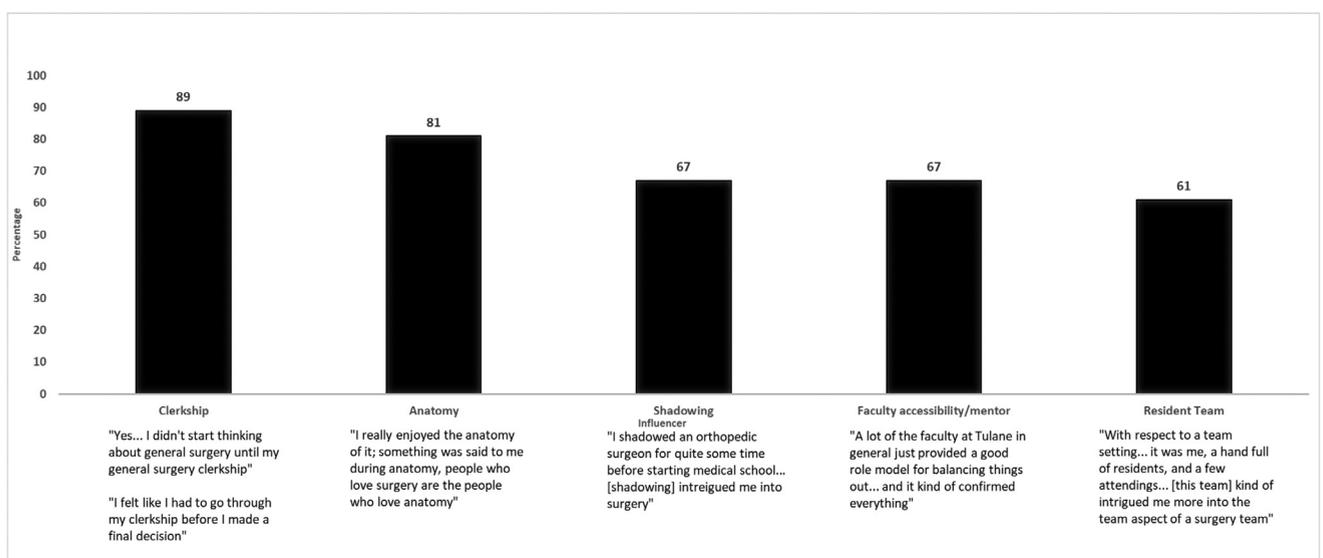


FIGURE 3. Specific influencers.

“I had a good experience with the surgeon’s I worked with in anatomy”
“It did. I mean [staff surgeon] was a fantastic general surgeon. And one thing I remember is... he would go ahead and do a dissection and his hand was so still... it definitely gave me a good first exposure to general surgery”
“Absolutely. I worked with [staff surgeon] in my abdominal block. Having his kind of expertise from a surgeon’s perspective changed how I thought about anatomy and how I thought about surgery.”
“Having [staff surgeon] stick with me... and [I] realized in anatomy that I had the possibility of being a surgeon.”
“[Surgeon in gross anatomy] gave me a good first exposure to general surgeons. So it set up my interaction with future general surgeons in clinical years as well.”

FIGURE 4. Statements on the impact of surgeons in anatomy.

specialties (Fig. 4). From the literature, it was identified by Pulcrano et al. that gross anatomy leads to an increase in students interest in working with instruments and tools (41%-50%), desire to work with their hands (33%-50%), and overall a net increase of 15% of students stating that they were more interested in pursuing a surgical career.¹⁹ Also documented was 75% of students with initial interest in surgery maintained their interest following M1 anatomy, and 21% of neutral students also expressed interest.¹⁹ Of note, this study was not specific for assessing students interest in general surgery. Our student population also reflected an increase in interest in surgery postanatomy; however, our results were to a greater extent. When looked at independently, gross anatomy and experiences with surgeons outside of the core surgical clerkship are both nonsignificant factors, yet the combination of clinically based anatomy with surgeons leading the coursework was identified as very influential in our institution’s students selecting surgery. It was identified by Peel et al. in a systematic review of current literature that the limited exposure of medical students to surgery during medical school is a likely deterrent to a student choosing to pursue a surgical career.²⁷ Having surgeons lead our institution’s anatomy program counteracts this trend of less undergraduate medical exposure to surgery, and contributes to the level of our matriculation numbers.

The remaining results from the survey indicated that our data are generally consistent with the current body of literature for student selection of general surgery as a career. Our data show that for initial selection of general surgery, the strongest influencer is premedical experiences. This trend of strong premedical influence in pursuing general surgery as a career is well documented in the literature.¹⁰ Additionally, it is apparent throughout our data that 1 of our institution’s strengths is the quality of the surgical clerkship. The vast majority of students (89%) indicating that their personal clerkship experience was a major driving factor in their choice of general surgery. This is supported immensely by literature and has been well documented.^{11,28,29}

Limitations of this study include limited sample size and selection bias. With regards to sampling size, only the most recent graduated class from our institution was considered for the interview while the matriculation rate of students applying into general surgery was trended over the course of 5 years. While this might seem like grossly limited sample size, the general structure of our institution’s medical school curriculum was not significantly altered over the years that this study was looking at, and the sampled class underwent the same coursework for medical school as did the class of 2015. Additionally, only minimal changes to staff and key instructors were made over the course of those years. Therefore, it is reasonable to presume that the trends noted in the interviewed students are consistent with the majority of the class. It is important to note that the students who were offered interviews and participated in the study were those that had chosen general surgery as their career option. These data that were acquired are representative of those who made a definite choice to pursue general surgery in the end and do not reflect the influencing factors for those who initially had interest in general surgery and chose a different field. This is an inherent bias of the study design. Future studies are warranted to look at the critical decisions in a student who initially expressed interest in general surgery and ultimately chose to pursue a different specialty.

Overall, it can be confidently stated that Tulane’s surgeon led anatomy course—in addition to student’s surgical clerkship experiences and other previously mentioned impactful events—is a substantial influencer in students deciding to choose general surgery as a career.

CONCLUSIONS

Based on the results obtained at our institution, the decision process for a student considering general surgery can be defined as a gradual, clerkship, and surgeon-led clinical anatomy-influenced decision, which begins in premedical years and is finalized during the core surgical

clerkship. While the decision process is widely multifactorial, the combination of surgeon-led clinical anatomy and clinical clerkships at our institution is a significant component that explains the higher than average general surgery matriculation rate seen over the years. With the continuous evolution of medical education, understanding which experiences influence students to choose general surgery as a career is valuable to medical education planners looking to structure undergraduate medical education curricula.

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