Evaluation of a Curricular Addition to Assist Medical Students in Specialty Selection

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ABSTRACT: Early hands-on experience with surgical procedures may help medical students make better-informed choices if considering a surgical specialty. Here, we evaluate a curricular addition in surgical anatomy, formally exposing second-year students to different surgical subspecialties. Students met with surgeons for 7 weeks (one afternoon per week) and practiced surgical procedures on human cadavers with supervision. About a quarter of the participants reported a change in their top choice of specialty upon completing the course, and about half of the students reported changes in their second and third choices. At the time of graduation, 85% of those surveyed reported participation in the course impacted their final choice of specialty. These results demonstrate such a course helped medical students select a specialty during early training.

KEYWORDS: Surgery, anatomy, pathology, specialty, elective

Introduction

The selection of a medical specialty is a complex, multifactorial decision-making process, involving interacting academic and social pressures as they relate to personal and professional goal achievement.¹⁻⁶ Medical students must take a myriad of factors into account as they research various specialties and reflect upon their experiences and preferences. Over half of students report a change in their likely first choice during medical school.⁷⁻¹¹ Recent scholarly work has elaborated a number of the forces influencing medical students’ decisions and has demonstrated two particularly salient consistent trends. First, both male and female medical students are increasingly selecting medical specialties that allow for a more controllable lifestyle, for various reasons.¹²,¹³ Second, a decreasing proportion of American, Australian, and Canadian students are choosing surgery and surgical specialties such as OB/GYN.¹⁴,¹⁵ This assertion holds true in Australia despite the fact that its medical education system provides a more integrated internship year outside of selected specialty, systematically allowing for a broader foundation in multiple disciplines before selection. It therefore appears that practical exposure to multiple specialties influences the ultimate decisions of medical students in accordance with the wider trends laid out above.

Many studies seek to improve our understanding of how students choose specialties in the setting of the growing provider shortage in primary care,¹⁶ but this body of work is also relevant to those students considering surgery. There are inconsistent findings with respect to the development of students’ interest in surgical specialties. One previous analysis found that many students had chosen to pursue surgery prior to their matriculation to medical school,¹⁷ and another study found that students interested in surgery were significantly more likely to have a surgeon in the family.¹⁵ However, students in one study self-reported exposure to the specialty during their preclinical curricula significantly impacted their eventual career choices, and nearly all of those students who reported an interest in surgery had positive experiences on a surgical service during their third-year clerkships.¹⁴

Much existing work has focused on the factors influencing specialty choice (such as, for example, hospital-orientation, work hours, presence of mentors or role models, or prestige),¹,¹⁸ but relatively few interventions have been described to assist students in their decision-making process. One recent meta-analysis of methods aimed to increase the proportion of students matching into primary care specialties found that the only consistently effective intervention was a longitudinal program, such as a preclinical preceptorship, family medicine faculty advisor, or overarching community project.¹⁹ This review did not investigate medical students’ own assessments of the utility or benefit afforded by such interventions as they chose a specialty. Another recent study, looking specifically at medical students’ attitudes toward surgical specialties, identified that approximately two-thirds of students who participated in a 1- to 2-week summer surgical program akin to what they might experience in a clinical clerkship found it helpful in guiding career decision-making,²⁰ students who did not find it helpful felt the program was simply too short to allow them time to evaluate the experience.

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The Surgical Anatomy selective, created by the Department of Pathology at the David Geffen School of Medicine at UCLA, was developed in accordance with recommendations for medical career guidance21 and aimed to provide second-year medical students with more opportunities to explore various surgical specialties. The present study investigated if and how this course impacted students’ consideration of surgical specialties as a career choice immediately on completion, and how they perceived its impact on their final specialty choice at graduation from medical school.

Methods

Sample

Second-year medical students at the David Geffen School of Medicine at UCLA must, as part of the curriculum, take two selective courses during their pre-clerkship years. There are dozens of courses available, and students may select them based on their interests and schedules. The Surgical Anatomy course is geared toward students who are interested in a surgical specialty and would like to learn and acquire hands-on experience with seven different surgical subspecialties. There are 18–24 spots available for students to participate. Historically, there have been roughly twice as many students interested in the course as spaces available; thus, in the last 3 years, a lottery has been instituted to select the group of participants. The sample for this study consisted of 20 students from the Class of 2015, 20 students from the Class of 2016, and 24 students from the Class of 2017.

Intervention—course description

The Surgical Anatomy Selective met once a week for 7 weeks, each session lasting for 2 hours. At each meeting, clinicians of different surgical specialties demonstrated procedures on human cadavers for the students before assisting the students in practicing those same procedures. There was a ratio of 2–3 students per cadaver. Cadavers were embalmed and unembalmed, depending on the procedures practiced in a given week. Clinicians and students reviewed anatomy relevant to routine surgical procedures in Urology, Vascular Surgery, Head and Neck Surgery, General Surgery (thoraco-abdominal procedures), Plastic Surgery, and Orthopedic Surgery, while practicing procedures. Clinicians also shared information pertinent to the lifestyle afforded by each specialty during informal conversation and discussion. The Urology session consisted of performing right and left nephrectomies; during the Vascular Surgery session, students performed guided endarterectomies and femoral-to-popliteal bypass with saphenous vein grafting; the Head and Neck Surgery session included facial nerve sections, parotidectomy, and laryngectomy; and during the General Surgery sessions, students were guided through gastrectomy, appendectomy, duodenopancreatectomy, splenectomy, and cholecystectomy (during the abdominal session), as well as thoracotomy with lobectomy or pneumonectomy (during the thoracic session). All of these sessions used embalmed cadavers. The last two sessions, emphasizing Plastic Surgery and Orthopedics, used unembalmed cadavers. The Plastic Surgery session included mastectomy repairs, craniofacial reconstruction, and different types of grafts, and during the Orthopedic Surgery session, the students practiced fracture repair using plates, ulnar nerve translocation, and carpal tunnel repair. Suturing was encouraged at the end of every session.

Design

The study employed a one-group pretest/post-test design. Students indicated in a survey their top three specialty choices from among all those available as residency programs immediately prior to and following the Surgical Anatomy course. Data were collected and codified according to whether these specialties were surgical or nonsurgical, and changes were noted at the conclusion of the course.

In addition, at the end of the course, the students rated its usefulness (with a Likert-type-scale of 0 = "not helpful" to 5 = "extremely helpful") in increasing their knowledge about different surgical specialties and the extent to which the course increased their confidence in specialty choice. Students were also encouraged to comment on any aspect of the course.

A follow-up survey at the time of graduation was given to course participants in the Class of 2015. The survey retrospectively assessed the impact the Surgical Anatomy selective had when students made their final choice of specialty. All study surveys were optional and anonymous. Institutional review board (IRB) approval was obtained.

Results

Of the 64 students who participated in the course, 57 complete survey responses were collected (response rate 89.1%). About a quarter (26.3%, N = 15) reported a change in their top choice of specialty after taking the course. There were two more students whose top choice of specialty was surgical than there were before the course, and 12 students’ top choice had changed from one surgical subspecialty to another. About half of the students reported changes in their second and third choices of specialty (50.9%, N = 29% and 54.4%, N = 31 respectively) after taking the course (Tables 1 and 2).

Students found that the course was helpful in increasing their knowledge about different surgical specialties (mean of 4.7, range = 2-5; mode = 5) and in increasing their confidence about choosing the right specialty (mean of 4.0, range = 2-5; mode = 5) (Table 3).

The long-term follow-up survey was completed at time of graduation by 13 of the 20 students from the Class of 2015 who had participated in the course (response rate 65%). Eleven of 13 students responded that the Surgical Anatomy selective impacted their final choice of specialty. When asked to rank the
medical school experiences that had the greatest effect on final choice of specialty, one student noted that the Surgical Anatomy selective had the single greatest effect on specialty choice throughout all of medical school. Six students ranked the course among their top five most influential experiences on their choice of specialty: One student reported the course as having the second greatest influence on specialty choice; three students, as having the third greatest influence; and one student each as having the fourth and fifth greatest influence. Other experiences rated as having the single greatest effect included “3rd year clerkship” (six students), “4th year sub-internship” (three students), “interactions with attending physicians” (one student), “gross anatomy” (one student), and “preceptorship” (one student). The following miscellaneous responses were also noteworthy as events having an influence on specialty choice: mentors, research, second-year lectures, anatomy tutoring, student interest groups, and specific preclinical courses.

Student evaluations of the Surgical Anatomy Selective were overwhelmingly positive. Depending upon the year, the course consistently received an overall score of 4.9 or 5.0 (5.0 being the highest rank) in student satisfaction. Numerous narrative comments praised the course for the opportunities it provided for exposure to surgical practices in the first two years of medical school. Consistently, the most praised aspect of the course was the opportunity for hands-on procedure practice. While constructive criticism was uncommon overall, the most frequent piece of constructive criticism from students was that they would have liked more time in each session. One student “loved the great amount of exposure [that students] were given to the variety of surgical specialties,” while another elaborated that “the course … provides good insight into the procedural aspects of different fields, which is something that we don’t get much exposure to through our curriculum in the first two years.”

Some students mentioned that some of the presented fields were those which they had not yet considered pursuing: “I am very grateful to have had the opportunity to experience and learn about a wide range of surgical specialties that I would never have considered [nor] had the time to fully explore on my own.” Two students reported in their narrative comments that they had been interested in surgery before the course but would no longer be considering surgical specialties.

### Discussion

While there were a few students on the whole who changed their first-choice specialty from nonsurgical to surgical, students in general tended to select the same specialty as their first choice before and after the course. However, given the strong positive response to the course as a preparation for choosing a specialty, and noting that many course participants reordered or altered their top three choices after the Surgical Anatomy course, early hands-on practical experiences in surgical procedures helped students to make a more informed choice of specialty from among all available options. Consequently, the experience may additionally help students in the planning of subsequent electives in medical school. Specifically, confirming their interests could permit students to seek out opportunities to work with mentors in specialties of interest. Making an early connection, in turn, might deepen their relationship with these clinicians and allow them a wider pool of advisers from whom to obtain high-quality letters for their residency applications.

A drawback of this course is the cost associated with the necessary specimens, as well as attending and resident surgeons to volunteer their time to instruct students. Hands-on activities of this kind require the supervised use of embalmed and unembalmed cadavers, which might be more expensive than other resources (such as anatomical models or knot-tying boards, for example) used in different learning activities, primarily due to the need for professional staff to embalm and maintain the donated human specimens. Cost-reducing measures which will not compromise course effectiveness are currently being explored. For example, investigation is underway to determine if implementation of a higher student/cadaver ratio and a slight decrease in hands-on time significantly impact the students’ overall perceptions of the course. However, when the costs of this course are

| YEAR OF COURSE | NUMBER OF STUDENTS | NUMBER OF STUDENTS WHO COMPLETED SURVEY | NUMBER WHO CHANGED THEIR FIRST CHOICE OF SPECIALTY AFTER COURSE | NUMBER WHO CHANGED THEIR SECOND CHOICE OF SPECIALTY AFTER COURSE | NUMBER WHO CHANGED THEIR THIRD CHOICE OF SPECIALTY AFTER COURSE |
|----------------|--------------------|----------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|
| 2013           | 20                 | 13 (65%)                               | 4 (30.7%)                                                     | 4 (30.7%)                                                     | 4 (30.7%)                                                     |
| 2014           | 20                 | 20 (100%)                              | 5 (25%)                                                       | 8 (40%)                                                       | 9 (45%)                                                       |
| 2015           | 24                 | 24 (100%)                              | 6 (25%)                                                       | 17 (70.8%)                                                    | 18 (75%)                                                      |
| Totals         | 64                 | 57 (89.1%)                             | 15 (26.3%)                                                    | 29 (50.9%)                                                    | 31 (54.4%)                                                    |

| PRE-COURSE | POST-COURSE |
|------------|-------------|
| Surgical   | 18 (31.6%)  |
|            | 20 (35.1%)  |
| Nonsurgical| 39 (68.4%)  |
|            | 37 (64.9%)  |

Table 1. Preferred specialty choices of course participants assessed before and after the course.

Table 2. Changes in first-choice specialty before and after the course, organized by whether or not the specialty was a surgical one.
weighed in relation to the costs incurred by similar interventions that rely on a clinical immersion experience,19,20 the relative savings is considerable and the logistics are significantly simplified. Supervisors are not tasked with allocating students to appropriate surgical cases or ensuring they are adequately trained and prepared for a sterile and safe operating room experience, which saves expensive faculty time. Moreover, the central principle of the Surgical Anatomy course is actively experiencing and practicing surgical procedures, not simply passively observing them, in keeping with principles of experiential learning.

This pilot study has several limitations, including its implementation at only one institution, its dependence on subjective survey response data, and its relatively small sample size, especially for the long-term follow-up survey. Narrative data were dutifully recorded where available to enable us to comment superficially on the way in which any given specialty choice was impacted; however, because of the way the data on final specialty choice were collected and because the surveys were completed voluntarily based on subjective self-reflection, it was not possible to analyze exactly how the course impacted selection beyond a student’s reported perceptions. Finally, participants were self-selected, and hence, selection bias cannot be ruled out.

Nevertheless, these results suggest a curricular addition such as the Surgical Anatomy course may be a useful tool for helping medical students select a medical specialty during their pre-clerkship years. Ways to make the course more cost-effective are being explored.

Authors’ Note
The views expressed in this paper are those of the authors and do not reflect the official views or policies of the United States Government, Army, Air Force, Navy, or Department of Defense.

Author Contributions
ES conceived and designed the experiments. ES, NAS, and JDC analyzed the data. ES and NAS wrote the first draft of the manuscript. JDC and SU contributed to the writing of the manuscript. ES, JDC, NAS and SU agree with manuscript results and conclusions. JDC and ES jointly developed the structure and arguments for the paper. ES and JDC made critical revisions and approved final version. All authors reviewed and approved of the final manuscript.

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As a requirement of publication, authors have provided to the publisher signed confirmation of compliance with legal and ethical obligations including but not limited to the following: authorship and contributorship, conflicts of interest, privacy and confidentiality and (where applicable) protection of human and animal research subjects. The authors have read and confirmed their agreement with the ICMJE authorship and conflict of interest criteria. The authors have also confirmed that this article is unique and not under consideration or published in any other publication, and that they have permission from rights holders to reproduce any copyrighted material. Any disclosures are made in this section. The external blind peer reviewers report no conflicts of interest.

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