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# Determining the educational value of a technical and nontechnical skills medical student curriculum



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## ABSTRACT

**Background:** Residency application rates to general surgery remain low. The purpose of this study is to describe the educational value of a curriculum designed to increase preclinical medical student interest in surgical careers to better understand the process by which medical students decide to pursue a career in surgery.

**Materials and methods:** We used qualitative methodology to describe the educational value of a technical and nontechnical skills curriculum offered to preclinical medical students at our institution. We conducted semistructured interviews of students and instructors who completed the curriculum in 2016. The interviews were recorded, transcribed, and inductively coded. The data were analyzed for emergent themes.

**Results:** A total of eight students and five instructors were interviewed. After analysis of 13 transcripts, four themes emerged: (1) The course provides a safe environment for learning, (2) acquisition and synthesis of basic technical skills increases preclinical student comfort in the operating room, (3) developing relationships with surgeons creates opportunities for extracurricular learning and scholarship, and (4) operative experiences can inspire students to explore a future career in surgery.

**Conclusions:** These factors can help inform the design of future interventions to increase student interest, with the ultimate goal of increasing the number of students who apply to surgical residency programs.

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## Background

Structured outreach programs offered to preclinical medical students represent an important initiative to increase student interest in surgical careers. These programs originate from the observation that the number of students applying to general surgery residency programs has declined significantly over the past decade; from 1984 to 2016, the percentage of United States medical school graduates matched to general surgery residency programs decreased from 13.5% to 7.6%.<sup>1,2</sup> From

1981 to 2005, the general surgeon work force also underwent a 25.9% reduction in the overall number of surgeons per 100,000 individuals, with population modeling suggesting that this trend will persist in the coming years.<sup>3,4</sup>

When designing interventions to counter these trends, the rationale for concentrating on the preclinical medical student population arises from several factors. For one, the majority of medical students appear to commit to a career discipline before they begin their clinical clerkships.<sup>5,6</sup> Surgeons have also observed that the traditional opportunities to interact

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with clinical medical students are dwindling as a result of increased medical school curricular emphasis on primary care and other specialties and subsequent curtailment of surgical clerkships.<sup>7,8</sup> The implication is that increased attention should be directed to medical students earlier in their career, while their professional interests are still malleable.

A panoply of curricula have emerged to increase interest in surgical careers among preclinical medical students, with accompanying scholarship investigating the effectiveness of these varying curricular designs and modalities. Early exposure alone, in the form of surgeon demonstration in the anatomy laboratory or pure shadowing experiences in the operating room, has been shown to increase interest in surgery.<sup>9-11</sup> Other courses have sought to impress on students the teaching of basic technical skills, such as knot tying and suturing.<sup>12,13</sup> Focused efforts to increase surgical mentorship at the preclinical level have also been described in the literature.<sup>14,15</sup> Many curricula have integrated some or all of these components, as a part of a comprehensive strategy to muster interest in surgical careers.<sup>16-19</sup> Along those lines, we reported our experience with a technical skills and high-fidelity simulation operative training curriculum in 2007.<sup>20</sup> In 2016, we iterated the curriculum to include structured faculty shadowing and mentoring experiences, as well a component of nontechnical skills training to assist preclinical students in navigating the operating room environment. A general overview of our curriculum is summarized in [Figure 1](#).

In the literature, these curricula have generally been reported as successful when described in terms of student self-reported interest in surgical careers; however, application rates to general surgery residency programs have continued to remain low, suggesting that the role of these interventions is poorly understood. To better understand the complex interplay between preclinical interest in surgical careers and curricular interventions, we sought to examine our own curriculum through the lens of qualitative methodology. The purpose of this study is to describe the educational value of our own comprehensive preclinical surgical skills curriculum through analysis of student and instructor experiences.

**Materials and methods**

Using a phenomenological qualitative approach, we conducted semistructured interviews about the individual

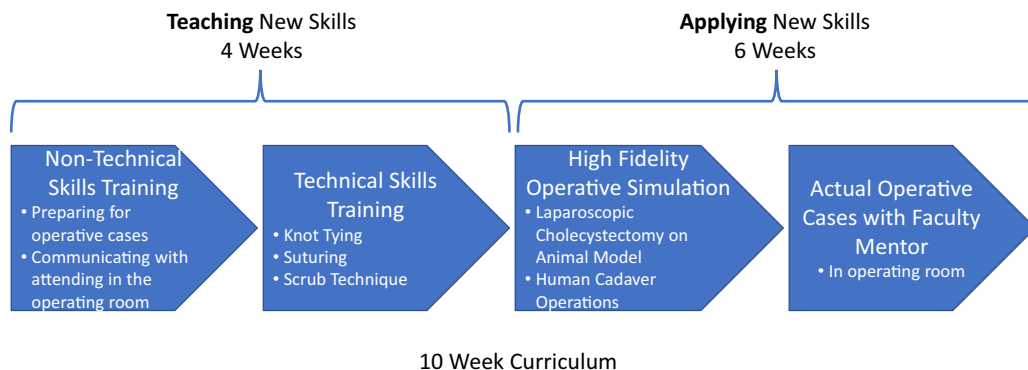
experiences of both students and instructors who participated in the 2016 version of our curriculum which includes the mentorship innovation. Our institutional review board reviewed our protocol and designated it as exempt from review.

**Study participant selection and enrollment**

Our curriculum was offered as an elective course to all first-year (medical student 1) and second-year (medical student 2) medical students at our institution (*n* = 183). Owing to logistical reasons, enrollment was capped at 30 students. We recruited all students who completed the curriculum in 2016 (*n* = 30), a cohort that included 9 first-year and 21 second-year students. We emailed these students a research information sheet describing the study and invited them to participate. All students who responded affirmatively were enrolled in the study (*n* = 8). We similarly recruited all instructors (faculty, residents, and student teaching assistants) who taught in the course (*n* = 10) and enrolled all those who responded affirmatively (*n* = 5). We achieved thematic saturation during the interviews with these recruitment efforts.

**Data collection**

We created a *de novo* qualitative interview guide with semi-structured questions designed to explore a range of issues pertaining to the educational value provided by the curriculum. The interview script for student participants is presented in [Appendix A](#). These questions were informed by a curriculum evaluation survey administered to students who completed the curriculum in 2015. We piloted the interview guide with three former students (*n* = 3) and two former instructors (*n* = 2) for the refinement of questions and the development of question probes to call forth clarifying information if needed. We conducted one-on-one in-person interviews with student and instructor participants using the same interview guide. These interviews were conducted by two resident members of the research team who served as course instructors and a medical student member of the research team who served as a course teaching assistant. As the course was elective with attendance as the only requirement for credit, the interviewers did not have a role where grades were assigned to study participants. The interviews were audio recorded, transcribed verbatim, and transcripts



**Fig. 1 – General curriculum structure with representative course activities. (Color version of figure is available online.)**

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