

Medical Student Experience in Surgery Influences Their Career Choices: A Systematic Review of the Literature

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OBJECTIVES: Student experiences during surgical rotations may dictate interest in future surgical careers. The objective of this study was to systematically examine the effect of surgical experience (SE) on student attitudes toward surgical careers and also to identify variables influencing the educational value of SE.

METHODS: A systematic review of the available literature was conducted by 2 independent researchers searching Medline, EMBASE, Google Scholar, and Cochrane databases, in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analyses recommendations. Studies assessing SE during the students' surgical rotations were identified. The quality of the included studies was assessed using a validated quality index. Factors affecting student surgical rotation experience and perceptions of surgical careers were recorded.

RESULTS: Overall, 204 studies were identified; 20 unique studies met the inclusion criteria with a median cohort size of 169 (interquartile range: 107-262) respondents. Most were cross-sectional surveys ($n = 16/20$) and administered to clinical students ($n = 16/20$). All studies investigating the effect of SE on career choices ($n = 8$) found that positive experiences during the surgical placement were associated with an increased interest in surgical careers. The operating theater experience was identified as a defining feature of overall SE. Involvement in operative procedures, a welcoming environment, and avoidance of syncopal events positively influenced the SE, particularly in those who actively sought educational opportunities. Study limitations included single-center and single-year cohort designs (70%) with the use of nonvalidated research tools (95%).

CONCLUSIONS: A systematic review of the literature highlights a number of factors associated with a positive surgical rotation, which may lead to more students deciding to pursue a career in surgery. Understanding the factors that contribute to these decisions through multicenter studies using validated research tools may lead to more effective surgical rotations, ultimately improving the delivery of the surgical education. (J Surg 72:438-445. © 2015 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: surgical experience, career choice, medical students

COMPETENCIES: Professionalism, Interpersonal and Communication Skills, Practice-Based Learning and Improvement

INTRODUCTION

The recruitment and training of candidates into surgical programs is critical for any health care system, yet it has become increasingly difficult as students favor lifestyle decisions over profession.¹ In 2014, the National Residency Match program results indicated that 143 surgical programs went unfilled, with the percentage preliminary positions of surgery filled reported as 65.1%, 64.1%, and 60.4% in 2014, 2013, and 2012, respectively. A total of 51.4 million operations were performed in the US in 2010² and demand is expected to grow.³ Factors such as lifestyle and income are important for male and female graduating students and have been strongly associated with trends in specialty choices.⁴ Although surgery is considered a favorable specialty for future earnings, it is often rated among the lowest for lifestyle.^{4,5} Lifestyle is likely perceived as worse in surgery owing to a number of factors such as duration of training, total hours worked and antisocial hours, in addition to the intrinsic stresses associated with the nature of the work. Self-reported

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survey data indicated that surgical trainees are likely to be working significantly more hours than many of their medical colleagues⁶ with high rates of burnout during their career.⁷

Medical school is an opportunity to not only acquire the knowledge and skills required to be a doctor but also experience many of the specialties and begin to form career preferences and aspirations. Studies have demonstrated that surgical experience (SE) in the clinical years of training has a significant effect on the decision to pursue a career in surgery.^{8,9} However, no previous investigation has systematically assessed the literature to determine the implications for recruitment of medical students into surgical specialties.

Medical students have less exposure to surgical than medical specialties and this gap has widened in previous years.¹⁰ Considering that surgical competence is composed of several elements, including knowledge, technical skill, judgment, and professionalism, it is important that medical students and junior doctors are sufficiently exposed to these attributes before constructing their career choices. In particular, unlike medical specialties, the craft nature of surgery necessitates that surgeons develop the technical skills required by their specialty and, as a craft specialty, exposure is key to the attraction to, satisfaction in, and progression through surgery. Surgery is often considered to have retained aspects of an apprenticeship model of training,¹¹ and a number of studies have examined the role of mentoring in this context.^{12,13} Surgical training can be considered to be situated learning,¹⁴ whereby the student, and surgical trainee thereafter, is brought into a community of practice.¹⁵

A good surgical rotation is also important for its educational value and holds potential additional benefits as described by Chapman et al.¹⁶ Students critically evaluate the usefulness of educational opportunities; therefore, it is revealing that in one study students attended less than half of their surgical rotation.¹⁷ Understanding the factors that contribute to a beneficial experience and encouraging students to attend and engage are important for improving medical education.

We hypothesize that students can identify specific factors that contribute to SE and that positive SE will be associated with students' interest in a career in surgery. The aims of our investigation are as follows: first, to assess whether SE changes student attitudes toward surgery as a career; second, to identify methods of assessing SE; and third, to classify aspects of SE that are associated with medical students expressing an interest in surgery. We performed a systematic review of the literature for medical student experience and its influence on surgical career decisions.

METHODS

Search Strategy

This study was performed in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analyses recommendations for best practice in reporting systematic

reviews.¹⁸ The electronic Medline, EMBASE, Google Scholar, and Cochrane databases were interrogated using the following search strategy: “medical student(s)” AND “Surgical experience” OR “operative experience” OR “operating theater experience” OR “operating room experience” OR “surgical training”. The reference lists of all included articles were searched for additional studies. To confirm eligibility, 2 independent reviewers (D.M. and J.D.S.) assessed all identified article titles and abstracts against *a priori* selection criteria. The articles were retrieved in full if insufficient data were available to make a determination based on title or abstract. A third independent reviewer (G.M.) was responsible for resolving any discrepancies in data extraction or quality assessment.

Selection Criteria

All studies evaluating the impact of SE on medical students' career decision making were included. Studies evaluating SE on a range of medical rotations were included provided they contained a clear subgroup of SE whose outcomes could be extracted. They were excluded if they did not include a group undergoing a surgical rotation, or did not report the data of interest.

Data of Interest

Data were synthesized according to: first author, year of publication, country of origin, study design (survey, other observational study, or randomized investigation), training level and number of students enrolled, surgical subspecialty, tools for assessing SE, factors affecting positive or negative association with career decision making.

Quality Assessment

The quality of the included studies was assessed using a validated quality index ([Supplementary materials](#)), a tool that has been recommended as part of the reporting guidelines for survey research.^{19,20}

Statistical Analysis

We summarized study characteristics using simple descriptive statistics, including median with interquartile ranges and frequencies with percentages, as appropriate. We describe the frequency with which factors associated with student career decisions in surgery were reported. Significant heterogeneity in survey design, population studied, and setting precluded meta-analytical techniques. Therefore, we summarize the study characteristics and qualitatively describe the main findings of each study.

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