Clinics in Surgery

Research Article
Published: 09 Nov, 2017

# How Can We Attract More Medical Students to General Surgery Residencies? A Study of Medical Student Evaluations of a General Surgery Clerkship for 10 Years: 2005-2015

*Garrett Taylor, Joseph C Wallace, Andrew G Harrell, John Burkhardt, Daniel M Avery Jr*, Charles E Geno, Catherine Skinner and Gregg Bell*

*Department of Obstetrics and Gynecology, College of Community Health Sciences, The University of Alabama, USA*

## Abstract

**Background:** Medical student interest in general surgery has been declining for over three decades leading to projections of future surgeon shortages and decreased quality of surgical applicants. Research has identified numerous factors in students' medical school experience that influence students to choose general surgery such as operative experience, interaction with faculty, and opportunities for mentoring. The third year surgery clerkship provides a unique and invaluable opportunity to create an experience that influences students to pursue surgery. However, student and faculty perceptions of the third year surgery clerkship experience are often very different.

**Design, Setting and Participants:** Medical student evaluations of the general surgery clerkship at the Tuscaloosa Campus of the University of Alabama School of Medicine from 2005 to 2015 were reviewed. The evaluations were required of all students at the completion of their two month surgery clerkship. Scaled numerical responses were used to measure student satisfaction with the clerkship in 15 aspects of the clerkship and the clerkship overall. Narrative evaluations from student participants regarding what were done well, areas for improvement and further recommendations were also obtained.

**Results:** Three hundred-four medical students completed the surgery clerkship during the study period and 299 students' submitted evaluations. All areas were rated excellently with the exception of organization of lectures (6.5), value of lectures (6.6), observation of history and physicals (6.2), and constructive criticism (6.9). The highest rated areas were the number of patients seen by students (7.9) and the receptiveness of the course director to concerns (7.8), quality of faculty teaching (7.7), and faculty responsiveness to student concerns (7.7). Content analysis of narrative responses demonstrated strong satisfaction with operative experience and the quality of teaching, but students were dissatisfied that many lectures were canceled or improperly scheduled. Recommendations for improvement of the clerkship included more case studies, more surgical experience, elective time, more postoperative management, and more technical skills training.

**Discussion:** Student responses demonstrated strong satisfaction with operative experience and the responsiveness of faculty to student concerns. Areas evaluated less strongly were the quality and organization of lectures and feedback regarding observation of student performance on the clerkship. These results are consistent with the results of other research evaluating student expectations and desires for the third year surgery clerkship as well as research into factors that drive student interest in surgery. Efforts to incorporate student feedback into the organization of the third year surgery clerkship may result in increased student interest in Categorical Surgery residency positions.

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***Correspondence:***
*Daniel M Avery, Department of Obstetrics and Gynecology, College of Community Health Sciences, The University of Alabama, USA, Tel: 205-348-4487; Fax: 205-348-1395; E-mail: davery@cchs.ua.edu, davery@ua.edu*

**Received Date**: *17 Aug 2017*
**Accepted Date:** *01 Nov 2017*
**Published Date:** *09 Nov 2017*

***Citation:***
*Taylor G, Wallace JC, Harrell AG, Burkhardt J, Avery DM Jr, Geno CE, et al. How Can We Attract More Medical Students to General Surgery Residencies? A Study of Medical Student Evaluations of a General Surgery Clerkship for 10 Years: 2005-2015. Clin Surg. 2017; 2: 1722.*



## Introduction

Medical student interest in general surgery has been steadily declining since 1980 as evidenced by the proportion of students who match into categorical surgery spots each year [1-5]. The increasing and aging population necessitates a growing demand for general surgeons. A combination of decreased interest from medical students, increased resident attrition, stagnant growth in the number of categorical residency positions, increased sub-specialization, and the aging surgeon

**Table 1:** Medical Student Evaluations of Tuscaloosa Campus Surgery Clerkship 2005 to 2015.

| Scale is 0-9. 0=Can't Assess;1-3=Improvement Needed; 4-6=Satisfactory; 7-9=Excellent | |
|---|---|
| Description of responsibilities and duties: | Mean=7.3 |
| Provision of learning objectives: | Mean=7.3 |
| Experiences supported objectives: | Mean=7.4 |
| Organization of clerkship: | Mean=7.2 |
| Receptiveness of course director to concerns: | Mean=7.8 |
| Outpatient Exposure: | Mean=7.6 |
| Sufficient number of patients: | Mean=7.9 |
| Variety of patients: | Mean=7.2 |
| Organization of lecture: | Mean=6.5 |
| Value of lectures: | Mean=6.6 |
| Clarity of grading system: | Mean=7.0 |
| Observation of History & Physicals: | Mean=6.2 |
| Constructive Criticism: | Mean=6.9 |
| Faculty responsiveness to student concerns: | Mean=7.7 |
| Quality of faculty teaching: | Mean=7.7 |
| Overall clerkship assessment: | Mean=7.5 |
| All areas are in the excellent range except organization and value of lectures, observation of history and physicals and constructive criticism; these are in the high satisfactory range. | |

workforce have led to predictions of surgeon shortages in the near future [6,7]. Concerns have also been raised over the declining quality of applicants and how far programs must go into their applicant list in order to fill categorical positions [4,8,9]. Thus, investigations into medical students' interest in general surgery residencies and careers have remained timely and relevant for well over a decade.

A general surgery residency is almost universally perceived by medical students as the most personally taxing residency in medicine. The foreboding picture in the minds of most medical students considering the field is a grueling five to six years of demanding and unpredictable hours, unforgiving breadth and pace of learning, and a reputation for ruthless perfectionism [10-13]. Even a career in surgery after residency is frequently ranked by medical students among the lowest in terms of perceived lifestyle [1,14]. In one study, 83% of males and 63% of females reported lifestyle as the deciding factor in not choosing surgery as a career [15]. Fatigue is expected and burnout seems unavoidable [16]. Furthermore, the high attrition rate of general surgery residents is a widely known reality [17,18] and medical students are often unwilling spectators to residents under siege from the demands of training and a bleak perception of the future. Nevertheless, 6% of U.S. senior medical students matched into Categorical Surgery positions in 2017.

The traits and experiences that lead students to choose a surgery residency despite its daunting reputation have been widely researched. Residents are described as resilient, resistant to stress, and scientifically minded. They are less likely to be dissuaded by negatives inherent to surgical training such as long hours, a long training program, and social/familial strain which have been well documented in the literature [19-21]. These individual characteristics can be useful in the selection of applicants, but cannot be modified to increase the number of applicants in general surgery. The most pertinent concern is what modifiable, positive predictors influence students to choose general surgery, and how can we utilize the surgery clerkship to augment student interest in surgery [22-24]. Much research has focused on the role of positive surgical experiences during medical school. Due to its "craft nature," meaningful exposure to the technical aspects of surgery is essential to a positive experience in the field during surgery clerkships [1,23,24]. After surveying 113 students after their surgery clerkship, Berman et al found that "students who sutured were 4.8 times more likely, and those who drove the camera were 7.2 times more likely to express an interest in a career in surgery." Berman states, "students were more likely to express interest in a career in surgery if, during the surgical clerkship, they had hands-on experience in the operating room. Surgeons choose to become surgeons largely because they love to operate. It is unreasonable to expect that students will become captivated with the field if they are not provided with this opportunity during the surgical clerkship." The importance of meaningful participation in the operating theater is further supported in a study by O'Herrin in which 95% of students who had stated that their interest in surgery increased after their surgery clerkship attributed that increased interest to the number of cases that they scrubbed in while only 65% listed cases observed as an influencing factor. She states, "Based on [their] survey data, increased interest in a surgical career was in fact attributable to operative exposure [24]." Similar results have been obtained by others [25].

Richer experiences in the operating room and feeling legitimized by the attending surgeon and OR staff consistently lead to more satisfactory reviews of surgical clerkships and increased interest in surgery. The converse is also true [25-28]. It is interesting then, that students and attending surgeons, as well as residents, often have very different perceptions of how well students are involved, welcomed and educated in our surgery clerkships. In an interesting study by De, et al. in which students, residents, and attending surgeons were presented the same survey regarding medical student experiences and expectations on a surgery clerkship, when asked "How many opportunities per week do you think medical students usually get to practice their procedural skills?", faculty responded 3-4 while students answered a median of 0-2, demonstrating a clear disconnect in perceived involvement. The starkest disconnect, however, was

**Table 2**: Recurring Themes in the Narrative Responses of the Medical Student Evaluations of the Tuscaloosa Campus Surgery Clerkship 2005 to 2015.

| |
|---|
| **EXCELLENT:** |
| Outstanding teachers |
| More hands-on, first assist experience, and variety than other campuses |
| Lectures were excellent when surgeon made it |
| Receptiveness of course director and faculty to student concerns |
| Trauma residents were great and very helpful |
| Surgeons' Assistant was very helpful |
| **NEEDS IMPROVEMENT:** |
| Many lectures were cancelled and not rescheduled |
| History and physicals not observed |
| Students want feedback on H&Ps, progress notes and assessments |
| No trauma experience |
| Individual attending evaluations of students were variable |
| **RECOMMENDATIONS:** |
| More case studies |
| Lectures on trauma, anesthesia, neurosurgery, pediatric surgery, urology and orthopedics |
| More surgical experience on trauma, anesthesia, urology, orthopedics |
| Elective time like other campuses |
| More teaching on patient management like orders, transfusion, medical management, etc |
| More technical skills: chest tubes, suturing, tying knots, making incisions, central lines |
| Reduce CV Surgery to 1 week |
| More continuity of care: see patients from office or ER to surgery to postop care to discharge to F/U |
| Trauma experience |
| Mid-clerkship evaluation like other clerkships |
| Lectures designed to prepare student for passing the mini-boards |
| Spend 1 surgery week in Birmingham |
| Round with attending surgeon each day |
| Spends 2 weeks on a surgical subspecialty |
| "High Yield" lectures like hernias, gallbladders, breasts, colon lectures, etc. at front end of clerkship lectures rather than at the end. Earlier in the clerkship |

in formal education, feedback, and sense of belonging. Students' answers consistently indicated a desire for more formal teaching than attending surgeons felt was needed, a need for formalized feedback that was often omitted and not evaluated frequently enough on the wards. Fifty-one percent of students "believed themselves to be an inconvenience to the service" and 27% of faculty and 32% of residents in agreement. The effect of improving the relations and contact between attending surgeons and students has been demonstrated clearly in research into the effects of role modeling and mentorship by surgeons in the interest of students in surgical careers [1,29-34]. Tulane University School of Medicine who matriculates medical students into surgery at a rate greater than the national average, recently conducted a survey of its students who had matched into general surgery. The most important factors cited by their students for choosing general surgery were "perceived career enjoyment of residents and faculty, resident/faculty relationship, and mentorship [29]." Furthermore, "surgery residents and faculty were viewed as role models by 72 and 77 per cent of responders, respectively [29]." This effect has been demonstrated in numerous other studies addressing mentorship in surgery [30-32], Structured mentorship continues to be under-emphasized by attending surgeons, with residents primarily filling the role of mentor for medical students at most institutions. The lack of mentorship and positive role models for junior surgical residents is also frequently cited as a target for improving resident attrition rates [11,12,18,33]. In order to evaluate student perceptions of surgery clerkships and the potential impact they might have on medical student interest in careers in surgery, completed evaluations of the surgery clerkship at the Tuscaloosa Campus of the University of Alabama School of Medicine from the last 10 years from 2005 to 2015 were analyzed [34-39]. The surgery clerkship operates with an apprenticeship model. Students are directly paired with one attending surgeon for the first month of the clerkship and a different attending surgeon for the second month of the clerkship. The clerkship takes place at DCH Regional Medical Center in Tuscaloosa, Alabama. There are no surgery residents except a single visiting surgical resident from a community surgery residency in Birmingham, Alabama occasionally rotating on the trauma service. All students participate in required didactic educational activities scheduled weekly. We sought to identify areas in which student experience could be improved in order to increase interests in general surgery as a career.

## Design, Setting and Participants

This research was approved by the Institutional Review Board of the University of Alabama. Financial support was provided by the

Institute of Rural Health Research of The University of Alabama. Medical student evaluations of the general surgery clerkship at the Tuscaloosa Campus of the University of Alabama School of Medicine from the ten year period of 2005 to 2015 were reviewed. The evaluations were required of all students at the completion of their two month surgery clerkship. The evaluation required students to indicate their satisfaction with fifteen aspects of the clerkship as well as the clerkship overall by selecting a response from a 0-9 scale in which 0 = can't assess, 1-3 = Improvement needed, 4-6 = Satisfactory, and 7-9 = Excellent. The mean of the numerical responses were selected for each area of evaluation. The evaluations also included narrative responses for the following prompts: 1) Things done well during the clerkship, 2) Areas needing improvement, and 3) Any further recommendations.

## Results

Three hundred-four medical students completed the surgery clerkship between 2005 and 2015 at the Tuscaloosa Campus of the University of Alabama School of Medicine and 299 students submitted evaluations. All areas were rated excellently by students with the exception of organization of lectures (6.5), value of lectures (6.6), observation of history and physicals (6.2), and constructive criticism (6.9). The highest rated areas were the number of patients seen by students (7.9) and the receptiveness of the course director to concerns (7.8). Other highly rated areas included quality of faculty teaching (7.7) and faculty responsiveness to student concerns (7.7). The areas of evaluation and their mean values are shown in Table 1. Explanations regarding the mean rating of some areas of evaluation were found upon content analysis of the 299 student evaluations. Students praised the amount of hands on, first assistant experience they received in the apprenticeship model and also praised the quality of lectures and educational activities—with the caveat, "When the surgeon made it." Many students expressed concern over lectures that were canceled and not rescheduled and over improper timing of lectures, in which some foundational topic lectures were scheduled later in the clerkship. Recurring themes from the narrative questions are summarized in Table 2. Recommendations for improvement of the clerkship included more case studies, more surgical experience, elective time, more postoperative management, and more technical skills like chest tubes, suturing, tying knots.

## Discussion

In accordance with previous studies of other apprenticeship models [35], our surgery clerkship students reported extensive and rich operating room exposure, and operative experience was accordingly praised in narrative responses. Though there was not a quantitative scaled response question evaluating surgical experience directly, it is almost certain that students' satisfactory OR experience factored highly in their favorable evaluations of the number and variety of patients seen and of the clerkship as a whole. This conclusion is supported by data from Redlich et al. [36] in which "direct instructional contact with attending in the operating room" and operative experience were identified as the most important variables in students' evaluation of the educational value of a surgery clerkship. It is also very likely that increased amounts of direct instructional contact with attending in the operating room factored greatly in student perceptions of the quality of faculty teaching, which was also highly rated. Interestingly, despite or perhaps because of ample operating exposure, another common thread in the narrative responses were requests for even more technical skill training. It seems that once exposed to the hands on practice of surgical skills, students' appetites for more instruction grew. This interest in operating and surgical procedures such as making incisions, suturing, insertion of chest tubes, and even central lines should be encouraged in order to foster the captivation with surgery as described by Berman. Another encouraging result was students' very favorable evaluations of faculty responsiveness to student concerns and the receptiveness of the course director to student concerns. Implied by these results, is a certain sense of educational collegiality essential to mentoring relationships. It is possible that the extended amount of time that our students spend with their respective clerkship faculty creates a relational environment in which concerns can be more easily expressed and addressed. It also allows for effective mentoring relationships to form, which have been shown to increase students' interest in general surgery and private practice surgical careers especially. Therefore, continuing to remain open to student concerns, whether about educational objectives, surgical training, or life as a practicing surgeon, is essential. Unfortunately, the lowest rated areas by our students are those which perhaps most directly define and validate their role as student: didactic education, observation, and feedback. The perceived deficits of surgeons as educators are not unique to our institution [27,37]. Practicing surgeons invariably have busy and unpredictable schedules and safe patient care must always supersede other responsibilities, but every effort must be made to limit failing to live up to educational responsibilities, which, as already described, threatens to devalue students and create the impression that they are unimportant or an inconvenience. Our students poorly reviewed canceled and rescheduled lectures during their clerkship. In the narrative responses, they commented on the omission of key topics and the scheduling of some foundational topics that students felt should be covered earlier in the clerkship. This led to students not feeling comfortable with some key surgical issues until later in the clerkship. This theme was also present in quantitative and narrative feedback regarding a lack of observation and constructive criticism. Mid-clerkship evaluations, according to narrative comments, were sometimes omitted. These serve critical roles in identifying students at risk of clerkship failure and are absolutely essential to the educational process. There have been numerous studies that demonstrate the poor correlation between surgery clerkship preceptor evaluations and objective measures of clinical knowledge [38]. Lack of observation of students' clinical skills are the likely prime driver of this phenomenon, which is concerning in light of the heavy weight such preceptor evaluations have in determining a student's grade. Finally, there was a prevalent theme in the narrative responses of students recommending more exposure to other surgical specialties (e.g. urology, orthopedics, neurosurgery) or subspecialties of general surgery (e.g. cardiothoracic, pediatric, and trauma surgery). Restriction of the core surgical clerkship to general surgery is a concern for many medical students seeking to encounter highly specialized surgical fields in which they usually have no previous experience and, if not choosing to specialize in one of them, will have little exposure to in the future. This desire must be checked however by the core educational goals of the surgery clerkship and the need to increase interest in general surgery careers. O'Herrin and colleagues showed in 2002 that students matching into categorical general surgery positions had observed significantly more abdominal and general surgery procedures on their 3rd year clerkship than their counterparts matching into specialty surgery or non-surgery positions [39]. This was not true of any other subset of procedures. Therefore, though limited elective time may be beneficial, it should

be limited to avoid reducing the benefits increased general surgery exposure.

## Conclusion

As student interest in general surgery continues to decline and the need for practicing general surgeons becomes more pressing, efforts must be made to influence students toward choosing careers in surgery. Student evaluations of surgery clerkships provide valuable insight into students' perceptions of the strengths and weaknesses of their educational experience. Combined with other research, student evaluations can also indicate areas for commendation and for improvement regarding increasing student interest in surgery through the 3rd year clerkship. Our data showed that maintaining excellent, interactive OR experience and having faculty that are responsive to student concerns have a strong influence on student satisfaction with their educational experience. Mechanisms for observation and feedback and formalized didactic education were found to be areas for improvement.

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