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## Medical students' perceptions and motivations prior to their surgery clerkship



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### ABSTRACT

**Background:** This study aims to determine the effect of a pre-clerkship workshop on medical students' perceptions of surgery and surgeons and to describe their concerns and learning goals.

**Methods:** Thirty-nine medical students completed surveys before and after a workshop preceding their surgery clerkship. Quantitative data and free responses that were inductively coded were used to assess effectiveness.

**Results:** Perceptions from 38 students (response rate = 97.4%) significantly improved for 11 of 21 items. At pre-workshop, the most frequently cited learning goals were improving technical skills (58%), surgical knowledge (53%), and understanding surgical culture and work (53%). Students' top concerns were meeting clerkship demands (68%) and being evaluated (55%). After the workshop, student learning objectives and concerns remained largely unchanged.

**Conclusions:** A pre-clerkship workshop improved student perceptions of surgery and surgeons. Understanding students' intrinsic motivations may facilitate future clerkship curriculum improvement via better alignment of educator and student goals and objectives.

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### Introduction

Persistently low rates of medical students entering the field of surgery and the projected national shortage of general surgeons have generated interest in improving the quality of surgical undergraduate education to foster medical student interest in the field.<sup>1,2</sup> Traditionally, surgeons' primary contribution to medical student education, and thus their main opportunity to impact student trajectories, has been the surgical clerkship, and significant investment in the student clerkship experience has correlated with improved clerkship ratings and even increased rates of students pursuing surgical careers.<sup>3</sup> The preclinical undergraduate time is also being recognized as an opportunity to engage with students.<sup>4–6</sup>

The transition from the preclinical phase of medical school to the clerkships is an important developmental moment at which students harbor several personal and professional concerns.<sup>7–9</sup> The unique nature of the field of surgery, combined with the fact that many students harbor misperceptions about the personality of surgeons or the demands of the profession based on stereotypes and hearsay, might make the transition to the surgical rotation particularly fraught.<sup>10,11</sup> One study found that over half of pre-surgery clerkship students expressed concerns about fatigue and long hours, and over a third about potential mental abuse.<sup>12</sup> Students also express differing expectations from the rest of the surgical team about their role in the daily workflow or their surgical learning experience.<sup>10,13,14</sup> The mismatch between learner and educator expectations could be source of student disappointment and frustration. Taken together, these findings suggest that the transition between the preclinical curriculum and the core clinical clerkships may represent a critical opportunity for a positive surgical education intervention.

At least one study has suggested that most student concerns just prior to the start of the core clerkships can be addressed by

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curricular activities such as role clarification, explanation of healthcare hierarchy, and explicit disclosure of assessment processes.<sup>8</sup> To this end, we created a half-day introductory workshop as a structured way to introduce students to issues that would likely arise during their upcoming surgical clerkship and to better understand their perceptions and any pre-existing biases. We hypothesized that a pre-clerkship workshop introducing students to the field of surgery at the junction of preclinical and ward-based teaching would have a positive influence on student perceptions of surgery. We also anticipated that identifying transitioning students' impressions and interests could inform surgical clerkship orientations and activities to both help manage learner expectations and achieve learner goals.<sup>15</sup>

## Materials and methods

All study materials and procedures were reviewed and approved by the Harvard Medical School Institutional Review Board.

### Participants and recruitment

All medical students participating in a transition to the wards program at the Massachusetts General Hospital in September 2017 were eligible to participate in the study. These students had completed their pre-clinical coursework and were undergoing a six-week transition block prior to beginning their core clerkships. At our institution, students enter clinical rotations in late September of their second year. Students were informed of the study purpose at the beginning of their introduction to surgery workshop during the transition to the wards course. Students were provided a study fact sheet and told that participation was voluntary, anonymous, and would not affect their evaluation. Students were recruited by a research resident (S.K.M.) who would have no clinical responsibilities involving students and who would not have any supervisory role over students in the upcoming surgical rotations. Completion of the survey implied consent to participate. No remuneration was provided to participants.

### Study procedures

Each student received both a pre- and post-workshop survey on arrival for the introduction to surgery workshop. To preserve student anonymity, these surveys were numbered and paired in advance without any key linking individual students to individual surveys. Students completed the survey prior to the beginning of the workshop and placed their surveys into an opaque folder. At the end of the workshop, students completed the post-workshop survey and placed the survey into a separate opaque folder. Students who chose not to participate likewise placed their incomplete surveys into the opaque folder so they could not be distinguished in behavior from participating students. Surveys were transcribed into digital form and redacted of any identifiers prior to analysis.

### Survey instrument (Appendix A)

The survey instrument was comprised of three portions: 1) demographics items, 2) perceptions of surgery items, and 3) open ended questions pertaining to student surgical learning goals and concerns. Demographics items included student age, gender, and pre-clerkship exposure to general surgery and surgical subspecialties beyond the standard pre-clinical curriculum. Items regarding student perceptions of surgery asked participants to indicate level of agreement with a particular statement about surgeons and were also adapted from the literature.<sup>17</sup> Students could

indicate agreement on a five-point scale, (1 = strong disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree). The two open-ended questions were adapted from a 2005 study on medical student concerns and fears prior to the surgical clerkship and included "Some things I'd like to learn about during my surgery clerkship are..." and "Some things I'm nervous about as I begin my surgery rotation are...".<sup>12</sup> Pre- and post-workshop surveys were identical except that demographics items were not repeated.

### Workshop contents

The half-day introduction to surgery workshop included three portions. Students were asked to read an article on the history of surgery in advance of the workshop.<sup>16</sup> In the first hour, a surgical faculty member welcomed the students and provided a didactic session on the culture and history of surgery. In the second portion of the workshop, students participated in a question and answer panel with surgical residents. Finally, we ran a high-fidelity simulation in a mock operating room with team members from nursing, anesthesia, and surgery caring for a mannequin with intra-operative hemorrhage. One medical student scrubbed into the simulated case, two students observed the operation, and the remainder of students watched via real-time video broadcasting. After the simulation, all students participated in a multidisciplinary debriefing focused on the role of the medical student during surgical crises such as intra-operative adverse events, traumas, or other surgical emergencies. In addition to the students, participants in the debriefing included a surgeon, surgical resident, an anesthesiologist, and nurse educator. Students were given an opportunity to ask any final questions about their upcoming surgical rotations prior to the close of the workshop.

### Statistical analyses

Perceptions of surgery items were analyzed by first determining proportion of students indicating "agree" or "strongly agree" to a given item. Pre- and post-workshop responses were compared using McNemar's test to determine change in proportion of students indicating agreement with a particular statement. Improvement in student perceptions was defined as an increased proportion of students expressing agreement with a positive statement or decrease in proportion of students expressing agreement with a negative statement. Differences in baseline perceptions of surgery based on gender or prior surgical exposure were compared using Chi-square analysis.

Free response text regarding student learning goals and concerns was inductively analyzed for prominent themes. Student responses to each open-ended question on surgical learning goals and concerns were openly coded by a single author without a predefined framework (S.K.M.). These codes were then organized into broader themes, with a definition of each theme generated based on the associated codes. This theme book was iteratively refined with input from a multidisciplinary team including an education psychologist (E.P.), surgical educators (R.P., A.H., N.S.), a surgical resident (S.K.M.), and a medical student (M.K.). Once a consensus theme book was defined, two raters (S.K.M. and M.K.) independently scored each student response for the presence or absence of all 11 identified themes. Cohen's kappa statistic was calculated for each theme to determine interrater agreement prior to consensus review. Frequency of themes was compared pre- and post-workshop with McNemar's test. If a student mentioned a theme more than once in a given free response, the theme was recorded as "present" without distinction for multiple mentions. Presence or absence of identified themes in formal surgery clerkship objectives was evaluated by two researchers (S.K.M. and M.K.).

We used Intercooled Stata software, version 13.1 (StataCorp, College Station, TX) for all statistical analysis, and statistical significance was set at  $p < 0.05$  for all tests.

## Results

### Participants

Thirty-eight of 39 eligible students completed surveys (97.4%). Mean age was  $24.5 \pm 2.2$  years, with 52.6% of participants identifying as female ( $n = 20$ ). A majority of students reported prior exposure to either general surgery or a surgical subspecialty (60.5%,  $n = 23$ ), with 36.8% reporting exposure to general surgery and 52.6% reporting exposure to a surgical subspecialty.

### Perceptions of surgery

Student perceptions of surgery both pre- and post-workshop are described in Table 1. Overall, 11 of 21 items demonstrated statistically significant improvement after the workshop. Items with the greatest improvement in percentage of students indicating agreement included “Surgeons respect medical students” (13.2% agreement pre-workshop to 63.2% agreement post-workshop), “Surgeons are good supervisors” (31.6%–68.4%) and “Surgeons are cynical” (50.0%–15.8%). Students demonstrated persistent low regard for aspects of the surgical lifestyle including “surgeons have a well-balanced lifestyle” (2.6%–5.3%) and “surgeons have time for their families” (7.9%–15.8%). There was no effect of gender or pre-clerkship surgical exposure on baseline, pre-workshop perceptions of surgery (all  $p > 0.05$ ).

### Surgical learning goals and concerns

Students generated a total of 143 free-text responses (9 questions left blank of 152 possible total responses, 94% of open-ended questions had a written response). Thematic analysis of open-ended questions regarding student surgical learning goals and concerns demonstrated 11 distinct themes (Table 2). Mean Cohen's kappa statistic for these themes was 0.85 indicating strong agreement (Table 2, range 0.74–0.97).

Prior to the workshop, students identified technical skill

acquisition (57.9% of students), surgical knowledge (52.6%), and surgical culture (52.6%) as their top three surgical clerkship learning goals (Table 3). After the workshop, top three surgical learning goals remained the same with no statistically significant change in the proportion of students citing these goals (Table 3, all  $p > 0.26$ ). Top student surgical clerkship concerns prior to the workshop were surgery clerkship demands (68.4% of students), evaluation (55.3%), and interactions with surgical educators (50%) (Table 4). The top three concerns after the workshop were also unchanged, however the proportion of students citing evaluation as a concern significantly declined to 29.4% (Table 4,  $p = 0.013$ ). Student learning goals and concerns were overall stable across the workshop, with few changes in the proportion of students citing the 11 different themes as a learning goal or concern. A smaller proportion of students identified management of surgical patients as a clerkship learning goal after the workshop (47.4%–22.2%,  $p = 0.04$ ); other than evaluation, the proportion of students citing different themes as possible concerns did not significantly change.

Comparison of identified themes to formal surgical clerkship objectives demonstrated that student learning goals and concerns encompassed formal clerkship documentation with themes of surgical knowledge, technical skills acquisition, management of surgical patients, working in a surgical team, and surgical culture and work demonstrating overlap. However, certain themes such as interacting with surgical educators, emotional toll, and surgical clerkship demands were not explicitly addressed in the clerkship objectives.

## Discussion

This study explores the effect of an introductory workshop on student perceptions of surgery and the surgical learning goals and concerns that medical students bring with them to the start of their clinical rotations. Similar to other studies, we found that students enter the surgical clerkship with a negative view of surgeons.<sup>17</sup> Likewise, we found that the workshop had an overall positive effect on specific student views of surgery, just as the clerkship and exposure to positive surgical role models has been found to have at least a transient positive effect on student surgical perceptions.<sup>3,17–20</sup> However, students continued to demonstrate persistent low regard for aspects of a career in surgery such as time

**Table 1**  
**Student perceptions of surgery pre- and post-workshop.** Pre and Post % indicates the proportion of students who selected that they either “strongly agree” or “agree” with a particular statement.

Statement	Pre	Post	Change (Pre-Post)	p, McNemar's test
Surgeons respect medical students	13.2%	63.2%	50.0%	<0.001
Surgeons are good supervisors	31.6%	68.4%	36.8%	<0.001
Surgeons are compassionate physicians	44.7%	76.3%	31.6%	<0.001
Surgeons respect other physicians	47.4%	73.7%	26.3%	0.006
Surgeons respect their patients	68.4%	92.1%	23.7%	0.012
Surgeons are good role models	52.6%	76.3%	23.7%	0.023
Surgeons are good teachers	28.9%	50.0%	21.1%	0.039
Surgeons are content with their career choice	59.5%	76.3%	16.9%	0.109
Surgeons actively participate in student education	44.7%	57.9%	13.2%	0.267
Surgeons are good disciplinary figures	57.9%	68.4%	10.5%	0.344
Surgeons have time for their families	7.9%	15.8%	7.9%	0.375
Surgeons are good friends	27.8%	34.2%	6.4%	0.688
Patients respect surgeons	94.7%	100.0%	5.3%	0.500
Surgeons have a well-balanced lifestyle	2.6%	5.3%	2.6%	1.0
Other physicians respect surgeons	92.1%	92.1%	0.0%	1.0
Surgeons encourage students to pursue surgery	63.2%	63.2%	0.0%	1.0
Surgeons work longer hours than other physicians	97.3%	94.7%	−2.6%	1.0
Surgeons victimize medical students	23.7%	2.6%	−21.1%	0.008
Surgeons are pessimistic	31.6%	10.5%	−21.1%	0.008
Surgeons are mean	26.3%	0.0%	−26.3%	0.002
Surgeons are cynical	50.0%	15.8%	−34.2%	0.001

**Table 2**

**Student surgical learning goals and concerns.** Two independent raters scored all student comments for presence or absence of a given theme prior to consensus review, and interrater reliability (Cohen's kappa statistic) is presented alongside representative quotes for the given theme.

Theme title	Cohen's kappa statistic	Representative quotes
Surgical knowledge	0.80	"Basic medical knowledge." "Anatomical and surgical knowledge."
Technical skills acquisition	0.88	"How to do basic sutures." "Suturing and knot-tying."
Management of surgical patients	0.84	"Post-op and pre-op management of surgical patients." "Surgical decision making and medical management of surgery patients."
Career planning	0.93	"Whether or not I'm interested in the field." "Research mentors"
Evaluation	0.82	"SHELF exam." "It seems grading is highly subjective."
Working in a surgical team	0.75	"How to work within a surgical team." "Being helpful but not getting in the way of my resident."
Surgical culture and work	0.87	"What it's like to be a surgeon." "Learn about the culture of surgery."
Surgery clerkship demands	0.97	"The long hours and lack of sleep." "That I will be too tired/physically compromised to learn/work effectively."
Interactions with surgical educators	0.85	"Pimping." "I'm worried about being asked questions... and being embarrassed."
Inadequate preparation	0.88	"Starting on surgery with no prior experience. My limited knowledge on anatomy." "We know nothing about what the clerkship even is."
Emotional Toll	0.74	"Witnessing unsuccessful procedures and not being able to emotionally unload afterwards." "The possible emotional burden."

**Table 3**

**Student surgical learning goals across workshop.** Pre and Post % indicates the proportion of students whose response to the question "Some things I'd like to learn about during my surgery clerkship are..." contained a given theme. Presence/absence of the theme was compared pre and post workshop using McNemar's test.

Theme	Pre Learning	Post Learning	p, McNemar's test
Technical Skills	57.9%	44.4%	0.267
Surgical Knowledge	52.6%	38.9%	0.289
Surgical culture	52.6%	38.9%	0.332
Management of surgical patients	47.4%	22.2%	0.039
Career planning	31.6%	27.8%	1.0
Working in surgical team	18.4%	22.2%	1.0
Evaluation	10.5%	11.1%	1.0
Surgery clerkship demands	5.3%	11.1%	0.625
Interactions with surgical educators	0.0%	8.1%	0.25
Inadequate preparation	0.0%	0.0%	1.0
Emotional toll	0.0%	2.7%	1.0

**Table 4**

**Student surgical clerkship concerns across workshop.** Pre and Post % indicates the proportion of students whose response to the question "Some things I'm nervous about as I begin my surgery rotation are..." contained a given theme. Presence/absence of the theme was compared pre and post workshop using McNemar's test.

Theme	Pre Concern	Post Concern	p, McNemar's test
Surgery clerkship demands	68.4%	61.8%	0.688
Evaluation	55.3%	29.4%	0.013
Interactions with surgical educators	50.0%	32.4%	0.065
Inadequate preparation	39.5%	17.7%	0.125
Surgical culture	21.1%	8.8%	0.375
Career planning	18.4%	8.8%	0.289
Working in surgical team	18.4%	26.5%	0.727
Emotional toll	10.5%	0.0%	0.125
Surgical Knowledge	0.0%	0.0%	1.00
Technical Skills	0.0%	0.0%	1.00
Management of surgical patients	0.0%	0.0%	1.00

for family and maintain a well-balanced lifestyle. These areas were not specifically targeted by any workshop content, which may explain the lack of improvement. To combat the perception that a life in surgery precludes a rich life outside of the hospital, students may benefit from meeting surgical role models who specifically share about family and extra-curricular aspects of their lives.

With regard to student motivations, we found that students enter the surgical clerkship with similar learning goals and concerns as previously reported from a school in the southern United

States.<sup>12</sup> In addition to wanting to learn technical skills, students demonstrate a keen interest in understanding the world of surgery including what it means to be a surgeon and the culture of the field. Students also expressed concern about the perceived demands of surgery and how they would interact with the residents and attendings alongside whom they would work and learn. That student goals and concerns are so similar at two geographically distinct institutions may indicate that surgical learning goals and concerns are similar nationally. The fact that the concerns are still so similar

after 10 years suggests more work is necessary to prepare pre-clinical medical students for their surgical clerkship experiences.

#### Implications for surgical education

The results of this study can inform changes to the surgical clerkship to better align the surgical clerkship experience with student learning goals and concerns and to address inaccurate perceptions of the surgical lifestyle. Since this study's conclusion, we have significantly modified the structure of the first day of the surgical clerkship to address learner-identified areas of interest and concern. We now include a specific introduction to surgical culture and surgeon lifestyle, and the majority of the orientation is run by surgical residents in order to lessen student anxiety about interacting with surgical educators and foster a better understanding of working in a surgical team. Resident-led orientation sessions touch on resident expectations, how to handle the demands of the surgical clerkship, and targeted preparation for the clerkship including best use of the electronic medical record and suturing and knot-tying practice. New debriefing sessions have been added to the clerkship to provide students an opportunity to discuss the way in which the clerkship informs career planning and student understanding of surgical culture. The overall goal of these changes is to increase concordance between clerkship experiences and learner goals and concerns (Fig. 1). Future work is necessary to evaluate whether these changes are sufficient or effective in meeting learner needs.

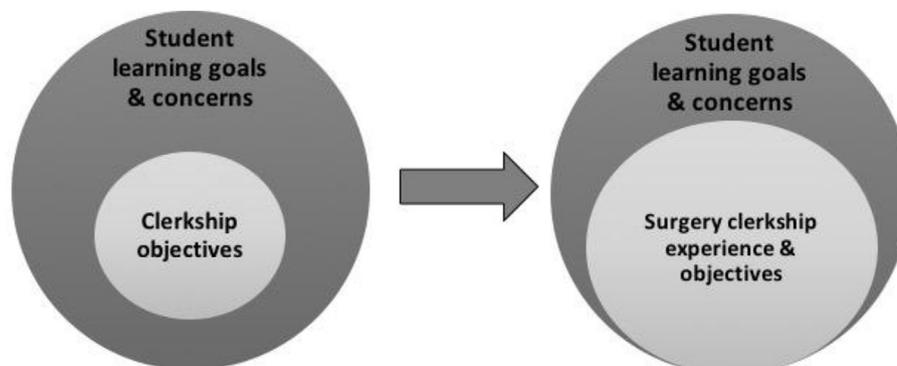
Study results also point to the benefit for surgeon involvement in the preclinical curriculum. Disappointingly, only 13% of students entered the workshop in agreement with the statement that “surgeons respect medical students,” and less than half agreed that “surgeons actively participate in student education.” At our institution, like many others, surgeon involvement in medical student education primarily occurs during the surgical clerkship, and these findings may reflect a cost of ceding the majority of preclinical education to physicians representing other specialties. Analysis of the pre-clinical teaching contributions at our affiliated medical school demonstrates that less than 10% is provided by surgeons despite the fact that 25% of the core clinical time is spent on the surgical rotation (unpublished data). The relative absence of surgeon educators may result to poor student opinion of surgeons. Alternatively, students may inherit negative stereotypes from upperclassmen that are not challenged until students enter the clerkship and interact with surgeons in a clinical context. Others have suggested that medical students matriculate into medical school with a negative view of surgeons; if this is true, then it is even more important for surgical educators to present themselves

early in the careers of medical students.<sup>17</sup> The limited exposure to surgeons may also explain the findings that nearly 40% of students reported inadequate preparation for the surgical clerkship as a concern.

Future work can investigate how to overcome the financial and logistical barriers for meaningful and effective surgeon involvement in the preclinical curriculum. It will also be important to understand the best way to introduce students to surgery in the preclinical period. Surprisingly, we found no difference in perceptions of surgery between students who did and did not report surgical exposure beyond the standard preclinical curriculum, which is inconsistent with other reports that early exposure to surgery fosters interest in a surgical career.<sup>4–6,21</sup> This finding suggests a need to re-evaluate the particular extra-curricular surgical activities offered to preclinical students at our institution.

#### Limitations

Although the single site nature and small number of participants limit claims of generalizability, our findings regarding student baseline perceptions of surgery and surgical learning goals and concerns are consistent with the literature as described above. An additional limitation is that students were sampled at a single point in time, and so the effect of the workshop may not be durable across time. Student perceptions of surgery and their surgical learning goals and concerns may evolve across their core clinical year as they gain more experience in a clinical setting and become more comfortable with working with residents and attendings across specialties. Inferences and implications from students who have not completed any clinical rotations may not hold true for students who are entering surgery as their final core clerkship, and educators may have to adjust the clerkship to the developmental trajectory of learners across the core clerkship year. Consistent with this hypothesis, others have noted that student surgical orientation goals change across the academic year.<sup>15</sup> Conclusions about the effect of the introduction to surgery workshop are also limited by the fact that a half-day workshop cannot encompass every aspect of surgical culture and learning environment that may be important to a medical student. To address these limitations, future investigation could compare students who participated in the workshop to students at the same medical school who did not participate in the workshop. Comparisons could include student perceptions of surgery across time or other educational outcomes such as match rates into general surgery and surgical subspecialties. Multi-institutional investigation across geographic region would bolster the generalizability of these findings.



**Fig. 1. Increasing alignment of clerkship with student learning goals and concerns.** Study results informed changes to the local surgical clerkship that would increase alignment between learner goals/concerns and surgical clerkship orientation and experiences.

## Conclusion

To summarize, an introductory workshop on surgery may improve medical students' poor perceptions of surgery and surgeons just prior to start of the core clinical year. Additionally, students demonstrate a particular set of surgical learning goals and concerns. Understanding these goals and concerns can inform changes to formal surgical experiences that facilitate better alignment between educators and learners. Future work may elucidate the best way to combat negative surgical perceptions in the pre-clinical period and how to structure the surgical clerkship to satisfy both learner and educator objectives.

## Conflicts of interest

The authors report no conflict of interests.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.amjsurg.2019.01.010>.

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