The influence of medical school on career choice: A longitudinal study of students' attitudes toward a career in general surgery

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\textbf{Abstract}

\textit{Background:} Less than 80\% of general surgery (GS) residency positions are filled by graduates from allopathic, U.S. medical schools. The aim of this study was to gauge students' interest in pursuing GS throughout their medical school matriculation and explore students' changing perceptions of the specialty.

\textit{Methods:} Students at two medical schools were surveyed annually for 4 years. Survey responses regarding interest were compared to actual NRMP match results.

\textit{Results:} Interest in a GS career was highest at the outset of medical school and declined steadily during the program, which was similar at both schools, including a positive effect on interest from the surgical clerkship.

\textit{Conclusions:} Our findings suggest that experiences during medical school impact students' perceptions of GS; specifically, lifestyle, work environment, and the length of training discouraged pursuit of GS. Perception of a GS's lifestyle and the educational environment are both highly modifiable factors that could increase interest in general surgery amongst graduates.

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\section*{Introduction}

There is a workforce shortage of general surgeons in many areas of the United States\textsuperscript{1} that is predicted to worsen over the next several years.\textsuperscript{2,3} Further, the current literature shows that, despite filling of NRMP positions, there is a declining interest in general surgery as a career amongst US allopathic graduates and currently, less than 80\% of general surgery residency positions are being filled by US seniors.\textsuperscript{5} Several studies have investigated reasons for this lack of interest,\textsuperscript{5–11} while others have explored interventions during undergraduate medical education aimed at increasing interest in a career in general surgery.\textsuperscript{12,13} The majority of studies that investigate this trend have been retrospective snapshot surveys,\textsuperscript{6,8–11} or short-term prospective studies.\textsuperscript{5,7,12}

In the Midwestern region of the U.S., there has been a higher than average interest in general surgery amongst fourth year medical students.\textsuperscript{6} Because career choices are influenced by a variety of factors\textsuperscript{14} and change over time, it becomes important to understand when and how medical students' attitudes toward general surgery vary over the course of their MD program. It is also instructive to investigate which personal or external factors exert influence on students' plans at various points during their medical school career.

The current study examined the changes in perceptions of a general surgery career (GS) amongst one group of students at two distinct institutions as they progressed through 4 years of medical school. The population of interest was all students at two medical schools, one private and one public, in the Midwestern region. The aims of the study were twofold: 1) to gauge students' interest in pursuing GS, and 2) to explore students' changing perceptions regarding why someone would be attracted to GS, as well as their general perceptions of the specialty. Experienced surgical
educators likely have opinions about students' thoughts and attitudes, based on their personal observations; however, no broad-based empirical study has been available to verify or refute those impressions. The study results will suggest points at which students make and hold to their career decisions, specifically whether or not to pursue GS, and how perceptions of the specialty may be affected by experiences during medical school.

Methods

A survey was designed to collect data on perceptions about general surgery, both from the respondent's own opinions and from the respondent's beliefs regarding decisions made by medical students in general. The survey form had previously been used and validated for this population. The study population consisted of all members of one year's matriculating class of students at two dissimilar medical schools. The same group of participants was surveyed 4 times, once during each year of their medical school career.

No participant identification was collected to encourage candor and deter students from submitting 'socially desirable' responses. Statistics were calculated and results were analyzed for the group as a whole in each year of the study to observe the group and sub-group trends. Linking the survey responses from individuals across all 4 years of the study would have compelled us to discard all responses from any students who did not complete the survey in each year. This would have removed about 75% of the participants from the study. More importantly, this design for data collection was selected to maximize the similarity of the educational events that all participants had experienced. Although the individual students in the classes varied slightly from year-to-year, comparisons of demographic data between respondents and non-respondents each year indicated that response bias was negligible.

The survey was delivered electronically to students at both schools simultaneously and completed annually during January, which was the mid-point of every academic level at both schools. January was selected for administration since by that time, first year students had acquired sufficient experience to get accustomed to medical school, while final year students had completed their residency applications and most of their residency interviews. The study was declared to be 'exempt' by the IRB of each institution.

Analyses of this study were done to compute descriptive statistics and graphs were generated to illustrate trends. Trends were inferred by comparing responses from the student group at each of the 4 measurement points in their progression through medical school. Actual residency match data that were supplied to the participating schools by NRMP and made publically available, were aggregated for the study group and then used to verify that

Table 1
Study participant demographics.

<table>
<thead>
<tr>
<th>Level</th>
<th>School</th>
<th>Female</th>
<th>Male</th>
<th>Total # of Responses</th>
<th>Response Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS1</td>
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<td>55</td>
<td>52</td>
<td>107</td>
<td>84%</td>
</tr>
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<td>34</td>
<td>72</td>
<td>56%</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>20</td>
<td>34</td>
<td>54</td>
<td>44%</td>
</tr>
<tr>
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<td>77</td>
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<tr>
<td></td>
<td>2</td>
<td>34</td>
<td>45</td>
<td>79</td>
<td>69%</td>
</tr>
</tbody>
</table>

Fig. 1. General surgery interest by student level.
students’ self-responses regarding GS were consistent with their residency choices.

Results

The survey population was a matriculating class of 249 medical students at two allopathic medical schools; the demographics of respondents are shown in Table 1. The overall response rate for the population was 66.1% (69.7% at one school and 62.4% at the other). At both schools the pattern of response rates was similar across the 4 years of the survey. The highest response rates (84% and 80%) were attained for the first survey, in the first year of school. The second highest rates (77% and 69%) were obtained during the senior year of school with the lowest response rates (56% and 44%) during the second year.

The key overall finding from the study was that interest in GS decreased steadily, by almost 5% each year throughout the 4 years of medical school. The survey results for both schools with a trend line for all respondents combined are shown in Fig. 1. Also shown in Fig. 1 is the actual match rate into GS for both schools (9.0%), which is often used to select applicants for residency positions. Fig. 3 shows that interest in GS was slightly lower at the top end of USMLE Step 1 scores than at other score ranges, but there is not a meaningful trend in the relationship between scores and GS interest.

Of particular note, given the aims of this study, was that the survey results indicated that medical students’ experiences during their required surgery clerkship may influence their decisions about GS, as seen in Fig. 4. At the time of the survey, students who were currently on the surgery clerkship, or had completed the clerkship, were more interested in GS than those who had not experienced the clerkship yet. This trend was clear for males at both schools and females at school 2, while females at school 1 demonstrated an increasing interest during the surgery clerkship, but declining interest after the surgery clerkship. Inference from this correlation is limited since students have some control over the sequence of their clerkships; however, some students prefer to do clerkships for specialties in which they may be interested first in their sequence, while other choose to do such clerkships last.

The second aim of this survey was to investigate students’ reasons for their own choices about GS (either to pursue or not to pursue) and their perceptions of factors that might encourage any student to consider GS. Two survey items regarding the factors for respondents’ decision were presented in parallel - with distinct wording and unique responses according to the
group into which the respondents self-identified. These are illustrated in Fig. 5a and b. Fig. 6 shows the opinions of all respondents regarding speculative factors that might affect students’ behavior. From these responses, the most noteworthy trend is that the importance of a role model in deciding to choose surgery increased substantially during the clinical phases of the students’ medical education program. Also worth noting from Fig. 5a is the steady decrease in importance of personal status as a reason for GS — specifically, both remuneration and social respect were less important to respondents at the end of medical school than at the beginning.

At all stages of medical school, students who were not interested in GS cited the lifestyle of general surgeons as the most important reason to choose a different specialty (Fig. 5b). Almost as important was the perception that GS as a specialty was an unfriendly environment filled with egotistical surgeons. This perception of the people and environment increased during the clinical phases of medical school when students would have experienced the people and environment during their required clerkships. Additionally, if students were unable to be active participants during their surgery clerkship, they frequently cited this as a reason why they did not opt for GS as a career in their post-clerkship survey responses.

The responses that all students provided, both those who were interested in GS and those who were not, correspond well to the responses from both types of students independently. Fig. 6 shows that there were consistently 3 important factors which respondents, both those who chose GS and those who did not, believed would attract students to GS: better lifestyle, friendly environment, and good role models. In particular, the environment and role models were considered more important during and after students had relevant experience from their surgery clerkship, while improvement of lifestyle actually became less important as students moved from MS3 to MS4. Involvement of surgeons in pre-clinical training was initially rated as important, but after clerkships it was not considered an important factor to encourage students towards GS.

Discussion

An essential value of conducting this study was to expose the trends in students’ perceptions of GS through their medical school program. It is clear that some of the factors which influence students are attributable to the experience they had during their required surgery clerkship — which occurred during the MS3 year at both schools in this study.

It is not surprising that the overall interest in GS decreased from the outset of medical school. Entering students are often unaware of the panoply of medical and surgical specialties and subspecialties available when they begin their training. Thus, in their initial plans they often gravitate toward familiar specialties, such as surgery, primary care, or pediatrics.

It is particularly encouraging that the female students at both schools exhibited a decrease in interest in GS at the same rate as the male students. Although females had lower interest at all points, the factors during medical school that discourage students from GS appear to be less dependent on sex than may have been true in previous generations.15,16 Also noteworthy is the slight uptick in interest amongst females at one school in the final survey. Given the importance of role models, as discussed in more detail below...
and in previous publications, this uptick might be attributable to the fact that the surgery clerkship director at the time of the survey was female. This fact may also explain the finding that GS interest increased after the surgery clerkship for females at school 2, the school with the female clerkship director, but decreased at the school with the male director.

While interest in general surgery was fairly consistent across a wide range of USMLE Step 1 scores, there was less career interest from third and fourth year students who scored more than 1 standard deviation above the national mean. The interest amongst those with higher USMLE scores may be due to interest in competitive surgical subspecialties as high-scoring students have likelihood of successful matching. MS4 students with low USMLE Step 1 scores, as noted in previous work, may recognize their decreased chances of matching and choose to focus on other areas of interest. This may become more evident to them in their MS4 year, after the residency application and interview process, than it was at the time of the MS3 survey.

Students’ rankings of factors that influenced their intentions towards a GS career were consistent in several regards. First, as students gained experience throughout medical school, their rankings of how other people and the clinical environment factored into their decisions increased. Human elements such as having a role model in the field and distaste for egotistical surgeons became more important factors as students progressed through their training program. Furthermore over the years of medical school, personal satisfaction in the specialty and the opportunity to actively participate in GS during training were increasingly rated as important reasons for/against selecting a GS career trajectory. This finding is consistent with recent research that identified medical school ‘culture’ and having a mentor as being significant predictors of students’ specialty choice. A detailed examination of the reasoning that students use to incorporate these extra-curricular factors into their personal career decision-making would be an enlightening area of future study.

Over the course of medical school, students expressed a decreased emphasis on their career decisions related to technical aspects of surgery, such as performing procedures and working with their hands. Likewise, business factors such as fear of malpractice, professional respect, and remuneration also decreased in importance as students became more familiar with clinical medicine.

Despite all of the trends noted previously, the primary factor ranked by all students at all levels of medical school for not pursuing GS was their perception of the lifestyle. ‘Lifestyle’ was the only factor on which those who were planning a GS career and those who were not all agreed on its importance. Notably, both groups ranked it as the single most influential factor in their decision process.

Conclusions

With the continued decline in the percentage of first-year general surgery residency positions that are filled by US seniors, a decreasing interest in the field over the four years of medical school indicates that this trend will persist and worsen. Lifestyle, environment and length of training ranked highest amongst students who did not choose general surgery. Perception of a general surgeon’s lifestyle and the educational
Fig. 5. a. Mean Ranking of Reasons by Students Who Are Planning a Career in General Surgery; b. Mean Ranking of Reasons by Students Who Are NOT Planning a Career in General Surgery.
environment are both factors that are within the purview of medical schools to modify. These readily modifiable factors need to be addressed by surgery departments at academic health centers if there is to be an increased interest in general surgery.

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Conflicts of interest

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