ORIGINAL INVESTIGATION

Medicine or Surgery? Factors for Medical Students to Consider When Choosing a Specialty.
Medicine or Surgery? Factors for Medical Students to Consider When Choosing a Specialty

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ABSTRACT

Objectives
One of the first branches in the medical specialty decision tree is the choice between a surgical and non-surgical career. However, no work has previously compared the applicant factors that determine a student’s competitiveness for surgical versus non-surgical residencies. This study aimed to compare applicant characteristics between students who matched into surgical and non-surgical specialties.

Methods
This was a cross-sectional study comparing surgical and non-surgical residency applicant characteristics obtained from annual reports published by the National Resident Matching Program (NRMP) for 2017-2018. Career data obtained from the 2019 Medscape Physician Compensation Report were then compared between surgical and non-surgical physicians to examine factors influencing specialty choice.

Results
Surgical residencies had higher US applicant to available residency spot ratios (1.05 vs 0.66, p<0.001) and more frequently utilized minimum Step 1 score cut-offs for interview consideration (83.1% vs 59.8%, p=0.001). Surgical applicants demonstrated higher Step 1 (242.3 vs 233.1, p=0.015) and Step 2 CK (250.8 vs 245.2, p=0.023) scores, had more research publications (10.3 vs 6.4, p=0.044), and were more frequently members of AOA (30.0% vs 16.7%, p=0.020) than non-surgical applicants. Surgical attendings had significantly higher average salaries ($415,800 vs $311,182, p=0.022) and worked more hours annually when standardized to family medicine physicians (+281.7 hrs vs -146.9 hrs, p=0.002).

Conclusions
Surgical specialties are, on average, more competitive than non-surgical specialties, with applicants demonstrating higher examination scores and publications than applicants to non-surgical specialties. These findings are important for administrators and students to help better prepare for match day success.

INTRODUCTION

A key professional decision facing medical students is their choice of specialty. This process necessarily requires that students carefully consider and predict which specialty will best fit their desired scopes of practice, clinical and research interests, and intended work-life balance. Students often encounter the adage that in order to most efficiently narrow their choices, they might first choose between surgical and non-surgical fields. In theory, these categories are sufficiently distinct in their roles and areas of expertise to allow students to hone in on specific specialties in a more timely and organized manner so that they can gain the requisite experiences needed for a competitive candidacy in the residency match process.

However, it is unknown whether this approach appropriately conveys to students
which applicant factors will be the most important determinants of their competitiveness as candidates. Several prior studies have surveyed residency program directors (PDs) to determine the characteristics that make candidates appear competitive, but these factors were found to be highly variable across different specialties. Various specialty-specific studies have indeed hinted that students should set different expectations for which factors make them competitive candidates based on their choice of specialty. For example, primary care residencies have been shown to value more qualitative measures of applicant performance (including dean’s letters and personal statements), whereas medical school class rank, clerkship grades, and step scores are reportedly more valued in surgery and surgical subspecialties. Nonetheless, differences in applicant characteristics between surgical and non-surgical specialties have not been clearly described.

Therefore, our primary objective was to compare applicant and program characteristics between surgical and non-surgical specialties for the most recently available cycle (2017-2018) while hypothesizing that medical students applying into surgical specialties would have more competitive objective measures associated with their candidacies. Secondarily, we describe career lifestyle differences between surgical and non-surgical fields in order to consider how these may influence choice of specialty.

**MATERIALS AND METHODS**

This was a cross-sectional study of de-identified, publicly available data across medical specialties, and therefore IRB approval was not required. The National Resident Matching Program (NRMP) annually publishes several reports on residency applicant characteristics, including “Charting Outcomes in the Match: U.S. Allopathic Seniors” and “Results and Data: 2018 Main Residency Match”. They also survey residency PDs and applicants regarding which factors they consider most important in the residency application process, entitled “Results of the 2018 NRMP Program Director Survey” and “Results of the 2017 NRMP Applicant Survey.” Summary data of matched applicants from these reports (presented in Tables 1-3) were abstracted and analyzed.

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<thead>
<tr>
<th>Non-Surgical (N=14)</th>
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<tbody>
<tr>
<td>Anesthesiology</td>
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<td>Radiology-Diagnostic</td>
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Table 1. Surgical and Non-Surgical Specialties

For each applicant characteristic in their survey reports, the NRMP publishes both an average importance rating (a number between 1 and 5, with 5 representing the highest level of importance) as well as the percentage of programs or applicants citing each factor as important, and further stratified by each unique type of residency program. Factor importance ratings were multiplied by the percentage of programs citing a given factor as important in order to generate weighted ratings which account for programs that did not consider a given factor as important. These weighted ratings were then used to generate a finalized list of applicant and program factors ranked by their overall importance according to both programs and applicants, between surgical and non-surgical specialties.

In considering future career characteristics, salaries and satisfaction data were obtained from the 2019 Medscape Physician Compensation Report, which was a survey of 19,328 physicians across 30+ specialties practicing medicine in the United States. Annual work
hours data were obtained from a 2011 study that reported results from the 2004-05 Community Tracking Survey, representing self-reported work hours from 6,381 physicians working 20-100 hours per week and >26 weeks worked per year.14 Last, residency training lengths were obtained from the ACGME.15 Again, specialties were separated into surgical and non-surgical cohorts in order to compare both applicant and career trajectory factors.

SPSS Statistics for Macintosh, Version 24.0 (IBM Corp, Armonk, NY) was used to perform all statistical analyses and calculate 95% confidence intervals (C.I.). Average applicant and physician characteristics were compared across surgical and non-surgical specialties using Independent two-tailed T-tests. A significance threshold of p<0.05 was used for all statistical tests.

RESULTS

Figure 1 illustrates the top five most important applicant factors for selecting interviewees and ranking applicants as reported in the “Results of the 2018 NRMP Program Director Survey”,

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**Legend**

- USMLE Step 1
- OR in specialty
- MSPE/Dean’s Letter
- USMLE Step 2 CK
- Clerkship Grades
- Personal Statement
- Clerkship Grades in desired specialty
- Personal prior knowledge of applicant
- Class ranking/percentile
- Away rotation within your department
- AOA membership
- Graduate of highly-regarded US medical school
- Demonstrated involvement/interest in research
- Away rotation in specialty/interest in research
- Interpersonal skills
- Interpersonal skills in general
- Feedback from current residents
- Desired geographic location (application)
- Perceived goodness of fit
- Reputation of program
- Quality of residents in program
- Academic medical center program
- Quality of educational curriculum and training
- Work/life balance
- Quality of faculty
- Size of program
- Quality of program director
- Future fellowship training opportunities
- Overall goodness of fit
- Interview day experience
grouped into surgical and non-surgical program cohorts. Using “Results of the 2017 NRMP Applicant Survey,” similar factors were again ranked according to what applicants report is most important for affecting application to and ranking of residency programs.

**Table 2** compares the overall volume and availability of positions between surgical and non-surgical specialties. The ratio of US applicants to available residency program spots was significantly higher for surgical compared to non-surgical (1.05 vs 0.66, p<0.001) specialties. Similarly, the percentage of residency spots filled by US seniors was significantly higher for surgical versus non-surgical (85.9% vs 61.0%, p<0.001) specialties. Lastly, a significantly higher percentage of surgical residency programs required a minimum Step 1 score for consideration of candidacy (83.1% vs 59.8%, p=0.001). There were no significant differences between cohorts with respect to the number of applications submitted, number of interviews attended, or the number of programs ranked per applicant.

Measured characteristics of matched candidates for surgical versus non-surgical residency programs are demonstrated in **Table 3**. Applicants for surgical residency programs had significantly higher Step 1 (242.3 vs 233.1, p=0.015) and Step 2 CK (250.8 vs 245.2, p=0.023) scores than those applying to nonsurgical programs. Surgical residency applicants also had significantly more research experiences (4.6 vs 3.3, p=0.007) and overall number of abstracts, presentations, and publications (10.3 vs 6.4, p=0.044) compared with non-surgical residency applicants. Last, a significantly higher percentage of candidates applying into surgical specialties were members of AOA (30.0% vs 16.7%, p=0.020). There were no significant differences between cohorts with respect to the total number of work and volunteer experiences, percentage graduating from a top 40 research medical school according to the highest totals of National Institutes of Health (NIH) grants received, or the percentage

<table>
<thead>
<tr>
<th></th>
<th>Non-Surgical (N=14)</th>
<th>Surgical (N=9)</th>
<th><strong>P value</strong></th>
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</thead>
<tbody>
<tr>
<td>US Applicant to Spot Ratio</td>
<td>0.66 (0.57-0.76)</td>
<td>1.05 (0.90-1.19)</td>
<td><strong>&lt;0.001</strong></td>
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<tr>
<td>Residency Spots Filled by US seniors (%)</td>
<td>61.0 (53.1-68.9)</td>
<td>85.9 (80.8-91.0)</td>
<td><strong>&lt;0.001</strong></td>
</tr>
<tr>
<td>Minimum Step 1 Score Requirement (%)</td>
<td>59.8 (51.8-67.8)</td>
<td>83.1 (76.6-89.7)</td>
<td>0.001</td>
</tr>
<tr>
<td>Number of applications submitted per applicant</td>
<td>38.9 (27.8-50.1)</td>
<td>53.4 (41.1-65.8)</td>
<td>0.133</td>
</tr>
<tr>
<td>Number of interviews attended per applicant</td>
<td>11.4 (9.7-13.1)</td>
<td>13.1 (11.2-15.1)</td>
<td>0.244</td>
</tr>
<tr>
<td>Number of programs ranked per applicant</td>
<td>11.9 (11.2-12.7)</td>
<td>12.9 (11.0-14.7)</td>
<td>0.287</td>
</tr>
</tbody>
</table>

**Table 2. Supply and Demand for Surgical vs Non-Surgical Residencies.** Values reported as means (95% Confidence Intervals)

<table>
<thead>
<tr>
<th></th>
<th>Non-Surgical (N=14)</th>
<th>Surgical (N=9)</th>
<th><strong>P value</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1 score</td>
<td>233.1 (229.0-237.3)</td>
<td>242.3 (237.3-247.2)</td>
<td><strong>0.015</strong></td>
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<tr>
<td>Step 2 CK score</td>
<td>245.2 (242.3-248.1)</td>
<td>250.8 (247.8-253.7)</td>
<td><strong>0.023</strong></td>
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<td>Number of research experiences</td>
<td>3.3 (2.7-3.9)</td>
<td>4.6 (4.1-5.2)</td>
<td><strong>0.007</strong></td>
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<td>Number of abstracts, presentations, publications</td>
<td>6.4 (4.4-8.4)</td>
<td>10.3 (7.2-13.3)</td>
<td><strong>0.044</strong></td>
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<tr>
<td>Number of work experiences</td>
<td>3.1 (3.0-3.2)</td>
<td>3.3 (3.1-3.4)</td>
<td>0.198</td>
</tr>
<tr>
<td>Number of volunteer experiences</td>
<td>7.2 (6.7-7.7)</td>
<td>7.3 (6.8-7.7)</td>
<td>0.904</td>
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<tr>
<td>AOA membership (%)</td>
<td>16.7 (10.3-23.1)</td>
<td>30.0 (22.1-37.8)</td>
<td><strong>0.020</strong></td>
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<tr>
<td>Graduated from top 40 medical school (%)</td>
<td>33.7 (30.5-36.9)</td>
<td>34.5 (30.8-38.2)</td>
<td>0.741</td>
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<tr>
<td>Have PhD degree (%)</td>
<td>7.2 (3.5-10.8)</td>
<td>4.0 (1.0-7.0)</td>
<td>0.260</td>
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<tr>
<td>Have another degree (%)</td>
<td>17.0 (15.5-18.5)</td>
<td>18.7 (16.3-21.0)</td>
<td>0.238</td>
</tr>
</tbody>
</table>

**Table 3. Characteristics of Matched Residency Applicants in Surgical vs Non-Surgical Specialties.** Values reported as means (95% Confidence Intervals)
with a PhD or other degree.

Characteristics related to expected salaries, career satisfaction, and work-life balance are shown in Table 4. The average annual salary for surgeons ($415,800) was significantly higher than for physicians in non-surgical specialties ($311,182, p=0.022). Attending physicians in surgical specialties also worked significantly (p=0.002) more hours annually (281.7 hrs vs -146.9 hrs, p=0.002) when standardized to the working hours of family medicine physicians than their peers in non-surgical specialties. The length of total training for those in surgical specialties was also significantly higher (5.4 yrs vs 3.9 yrs, p=0.002), though physicians in surgical fields reported higher satisfaction with their job performance compared to those in non-surgical fields (47.8% vs 41.4%, p=0.037). Finally, a lower proportion of those in surgical fields reported feeling they were fairly financially compensated compared with those in non-surgical fields (52.4% vs 58.7%, p=0.021).

**DISCUSSION**

This study is among the first to investigate how applicants pursuing surgical specialties differ from their peers applying into non-surgical programs with respect to key factors. We demonstrate that surgical specialty applicants, on average, face higher applicant-to-residency spot ratios and a higher percentage of spots filled by US seniors than non-surgical specialties. Additionally, surgical applicants possessed higher Step scores, more research experiences and publications, and were more frequently members of AOA. When examining factors valued by residency programs, surgical programs tended to value objective factors such as Step 1 scores and clerkship grades more than non-surgical programs. Compared to non-surgical students, surgical applicants valued goodness of fit of a program more frequently than geographic location, along with the reputation of a program and the quality of the residents and faculty.

The observation that surgical specialties place a greater emphasis on objective applicant factors may be a result of the relatively higher demand for surgical residency spots causing increased overall competition in the applicant pool. Furthermore, increased competition leads programs to utilize more objective screening characteristics to narrow down competitive applicant pools. Our analysis demonstrated that surgical specialties utilize minimum Step 1 score requirements nearly 35% more often than non-surgical specialties, with recent data showing increasing usage of such screening tools. Interestingly, there was no significant difference in the number of applications submitted between surgical and non-surgical specialties.
In the case of many CL-minded students, increased work hours were the primary negative indicator for not choosing a surgical specialty.\textsuperscript{25,26} A study by Dorsey showed that having a CL explained nearly 55% of the variability in specialty preference among medical students, while the number of students choosing a specialty with a more controllable lifestyle increased from 1996-2002.\textsuperscript{27} On the other hand, students pursuing a career in surgery tended to be less concerned about having a CL.\textsuperscript{28,29} Our study also shows that, despite surgical specialties working longer hours and more often feeling not appropriately compensated, surgical specialties have higher incomes and career satisfaction rates. This may indicate that, despite a trend of increasing interest in CL specialties overall, student motivations in career selection may be more monetarily and prestige driven than previously thought.

The primary limitations of this study pertain to the abstraction of summarized, publicly available data. As a result, a more in-depth multivariate analysis of confounding and interacting applicant factors related to match success in a given specialty could not be performed, as our results were instead based on holistic averages of applicant factors across an unidentifiable cohort of medical students. Additionally, comparisons were made based on relatively few data points, as there are a limited number of medical specialties. Thus, obtaining statistical significance in such a small sample size when true differences may exist is a challenge. Nonetheless, the data points used in our analyses are based on nationalized averages, improving our confidence in our results.

**CONCLUSION**

Choosing a medical specialty can be a daunting decision for students. Recognizing the advantages of more invested immersion in a limited number of specialties, many students...
first decide on whether they wish to enter surgical or non-surgical fields. Both for these students and their physician mentors, our findings are useful for providing evidence-based advice related to which application factors most impact candidates’ competitiveness. In doing so, students can more efficiently identify areas of strength and improvement, and better ensure match day success.

REFERENCES