

# Assessing the Finances of Applying to Surgical Residency in 2019-2020: A US Nationwide Surgical Specialties Comparison

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## ABSTRACT

**Background** The costs of applying to residency programs may affect which students choose to apply to a specialty, yet few studies have compared expenses of applying to different surgical specialties.

**Objective** To compare individual and total expenses for applicants applying to 5 US surgical specialties during an in-person interview and recruitment period.

**Methods** Post-match survey data from 2019-2020, from senior applicants of 123 of 141 (87.2%) US medical schools, to orthopaedic surgery (OS), neurological surgery (NS), urology (UR), plastic surgery (PS), otolaryngology (OTO) programs, was analyzed for applicant characteristics and mean application, away rotation, interview, and total expenses. Kruskal-Wallis H tests compared differences in costs between specialties. *P* values <.05 were significant.

**Results** The survey data included 1136 applicants, representing a response rate of 27%, with 459 applicants to OS, 121 to NS, 191 to UR, 117 to PS, and 248 to OTO. Mean application costs were different among the specialties: OS, \$1,990; NS, \$1,711; UR, \$1,570; PS, \$1,638; and OTO, \$1,612 (*P*<.003). Mean interview expenses also differed: OS, \$3,129; NS, \$6,400; UR, \$3,915; PS, \$5,486; and OTO, \$3,540 (*P*<.001) as well as away rotation expenses: OS, \$3,182; NS, \$3,840; UR, \$2,640; PS, \$4,074; and OTO, \$2,437 (*P*<.029). Mean total costs were high and differed among specialties: OS, \$8,205; NS, \$11,882; UR, \$8,207; PS, \$10,845; and OTO, \$7,516 (*P*<.029).

**Conclusions** Applying to surgical residencies in the pre-pandemic era was expensive, with mean costs over \$10,000 for NS and PS. The largest contribution to total costs were interview expenses.

## Introduction

Orthopaedic surgery (OS), neurological surgery (NS), urology (UR), plastic surgery (PS), and otolaryngology (OTO) are among the most competitive surgical specialties in the United States.<sup>1-6</sup> In 2020, match rates for these fields ranged from 81% to 92% for US allopathic seniors.<sup>7</sup> Most medical student applicants participate in one or more away rotations and submit greater numbers of applications to these residency programs to enhance their chances of matching. Although prior studies have quantified the costs of the application process for individual specialties,<sup>8-12</sup> more recent information on application, away rotations, interview, and total costs between specialties is needed. As costs may influence specialty choice, and these specialties rank low in diversity measures, despite recruitment and resident support efforts, examination of the costs of application are important. In addition, this information may be of interest to specialties and the Association of American Medical Colleges (AAMC) for future decisions regarding virtual versus in-person recommendations.

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*Editor's Note: The online version of this article contains further data from the study.*

The COVID-19 pandemic introduced another complexity to these competitive specialties, forcing program directors and applicants to adapt.<sup>13-15</sup> With the recommendations of the AAMC that residency programs for the 2021 residency application cycle suspend away rotations and in-person interviews, we sought to estimate the cost savings to these surgical applicants during this time and the potential ramifications.<sup>16</sup> Although few studies have broadly evaluated the economic burden of applying to surgical residency, many of these surveys are outdated or possess limitations.<sup>8-12,17-19</sup>

The aim of this study is to compare the various components of and total costs for US allopathic medical student applicants to these 5 competitive surgical residencies. The primary hypothesis was that total and individual costs would differ by surgical specialty.

## Methods

This cross sectional, retrospective evaluation of publicly available data used the 2019-2020 Texas Seeking Transparency in Application to Residency (STAR) Dashboard database. The Texas STAR Dashboard is an online database generated from a nationwide, anonymous online survey of US allopathic medical students, sent shortly

after the residency match each year. Medical school participation allows access to applicant data for study. The data is drawn from 123 of the 141 (87.2%) participating US allopathic medical schools. In this survey year there were 1136 US allopathic applicants to surgical residency: OS (n=459), NS (n=121), UR (n=191), PS (n=117), and OTO (n=248). The response rate to the survey was 27%. Osteopathic and international medical graduates were not available for inclusion in the study.

Survey data collected includes residency program specialty, medical school, and applicant characteristics such as United States Medical Licensing Examination (USMLE) Step 1 and Step 2 scores, research output, leadership experiences, volunteer experiences, and the percentage of applicants achieving Alpha Omega Alpha honors, and is comparable with published data from the National Resident Matching Program. To protect anonymity and encourage participation from medical schools and applicants, applicant sex and race are not available to researchers. Additionally, applicants responded to 3 questions regarding costs of applying to residency: application costs, away rotation costs, and interview costs. Application costs included total dollars of application fees from the Electronic Residency Application Service for the number of programs applied to. Away rotation costs were comprised of living expenses (food, travel, parking) for the visiting clerkship. Interview costs included any travelling expenses and living expenses pertaining to the interview day(s). More information regarding the database is available on the website.<sup>20</sup>

The survey database was queried to record the application costs, away rotation costs, interview costs, and total costs for each surgical specialty. General surgery applicants were excluded because these applicants typically do not participate in away rotations. The following demographic applicant information was also included: USMLE Step 1 and Step 2 scores, number of applications, number of interviews, and medical school region by AAMC groups (Central Group on Student Affairs, Northeast Group on Student Affairs, Southern Group on Student Affairs, Western Group on Student Affairs; online supplementary data).

Median costs and interquartile ranges (IQRs) are reported with percentile distributions for each type of cost incurred. The dependent variable (USD) was analyzed to determine the normality of distribution. Mann-Whitney U tests or Kruskal-Wallis H tests were used to determine whether there were statistically significant differences in costs between medical school regions. A *P* value of  $<.05$  was considered statistically significant. Data was analyzed by using SPSS Statistics, Version 23.0 (IBM Corp, Armonk, NY).

This study was deemed exempt by the Institutional Review Board of Maimonides Medical Center.

## KEY POINTS

### What Is Known

Expenses for applicants hoping to match into competitive surgical subspecialties have been substantial, especially considering applicants may need to do multiple extramural rotations and apply to more programs than those looking to match into less competitive fields.

### What Is New

The authors report more recent data around costs for extramural rotations, applications, and interviews, spanning the 2019-2020 pre-pandemic application cycle, for 4 surgical subspecialties.

### Bottom Line

Costs to attempt to match into surgical subspecialties remain high. Neurological surgery and plastic surgery applicants reported mean costs of more than \$10,000.

## Results

Applicant characteristics for the 5 surgical specialties are presented in the online supplementary data. When considering all applicants, the mean application costs were: OS, \$1,990; NS, \$1,711; UR, \$1,570; PS, \$1,638; and OTO, \$1,612 (TABLE). Mean interview costs were: OS, \$3,129; NS, \$6,400; UR, \$3,915; PS, \$5,486; and OTO, \$3,540 (TABLE). Mean away rotation costs were: OS, \$3,182; NS, \$3,840; UR, \$2,640; PS, \$4,074; and OTO, \$2,437 (TABLE). Mean total costs were: OS, \$8,205; NS, \$11,882; UR, \$8,207; PS, \$10,845; and OTO, \$7,516, and these were significantly different between specialties (FIGURE 1). To evaluate quartiles, a comparison of the median total costs for the 5 specialties is shown in FIGURE 2. With regards to total costs, NS and PS applicants spent more than OTO, UR, and OS. OS applicants spent more than OTO applicants ( $P<.001$ ).

The online supplementary data shows the comparison of median application fees, away rotation costs, and interview costs for the 5 specialties. For application fees, OS applicants spent more than UR, PS, OTO, and NS applicants. For away rotation costs, NS applicants spent more than OTO, UR, and OS applicants. For interview costs, NS applicants spent more than OTO, UR, and OS applicants.

## Discussion

This is the first evaluation to directly compare the 5 surgical specialties that emphasize participation in away rotations. This national survey of US allopathic medical school senior applicants for the 2019-2020 cycle found that expenses associated with applying to OS, NS, UR, PS, and OTO surgical residencies were substantial and ranged from more than \$7,000 to more than \$11,000. The largest contribution to this cost was

**TABLE**  
Comparison of Mean Costs for Surgical Specialties

Cost Category	OS	NS	UR	PS	OTO	P values <sup>a</sup>
Application costs	\$1,990	\$1,711	\$1,570	\$1,638	\$1,612	≤.003
Interview costs	\$3,129	\$6,400	\$3,915	\$5,486	\$3,540	≤.001
Away rotation costs	\$3,182	\$3,840	\$2,640	\$4,074	\$2,437	≤.029
Total costs	\$8,205	\$11,882	\$8,207	\$10,845	\$7,516	≤.029

<sup>a</sup> Derived from Kruskal-Wallis H tests.

Abbreviations: OS, orthopaedic surgery; NS, neurological surgery; UR, urology; PS, plastic surgery; OTO, otolaryngology.

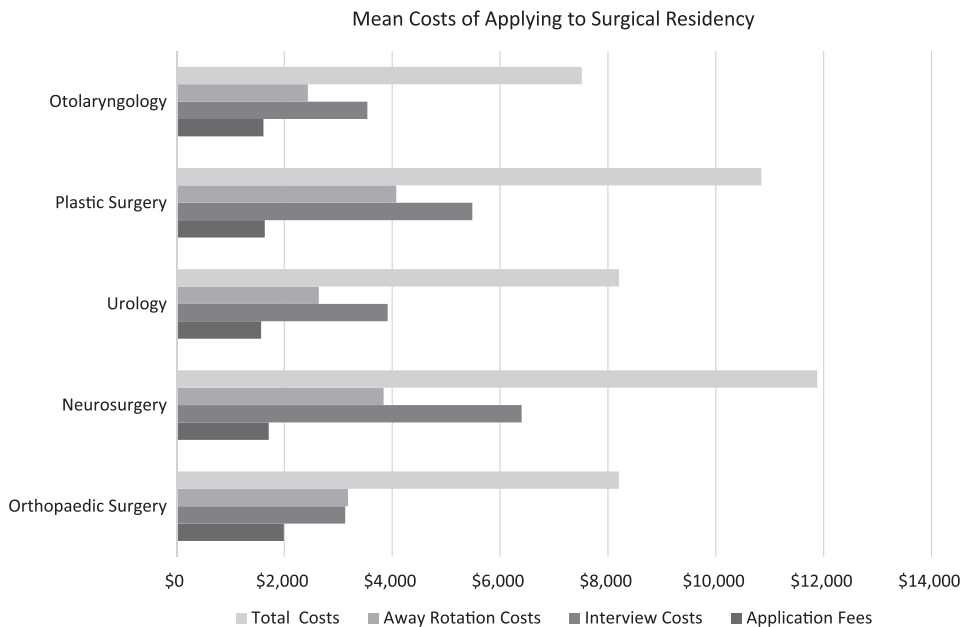
in-person interviews, which varied from more than \$3,000 to more than \$6,000.

Prior studies examining application process costs occurred primarily 5 to 10 years earlier and may not be current, given ongoing “application inflation” to these specialties.<sup>8-12,17-19</sup> NS and PS applicants reported the highest total costs, and these are specialties with fewer residency programs than other specialties.<sup>21-23</sup> NS and PS applicants also spent more on away rotations, which is consistent with surveys reporting that away rotations in these specialties are used predominantly by program directors and students to identify a “good fit” and increase match success.<sup>24-26</sup> OS applicants had the highest application costs, which aligns with reports that OS applicants often apply to large numbers of US programs.<sup>27,28</sup> UR and OTO applicants on average spent less than the other specialties, which aligns with OTO program director survey results reporting that away rotations predominately used address deficiencies in clinical exposure or case volume.<sup>29</sup> Finally, in

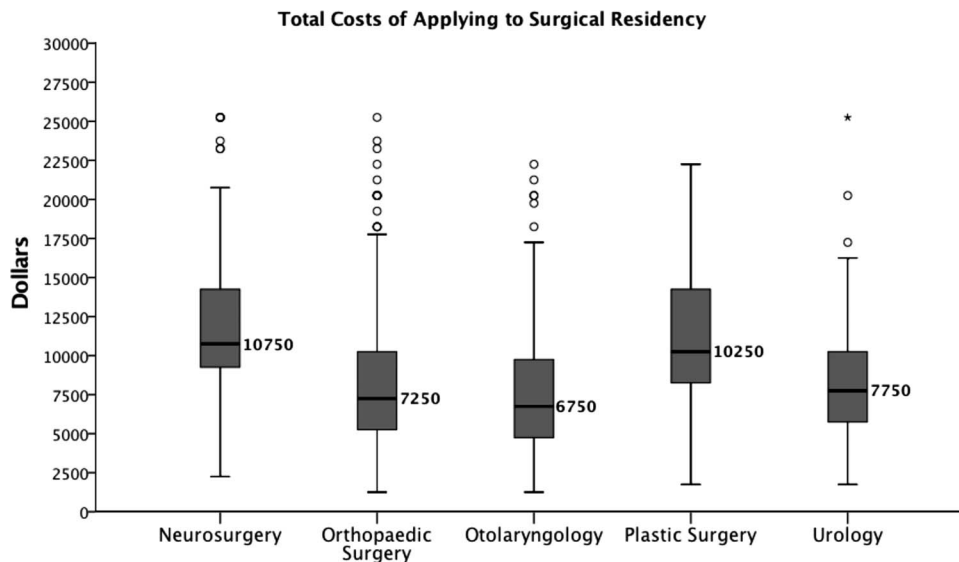
interview cost comparisons between the specialties, NS, PS, and UR applicants spent the most during interview season and also attended the greatest number of interviews.

If these numbers are extrapolated to the entire application cohort of 1136 allopathic seniors applying to these specialties, the costs are striking: \$9.9 million. While the mean cost per applicant in this study represents about 3% of total medical school expenses (\$7,516/\$300,000), this cost may be a factor in student career decisions.<sup>30,31</sup> Studies have reported that 34% to 72% of applicants require additional funding for the application process: loans, family assistance, tapping into a saving account(s), or credit cards.<sup>8,11,18</sup> When considering the economic burden of interviews and the application process, 28% of OS and OTO applicants report that they still do not have sufficient funding for the application and interview process.<sup>8,18</sup>

This study is limited by the low response rate, and respondents may not represent the total population of applicants to these specialties. The greatest proportion



**FIGURE 1**  
Mean Costs to Students Applying to Surgical Specialty Residency During 2019-2020



**FIGURE 2**  
Total Costs Applying to Surgical Residency From 2019-2020

Note: Box plot resembles median value with quartiles. Neurological surgery and plastic surgery applicants spent significantly more than otolaryngology ( $P < .001$ ), urology ( $P < .001$ ), and orthopaedic surgery ( $P \leq .029$ ). Orthopaedic surgery applicants spent significantly more than otolaryngology applicants ( $P < .001$ ).

of responses from applicants in the South may not entirely reflect the proportion of medical schools in the United States and could be a selection bias. However, the findings suggest that over a quarter of applicants in this application cycle had substantial costs due to the application process. Surveys are also limited by recall bias on the part of respondents, and how well respondents understood the questions. The cost data available from the survey is limited to mean and percentile distributions of application costs, away rotation costs, interview costs, and total costs, of US allopathic medical school seniors. Using this national survey data prevented us from reporting more granular information regarding expenses at each stage of the process or correlating expenditures with applicant demographics or match success. Expenses for osteopathic and international medical school graduates are unknown using this data source.

Key next steps are to examine student application expenditures with new processes underway, such as virtual-only interviews followed by limited post-match visits, effects of grants or scholarships for away rotations, preference signaling, and caps on application numbers and interviews. Some of these future studies could be conducted using available cost estimates or thought experiments before actual implementation. Finally, the study findings may be considered by national specialty surgical societies when creating alternative application processes.

## Conclusions

This study of US student application costs for OS, NS, UR, PS, and OTO surgical specialty residencies for the 2019-2020 cycle found substantial costs, from \$7,000 to more than \$11,000 total cost, with the largest contribution from interviews. Applicants to NS and PS reported the highest total costs.

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