

# Total Costs of Applying to Integrated Plastic Surgery: Geographic Considerations, Projections, and Future Implications

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**Background:** In 2020, the American Council of Academic Plastic Surgeons and the Association of American Medical Colleges recommended residency programs suspend away rotations and in-person interviews. This study quantifies applicant costs and potential savings in the residency application process resulting from that change, while also evaluating differences in cost with respect to geographic region of the applicant.

**Methods:** A retrospective evaluation of the 2019–2020 Texas STAR (Seeking Transparency in Application to Residency) database was conducted. We queried responses from plastic surgery residency applicants, including expenses associated with the application, away rotations, interviews, and total costs for medical school seniors. Applicant characteristics were recorded. A Kruskal-Wallis H-test was used to evaluate differences in mean costs by medical school region.

**Results:** In total, 117 US allopathic applicants to plastic surgery residency were included. Total expenses for the application cycle were \$10,845. This was made up of \$1638 in application costs, \$4074 in away rotation costs, and \$5486 in interview costs. No significant differences were observed for mean total costs for applicants from schools in the Central (\$11,045/applicant), Northeast (\$9696/applicant), South (\$11,332/applicant), and West (\$11,205/applicant) ( $P = 0.209$ ).

**Conclusion:** Assuming relatively minimal expenditures related to a virtual interview cycle and lack of away rotations in 2021, the average cost savings for plastic surgery residency applicants during the COVID-19 pandemic was estimated to be over \$9000. (*Plast Reconstr Surg Glob Open* 2021;9:e4058; doi: 10.1097/GOX.0000000000004058; Published online 22 December 2021.)

## INTRODUCTION

Integrated plastic surgery residency is consistently one of the most competitive specialties in the match. In 2020, 291 total applicants (236 allopathic seniors) competed for 180 spots, yielding an overall match rate of 61.8%.<sup>1</sup> Securing a position is challenging, with plastic surgery applicants rotating at away institutions, interviewing, and frequently applying to all integrated programs. Although

prior evaluations have quantified the costs of the plastic surgery application process for medical students,<sup>2–4</sup> a detailed breakdown of application fees, away rotation expenses, interview costs, and total costs stratified by geographic region has not been reported. These prior studies have broadly evaluated the costs of applying to plastic surgery residency,<sup>2,3,5–8</sup> with the focus of the most recent evaluation in 2020 centered around the interview season.<sup>4</sup> Although completing multiple away rotations and applying to every residency program may increase an applicant's match success, these come at a significant cost, of which we quantify in the current study.<sup>5,6,9</sup>

The present study was designed to address the following questions regarding the expenses of applying to plastic surgery residency: (1) What were the projected financial savings for applicants by the omission of away rotations and in-person interviews in the 2020–2021 cycle? (2) Did medical school geographic region influence expenses when applying to residency? (3) Are there avenues to

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streamline the plastic surgery residency application for programs and applicants?

**Material and Methods**

This is a cross-sectional, retrospective evaluation of public data utilizing the 2019–2020 Texas STAR (Seeking Transparency in Application to Residency) dashboard database. The Texas STAR dashboard is an online tool generated from a nationwide survey of students. Participation allows access to applicant data from United States allopathic medical schools who agree to participate. The Texas STAR online dashboard database for 2019–2020 was derived from 115 US allopathic medical schools, including 7265 student respondents. Medical school participation is voluntary. Applicants respond anonymously to a series of questions related to residency applications and the match (Table 1). Application costs include total dollars of application fees from The Electronic Residency Application Service. Away rotation costs include food, travel, parking, and any living expenses for the visiting month clerkship. Interview costs include any traveling expenses and living expenses pertaining to the interview process. The database is available to be accessed and sorted by medical specialty.<sup>10</sup>

The database was queried to record application costs, away rotation costs, interview costs, and total costs for medical school seniors applying to plastic surgery residency. Demographic information for applicants was also recorded including Step 1 score, Step 2 Clinical Knowledge score, number of programs applied to, number of interviews, and supporting applicant demographics including medical school region. The four medical school regions (Central Group on Student Affairs, Northeast Group on Student Affairs, Southern Group on Student Affairs, Western Group on Student Affairs) and the states they comprise are shown in Table 2.<sup>10</sup> This study was determined not to require institutional review board approval, given the publicly available information and lack of human subjects.

**Statistical Analysis**

Mean and median costs were reported with percentile distributions for each cost type incurred. A Kruskal-Wallis

**Takeaways**

**Question:** What were projected financial savings for applicants by omitting away rotations and in-person interviews in the 2020–2021 cycle and did medical school region influence expenses?

**Findings:** This cross-sectional survey of plastic surgery applicants examined application, away rotation, interview, and total costs. Interview expenses were the most costly aspect of the application process. Geographic region did not influence expenses.

**Meaning:** As a result of COVID-19, applicants could save an average of \$9560, assuming minimal expenses related to virtual interviews versus in-person experiences.

H-test was utilized to determine if there were statistically significant differences in mean costs by medical school region. A *P* value of less than 0.05 was considered statistically significant.

**RESULTS**

**Application Cohort**

In total, 117 responses were available from applicants to integrated plastic surgery residency. Applicant demographics are presented in Table 3. Respondents sent on average 65 applications, received 17 interview offers, and attended 13 interviews. The greatest proportion of respondents were from southern (*n* = 52, 44.4%) medical schools, followed by northeastern (*n* = 28, 23.9%), and central (*n* = 25, 21.4%).

**Cost Analysis**

Application cost breakdown is displayed in Figure 1. Over half of the plastic surgery respondents spent more than \$1750 solely on application fees, \$5250 on interviews, \$3250 on away rotations, and \$10,250 in total costs. A comparison of the median total costs, application costs, away rotation costs, and interview costs with interquartile ranges for all respondents is shown in Figure 2.

**Medical School Region Cost Comparisons**

There was no significant difference observed for mean total costs for respondents from schools in the central,

**Table 1. Applicant Variables Captured in the Texas STAR Database**

Medical School Attended
USMLE step 1 score
USMLE step 2 score
Alpha Omega Alpha Honors (Yes/No)
No. applications submitted
No. interview offers received
No. interviews attended
No. clerkships “honored”
No. research experiences
No. publications
No. presentations
No. volunteer experiences
No. leadership positions
Application expenses
Away rotation expenses
Interview expenses
Total expenses

**Table 2. Geographic Representation of Student Affairs in the United States**

Central Group on Student Affairs – Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin.
Northeast Group on Student Affairs – Connecticut, District of Columbia, Maine, Massachusetts, New Hampshire, New Jersey, Maryland, New York, Pennsylvania, Rhode Island, Vermont.
Southern Group on Student Affairs – Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia.
Western Group on Student Affairs – Arizona, California, Colorado, Hawaii, Nevada, New Mexico, Oregon, Utah, Washington.

**Table 3. Plastic Surgery Residency Applicant Demographics**

No. Applicants	117
No. applicants from Central Group on Student Affairs	25 (21.4%)
No. applicants from Northeast Group on Student Affairs	28 (23.9%)
No. applicants from Southern Group on Student Affairs	52 (44.4%)
No. applicants from Western Group on Student Affairs	12 (10.3%)
Mean step 1	246
Mean step 2	255
AOA (%)	34
Mean no. applications	65
Mean no. interview offers	17
Mean no. interviews attended	13
Mean no. clerkships “honored”	4
Mean no. research experiences	6
Mean no. publications	5
Mean no. presentations	8
Mean no. volunteer experiences	7
Mean no. leadership positions	4

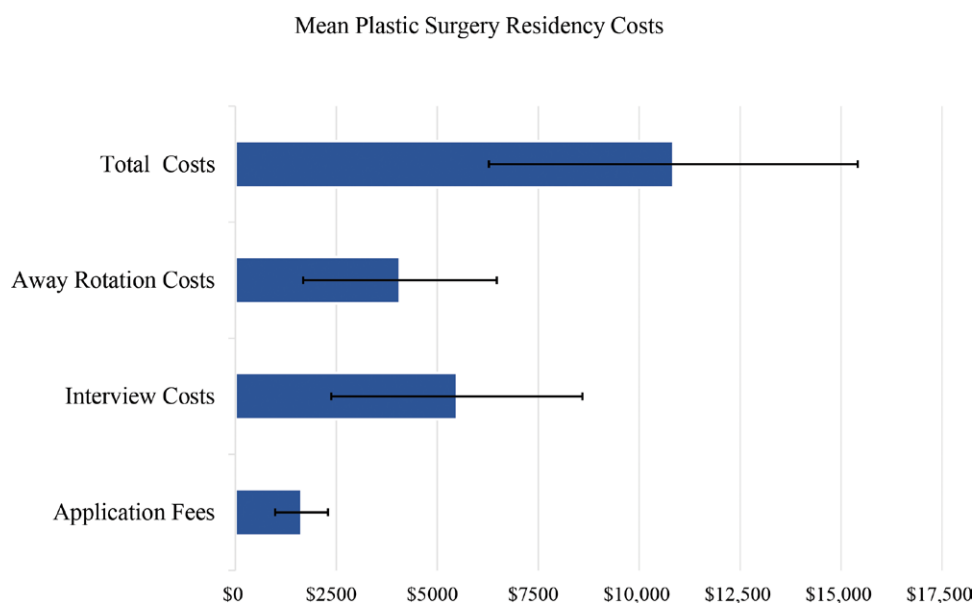
northeast, south, and west regions (Fig. 3). Application costs, away rotation costs, and interview costs for respondents from schools in different regions are shown in Figure 4. There was no significant difference between the mean application fees ( $P=0.901$ ), away rotation costs ( $P=0.308$ ), or interview costs for respondents between regions ( $P=0.246$ ) (Table 4).

## DISCUSSION

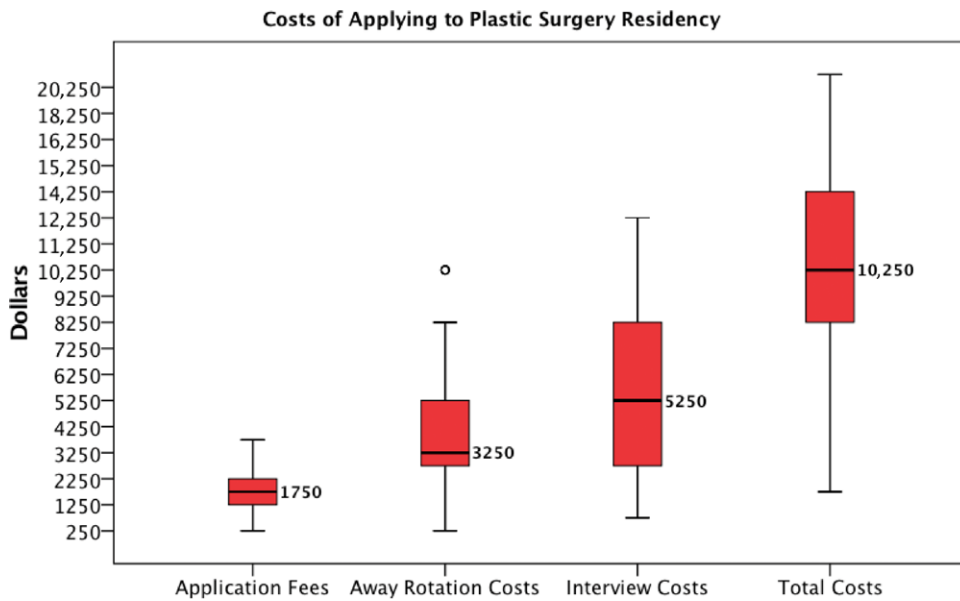
Using a nationwide sample of plastic surgery applicants, we were able to estimate the costs of applying to integrated plastic surgery residency. Prior studies are limited in that they do not report all associated costs—application fees, away rotation costs, and interview costs. In the 2019–2020 cycle, the mean application costs were \$1638, away rotation costs were \$4074, interview costs were \$5486, and total costs were \$10,845. As a result of COVID-19 restrictions, plastic surgery residency applicants could therefore

save an average of \$9560, assuming relatively minimal expenses related to virtual interview versus in-person experiences. Although the exact number is unknown, data from Shen et al showed that 88% of respondents in their survey of applicants in the 2020–2021 virtual cycle reported spending \$500 or less on virtual interviews.<sup>11</sup>

Studies have previously evaluated the costs of applying to residency for both plastic surgery applicants and other competitive specialties, including orthopedic surgery, neurosurgery, and otolaryngology.<sup>12–15</sup> Remarkably, the total mean cost of applying to plastic surgery residency for medical students represents almost 4% of the total costs of the average total undergraduate medical education debt/expense (\$10,845/\$275K).<sup>16–18</sup> Until Sarac and colleagues published updated expenditures during the interview season in 2020,<sup>4</sup> the most recent studies reporting on the topic took place more than 5 years prior.<sup>2,3</sup> This study demonstrates once again that the most costly aspect of the plastic surgery residency application process is the in-person interview. Interview costs seen in the present study were similar to prior evaluations, and prior studies have reported that 34% of applicants require additional funding, whether it be in the form of loans (43%), family assistance (27%), personal savings (18%), or further employment (10%).<sup>4</sup> When queried about the importance of the economic burden of interviews ranging from “extremely important” to “not at all important,” 64% of respondents at least reported it was “moderately important.”<sup>4</sup> Results from other competitive specialties have found that 72% of the applicants borrow additional money to finance interview season, and 28% cancel at least one interview due to financial concerns.<sup>19</sup> With the average reported total costs of \$10,845 and the majority of plastic surgery applicants projected to save money during a virtual application season, it is unclear how this will impact the application process in the future.



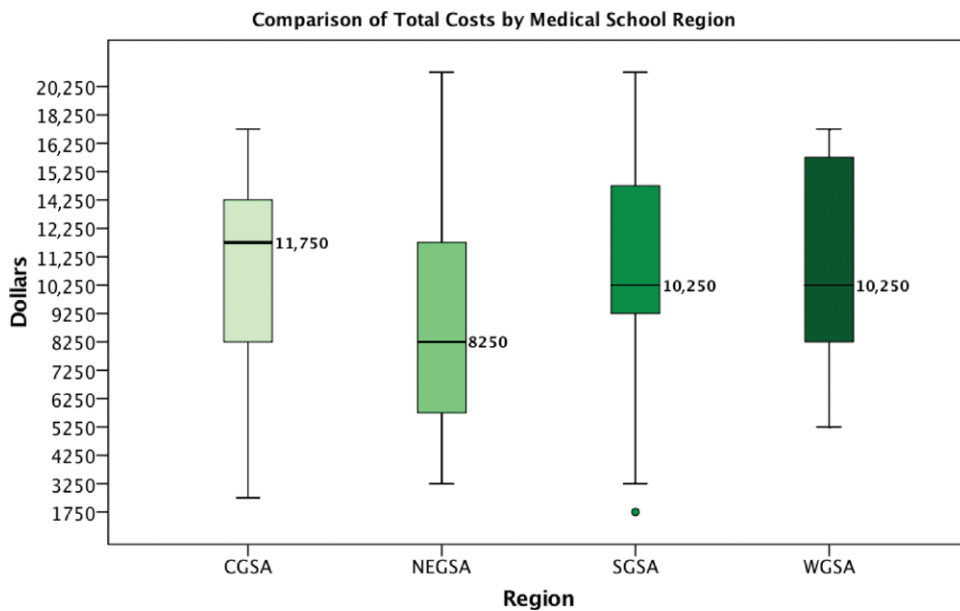
**Fig. 1.** The mean costs to students applying to plastic surgery residency during 2019–2020. Error bars are SD of the mean.



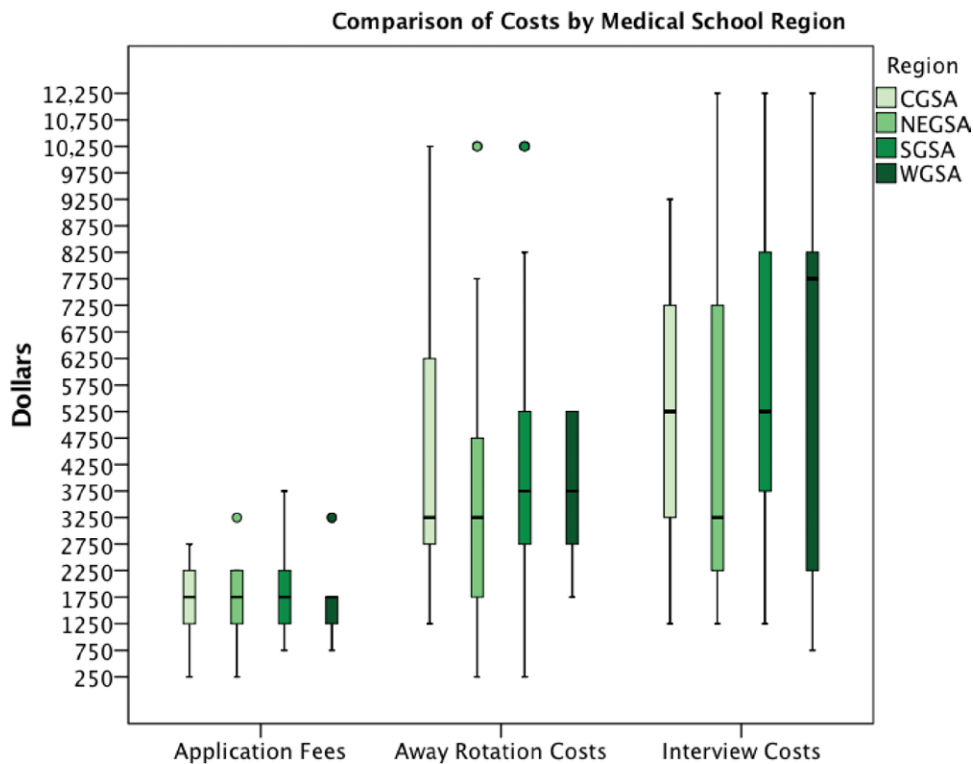
**Fig. 2.** Box plot of costs associated with applying to plastic surgery residency for all applicants from 2019 to 2020. Box plot resembles median value with quartiles.

The projected financial savings to medical students from COVID-19 limitations on away rotations and interviews can be quantified from this study. Although saving money is desirable for applicants, studies have reported that completing an away rotation may meaningfully increase an applicant’s chance of matching.<sup>14</sup> In plastic surgery, studies have found that as many as two-thirds of

applicants match at either their home program or one of their away rotation programs.<sup>5,20</sup> Thus, the accrued expense of away rotations may be a worthwhile endeavor because they are used predominantly by program directors and students to identify a “good fit.”<sup>6,21</sup> Almost half of plastic surgery residency program directors (49%) have previously indicated that program “fit” was most



**Fig. 3.** Box plot of total costs associated with applying to plastic surgery residency from 2019 to 2020 by applicant geographic region (Central Group on Student Affairs, Northeast Group on Student Affairs, Southern Group on Student Affairs, Western Group on Student Affairs). There was no significant difference between the mean incurred total costs for applicants from schools in the Central Group on Student Affairs region (\$11,045/applicant), Northeast Group on Student Affairs region (\$9696/applicant), Southern Group on Student Affairs region (\$11,332/applicant), and Western Group on Student Affairs region (\$11,205/applicant) ( $P = 0.209$ ).



**Fig. 4.** Box plot of costs associated with applying to plastic surgery residency from 2019 to 2020 by applicant geographic region. There was no significant difference between the mean application fees ( $P = 0.901$ ), away rotation costs ( $P = 0.308$ ), or interview costs between regions ( $P = 0.246$ ).

important during an away rotation.<sup>6</sup> Additional studies have shown that resident evaluation was the most valuable aspect of both away rotations and in-person interview days for applicants.<sup>22,23</sup> Despite a reduction in spending, there may be an opportunity cost of reduced ability for applicants and programs to demonstrate their value to one another.<sup>24</sup>

The current study adds to the currently available literature by addressing a gap in knowledge through the inclusion of geographic comparisons.<sup>2-8</sup> Although we did not

note any significant differences between different regions of the country, in the past, medical school location has been shown to correlate with match location, with the greatest contribution among northeast programs.<sup>25,26</sup> In the present study, application costs were not significantly different from applicants in different regions.

To lower costs of applying to residency, organizations like the American Council of Academic Plastic Surgeons should consider restrictions on away rotations and interviews, already proposed by other specialties.<sup>27,28</sup> There have already been proposed minor and major changes to streamline the plastic surgery match process,<sup>2</sup> including the Plastic Surgery Common Application, which is free to applicants. With our own application, academic plastic surgery will have more control to evolve the application process over time to innovatively decrease financial barriers to our specialty.

This study has limitations. Most importantly, this sample represents less than half of all applicants to integrated plastic surgery. The available cost data are limited to mean and percentile distributions of application costs, away rotation costs, interview costs, and total costs of US allopathic applicants. Utilizing a voluntary, national survey prevented us from reporting more granular information with regard to expenses at each stage of the process, which would improve the usefulness of the study. We could not correlate expenditures to applicant demographics or match success. International medical graduates or osteopathic applicants, who contribute to a portion of the applicant pool, are also not included. Additionally, the data

**Table 4. Comparison of Mean Costs by Geographic Region**

Region	Fee Type	P
Central	Application fees	0.901
Northeast	\$1554	
South	\$1679	
West	\$1792	
Central	Interview costs	0.246
Northeast	\$5273	
South	\$4661	
West	\$5969	
Central	Away rotation costs	0.308
Northeast	\$5875	
South	\$4250	
West	\$3679	
Central	Total costs	0.209
Northeast	\$11,045	
South	\$4321	
West	\$3667	
Central		
Northeast		
South		
West		



are dependent on medical school participation and the applicant completing the survey. Additionally, these data may be skewed to reflect higher-performing applicants, as unmatched applicants may be less likely to complete the survey. Despite the limitations, this is the most up-to-date cost analysis of applicants applying to plastic surgery residency, and the results show a stable financial burden to applicants in comparison with prior studies.

## CONCLUSIONS

Assuming no away rotations and minimal expenditures related to a virtual interview cycle in 2021, the average cost saving for plastic surgery residency applicants during the COVID-19 pandemic may be over \$9000. Although outcomes (as they relate to the match and opportunity costs) are unknown, it seems feasible that these expenses could be permanently eliminated by eliminating away rotations and in-person interviews.

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