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ORIGINAL ARTICLE
Education

Effect of COVID-19 on Geographic Distribution of the Integrated Plastic Surgery Match

Anjali Om, BA
Albert Losken, MD

Background: COVID-19 had significant impact on the 2021 integrated plastic surgery match, most notably through cancellation of away rotations and virtual interviews. While previous studies have analyzed geographic outcomes of the match in prior years, the effects of COVID-19 have not been determined. This study aims to contribute 2021 match data to determine the effects of COVID-19 on the geographic distribution of the integrated plastic surgery match.
Methods: Official match results for each program were populated by searching official program institutional websites and social media pages. Trainees' home medical institutions and current integrated plastic surgery residency programs were noted. Statistical analysis compared geographic distribution in COVID-19 affected (2021) and non-COVID-19 affected (2015-2020) match years.
Results: Of 85 integrated plastic surgery programs, 80% (n = 68) of programs and 1,015 matched trainees were included in this study. The average percentage of institutional matches in COVID-19-affected match year was 25.12%, compared to 16.67% for non-COVID-19-affected match years (p = 0.0012). The odds ratio of matching at a home institution in 2021 compared to prior years was 1.68 (95% CI 1.11-2.53).
Conclusions: Our study is consistent with previous studies that demonstrate strong match preferences for affiliated medical students but also adds that this trend may be amplified in the post-COVID-19 era. While multiple factors may be involved in geographic distributions of residency match outcomes, the results of this study suggest that COVID-19 restrictions on travel and exposure to outside programs may have contributed to an even higher percentage of matches within the same institution. *(Plast Reconstr Surg Glob Open 2021;9:e3676; doi: 10.1097/GOX.0000000000003676; Published online 24 June 2021.)*

INTRODUCTION

COVID-19 has severely impacted many aspects of our lives, including the 2020–2021 residency application process and match. The two main deviations from traditional years included the inability for medical students to do away rotations and the loss of in-person interviews. In May 2020, following guidelines from the Association of American Medical Colleges, programs suspended away rotations.[1] The Association of American Medical Colleges also strongly encouraged schools to conduct only virtual interviews, limiting applicants' physical contact with programs outside their home institution.[2] These "away rotations" are popular for all students, especially those without a plastic surgery program at their home institution. In addition to learning more about the specialty, students may benefit from away rotations by learning about different programs, broadening their mentorship, making themselves better known to programs and increasing their overall competitiveness.[3]

Little is known about how these changes due to COVID-19 affected the integrated plastic surgery match outcomes in 2021. Although travel restrictions limited applicants' physical exposure with no in-person rotations or in-person interviews, the convenience and affordability of virtual interviews may have expanded access to more distant programs that applicants might otherwise not have had exposure to.[2] We feel that these two changes might have impacted geographical distribution in the match from a program and individual perspective.

From the Emory University School of Medicine. Division of Plastic and Reconstructive Surgery, Atlanta, Ga.

Received for publication April 24, 2021; accepted May 12, 2021.

DOI: 10.1097/GOX.0000000000003676

Disclosure: *The authors have no financial interest to declare in relation to the content of this article.*

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Table 1. Percentage of Home, in State, and in Region Matches among Integrated Plastic Surgery Residents

Match Year	No. Programs	No. Students	Average % Home Match	Average % in State Match	Average % Out of State Match	Average % in Region Match	Average % Out of Region Match
COVID-19-affected match year	68	147	25.12%*	30.76%	69.24%	55.10%	44.90%
Non-COVID-19-affected match year [Post-graduate year (PGY)]	68	868	16.67%*	25.73%	74.27%	48.16%	51.84%
2020 (PGY1)	68	143	19.79%	28.26%	71.74%	48.25%	51.75%
2019 (PGY2)	68	151	14.61%	29.59%	70.41%	52.32%	47.68%
2018 (PGY3)	68	154	17.89%	26.35%	73.65%	52.59%	47.41%
2017 (PGY4)	68	149	18.08%	27.18%	72.82%	44.30%	55.70%
2016 (PGY5)	68	144	17.18%	20.96%	79.31%	43.75%	56.25%
2015 (PGY6)	68	127	12.15%	21.33%	78.67%	44.78%	55.22%

*Denotes a statistically significant difference ($P < 0.05$).

Previous studies have analyzed the geographic distribution of the integrated plastic surgery residency match in years before COVID-19.[4,5] The purpose of this report was to analyze geographic distribution of the integrated plastic surgery match results following the pandemic 2021 match with altered circumstances and compare it with prior years.

METHODS

A list of all American College of Graduate Medical Education accredited integrated plastic surgery residency programs was compiled using the Fellowship and Residency Electronic Interactive Database. Official 2021 match results for each program were populated by searchin official program institutional websites, social media pages (Instagram, Twitter), and official match lists accessed through posts on Student Doctor Network forums. Any program without accessible 2021 match results was excluded. For remaining programs, 2015–2020 match data were populated by searching each integrated plastic surgery program official website for current resident (PGY1–PGY6) profiles. Programs without lists of current residents, residents without verified profile data indicating medical school, and residents denoted to match via the independent plastics pathway were all excluded.

For each trainee participating in the integrated plastic surgery match in 2021 (current M4) and 2015–2020 (current PGY1-PGY6), home medical institutions and current integrated plastic surgery residency programs were noted. If applicants' medical school matched their affiliated plastic surgery residency institution, a "home match" was considered. If applicants' medical school was in the same state as their plastic surgery residency institution, an "in state" match was considered. Similarly, if applicant's medical schools were in the same region as their plastic surgery residency institution, an "in region" match was considered. Regions were defined according to the United States Census Bureau's four statistical regions.[5] Programs in Washington D.C. were considered "home matches" for other programs in Washington D.C. only. International medical graduates, including graduates from Caribbean medical schools, were considered out of state and out of region.

For each program, percentage of home, in state, and in region matches were calculated for years 2015–2021. Average percentages across all 68 programs for each year of analysis were calculated. Independent *t*-tests and odds ratio calculations between pre- and combined post-COVID-19 years were performed for each parameter.

RESULTS

A total of 85 integrated plastic surgery programs particiof pated in the 2021 match, with 187 total matched applicants. Of these, 80% (n = 68) of programs had publicly available match data for 2015–2021 years and were included in this study.

A total of 1015 matched trainees with verified profile data across 68 programs were included in this study. Table 1 lists the average percentages of each match parameter (home, in state, and in region) across all programs in COVID-19-affected and non-COVID-19-affected match years. The average percentage of "home matches" in COVID-19-affected match year was 25.12%, which was higher than 16.67% for the prior non-COVID-19-affected match years ($P = 0.0012$). Odds ratio of matching at home institution in 2021 compared with those in prior years was 1.68 (95% CI 1.11–2.53). There was no statistically significant difference between the percentage of "in state matches" or "in region matches" between COVID-19 and non-COVID-19 affected years ($P > 0.05$). (**See figure 1, Supplemental Digital Content 1,** which displays the study selection results. **http://links.lww.com/PRSGO/B694**.)

Across all years, a total of 218 trainees (21.5%) came from Midwest medical schools, 274 (27.0%) from the Northeast, 370 (36.5%) from the South, 110 (n = 10.8%) from the West, and 43 (4.3%) students from international schools. Supplemental Digital Content 2 shows the percentage of students from each medical school region (excluding international students) who matched into corresponding residency program regions in COVID-19-affected and non-COVID-19-affected years. (**See figure 2, Supplemental Digital Content 2,** which displays the percentage of integrated plastic surgery matches by medical school region. **http://links.lww.com/PRSGO/B695**.) For all US regions, there was a strong preference for "in region" matches. This preference was highest among West schools (59%), followed by South (52%), Northeast (50%), and Midwest schools (48%). However, the difference in home, in state, or in

region matches did not vary significantly by region or across years studied ($P > 0.05$).

DISCUSSION

As the ramifications of COVID-19 continue to linger on, it is important to understand the impact this changing landscape has on residency match outcomes. At this time, it is unclear how many more match cycles will be affected by virtual interviews and restrictions on away rotations. Currently, the AAMC has recommended a limit of one rotating elective per learner; there is no official recommendation on holding virtual or in-person interviews.[2]

This study demonstrates that residency programs have demonstrated a strong preference for affiliated medical students even in prior years. Programs usually become familiar with their own medical students through clinical rotations, research, and electives and may also have institutional preferences to accept their own students.[4,6] These trends have been noted in similar studies of plastic surgery matches and of other surgical specialties.[7,8] Our study also shows that this trend may have been amplified in the post-COVID-19 era. Although multiple factors may be involved in geographic distributions of residency match outcomes, the results of this study suggest that COVID-19 restrictions on travel and exposure to outside programs may have contributed to higher percentages of matches within the same institution. Programs that no longer had exposure to visiting medical students may have favored students with whom they were familiar. It is important that plastic surgery programs and applicants are aware of these data and the potential challenges both have during the post-COVID-19 era application process. The utility of social media, virtual events, and other ways to provide more program exposure to the applicants, and improved applicant exposure to the programs will likely become more popular, as we search to replace some of the limitations placed on us by the current restrictions.

Our study also found significant geographic preferences toward region across all years studied, meaning applicants in all US regions tended to match to residencies in the same region. These results are also consistent with those of the prior studies demonstrating geographic importance in match outcomes.[5,9–11] In-region matches across all years were highest among West schools (59%) and lowest among Midwest schools (48%), though this difference was not significantly different. It is worth noting that medical schools in all regions had increased in-region matches in 2021 compared with in prior years, except for West schools. Although we may speculate that the ease of virtual interviews compared with in-person travel allowed for the possibility for applicants to compete at programs further from their own schools, this trend was not noticed for other regions.

This study has several limitations, which may serve as areas for future research. First, this study included only programs with publicly available resident lists and profile information and may be subject to sampling bias. Second, this study did not assess all factors that may influence geographic distribution of match outcomes, including applicant competitiveness, hometowns, or other personal connections. Third, this study included data only from the integrated plastic surgery match and may not be extrapolated to other surgical subspecialties or the independent plastic surgery pathway.

Despite these limitations, these data may be helpful for future applicants to understand factors that impact match outcomes and strategize their application process accordingly. Further analysis of data from the National Resident Matching Program may elucidate other match statistics affected by COVID-19, such as number of interviews or number of programs ranked. Objective data that provide transparency on match outcomes may help both applicants and program directors navigate the uncertainty of residency match in post COVID-19 years.

Anjali Om, BA
Emory University School of Medicine
100 Woodruff Circle
Atlanta, GA 30322
E-mail: anjali.om@emory.edu

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