

Orthopaedic surgery residency match trends during COVID-19 pandemic: a cross-sectional study

Dan Hayward, MBA^a, Travis S. Dowdle, BS^a, Jesse Steadman, BS^b, Devin Froerer, BS^b, Cody Perry, BS^a and Mimi Zumwalt, MD^c

^aSchool of Medicine, Texas Tech University Health Sciences Center, Lubbock, TX

^bSchool of Medicine, University of Utah, Salt Lake City, UT

^cDepartment of Orthopaedics, Texas Tech Physicians, Lubbock, TX

ABSTRACT

Background:

Orthopaedic surgery is one of the more competitive specialties for medical students to pursue. Students often complete subinternship rotations to demonstrate skill, work ethic, and fit within a program. Away rotations were suspended during the COVID-19 pandemic.

Methods:

This investigation compared home and regional match rates before the pandemic to the match cycle of 2020-2021.

Results:

There was a statistically significant increase in students matching to their home program, and insignificant increase in regional matches.

Conclusions:

This increase is likely due in part to the familiarity of students to programs where they could still rotate during the pandemic.

Level of Evidence:

Level IV.

Key Words

residency match, COVID-19, away rotations, subinternship

These experiences provide programs with additional parameters of application assessment as other performance metrics shift to pass or fail, including the United States Medical Licensing Examination (USMLE) Step 1.^{1,2}

Before the COVID-19 pandemic, students could complete a subinternship (or rotation) at their home programs and multiple away rotations at other institutions. However, away rotations were not offered during the 2020-2021 application cycle due to pandemic restrictions. Few programs offered virtual subinternships, and all interviews were held virtually.³ Thus, this investigation examined the proportion of students who matched to their home programs or a regional program during the 2020-2021 cycle affected by COVID-19 relative to prior years. The authors hypothesized the cancellation of away rotations resulted in increased home and regional match rates compared to prior match cycles.

MATERIALS AND METHODS

Ethical Review and Study Design

This study was exempt from Institutional Review Board approval. Published match lists were gathered from allopathic medical schools in the United States with associated orthopaedic surgery residency programs. The Association of American Medical Colleges' (AAMC) Residency Explorer tool⁴ was used to determine regionality of applicants and programs. Regions included Northeast, South, Central, and West. Data from match years 2018-2020 (79 schools) were used to establish historical baseline match data.

Statistical Analysis

Chi-square analysis then was used to compare these data to that of the 2020-2021 (62 schools) pandemic match. A separate chi-square analysis was performed for overall internal, Northeast internal, South internal, Central internal, and West internal match rates. For each test, the y-axis included prepandemic (2018-2020) and COVID-19 (2021) match years, while the x-axis included internal matches and external matches (total-internal).

Similarly, a separate chi-square analysis was performed for overall regional, Northeast regional, South regional, Central regional, and West regional match rates. In the regional calculations, the y-axis included prepandemic and COVID-19 match years, while the x-axis included regional matches and

INTRODUCTION

Orthopaedic surgery is reliably one of the more competitive specialties available for medical students to pursue. Each annual match cycle, the number of qualified applicants continues to exceed the amount of available positions. Senior medical students complete subinternships at various institutions to demonstrate early technical skill, work ethic, and overall fit within a particular institution.

Financial Disclosure: The authors report no conflicts of interest.

Correspondence to Dan Hayward, MBA, School of Medicine, Texas Tech University Health Sciences Center, 3601 4th Street, Stop 9400, Lubbock, TX 79430-9400

Tel: +801-580-5454; fax: +801-905-8673;

e-mail: dan.hayward@ttuhsc.edu.

1941-7551 Copyright © 2022 Wolters Kluwer Health, Inc. All rights reserved.

nonregional matches (total-regional). No sample size study or power study was performed.

RESULTS

Of the included applicant cohort, prepandemic applicants matched to their home programs at an overall rate of 19.8%. During the 2020-2021 match, this rate increased significantly to 29.5% ($P < 0.001$; Table 1). Regional matches showed an insignificant overall increase from 60.5% to 65.8%, respectively ($P = 0.08$).

When stratified according to geographical region, home match rates were increased statistically in the Northeast ($P < 0.05$) and Central states ($P < 0.05$), while programs in the South and West saw an insignificant increase in home matching ($P = 0.169$, $P = 0.859$, respectively). Within the same geographic stratification, regional match rates were found to be increased insignificantly in the Northeast ($P = 0.132$), South ($P = 0.126$), and Central ($P = 0.167$) areas. The West region saw a decrease in regional match rates, from 55.8% at baseline to 48.9% during the pandemic, which was also insignificant statistically ($P = 0.500$) (Table 1).

DISCUSSION

Interpretation

This observed increase in pandemic home program matching was most likely multifactorial. Home students may have stronger, long-standing relationships with faculty members within their home department. They also may be more familiar with charting software, operative protocol, and policies of the institution, allowing them to be more functional and efficient as a subintern. With the paucity of visiting students, the stronger connections and increased efficiency of home students may be perceived favorably by a particular residency program, leading to an interview invitation.

Some factors leading to increased home match rates in orthopaedic surgery also have been observed in other competitive specialties.⁵⁻⁷ In one study, otolaryngology applicants placed a high value on the geographic location of a residency

program.⁵ After observing a 2.3 to 3.7 times higher than expected regional match ratio in ophthalmology residents, Loh *et al.*⁶ speculated that geographic bias might reflect implied interest between applicants and programs. The regions where applicants attended medical school may have stronger familial ties, more faculty mentors, and greater comfort with community culture and daily living.⁵ These preferences may account for applicants ranking programs within their region higher. Without the opportunity to experience away rotations in other regions, applicants in this study may have followed suit in ranking programs within their respective regions higher.

Loh *et al.*⁶ also described the impact of a medical school's geographic region on how surgery program directors perceive applicants' interests. While away rotations had previously been a way for applicants to demonstrate a sincere interest in an orthopaedics program, the pandemic reduced expressions of interest to only the application process. It is feasible that without away rotations, orthopaedic surgery programs relied more heavily on the location of an applicant's medical school as a gauge for willingness to come to their program.

Without away rotations, applicants also had minimal opportunities for letters of recommendation (LOR) outside of their home institutions. In 2018, the National Resident Matching Program (NRMP) program director survey reported that a LOR within an applicant's specialty had a 4.5/5 importance factor in screening and ranking applicants.⁸ However, Egan *et al.*⁹ found that the content of a LOR might not have as much significance as does the recognition of the LOR writer and the institution that he or she represents.¹⁰ Admissions committees might have put a higher value on the LORs that came from familiar orthopaedic surgeons within their home institution or geographic region, contributing to the increased match rates the authors observed.

Program directors must ensure that residents perform well enough to keep accreditation.¹¹ Reliable evaluation of potential residents is ideally done during away rotations in addition to interview day. However, due to the COVID-19 guidelines restricting in-person interaction, those evaluations could only be done virtually, with limited applicant exposure to the program. Those restrictions made a holistic evaluation of each candidate difficult, and reduced the program's and candidate's ability to evaluate personality fit. For those reasons, it seemed advantageous from both the applicant and program director's standpoint to assign a higher rank to the applicant/program with which they were most familiar.

Limitations and Future Perspectives

This study was limited partly by the inability to analyze entire rank lists of programs or applicants. Its results were restricted to publicly available match data alone. Future investigation might reveal the impact of canceled away rotations on applicants' complete rank lists and programs' perspectives of all candidates.

If the increased home and regional match rates continue in post-COVID match cycles, the results of this study might have important implications for future medical school applicants. The region they choose to attend medical school may continue affecting future residency opportunities. The significant increase in home program match rates indicates that programs tend to favor those with whom they have

TABLE 1. Internal and regional match data

	Prepandemic match (2018-2020)	COVID-19 match (2021)	P
Number of matches	1200	336	-
Internal match	19.8%	29.5%	< 0.001
Northeast	17.4%	29.1%	0.013
South	20.6%	26.9%	0.169
Central	21.2%	33.4%	0.011
West	26.3%	27.9%	0.859
Regional match	60.5%	65.8%	0.079
Northeast	67.3%	75.6%	0.132
South	55.6%	63.9%	0.126
Central	59.0%	66.7%	0.167
West	55.8%	48.9%	0.500

Regions defined according to the Association of American Medical Colleges Residency Explorer Tool.
 P values generated using a Person χ^2 test. Alpha level for all tests was set at 0.05.
 Boldface denotes significance.

worked in-person, and students who had opportunities for these interactions may have an advantage in matching at their respective programs.

Similar to the authors' findings, increased home match rates also have been observed in dermatology.⁷ Further research should investigate other specialties; they might find a consistent increase in home matching within several competitive specialties.

CONCLUSIONS

Orthopaedic surgery is a competitive specialty that relies on away rotations for programs to assess medical students as potential residents. Due to pandemic restrictions, applicants and programs alike lost the opportunity to explore outside their institution with away rotations. The authors' data show a significant increase in home match rates during the pandemic, likely due to applicants' familiarity with their home programs and program directors' familiarity with home applicants. Should this increase in home matching persist in postpandemic match cycles, it might impact the way incoming medical students assess which school to attend since that decision may dictate where they can match for residency.

REFERENCES

1. Blood T, Hill K, Brown S, *et al.* Variability of the orthopaedic away rotation: a survey of orthopaedic program directors. *J Am Acad Orthop Surg Glob Res Rev.* 2021; 5:e21. 00024.
2. United States Medical Licensing Examination Announcements. [USMLE website]. 2021. Available at: <https://www.usmle.org/announcements/?ContentId=290>. Accessed Aug. 15, 2021.
3. Association of American Medical Colleges. Specialty recommendations on away rotations for 2021-22 academic year. [AAMC website] 2021. Available at: <https://students-residents.aamc.org/researching-residency-programs-and-building-application-strategy/specialty-responses-covid-19>. Accessed Aug. 15, 2021.
4. Residency Explorer™ Tool: Explore. [Residency Explorer website] 2021. Available at: <https://www.residencyexplorer.org/Explore>. Accessed Aug. 15, 2021.
5. Johnson AP, Svider PF, Folbe AJ, *et al.* An evaluation of geographic trends in the otolaryngology residency match: home is where the heart is. *JAMA Otolaryngol Head Neck Surg.* 2015; 141:424–428.
6. Loh AR, Joseph D, Keenan JD, *et al.* Predictors of matching in an ophthalmology residency program. *Ophthalmology.* 2013; 120: 865–870.
7. Dowdle TS, Ryan MP, Wagner RF. Internal and geographic dermatology match trends in the age of COVID-19. *J Am Acad Dermatol.* 2021; 85:1364–1366.
8. Results of the 2018 NRMP program director survey. [National Resident Matching Program website] 2018. Available at: <https://www.nrmp.org/wp-content/uploads/2018/07/NRMP-2018-Program-Director-Survey-for-WWW.pdf>. Accessed April 18, 2022.
9. Egan CR, Dashe J, Hussein AI, *et al.* Are narrative letters of recommendation for medical students interpreted as intended by orthopaedic surgery residency programs? *Clin Orthop Relat Res.* 2021; 479:1679–1687.
10. Raj S, Abu-Ghname A, Davis MJ, *et al.* The COVID-19 pandemic: implications for medical students and plastic surgery residency applicants. *Plast Reconstr Surg.* 2020; 146:396e–397e.
11. Accreditation Council for Graduate Medical Education. [ACGME website] Updated Feb. 3, 2020. ACGME Common Program Requirements (Residency). Available at: <https://www.acgme.org/what-we-do/accreditation/common-program-requirements/pdf>. Accessed Aug. 15, 2021.