








# Applicant Characteristics Associated With Being Ranked by US Surgical Specialty Programs in 2022-2025

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## ABSTRACT

**Background** An understanding of surgical specialty program ranking patterns related to residency applicant characteristics could help inform applicant and program decision-making.

**Objective** To assess characteristics of applicants on program rank order lists (ROLs) for general surgery, neurological surgery, orthopaedic surgery, otolaryngology, and plastic surgery and whether applicant characteristics differ on the competitive vs less competitive ROL segments.

**Methods** Certified program ROL data (N=2899) from the 2022-2025 National Resident Matching Program (NRMP) Main Residency Matches for 5 surgical specialties, United States Medical Licensing Examination (USMLE) data from the National Board of Medical Examiners, and applicant self-reported demographic information from NRMP were analyzed. Included programs submitted a certified ROL  $\geq 30$  and had less than 25% missing data in the competitive and less competitive ROL segments for the variable of interest. Descriptive statistics and boxplots were used to examine ranking patterns for applicant type (medical school type and location/citizenship status), sex, underrepresented in medicine (URiM) status, and USMLE Step 1/Step 2 Clinical Knowledge (CK) performance.

**Results** General surgery programs were more likely to rank various applicant types, with 79.1% ranking US DOs and 48.6% ranking US international medical graduates (IMGs). Among the other surgical specialties, 18.0-49.7% ranked US DOs, less than 20% ranked US IMGs, and 20.4-54.8% ranked non-US IMGs. Besides general surgery, 15% or less of the remaining surgical specialties included any applicants who had ever failed Step 1 or Step 2 CK.

**Conclusions** In all 5 surgical specialties, overall and competitive ranking patterns differed by applicant type and USMLE performance. Differential patterns were also seen to a lesser extent for sex and URiM status.

## Introduction

Residency program selection behaviors are important to the graduate medical education community as they help applicants and programs better understand the transition to residency process and ensure transparency in practices. Increased transparency through access to high-quality information helps advisors better guide prospective residency applicants on where to apply, gives applicants clearer insight into their likelihood of being ranked or ranked competitively, and enables program directors to make more informed decisions and conduct internal quality improvement efforts.<sup>1,2</sup> Disparities within the medical education and transition to residency process have resulted in the underrepresentation of certain applicant characteristics across specialties.<sup>3-6</sup>

Given notable differences in applicants and matched residents,<sup>7-9</sup> surgical residency training programs have focused on addressing these disparities with variable success in changing outcomes. Trends for underrepresented in medicine (URiM) groups demonstrate persistently lower matches into competitive specialties.<sup>8,9</sup> Outcomes have been mixed to improve female representation, with evidence of change in some surgical specialties, but no differences in representation over time in others.<sup>7,9</sup> Over the past decade, overall representation of international medical graduates (IMGs) in surgical specialties has declined.<sup>9,10</sup>

While numerous studies have examined the impact of applicant characteristics in program interview selection behaviors<sup>2,11,12</sup> and matching outcomes,<sup>2,10,13-19</sup> far less research has investigated program ranking behaviors generally. Of studies that examined ranking decisions, academic performance, specifically United States Medical Licensing Examination (USMLE) performance, is consistently cited as the most important factor.<sup>2,20-25</sup> Applicant characteristics—such as applicant type (MD/DO/US IMG/non-US IMG) and URiM—have

DOI: <http://dx.doi.org/10.4300/JGME-D-25-00582.1>

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

not been a focus of program selection studies, but a few studies have examined sex representation. Findings from these studies suggest wide variation may exist in how sex has impacted selection decisions over time, ranging from no change to increasing female representation.<sup>20</sup> However, these ranking studies have several limitations, such as relying on self-reported program ranking behaviors<sup>17,22,24-26</sup> and focusing only on a limited subset of surgical programs or specialties<sup>17,20,21,23-26</sup> rather than examining all programs within a given specialty, across all surgical specialties.

This study examines program ranking patterns with respect to applicant type, sex, URiM status, and USMLE performance and whether these characteristics differ on the upper and lower segments of the rank order list (ROL) across 5 surgical specialties. It is part of a larger study in which the National Resident Matching Program (NRMP) and the National Board of Medical Examiners (NBME) leveraged primary source ranking data and USMLE score information to examine a range of applicant characteristics across specialties that participate in the Main Residency Match.

## Methods

### Setting and Participants

This study utilized a retrospective observational design. Proprietary primary source program ranking data from the NRMP, primary source USMLE Step 1 and Step 2 Clinical Knowledge (CK) performance data from the NBME, and self-reported applicant characteristics data from NRMP's Registration, Ranking, and Results system were merged across the 2022-2025 Match cycles. Data were aggregated to the program-Match year level, with each observation representing a single ROL certified by a program. For example, programs participating annually contributed 4 ROLs (one per year), which were treated as independent observations. To focus on core training programs targeting those newly entering US graduate medical education, categorical, primary, and advanced programs were included in our sample, while preliminary and reserved programs were excluded. To obtain reliable and generalizable estimates, we established inclusion criteria at the program-Match year and specialty level. We included specialties (N=21) that for at least 3 of the 4 Match years had: (1) a minimum of 20 programs with an ROL  $\geq 30$  in a given Match year; and (2) at least 50% of all programs meeting the program-Match year ROL criteria of 30 applicants in a given Match year. Of included specialties, we included program ROLs with  $\geq 30$  ranked applicants (N=17046; online supplementary data A). This cutoff was selected (1) after an examination of the percentage of data lost in

### KEY POINTS

#### What Is Known

Understanding how residency programs rank applicants across surgical specialties may clarify how applicant characteristics influence placement and decision-making for programs and candidates.

#### What Is New

This multi-year, multi-specialty analysis of National Resident Matching Program and United States Medical Licensing Examination (USMLE) data for 5 surgical specialties shows that ranking patterns differ markedly by applicant type and USMLE performance, with competitive rank order list segments reflecting more restrictive patterns than less competitive segments.

#### Bottom Line

Surgical residency programs rank applicants differently based on medical school background, USMLE scores, and, to a lesser extent, sex and underrepresented in medicine status, highlighting opportunities to examine equity and transparency in selection processes. This information can be used to counsel applicants as well.

terms of program-Match years and number of ranked applicants at various minimum ROL length thresholds; and (2) to ensure the top quartile included enough applicants to facilitate more robust and meaningful comparisons between the competitive and less competitive ROL segments. This article focuses on 2899 program ROLs within 5 surgical specialties: general surgery, neurological surgery, orthopaedic surgery, otolaryngology, and plastic surgery. It is important to note that these surgical specialties vary in the number of positions available (online supplementary data B).

Descriptive statistics and medians with interquartile ranges were used to characterize specialty-level differences. To compare residency programs across specialties, the 25th, 50th, and 75th percentile values were calculated for the entire sample of 17046 program-Match years for all applicant characteristics. Analyses were conducted in R (v4.4.1) using the tidyverse (v2.0.0) packages.

### Competitive vs Less Competitive Ranking Segments

In this study, applicants in the top 25% of a program's ROL were classified as "competitive," while the remaining 75% were "less competitive." The 25% cutoff was chosen for 3 reasons: (1) smaller percentiles would limit generalizability and exclude some programs due to applicant thresholds; (2) larger cutoffs, like 50%, would include lower-ranked applicants with reduced matching likelihood, diluting the focus on competitiveness; and (3) the "ranking to match" metric—ranking equal to the number of positions available at that program—was avoided to

prevent programs from being encouraged to shorten ROLs and risk unfilled spots.

### Outcomes Measured

For each characteristic below, programs were excluded from the analysis if more than 25% of data for a variable was missing in either the competitive or less competitive ROL segment.

**Applicant Type:** Applicant type was a 4-level variable. Those who attended medical school in the United States were grouped based on whether they attended an allopathic (US MD) or osteopathic program (US DO), while IMGs were grouped based on their US citizenship status. Applicant types in our analyses include US MD applicants (which combines US MD seniors and graduates), US DO applicants (which combines US DO seniors and graduates), US IMGs (US citizen IMGs), and non-US IMGs (non-US citizen IMGs).

**Self-Reported Applicant Characteristics:** Upon registration with the NRMP, applicants are (optionally) asked to self-report various characteristics. For this study, the characteristics of interest included: sex (female; male) and URiM status (yes [Hispanic/Latino, Black/African American, American Indian/Alaska Native, and/or Pacific Islander]; no). For each of the aforementioned items, applicants could select “I do not know” or “I prefer not to answer,” which were categorized as missing.

**USMLE Performance:** The USMLE comprises 3 independent examinations (Steps) that inform state medical board licensing decisions. This study explored how Step 1 outcome history (ie, whether the examinee ever failed) and Step 2 CK outcomes and scores related to selection behavior, as these examinations are typically taken before applying for residency and

remain influential in applicant selection.<sup>27</sup> Step 1 measures understanding and application of science foundational to medical practice and reports a pass/fail outcome. Step 2 CK assesses the application of clinical science and skills necessary for supervised patient care and reports a pass/fail outcome along with a 3-digit scale score ranging from 1 to 300.

Per the primary site institutional review board (IRB) definitions, this study did not constitute human subjects research and thus did not require IRB review.

### Results

By specialty, 65-100% of program ROLs were included. The percentage of these ROLs included for each characteristic is displayed in the TABLE. To enhance readability, hereafter “program ROLs” will be referred to as “programs.”

#### Applicant Type

To contextualize the applicant type results, we have included the average percentage of each specialty’s ROL that is comprised of each applicant type in online supplementary data C. While 9% of general surgery programs only included US MD applicants, 31.5-46.6% of programs in the remaining surgical specialties did so (FIGURE 1). Similarly, 34.4% of general surgery programs ranked exclusively US MD applicants competitively, compared to 73.3-90.1% of programs in the other 4 surgical specialties.

Additionally, we sought to investigate which programs ranked (1) at least one DO; (2) at least one US IMG; and (3) at least one non-US IMG. Whereas 79.1% of general surgery programs ranked at least one US DO applicant, 18-49.7% of the remaining surgical specialties did so. General surgery had the highest proportion of programs ranking at least one US IMG (48.6%), with other specialties having proportions of 18.2-20%. For non-US IMGs, neurological

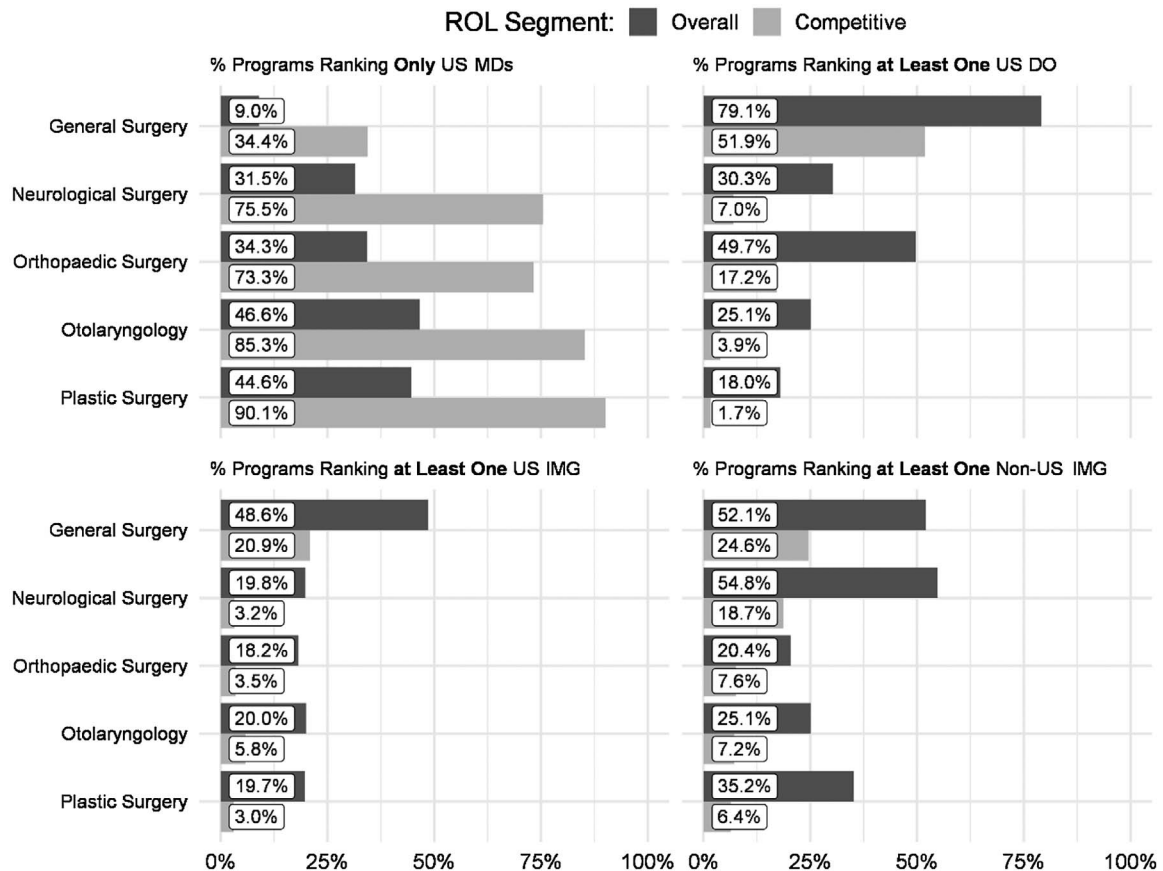
TABLE

Percent of Program Rank Order Lists (ROLs) Included for Each Variable by Specialty

	General Surgery, n (%) (N=1251)	Neurological Surgery, n (%) (N=343)	Orthopaedic Surgery, n (%) (N=658)	Otolaryngology, n (%) (N=414)	Plastic Surgery, n (%) (N=233)
Applicant type	1251 (100)	343 (100)	658 (100)	414 (100)	233 (100)
Sex	1199 (96)	290 (85)	603 (92)	367 (89)	208 (89)
URiM	1216 (97)	301 (88)	614 (93)	371 (90)	212 (91)
USMLE Step 1	1202 (96)	343 (100)	648 (98)	414 (100)	233 (100)
USMLE Step 2 CK	1240 (99)	339 (99)	647 (98)	414 (100)	233 (100)

Abbreviations: URiM, underrepresented in medicine; USMLE, United States Medical Licensing Examination; CK, Clinical Knowledge.

Note: The total number of programs listed for each specialty at the top of the table denote the number of program ROLs with  $\geq 30$  applicants. The n and percentage in each column denote the percentage of those programs missing  $\leq 25\%$  of data for a variable in both the competitive and less competitive ROL segments.



**FIGURE 1**  
Percent of Programs Overall and Competitive Rank Order List (ROL) that Include at Least 1 Member in Each Applicant Type by Specialty

surgery and plastic surgery programs ranked them more frequently (54.8% and 35.2%, respectively) than the remaining specialties (20.4-35.2%). Across all specialties, DO and IMG applicants had lower rates of inclusion on the competitive portion of the ROL than on the overall ROL (FIGURE 1).

### Sex

Compared to the overall residency program sex distribution—conveyed through the dashed and dotted lines in FIGURE 2—orthopaedic and neurological surgery programs included lower proportions of female applicants (median 29.9% and 32.4%, respectively), while otolaryngology, general surgery, and plastic surgery programs included a higher proportion of female applicants (median 51.2%, 55.7%, and 59.0%, respectively). FIGURE 2 also shows that all 5 surgical specialties had higher representation of female applicants in the competitive segment of their ROL compared to the less competitive segment. This pattern seemed more pronounced among otolaryngology, orthopaedic surgery, and neurological surgery programs.

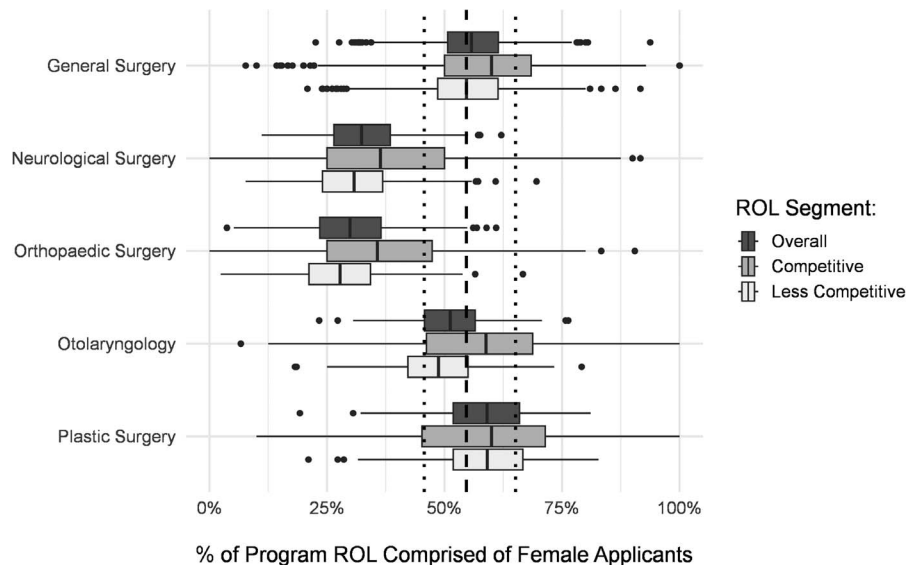
### URiM

All surgical specialties tended to have similar distributions to the overall residency program URiM distribution (see online supplementary data D). Due to small sample sizes and wide variability across programs, these results should be interpreted with caution.

### USMLE

Among the surgical specialties, general surgery had the highest proportion of programs ranking at least 1 applicant who had ever failed Step 1 (38.2%, FIGURE 3). Conversely, the other 4 specialties had considerably lower percentages (2.3-15.0%). Despite up to 38.2% of programs ranking applicants who had ever failed Step 1, far fewer programs ranked these applicants in the competitive segment of the ROL (FIGURE 3). General surgery had the highest percentage (8.8%) of programs with such applicants ranked competitively compared to the other specialties (0.3-3.1%).

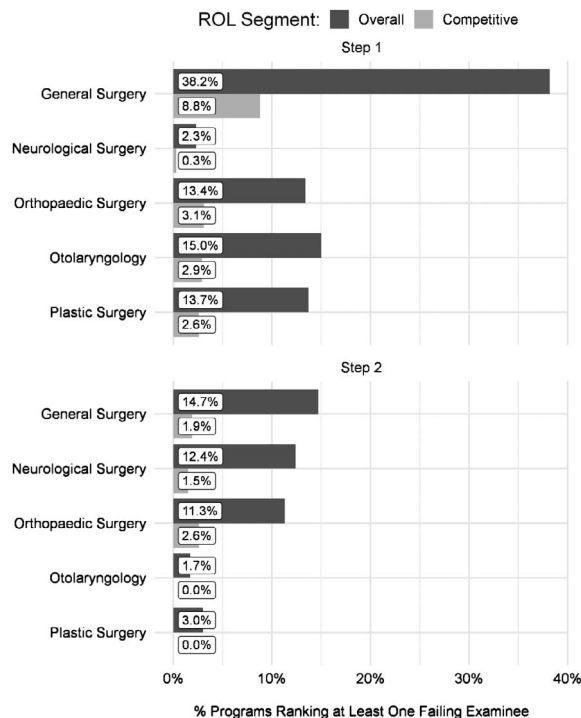
For Step 2 CK, 3 surgical specialties had more than 10% of programs that included at least one



**FIGURE 2**  
Percent of Programs Overall, Competitive, and Less Competitive Rank Order List (ROL) Comprised of Female Applicants by Specialty  
Note: Dashed line represents the program-level median across all 17 046 program-Match years within 21 specialties that met the study's inclusion criteria. Upper and lower dotted lines represent the 25th (45.7% female) and 75th (65.1% female) percentiles, respectively.

applicant who had ever failed Step 2 CK—general surgery (14.7%), neurological surgery (12.4%), and orthopaedic surgery (11.3%)—compared to 3% of plastic surgery and 1.7% of otolaryngology

programs. Among the applicants included on ROLs who had ever failed Step 2 CK, few programs placed them in the competitive segment (3% or less of competitive ROL segments in each specialty contained at least one applicant who ever failed Step 2 CK). Otolaryngology and plastic surgery did not competitively rank any applicants who had ever failed Step 2 CK.

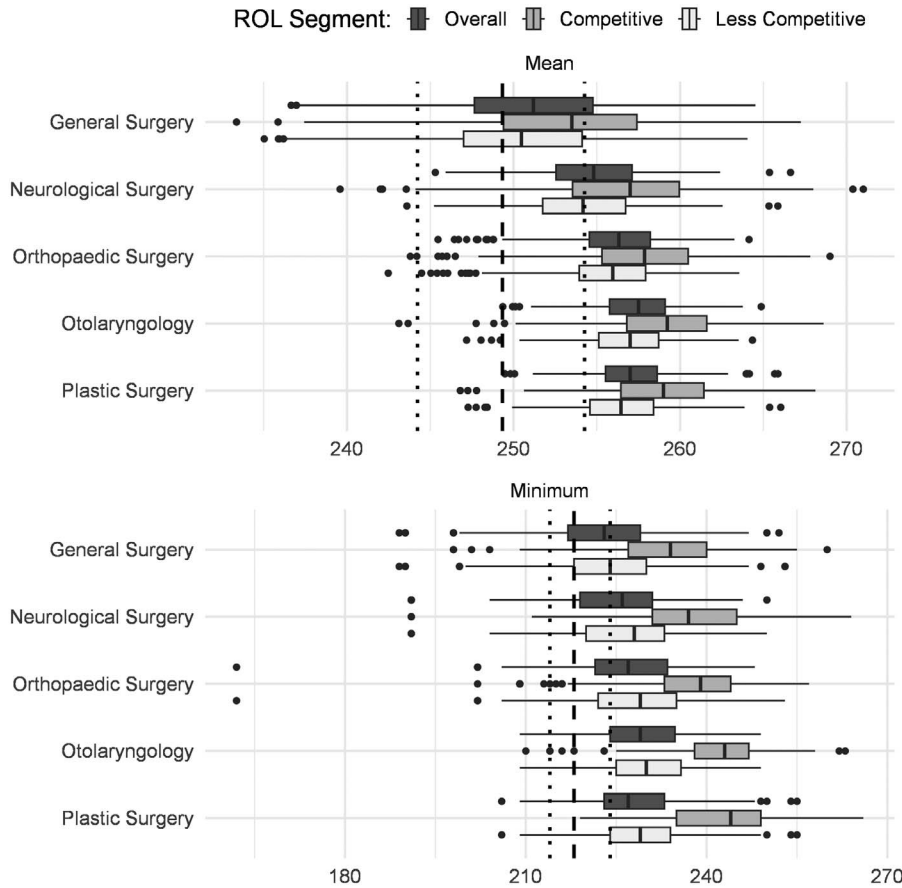


**FIGURE 3**  
The Percentage of Programs That Included at Least 1 Applicant Who Ever Failed Step 1 and Step 2 Clinical Knowledge on the Overall, Competitive, or Less Competitive Rank Order List (ROL) by Specialty

FIGURE 4 shows that general surgery programs had a similar Step 2 CK score distribution as the overall Step 2 CK distribution (from the overall comparison group). The median Step 2 CK score means for the remaining 4 surgical specialties fell above the overall comparison group 75th percentile. The distribution of score means was also narrower for neurological surgery, orthopaedic surgery, otolaryngology, and plastic surgery compared to general surgery, though all 5 surgical specialties still had a small range when compared to all specialties. Across all 5 surgical specialties, the mean scores for the competitive segment of the ROL were higher than those for the less competitive segments. Examining the distribution of minimum Step 2 CK scores appearing on the ROLs (bottom panel of FIGURE 4) shows that 75% of otolaryngology programs, and at least 50% of plastic surgery, orthopaedic surgery, and neurological surgery programs, did not rank any applicants with Step 2 CK scores under 224.

### Discussion

Across all 5 surgical specialties, applicant type patterns were observed in both the overall and competitive segments of the ROL, and very few programs included



**FIGURE 4**

Program-Level Overall, Competitive, and Less Competitive Mean and Minimum Step 2 Clinical Knowledge Scores by Specialty

Note: Dashed line represents the program-level median across all 17 046 program-Match years within 21 specialties that met the study's inclusion criteria. Upper and lower dotted lines represent the 25th (244 mean, 214 minimum) and 75th (254 mean, 224 minimum) percentiles, respectively.

US IMG, non-US IMG, or DO applicants in the competitive portion. Overall, general surgery largely reflects the comparison group of residency specialties meeting our inclusion criteria with minor differences regarding applicant characteristics and USMLE performance, whereas the remaining 4 specialties included applicants with higher USMLE scores. Additionally, neurological and orthopaedic surgery programs ranked lower percentages of female applicants.

While orthopaedic surgery programs ranked lower percentages of female applicants, all 5 surgical specialties had higher representation of female applicants in the competitive segment of their ROL compared to the less competitive segment. A recent study found that representation of female orthopaedic trainees has been increasing,<sup>28</sup> which suggests the importance of monitoring trends in ranking behaviors over time. While lack of racial/ethnic diversity in surgical specialties has been cited,<sup>3</sup> we observed surgical specialties ranking URiM applicants at rates

similar to those observed in other specialties, which may be in line with a recent study that observed an increase in URiM trainees in orthopaedic surgery from 2011 and 2023.<sup>28</sup> The applicant type patterns identified align with prior work showing declining IMG representation in surgical fields. In particular, decreasing fill rates by IMGs in orthopaedic surgery<sup>10</sup> and reductions in IMG representation across surgical fields<sup>9</sup> are consistent with our findings that fewer surgical programs rank IMGs competitively.

Our finding that mean Step 2 CK scores were higher for the competitive segment of the ROL is consistent with the few prior studies which found USMLE scores were associated with program ranking behaviors,<sup>20,21,23</sup> including ROL position.<sup>20,23</sup> Similar to studies examining USMLE performance and Match outcomes by specialty,<sup>29</sup> on average, the surgical specialties, particularly orthopaedic surgery, otolaryngology, and plastic surgery, ranked applicants with higher Step 2 CK scores compared to all specialties.

This study has a few limitations worth noting. First, as previously mentioned, within all 5 specialties reported in this article, programs were excluded from analyses due to the sample size constraints aimed at ensuring the generalizability of findings. Second, as the scope of this study was limited to looking at ranking outcomes, we did not have access to application data, meaning we cannot determine the characteristics of the initial pool of applicants applying to these specialties. Given programs can only rank applicants who apply to their programs, the initial applicant pool, in part, shapes ranking behaviors. Indeed, it is also important to acknowledge that several residency program characteristics—such as program size, geographic location, and institutional type—that likely influence both the composition of the applicant pool and the construction of program ROLs were not included in the scope of our analysis. Therefore, we want to reiterate that the data presented reflects the characteristics of applicants on program ROLs in the surgical specialties. However, how, why, and where those applicants ended up on ROLs is complex to unpack.

While future work is needed to more fully explore these complexities, these findings represent an initial step toward providing specialty societies and residency programs with greater transparency around ranking behaviors, supporting ongoing reflection on whether selection processes align with the populations they serve. Future research should aim to incorporate a broader range of program-level factors to more fully understand their potential impact on residency program selection.

## Conclusions

Overall and competitive ranking patterns in neurological surgery, orthopaedic surgery, otolaryngology, plastic surgery, and general surgery programs differed by applicant type and USMLE performance, with smaller differences observed for sex and URiM status.

## References

- Ulin L, Bernstein SA, Nunes JC, et al. Improving transparency in the residency application process: survey study. *JMIR Form Res*. 2023;7:e45919. doi:10.2196/45919
- Yaeger KA, Schupper AJ, Gilligan JT, Germano IM. Making a match: trends in the application, interview, and ranking process for the neurological surgery residency programs. *J Neurosurg*. 2021;135(6):1882-1888. doi:10.3171/2020.11.JNS203637
- Williams AJ, Malewicz JJ, Pum JM, Zurakowski D, Day CS. How did Black and Hispanic orthopaedic applicants and residents compare to general surgery between 2015 and 2022? *Clin Orthop Relat Res*. 2024;482(8):1361-1370. doi:10.1097/CORR.0000000000003069
- Brandt Z, Chung JH, Razzouk J, Wongworawat MD. Recent trends in the effect of race and gender on the orthopedics match. *Cureus*. 2024;16(1):e53247. doi:10.7759/cureus.53247
- Madrigras J, Rudasill S, Tran Z, Bergman J, Benharash P. Sexual and gender minority identity in undergraduate medical education: impact on experience and career trajectory. *PLoS One*. 2021;16(11):e0260387. doi:10.1371/journal.pone.0260387
- Lin JS, Lattanza LL, Weber KL, Balch Samora J. Improving sexual, racial, and ethnic diversity in orthopedics: an imperative. *Orthopedics*. 2020;43(3):e134-e140. doi:10.3928/01477447-20200129-04
- Bowe SN, Wang X, Whipple ME, Bly RA. Evidence of specialty-specific gender disparities in resident recruitment and selection. *J Grad Med Educ*. 2021;13(6):841-847. doi:10.4300/JGME-D-21-00337.1
- Bowe SN, Bly RA, Wang X, Whipple ME. Racial and ethnic differences in resident selection in 11 specialties, 2013-2018. *JAMA*. 2022;327(24):2450-2452. doi:10.1001/jama.2022.6424
- Mohan AT, Banuelos J, Cespedes-Gomez O, et al. Diversity matters: a 21-year review of trends in resident recruitment into surgical specialties. *Ann Surg Open*. 2021;2(4):e100. doi:10.1097/AS9.000000000000100
- Hoveidaei AH, Kistler NM, Jackson G, LaPorte DM, Chahla JA, Heckmann ND. International medical graduates (IMGs) matching into US orthopaedic surgery residency: a fifteen year analysis of trends in applications and geographical distribution. *Int Orthop*. 2024;48(11):2775-2784. doi:10.1007/s00264-024-06283-5
- Kremer TR, Kremer MJ, Kremer KP, Mihalic A. Predictors of getting a residency interview: differences by medical specialty. *Med Educ*. 2021;55(2):198-212. doi:10.1111/medu.14303
- Rogers CR, Gutowski KA, Rio AMD, et al. Integrated plastic surgery residency applicant survey: characteristics of successful applicants and feedback about the interview process. *Plast Reconstr Surg*. 2009;123(5):1607-1617. doi:10.1097/PRS.0b013e3181a075ea
- Vaysburg DM, Cortez AR, Hanseman DJ, et al. An analysis of applicant competitiveness to general surgery, surgical subspecialties, and integrated programs. *Surgery*. 2021;170(4):1087-1092. doi:10.1016/j.surg.2021.03.035
- Mao RMD, Williams TP, Price A, Colvill KM, Cummins CB, Radhakrishnan RS. Predicting general surgery match outcomes using standardized ranking metrics. *J Surg Res*. 2023;283:817-823. doi:10.1016/j.jss.2022.11.038
- Yu N, Hoch JS, Martin AR, Shahlaie K. Trends in successfully matched neurosurgery residency applicants.

- J Neurosurg.* 2023;139(5):1456-1462. doi:10.3171/2023.3.JNS222397
16. Hauser LJ, Gebhard GM, Blumhagen R, Carlson NE, Cabrera-Muffly C. Applicant characteristics associated with successful matching into otolaryngology. *Laryngoscope.* 2017;127(5):1052-1057. doi:10.1002/lary.26236
  17. Schultz KP, Shih L, Davis MJ, et al. Integrated plastic surgery applicant review: important factors and selection criteria. *Plast Reconstr Surg Glob Open.* 2020;8(7):e2892. doi:10.1097/GOX.0000000000002892
  18. Super N, Tieman J, Boucher K, Rockwell WB, Agarwal JP. Recent trends in applicants and the matching process for the integrated plastic surgery match. *Ann Plast Surg.* 2013;71(4):406-409. doi:10.1097/SAP.0b013e31824ca654
  19. Mellia JA, Jou C, Rath S, et al. An in-depth analysis of research output in successful integrated plastic surgery match applicants and factors associated with matching at top-ranked programs. *J Surg Educ.* 2021;78(1):282-291. doi:10.1016/j.jsurg.2020.06.026
  20. Stain SC, Hiatt JR, Ata A, et al. Characteristics of highly ranked applicants to general surgery residency programs. *JAMA Surg.* 2013;148(5):413-417. doi:10.1001/jamasurg.2013.180
  21. Dort JM, Trickey AW, Kallies KJ, Joshi ART, Sidwell RA, Jarman BT. Applicant characteristics associated with selection for ranking at independent surgery residency programs. *J Surg Educ.* 2015;72(6):e123-e129. doi:10.1016/j.jsurg.2015.04.021
  22. Makdisi G, Takeuchi T, Rodriguez J, Rucinski J, Wise L. How we select our residents—a survey of selection criteria in general surgery residents. *J Surg Educ.* 2011;68(1):67-72. doi:10.1016/j.jsurg.2010.10.003
  23. Hahn A, Gorham J, Mohammed A, Strollo B, Fuhrman G. Examining the factors influencing applicants' placement on one general surgery program's rank order list. *Am Surg.* 2023;89(5):1616-1621. doi:10.1177/00031348211068003
  24. Al Khalili K, Chalouhi N, Tjoumakaris S, et al. Programs selection criteria for neurological surgery applicants in the United States: a national survey for neurological surgery program directors. *World Neurosurg.* 2014;81(3-4):473-477.e2. doi:10.1016/j.wneu.2013.08.019
  25. O'Mary K, Tompane T, Perry N, Smith J, Janney C. Matching into orthopedic surgery in the U.S. navy: a review of applicant selection criteria. *Mil Med.* 2023;188(11-12):3641-3644. doi:10.1093/milmed/usac267
  26. Field NC, Gullick MM, German JW. Selection of neurological surgery applicants and the value of standardized letters of evaluation: a survey of United States program directors. *World Neurosurg.* 2020;136:e342-e346. doi:10.1016/j.wneu.2019.12.176
  27. Makhoul AT, Pontell ME, Kumar NG, Drolet BC. Objective measures needed—program directors' perspectives on a pass/fail USMLE Step 1. *N Engl J Med.* 2020;382(25):2389-2392. doi:10.1056/NEJMp2006148
  28. Fones L, Fellheimer H, Pennington M, Hozack BA, Fletcher DJ, Beredjikian PK. Trends of underrepresented minorities and female trainees in orthopedic, plastic, and hand surgery: did we do better in 2023? *J Hand Surg.* 2025;50(12):1522.e1-1522.e8. doi:10.1016/j.jhsa.2025.01.008
  29. Gauer JL, Jackson JB. The association of USMLE Step 1 and Step 2 CK scores with residency Match specialty and location. *Med Educ Online.* 2017;22(1):1358579. doi:10.1080/10872981.2017.1358579



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Funding: The authors report no external funding source for this study.

Conflict of interest: The authors declare they have no competing interests.

The authors would like to thank Amber Williams for her organization and leadership to the research.

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Received July 9, 2025; revisions received October 29, 2025, and February 4, 2026; accepted February 6, 2026.