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AOA Critical Issues in Education

# A Comparison of Match Rates to Orthopaedic Surgery Residency Programs Between First-Time Versus Repeat Applicants

## An Analysis of the National Resident Matching Program Data from 2018 to 2022

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**Introduction:** Orthopaedic surgery has become one of the most competitive specialties to match into among medical students applying to residency. The purpose of this study was to compare match rates to orthopaedic surgery residency programs among first-time vs. repeat applicants.

**Methods:** Data were obtained from the National Resident Matching Program from 2018 to 2022. For each year, the total number of applicants to orthopaedic surgery residency programs was obtained, as well as the number of applicants who successfully matched into orthopaedics. The match rate was compared between first-time vs repeat applicants. A subanalysis was performed on allopathic graduates (MDs) and osteopathic graduates (DOs)/international medical graduates (IMGs). In addition, the match rate for first-time applicants and reapplicants was compared between MD and DO/IMG applicants.

**Results:** Overall, there was a significantly higher match rate among first-time applicants (89.8%) vs. repeat applicants (22.5%, $p < 0.0001$). When substratified by MD and DO/IMG applicants, first-time applicants still matched at a significantly higher rate than reapplicants within each group ($p < 0.0001$ for each). Among first-time applicants, MDs (93.1%) matched at a significantly higher rate than DOs/IMGs (68.6%, $p < 0.0001$). Among reapplicants, DOs/IMGs (25.3%) matched at a significantly higher rate than MDs (20.1%, $p < 0.01$).

**Conclusion:** First-time applicants to orthopaedic surgery residency programs have a significantly higher rate of matching compared with reapplicants, irrespective of degree. In recent years, first-time MD applicants have matched at a significantly higher rate than first-time DO/IMG applicants.

**Disclosure:** The **Disclosure of Potential Conflicts of Interest** forms are provided with the online version of the article (http://links.lww.com/JBJSOA/A543).

## Introduction

Orthopaedic surgery is one of the most competitive specialties in medicine for which medical students apply to residency[1]. From 2013 to 2022, the number of orthopaedic surgery residency positions has steadily increased with an average of 762.4 positions and a total applicant match rate averaging 70.0% during that time[2]. In 2022, approximately 40% of allopathic (MD) applicants and 46% of osteopathic (DO) applicants did not successfully match[3]. As the number of orthopaedic applicants for residency increases yearly, there has not been a proportional increase in the number of positions available[4].

A study by Amin et al.[5] was the first study to address the issue of unmatched orthopaedic surgery applicants. The authors surveyed orthopaedic residency program directors, most of whom recommended unmatched applicants do a general surgery internship for 1 year to increase their chances of matching. However, this study was based on survey results and not on objective match statistics on this specific population. A more recent study[6] of orthopaedic surgery reapplicants from 2016 to 2019 found that 58% of reapplicants matched during their subsequent attempt. However, the results were based on applicant responses to a survey, leading to potential selection bias.

Multiple studies exist regarding orthopaedic residency selection. However, no previous study on a national level has compared the match rate of first-time vs. repeat applicants. This information is most important as prognostic information for prospective orthopaedic surgery residents who do not match because they must make an important decision to reapply the following year, find another specialty with an open position, or train overseas. Although many of these questions are specific to an individual applicant, for those who want to continue to pursue orthopaedic surgery as a career, the literature is sparse on how they will fare as unmatched applicants reapplying for the match[6]. The purpose of this study was to compare match rates to orthopaedic surgery residency programs among first-time vs. repeat applicants. The authors hypothesized that first-time applicants would have a significantly higher match rate than repeat applicants, regardless of their degree.

## Methods

A data request was submitted to the National Resident Matching Program (NRMP)[7]. For each year from 2018 to 2022, the total number of first-time and repeat applicants to orthopaedic surgery residency programs was obtained, as well as the number of applicants who successfully matched into orthopaedics and the number of applicants who matched into another specialty. The match rate was compared between first-time vs. repeat applicants for all applicants combined (MDs, DOs, and international medical graduates [IMGs]). A subanalysis was performed on MD graduates and DOs/IMGs, where the results were stratified between the 2 groups. In addition, the match rate between MDs and DOs/IMGs was compared for first-time applicants and reapplicants. As per the NRMP, match rates could not be substratified for applicants applying the second time, third time, etc. because of the smaller sample size and potential identification of individual applicants. Results also could not be distinguished between DO/IMG applicants for this same reason.

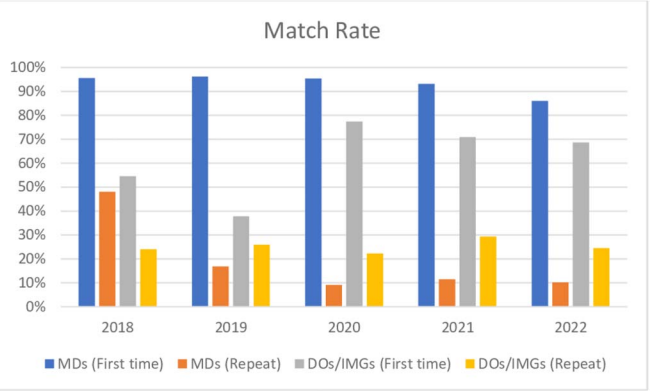


Fig. 1

Match Rate for MDs and DOs/IMGs. IMG = international medical graduate.

### *Statistical Analysis*

$\chi^2$ tests were used to compare match rates between first-time vs. repeat applicants as well as between MD vs. DO/IMG applicants.

## Results

Overall, the match rate for first-time applicants (89.8%) was significantly higher than for reapplicants (22.5%, $p < 0.0001$) (Fig. 1, Table I). The match rate for first-time MD applicants (93.1%) was also significantly higher than for repeat MD applicants (20.1%, $p < 0.0001$) (Table II). A similar trend was observed for DO/IMG applicants, as first-time applicants (68.6%) matched at a significantly higher rate than repeat applicants (25.3%, $p < 0.0001$) (Table III). It should be noted that the number of DO/IMG applicants increased substantially in 2020 because the distinction between MD and DO residency programs was removed before this application cycle.

Among first-time applicants, MDs (93.1%) matched at a significantly higher rate compared with DO/IMG applicants (68.6%, $p < 0.0001$) (Table IV). Among reapplicants, the overall match rate was similar but statistically different between MD

**TABLE I Match Rate for All Applicants***

| Year | First-Time Applicant | Repeat Applicant | p |
|---|---|---|---|
| 2018 | 581/617 (94.2%) | 157/400 (39.3%) | <0.0001 |
| 2019 | 684/738 (92.7%) | 65/299 (21.7%) | <0.0001 |
| 2020 | 791/858 (92.2%) | 53/335 (15.8%) | <0.0001 |
| 2021 | 782/876 (89.3%) | 84/414 (20.3%) | <0.0001 |
| 2022 | 792/956 (82.8%) | 83/517 (16.1%) | <0.0001 |
| Total | 3,630/4,042 (89.8%) | 442/1,965 (22.5%) | <0.0001 |

*Rates are reported as number of applicants matched into orthopaedic surgery/total number of applicants for each year.

**TABLE II Match Rate for Allopathic (MD) Applicants***

| Year | First-Time Applicant | Repeat Applicant | p |
|---|---|---|---|
| 2018 | 569/595 (95.6%) | 122/254 (48.0%) | <0.0001 |
| 2019 | 667/693 (96.2%) | 23/137 (16.8%) | <0.0001 |
| 2020 | 671/703 (95.4%) | 15/164 (9.1%) | <0.0001 |
| 2021 | 675/725 (93.1%) | 24/209 (11.5%) | <0.0001 |
| 2022 | 674/784 (86.0%) | 31/305 (10.2%) | <0.0001 |
| Total | 3,256/3,497 (93.1%) | 215/1,069 (20.1%) | <0.0001 |

*Rates are reported as number of applicants matched into orthopaedic surgery/total number of applicants for each year.

(20.1%) and DO/IMG (25.3%) applicants (Table V). However, after the MD/DO residency merger in 2020, DO reapplicants (25.5%) had a 2.5-fold higher match rate than MD reapplicants (10.3%, $p < 0.0001$).

For first-time DO/IMG applicants, 14.7% matched into a specialty other than orthopaedic surgery, compared with only 4.0% of first-time MD applicants ($p < 0.0001$). For repeat applicants, the match rate into another field was 20.3% and 11.5% for DO/IMG and MD reapplicants, respectively ($p < 0.0001$).

## Discussion

Based on the results of this study, first-time applicants to orthopaedic surgery residency programs have a significantly higher rate of matching compared with reapplicants, regardless of medical degree. Among first-time applicants, MD applicants matched at a significantly higher rate compared with DO/IMG applicants. Interestingly, DO/IMG reapplicants matched at a significantly higher rate than MD reapplicants.

Orthopaedic surgery remains one of the most competitive residencies to which medical students apply. As a result, many applicants go unmatched each year. Previous studies have demonstrated significant differences between matched and unmatched applicants in US Medical Licensing Examination (USMLE) Step 1 and Step 2 scores, number of research experiences, and number of research products[8]. To further illustrate the competitive nature of orthopaedic residencies, most orthopaedic residency programs used a minimum Step 1 score when screening residency applications before these scores transitioned to a pass/fail system[9]. In 2017, Kraeutler[10] proposed a solution to improve the orthopaedic residency application process by limiting the number of programs to which applicants are allowed to apply. This would then necessitate a strategy for applicants in choosing to apply to programs with which they have a strong connection or programs on par with their application strengths. There has already been a step toward this direction with the implementation of "preference signaling" during the 2022 to 2023 application cycle[11].

To the best of our knowledge, this is the first study based on a national sample size to report the match rates of first-time vs. repeat applicants to orthopaedic surgery residency programs. The results of this study can provide useful information for applicants who do no match on their first attempt because it provides data on the chances of matching as a repeat applicant. For applicants who fail to match into orthopaedic surgery, it is

**TABLE III Match Rate for Other (Osteopathic [DO], International Medical Graduate [IMG]) Applicants***

| Year | First-Time Applicant | Repeat Applicant | p |
|---|---|---|---|
| 2018 | 12/22 (54.5%) | 35/146 (24.0%) | **<0.01** |
| 2019 | 17/45 (37.8%) | 42/162 (25.9%) | 0.12 |
| 2020 | 120/155 (77.4%) | 38/171 (22.2%) | **<0.0001** |
| 2021 | 107/151 (70.9%) | 60/205 (29.3%) | **<0.0001** |
| 2022 | 118/172 (68.6%) | 52/212 (24.5%) | **<0.0001** |
| Total | 374/545 (68.6%) | 227/896 (25.3%) | **<0.0001** |

Bold, statistically significant.
*Rates are reported as number of applicants matched into orthopaedic surgery/total number of applicants for each year.

**TABLE IV Match Rate for First-Time MD vs. DO/IMG Applicants***

| Year | MD | DO/IMG | p |
|---|---|---|---|
| 2018 | 569/595 (95.6%) | 12/22 (54.5%) | <0.0001 |
| 2019 | 667/693 (96.2%) | 17/45 (37.8%) | <0.0001 |
| 2020 | 671/703 (95.4%) | 120/155 (77.4%) | <0.0001 |
| 2021 | 675/725 (93.1%) | 107/151 (70.9%) | <0.0001 |
| 2022 | 674/784 (86.0%) | 118/172 (68.6%) | <0.0001 |
| Total | 3,256/3,497 (93.1%) | 374/545 (68.6%) | <0.0001 |

*Rates are reported as number of applicants matched into orthopaedic surgery/total number of applicants for each year. IMG = international medical graduate.

**TABLE V Match Rate for MD vs. DO/IMG Reapplicants***

| Year | MD | DO/IMG | p |
|---|---|---|---|
| 2018 | 122/254 (48.0%) | 35/146 (24.0%) | **<0.0001** |
| 2019 | 23/137 (16.8%) | 42/162 (25.9%) | 0.056 |
| 2020 | 15/164 (9.1%) | 38/171 (22.2%) | **0.001** |
| 2021 | 24/209 (11.5%) | 60/205 (29.3%) | **<0.0001** |
| 2022 | 31/305 (10.2%) | 52/212 (24.5%) | **<0.0001** |
| Total | 215/1,069 (20.1%) | 227/896 (25.3%) | **<0.01** |

Bold, statistically significant.
*Rates are reported as number of applicants matched into orthopaedic surgery/total number of applicants for each year. IMG = international medical graduate.

crucial to consider what the options are. Kheir et al.[6] conducted a survey of 81 reapplicants to orthopaedic surgery residency programs from 2016 to 2019. Overall, 47 of 81 reapplicants (58%) subsequently matched, with no difference in match rate between those who pursued a research year (52.1%) and those who completed a preliminary surgery internship (64.0%) after initially not matching ($p = 0.46$). This match rate far exceeds that identified among reapplicants in our study, likely because of the selection bias involved in a survey study. Of the successful reapplicants in the study by Kheir[5], the majority (43/47, 91%) matched on their second attempt while 3 reapplicants (3/47, 6.4%) matched on their third attempt and 1 reapplicant (2.1%) matched after more than 5 attempts. Interestingly, Kheir et al.[5] illustrated that nearly 30% of successful reapplicants matched at the institution where they pursued a surgical internship or a research year.

In another study by Rivero et al.[12], a survey was conducted of unmatched orthopaedic surgery applicants over a 20-year period (1994-2013). Similar to the study discussed above, the authors found no difference in the match success rate between reapplicants completing a research year vs. surgical internship. Furthermore, the authors of this study found that 37.5% of successful reapplicants matched at their home institution, defined as the location where they had completed medical school and/or the site of their postgraduate year[12]. These findings, demonstrated by both studies, further imply that developing strong relationships with faculty at the location of a reapplicant's first postgraduate year is of particular importance.

It is interesting and perhaps unexpected that DO/IMG reapplicants matched at a significantly higher rate than MD reapplicants. This is likely because of a combination of factors. We showed that DO/IMG applicants matched into a specialty other than orthopaedic surgery at a significantly higher rate than MD applicants. This provides evidence that DOs/IMGs applying to orthopaedic surgery know it is competitive, and many of those who are less confident in their chances of matching into orthopaedics will apply for and interview for a backup specialty. Thus, those DOs/IMGs who do not match are more likely to be the more confident/committed applicants, which may explain the higher match rate on reapplication. Furthermore, there may be multiple other factors in play, such as the quality of advising at both the college and departmental levels or a different application/interview philosophy. These play into the likelihood of "finding a home" after a failed first attempt, regardless of the quality of the applicant.

Based on the results of our study, the match rate for reapplicants to orthopaedic surgery residency programs is lower than previously reported (22.5% overall). Thus, if one does not match the first time, he/she must really consider the strengths/weaknesses of their residency application and determine whether it is worthwhile to reapply. Even for first-time DO/IMG applicants, the match rate is relatively low (68.6%). Orthopaedic surgery is becoming an increasingly popular medical specialty, likely because of a combination of high salary, mostly elective-based procedures, and working with generally healthy patients who are committed to returning to a more active lifestyle. However, because of its popularity, orthopaedics has a high rate of unmatched applicants every year. Medical students considering orthopaedic surgery as a career choice should strongly commit to this specialty and ensure that they are competitive for the specialty before applying to residency programs. Owing to the increasing competitiveness of the field, it is important to seek mentorship as well as proper guidance and have a backup plan in case one fails to match.

### *Limitations*

The limitations of this study should be noted. We could not distinguish match rates between applicants applying the second time, third time, etc because of smaller sample sizes to avoid the possibility of individual applicants being identified. In addition, we could not distinguish match rates between DO and IMG applicants for this same reason. With the MD/DO residency merger in 2020, the match rate for DO applicants applying to DO-specific programs was not included before the merger. Therefore, in 2018 and 2019, only DO graduates who applied to MD-specific residency programs were captured in this study. Finally, we could not compare various application statistics between first-time applicants and reapplicants, including USMLE scores and number of publications.

## Conclusion

First-time applicants to orthopaedic surgery residency programs have a significantly higher rate of matching compared with reapplicants, irrespective of degree. In recent years, first-time MD applicants have matched at a significantly higher rate than first-time DO/IMG applicants. ■

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