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Research Article

The Impact of Diversity, Equity, and Inclusion Scholarships for Acting Interns on the Diversity of Orthopaedic Surgery Residency Programs

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Background

Improving diversity, equity, and inclusion (DEI) in orthopaedic surgery is a priority as statistics continue to demonstrate it as the least diverse surgical subspecialty. DEI scholarships for Acting Interns have been recently developed to recruit more diverse candidates.

Objective

To determine the impact of DEI scholarships on the orthopaedic surgery residency application process.

Design

An anonymous survey was distributed to program directors at ACGME accredited orthopaedic residencies that offered DEI scholarships for visiting medical students. The survey inquired about factors involved in scholarship implementation, source of funding, number of scholarship applications received, factors considered in selecting recipients, number of DEI scholarships awarded, program results in the 2023 Match, demographics of incoming first-year residents, and program directors' observations following implementation.

Results

Of the 49 programs with known DEI scholarships, 16 (32.7%) completed the survey. During the 2023 Match cycle, respondents matched an average of 5 residents (SD 0.5, Range 3 – 8) consisting of 36.7% female (SD 31.7%, Range 0 – 100%) and 36.9 (SD 28.2%, Range 0 – 100%) underrepresented minority (URM) residents. Following scholarship implementation, most program directors (56.2%) observed a rise in URM student rotators with an associated 18.8% increase in the number of URM residents. Additionally, 18.8% of programs claimed that scholarship recipients either matched at their program or another orthopaedic residency program. Respondents reported that 68.8% (SD 41.5%, Range 0 – 100%) of scholarship recipients received an invitation to interview at the awarding program. Of the three programs (18.8%) that claimed recipients matched at their program, two (13.3%) reported they matched one DEI scholar, while the other (6.7%) stated that five DEI scholars matched into their program.

Conclusion

DEI scholarships may be an effective strategy for promoting diversity in orthopaedics. However, longitudinal data and increased institutional GME funding are required to increase the proportion of orthopaedic residency programs that offer these scholarships for visiting students.

INTRODUCTION

Orthopaedic surgery is one of the most competitive post graduate residency programs ("10 Most Competitive Residencies (2022 Guide)" 2022; Trikha et al. 2020; Bernstein, Wei, Gu, Fufa, et al. 2022; White, Giordano, Chen, et al. 2023) but also the least diverse specialty in medicine (White, Giordano, Chen, et al. 2023; Haffner et al. 2021; S. Poon, Kiridly, Mutawakkil, et al. 2019; Day, Lage, and Ahn 2010; Emery 2019). Having a diverse physician workforce that reflects the demographics of its patients has been found to enhance cultural competency, increase understanding of unique patient challenges, and reduce health

disparities (Haffner et al. 2021). However, a disparity persists between the racial and ethnic backgrounds of orthopaedic surgeons and the communities they serve with several studies highlighting the limited inclusion of racial and ethnic underrepresented minorities in medicine (URM) and women (White, Giordano, Chen, et al. 2023; Haffner et al. 2021; S. Poon, Kiridly, Mutawakkil, et al. 2019; Day, Lage, and Ahn 2010; Emery 2019; S. C. Poon et al. 2022; S. Poon, Nellans, Rothman, et al. 2019). Although efforts to increase diversity have resulted in a slightly increased percentage of women and minorities in orthopaedic surgery (White, Giordano, Chen, et al. 2023; Haffner et al. 2021; S. Poon, Nellans, Rothman, et al. 2019; Wang, Chang, Nwachuku, et al. 2023; Chambers et al. 2018), representation remains lower compared to other medical specialties.

Diversity within orthopaedic surgery may be improved through recruiting more diverse applicants during medical school training. Institutional diversity, equity, and inclusion (DEI) scholarships for orthopaedic away rotations has become a popular strategy for enhancing diversity within a program. Prior studies have reported that completion of away rotations can improve an applicant's odds of successfully matching into a residency program (Bernstein, Wei, Gu, Campbell, et al. 2022; Baldwin et al. 2009; Porter et al. 2017; O'Donnell et al. 2017; Drolet et al. 2016; Robin et al. 2022; Camp, Sousa, Hanssen, et al. 2016; Winterton, Ahn, and Bernstein 2016), with most applicants completing two to three aways (Rosenow, Brinkman, Deckey, et al. 2022). Despite the widely acknowledged importance of completing away rotations, some applicants opt out of completing multiple aways due to the associated expenses such as travel, housing, and transportation. These expenses are in addition to their baseline expenses including primary housing at their home institution. In a cost analysis conducted by Gordon et al, medical students applying into orthopaedic surgery spend approximately $3,182 to complete away rotations (Gordon et al. 2021). These expenses can be a barrier for medical students of lower socioeconomic status to complete multiple away rotations. DEI scholarships may help mitigate the financial burden associated with away rotations and may attract more socioeconomically diverse applicants to the residency program.

Compared to other surgical subspecialties, a low percentage of orthopaedic surgery programs offer visiting student scholarships (Bernstein, Wei, Gu, Campbell, et al. 2022). Bernstein et al reported that 24.9% of orthopaedic residency programs offer DEI scholarships, although this number may be increasing as awareness and commitment to diversity grow. While DEI scholarships have been successful in promoting resident diversity in other specialties (Duong et al. 2020), their impact on orthopaedic residency programs has not been studied. Our primary aim was to assess and describe the impact of DEI scholarships on the orthopaedic surgery residency application process. We hypothesize that DEI scholarships may be useful for increasing racial and ethnic diversity within residency programs.

METHODS

STUDY POPULATION

This multi-center cross-sectional study received exemption from our Institutional Review Board. We assessed the websites of all 208 ACGME orthopaedic surgery residency programs to identify those offering DEI scholarships for visiting medical students. Program directors' emails at these institutions were collected from Doximity (www.doximity.com) and the American Medical Association's Fellowship and Residency Electronic Interactive Database (FREIDA Online).

SURVEY DESIGN

Our 18-item survey was developed and distributed through Google Forms. All responses were collected anonymously. Questions varied in format consisting of short free text, single-answer multiple-choice, multiple-answer multiple-choice, and Likert scales. Before distribution on May 30th, 2023, the survey underwent pretesting to ensure proper function of each question. Reminder emails were sent at two weeks, four weeks, eight weeks, and twelve weeks after the initial distribution. The survey was closed on September 12th, 2023. Questions addressed the 2023 Match results, demographics of the incoming first-year residency class, DEI scholarship details (number awarded, application count, selection criteria, and funding sources), initial establishment of scholarships, and post-implementation observations from program directors. The full set of questions from our 18-item survey is available in the Supplementary Files.

STATISTICAL METHODS

Continuous variables are expressed as means (standard deviations) and categorical variables are expressed as frequencies (percentages). All statistical analyses were performed using R version 4.3.1 (R Foundation for Statistical Computing, Vienna, Austria).

RESULTS

Surveys were sent to 49 program directors with known DEI scholarships for visiting students with a response rate of 32.7% (16/49). The geographical distribution of respondents was: Southeast (6/16; 37.5%), Midwest (4/16; 25%), West Coast (3/16; 18.75%), and Northeast (3/16; 18.75%). On average, programs had 23.8 visiting medical students (SD 8.8; Range 8 – 36) during the 2022-2023 application year.

CHARACTERISTICS OF MATCHED PGY-1S

During the 2022-2023 cycle, programs matched an average of 5 (SD 0.5; Range 3 – 8). On average the incoming PGY-1 class consisted of 36.7% female (SD 31.8%, Range 0 – 100%) and 36.9% (SD 28.2%, Range 0 – 100%) URM residents. Of the matched PGY-1's, 64.7% (SD 37.5%, Range 0 – 100%)

Table 1. Characteristics of matched PGY-1 class during the 2022-2023 application cycle.

	Number of Residents	Proportion of Residents
Matched PGY-1	5 (0.5, 3–8)	–
Female	2 (0.9, 0–6)	36.7% (31.8%, 0–100%)
URM	2 (0.5, 0–5)	36.9% (28.2%, 0–100%)
PGY-1 Completed Audition Rotation	4 (1.5, 0–6)	64.7% (37.5%, 0–100%)
Female	2 (1.5, 0–5)	79.5% (30.1%, 25–100%)
URM	1 (1.3, 0–5)	62.8% (36.7%, 0–100%)

All values reported as mean (standard deviation, range)

of incoming residents completed an away rotation at the program they matched at. 79.5% (SD 30.1%, Range 25 – 100%) of the female PGY-1's completed an away rotation at their program. 62.8% (SD 36.7%, Range 0 – 100%) of the URM PGY-1's completed an away rotation at their program (Table 1).

DEI SCHOLARSHIPS

Six (37.5%) programs awarded five or more DEI scholarships, while the rest awarded four or less. Most programs (n=10, 62.5%) received 1-10 applications. DEI scholarships were for a fixed amount at most programs (n=11, 68.6%) with an average award of $1,864 (SD $1,098; Range $1,000-$5,000). DEI scholarships were more commonly advertised on residency program websites (n=10, 62.5%) than on social media (n=6, 36.5%). Only two programs (12.5%) used both methods, while two respondents (12.5%) were unsure of their advertising method (Table 2).

FACTORS INVOLVED IN SCHOLARSHIP IMPLEMENTATION

The initiation of DEI scholarships was most often attributed to the Program Director (n=4, 25%). The most important factor in their development was most often listed as "*Other*" (n=8, 50%), with details provided in Supplementary Table 1. The factor most often (n=8, 50%) listed as the least important was "*Goal to increase resident class diversity*" (Table 3).

CRITERIA FOR SELECTION OF SCHOLARSHIP RECIPIENTS

USMLE Step 2/COMLEX Level 2, personal statement, and reputation of medical school were each identified as the most important criteria in DEI scholarship selection by 25% (n=4) respondents. Conversely, letters of recommendation were frequently deemed the least important criteria by 25% (n=4). Mean rankings for all seven criteria are presented in Supplementary Table 2.

OBSERVATIONS FOLLOWING IMPLEMENTATION OF DEI SCHOLARSHIP

Following the implementation of the DEI scholarship at their program, 9 (56.2%) program directors observed a rise in URM student rotators, 3 (18.8%) reported an increase in their number of URM residents, 3 (18.8%) reported that scholarship recipients had matched at their program, and 3 (18.8%) reported that scholarship recipients had matched at another orthopaedic residency program. On average 68.8% (SD 41.5%, Range 0 – 100%) program directors reported that scholarship recipients received an interview invite from the awarding program. Three programs (18.8%) claimed that scholarship recipients eventually matched at that program (Table 4). Two programs (13.3%) reported one of their newly matched PGY-1s was a DEI scholarship recipient, while one program (6.7%) had five DEI scholarship recipients in their incoming PGY-1 class.

DISCUSSION

DEI scholarships may be a valuable initiative to help improve, recruit, and foster diversity within orthopaedic surgery residency and attract more socioeconomically diverse applicants while helping to mitigate the financial burden associated with away rotations. This study demonstrates that following scholarship implementation, the majority of program directors observed a rise in the number of URM student rotators as well as an increase in URM residents. Our results suggest that altogether, scholarship initiatives that focus on diversity have shown promise since their inception, although there remains significant progress to be made.

While utilization of scholarships for away rotations has been studied in other specialties (Bernstein, Wei, Gu, Campbell, et al. 2022; Duong et al. 2020), there are currently no studies that analyze the characteristics, prevalence, and impact in orthopaedic surgery alone. Bernstein et al. conducted a study to evaluate URM visiting student scholarships for all surgical specialties and found that 22-62% of graduate medical education (GME) surgical programs funded and promoted DEI scholarships. The lowest percentage of programs that offered DEI scholarships was observed in general surgery (21.9%) and orthopaedic surgery (24.9%) (Bernstein, Wei, Gu, Campbell, et al. 2022). The average DEI scholarship award across all specialties was $1,852 ± 633 with an average award of $1,629 ± 619 for orthopaedic surgery scholarships. It was also reported that larger, more reputable, university training programs in urban areas having PGY-I class program sizes of three or more residents had higher rates of offering diversity scholarships compared to other programs. Respondent programs in the

Table 2. Diversity, Equity, and Inclusion (DEI) scholarship characteristics at 16 responding residency programs.

Scholarships Awarded	N (%)
Five or more	6 (37.5%)
Four	2 (12.5%)
Three	2 (12.5%)
Two	3 (18.8%)
One	3 (18.8%)
Scholarship Applications Received	**N (%)**
1-10	10 (62.5%)
11-20	5 (31.3%)
21-30	1 (6.3%)
DEI Scholarship Entailed	**N (%)**
Room	6 (37.5%)
Travel	6 (37.5%)
Fixed amount	11 (68.6%)
Average amount	$1864 ± $1098 (Range $1000 – $5000)
Scholarship Advertisement	**N (%)**
Residency program website	10 (62.5%)
Social media	6 (36.5%)
Residency program website & Social media	2 (12.5%)
Unsure	2 (12.5%)

Table 3. Ranking of factors that led to the development of the Diversity, Equity, and Inclusion (DEI) scholarship.

Factor	Average Ranking*
Requested by Orthopaedic surgery residents	2.4 (1.3)
Other - please describe in the space provided at the end of the survey	2.4 (1.6)
Goal of increasing faculty diversity	2.8 (1.6)
Meet departmental strategic plan	2.9 (1.2)
Goal to increase resident class diversity	3.1 (2.0)

*Factors were ranked from most (1) to least (5) important; means (± standard deviation)

Table 4. Program Director observations following the implementation of the DEI scholarship at their program. Respondents were able to select all that apply.

	N (%)
Increased number of URM student rotators	9 (56.2%)
Increased number of URM residents in our program	3 (18.8%)
Scholarship recipients matching at our orthopedic surgery residency program	3 (18.8%)
Scholarship recipients matching into any orthopedic surgery residency program	3 (18.8%)
None of the above	6 (37.5%)

*Reported as mean (standard deviation, range)

present study had an average of five PGY-1 residents and offered five or more DEI scholarships for a fixed amount of $1,864. Additionally, DEI scholarships were most commonly reported to have been initiated by the residency program director and were more likely to be advertised on the residency program websites compared to social media.

Program directors indicated that USMLE Step 2/COMLEX Level 2 scores, applicant personal statement, and reputation of applicant's medical school were the most important factors for selecting DEI scholarship recipients. These criteria differ from what has been reported in emergency medicine. Duong et al. reported that in addition to an appli-

cant's board scores and personal statement, medical school grades and applicant information within the Visiting Student Learning Opportunities (VSLO) application were important in selecting scholarship recipients (Duong et al. 2020).

In our study, 68.8% of programs claimed that DEI scholars received an interview invitation from the awarding program. Additionally, 18.8% of program directors reported that DEI scholarship recipients matched at either their institution or another orthopaedic surgery program. The majority of program directors reported an increased number of URM student rotators. Additionally, 18.8% of program directors reported a rise in URM residents following implementation of a DEI scholarship at their program. These results suggest that DEI scholarships may be an effective strategy for fostering greater diversity within orthopaedic surgery residencies although further studies are needed to evaluate the impact of these scholarships over longer periods of time.

When program directors were asked to comment on factors that lead to the development of DEI scholarships at their institution, most selected "*Other*" and provided variable free-text responses. Three (30%) faculty members reported difficulty in securing resources and grant funding for institutional scholarships where in funds were obtained either through the orthopaedic department or personal contributions of faculty. Two (20%) survey respondents stated that scholarship funding was provided by their affiliated medical school, while one program director stated their program offers visiting rotation scholarships to all applicants that demonstrate financial hardship rather than focusing on URM. Other responses included comments stating programs were indifferent about incorporating scholarships or they were unable to comment on its impact. From these results, we can infer that greater institutional, organizational, and GME support is needed to fund DEI scholarships for visiting medical students.

While DEI scholarships may be an emerging new approach to improve diversity within orthopaedics, we must still consider other strategies to promote increased URM representation. Although pathway programs have been demonstrated to be beneficial for increasing representation of URM and women in orthopaedic surgery, recent studies have suggested that the limited number of URM faculty is a major bottle neck to increasing diversity through mentorship (Mason et al. 2016; Shah et al. 2023; Malige, Wells, Brooks, et al. 2022; McDonald et al. 2020; Winfrey et al. 2022). Future efforts should be tailored towards increasing URM orthopaedic faculty that value the importance of mentorship of women and URM students to foster increased diversity and representation. By incorporating DEI scholarships, a recipient can have an invaluable opportunity to work with at least one URM or female faculty member during their away rotation in hopes to provide the student a role model and mentor as they pursue their interests in orthopaedic surgery.

Our study has several limitations. First, this is a cross-sectional survey study which was only able to assess program director beliefs at one particular point in time. It is possible that since the distribution of our survey, additional programs have implemented DEI scholarships for visiting students. Second, we used publicly available information from residency program websites to identify programs that offered DEI scholarships. It is possible that we may have missed programs that advertise their scholarships exclusively on social media, however we suggest that the optimal strategy for programs is to advertise scholarships through both mediums. Lastly, we are limited by the small sample size but had an acceptable response rate at 32%. The purpose of our study was simply to describe the impact of these scholarships and therefore no statistical comparisons were made that would require a priori sample size calculations. Our study is the first to describe the impact of institutional DEI scholarships for orthopaedic surgery applicants from the perspective of program directors. Future longitudinal data is needed to characterize the impact of these scholarships on promoting diversity within orthopaedic surgery.

CONCLUSION

DEI scholarships may be an effective strategy for promoting diversity in orthopaedics. However, longitudinal data and increased institutional GME funding are required to increase the proportion of orthopaedic residency programs that offer these scholarships for visiting students.

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Supplementary Table 1. Program director responses to *"Other - please describe in the space provided at the end of the survey"*

Please utilize this space if you'd like to share any additional thoughts or information regarding DEI scholarships
"If DEI is important, then resources (including money) need to be put behind it. A DEI scholarship is one way to do so, and decrease a barrier for URM candidates to doing critical away rotations"
"We focus on financial hardship and really allow anyone to request a scholarship. Has helped ease the burden of away rotations on students."
"We only instituted our scholarship this application cycle so cannot comment on recruitment efforts"
"I don't feel strongly positively or negatively about the program, but rotations are expensive, and it would be nice for all students to have free housing available."
"Providing the scholarship seems like a great idea. Everyone is in favor of it. It really has not changed things very much in regard to getting URM candidates into the program"
"We have found offering EDI scholarships provides value, even if the recipients ultimately decline to take advantage of the scholarship or apply elsewhere. It signals that we are open and inclusive, and this has benefits when we seek diverse applications for interview and selection. Although our diversity scholarship recipients have not ultimately chosen to match with us, we have diverse matches."
"The funding for the DEI scholarships is challenging. We do not get any money from GME it comes from the Department which is a large sum of money. I would be interested to see where the funding comes from for other programs"
"Funding came from faculty personal contributions- would be nice to have some institutional support."
"This was part of COM effort offered to all depts - we were one of two that took it on."
"I started to complete the survey, however, there are several questions I can't answer. The ones about the scholarships, etc. The reason is that the medical school totally owns that process. They (unfortunately) don't share this information to it is not readily obtained. I know that we offer them through the Visiting Clerkship Program, which many of our residents have utilized, but I don't have exact numbers"

Supplementary Table 2. Average program director rankings of criteria used in selecting Diversity, Equity, and Inclusion (DEI) scholarship recipients.

Criteria	Average Ranking (SD)
USMLE Step 2/COMLEX Level 2	3.3 (1.8)
Applicant CV	3.7 (2.3)
Reputation of Medical School (Doximity Rankings)	3.7 (2.4)
Medical School Transcripts	3.8 (1.8)
Personal Statement	3.9 (2.4)
Previous Nth Dimensions Scholar	4.6 (1.8)
Letters of Recommendation	4.6 (2.2)