Research Square

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Preference Signaling in the Inaugural Orthopaedic Fellowship Match: A National Survey of Program Directors

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Abstract

Purpose

To evaluate orthopaedic fellowship program directors' perceptions and use of preference signaling during the inaugural 2026 fellowship application cycle.

Methods

A prospective survey study was conducted using REDCap. Email invitations were distributed to orthopaedic fellowship program directors and program coordinators at United States fellowship programs identified through publicly available departmental websites and fellowship directories. Associations between program characteristics and attitudes toward preference signaling were evaluated using bivariate analyses and logistic regression.

Results

A total of 171 completed surveys were analyzed. Overall, 55% of program directors reported that preference signaling improved the application process, and 67% anticipated using signaling during the subsequent application cycle. However, 71% also anticipated interviewing applicants who did not signal their program. Perceived usefulness varied considerably, with 44% of respondents rating signaling as important or very important for application screening and 36% rating it as slightly important or not important. Higher applicant volume was associated with more favorable perceptions of signaling, including greater perceived improvement in the application process (r_b=0.46; q<.001), greater anticipated future use (r_b=0.54; q<.001), and greater perceived usefulness for screening (ρ = 0.51; q<.001). Adult reconstruction and sports medicine programs reported the most favorable attitudes toward signaling.

Conclusions

Program directors' perceptions and use of preference signaling varied substantially across orthopaedic fellowship programs. Preference signaling appears to provide the greatest perceived benefit for programs with larger applicant pools, where it may help identify applicants with genuine program interest and facilitate application review.

Introduction

The pursuit of fellowship training after orthopaedic surgery residency has become increasingly common, reflecting the continued expansion of subspecialization within orthopaedic practice.[1] The percentage of orthopaedic surgery graduates completing fellowship training increased from 76% in 2003 to 90% in 2013,[2] and by 2021 the fellowship selection rate reached 94%, the highest among all surgical specialties.[3] This trend parallels changes in the job market, where advertisements seeking fellowship-trained orthopaedic surgeons increased from 16.7% in 1984 to 68.2% in 2009.[4] As a result, fellowship-

trained surgeons now perform on average 78% of procedures within their subspecialty.[2] As fellowship training has become the norm, application volume and competition have continued to rise,[1] making it increasingly difficult for fellowship programs to identify applicants who are both highly qualified and genuinely interested in their program.

Orthopaedic surgery residency programs recently faced a similar challenge with rapidly increasing residency application volumes, leading to the implementation of preference signaling during the 2022–2023 application cycle to help applicants express genuine program interest and assist programs in holistic applicant review.[5,6] Following its adoption in the residency match, preference signaling was introduced into the orthopaedic fellowship application process through the San Francisco Match for the 2026 application cycle, allowing applicants to distribute 10 preference signals among fellowship programs.[7] To date, no published studies have evaluated how orthopaedic fellowship program directors perceive or utilize preference signals during the application review process. The purpose of this study was to characterize how fellowship program directors incorporate preference signaling into applicant screening, interview selection, and final applicant evaluation during the inaugural year of its implementation.

Methods

Study Design

This is a prospective self-completed survey study designed to evaluate the use of signaling in screening and considering applications in the 2026 orthopaedic fellowship application cycle. The cohort included orthopaedic fellowship program directors at United States based programs.

Data Collection and Security

Program director and program coordinator email addresses were obtained from publicly available departmental websites and fellowship directories for orthopaedic fellowship programs in the United States. Included subspecialties were adult reconstruction, foot and ankle, hand, musculoskeletal oncology, pediatric orthopaedics, shoulder and elbow, spine, and sports medicine. Survey invitations containing a REDCap survey link were emailed directly to program directors or to program coordinators with a request to forward the survey to their program director. Three rounds of email invitations were distributed between April and June 2026.

Electronic informed consent was obtained prior to survey participation. Survey responses were collected anonymously using REDCap, which automatically deidentified all responses. Survey questions did not collect identifying information and could not be linked to individual respondents.

Statistical Analysis

Categorical variables were summarized as frequencies and percentages, and continuous variables as mean ± standard deviation, median (interquartile range), and range. Signal rate was calculated as signaled applicants divided by total applicants. The screening-usefulness item was reverse-coded such that higher scores indicated greater perceived usefulness.

Associations between categorical variables were evaluated using chi-square or Fisher-Freeman-Halton exact tests with Monte Carlo simulation for sparse contingency tables. Continuous variables were compared using the Mann-Whitney U test for 2-group comparisons and the Kruskal-Wallis test for comparisons involving 3 or more groups. Associations between ordinal variables were assessed using Spearman rank correlation. Effect sizes were reported as Cramér's V, rank-biserial correlation, epsilon-squared, and Spearman's ρ, as appropriate.

Univariable logistic regression was used to evaluate associations between program characteristics and binary attitudinal outcomes. For anticipated interviewing of non-signaling applicants, responses of "no" and "not sure yet" were combined as the reference group. Continuous predictors were scaled per 10 additional applicants, per 5 additional signaling applicants, or per additional current fellow. Multivariable models examining perceived improvement in the application process and anticipated future use included total applicant volume and a high-demand subspecialty indicator (sports or adult reconstruction).

Given the exploratory nature of the analyses, exploratory bivariate P values from bivariate analyses were adjusted using the Benjamini-Hochberg false discovery rate procedure. Unless otherwise specified, q values represent Benjamini-Hochberg false discovery rate-adjusted P values. All statistical tests were 2-sided with a significance level of $\alpha = .05$. Analyses were performed using R version 4.5.0.

Results

Respondent Disposition and Program Characteristics

Of 278 survey responses received, 7 respondents declined consent. Among the remaining 271 respondents, 99 did not complete any survey items and 1 submitted a partial survey; these responses were excluded. The final analytic sample consisted of 171 completed surveys with no missing required survey-item data.

Programs received a mean of 68.4 ± 44.6 applications (median, 60; interquartile range [IQR], 32–90) and 19.2 ± 22.3 preference signals (median, 12; IQR, 6–27), corresponding to a median signal rate of 0.21 (IQR, 0.14–0.39). Programs extended a mean of 27.4 ± 12.6 interview invitations and had a median of 2 current fellows (IQR, 1–3).

Adult reconstruction (25.1%, n = 43) and sports medicine (18.1%, n = 31) were the most frequently represented fellowship subspecialties. The Midwest accounted for the largest proportion of respondents (31.0%, n = 53), followed by the Northeast and Southwest (22.8% each, n = 39) (Table 1).

Attitudes Toward Fellowship Signaling

Program directors were divided regarding whether preference signaling improved the fellowship application process, with 94 respondents (55.0%) reporting that it improved the process and 77 (45.0%) reporting no improvement. Despite these mixed projections, 114 respondents (66.7%) anticipated using signaling to screen applications in the subsequent cycle, and 122 (71.3%) anticipated offering interviews to applicants who did not signal their program (Fig. 1).

When asked about the role of preference signaling in application screening, 75 respondents (43.9%) rated it as important or very important, whereas 61 (35.7%) rated it as slightly important or not important at all. Thirty-five respondents (20.5%) were neutral. For the subsequent application cycle, 96 respondents (56.1%) anticipated that signaling would have the same level of importance, 43 (25.1%) anticipated it would become more important, and 32 (18.7%) anticipated it would become less important (Table 2).

Factors Associated With Attitudes Toward Signaling

In exploratory bivariate analyses, applicant volume and fellowship subspecialty were the strongest correlates of attitudes toward preference signaling. Programs with higher applicant volume were more likely to report that signaling improved the application process ($r_b = 0.46$; $q < .001$) (Fig. 2), anticipated using signaling in the subsequent application cycle ($r_b = 0.54$; $q < .001$), and perceived signaling as more useful for application screening ($\rho = 0.51$; $q < .001$).

Attitudes toward preference signaling also varied by fellowship subspecialty. Subspecialty was associated with perceived improvement in the application process ($V = 0.52$; $q < .001$), anticipated use of signaling in the subsequent application cycle ($V = 0.38$; $q = .002$), perceived usefulness for application screening ($\varepsilon^2 = 0.28$; $q < .001$), and anticipated importance of signaling in future application cycles ($V = 0.32$; $q = .008$). Adult reconstruction and sports medicine programs reported the most favorable attitudes, with 81% and 77% of respondents, respectively, indicating that signaling improved the application process, compared with 16% of foot and ankle and 14% of shoulder and elbow respondents (Table 3; Fig. 3).

Programs extending a greater number of interview invitations reported slightly greater perceived usefulness of preference signaling ($\rho = 0.24$; $q = .004$) and were more likely to anticipate using signaling in the subsequent application cycle ($rb = 0.26$; $q = .012$). Geographic region was not associated with any attitudinal outcome after adjustment (all $q \geq .262$).

In univariable logistic regression, programs with higher applicant volume were less likely to anticipate interviewing applicants who did not signal their program. The odds of planning to interview non-signaling applicants decreased by 12% for every 10 additional applicants (OR, 0.88; 95% CI, 0.81–0.95; $P < .001$) and by 23% for every 5 additional signaling applicants (OR, 0.77; 95% CI, 0.68–0.86; $P < .001$).

Multivariable Analysis

Total applicant volume and high-demand subspecialty status (defined as adult reconstruction or sports medicine) were moderately correlated (Spearman ρ = 0.56). In multivariable logistic regression, higher applicant volume remained independently associated with anticipated use of preference signaling in the subsequent application cycle (adjusted OR per 10 additional applicants, 1.30; 95% CI, 1.13–1.48; P < .001), whereas high-demand subspecialty status was not (adjusted OR, 1.52; 95% CI, 0.65–3.56; P = .339).

For perceived improvement in the application process, both higher applicant volume (adjusted OR per 10 applicants, 1.14; 95% CI, 1.03–1.26; P=.013) and high-demand subspecialty status (adjusted OR, 4.18; 95% CI, 1.90–9.22; P<.001) remained independently associated with favorable perceptions toward preference signaling (Table 4).

Free-Text Comments

Seventy-six respondents (44.4%) provided free-text comments. Qualitative responses were largely consistent with the quantitative findings. Respondents from lower-volume subspecialties frequently described limited utility of preference signaling because applicant demand was low relative to available fellowship positions. Conversely, respondents from higher-volume programs reported that signaling was valuable for identifying applicants with genuine interest and facilitating review of large applicant pools. Additional recurring themes included using signaling primarily to inform rank list decisions rather than interview selection, concern that allocating 10 preference signals diluted their value, and incomplete adoption of preference signaling across certain subspecialties.

Discussion

In this prospective survey study, we found substantial heterogeneity in program directors' perceptions and use of preference signaling during the inaugural orthopaedic fellowship application cycle. Although 55% of respondents believed signaling improved the application process and 67% anticipated using it in the subsequent cycle, 71% still planned to interview applicants who did not signal their program. Favorable perceptions of signaling were most common among adult reconstruction and sports medicine programs and among programs with larger applicant pools, which also reported greater perceived usefulness, greater anticipated future use, and a lower likelihood of interviewing non-signaling applicants. Collectively, these findings suggest that preference signaling may be most valuable for programs managing large applicant volumes, where it can help identify applicants with genuine program interest.

Preference signaling has been widely adopted across graduate medical education since its introduction in the 2020–2021 otolaryngology residency application cycle, with similarly favorable experiences reported following its implementation in the orthopaedic residency match.[6,8–10] In contrast, our findings suggest that support for signaling is more variable in the orthopaedic fellowship match. A likely explanation is the substantially lower application volume at the fellowship level – averaging 68

applications per program in our study compared to nearly 600 per residency program.[11] This reduced application burden likely diminishes the perceived utility of signaling. Consistent with this interpretation, programs in our study receiving higher applicant volumes were significantly more likely to view signaling as beneficial and to anticipate its continued use.

Our findings are consistent with those reported in an internal medicine subspecialty fellowship survey, in which most program directors agreed that preference signaling helped identify genuinely interested applicants and facilitated interview selection.[12] However, only 27% believed signaling reduced the burden of application review. The authors reported lower-volume programs reviewed all applications, whereas higher-volume programs were more likely to use signaling as a criterion for interview selection.[12] Together, these findings suggest that the relationship between applicant volume and the perceived value of signaling extends beyond orthopaedic surgery and may represent a common feature of fellowship recruitment across specialties.

Differences in perceptions across orthopaedic subspecialties likely reflect variation in applicant volume and fellowship competitiveness. Previous studies have demonstrated substantial variation in applicant demand and match competitiveness across orthopaedic fellowship subspecialties.[13] Consistent with this, adult reconstruction and sports medicine programs in our study received the highest applicant volumes and reported the most favorable perceptions of signaling, whereas foot and ankle and shoulder and elbow programs reported the least favorable attitudes. Notably, applicant volume remained independently associated with anticipated signaling use after adjustment, whereas classification as a high-demand subspecialty did not, suggesting that the perceived value of signaling is driven primarily by application volume rather than subspecialty designation.

Hand surgery fellowship warrants separate consideration because, unlike the other orthopaedic subspecialties included in this study, it participates in the National Resident Matching Program rather than the SF Match and did not use preference signaling during the study period.[13] Consequently, responses from hand surgery program directors reflect perceptions of signaling rather than direct experience and should be interpreted accordingly.

Despite its perceived value, preference signaling was not viewed as a primary determinant of interview selection. Although most program directors anticipated using signaling in future application cycles, 71% also anticipated interviewing applicants who did not signal their program, and fewer than half considered signaling important or very important for application screening. These findings suggest that signaling functions primarily as an adjunctive indicator of applicant interest rather than an absolute screening criterion. This interpretation is consistent with prior studies demonstrating that fellowship selection remains multifactorial, with letters of recommendation from subspecialty faculty, residency program reputation, and interview performance continuing to play major roles.[14–16] Accordingly, preference signaling should be incorporated as one component of a holistic review rather than used in isolation. For applicants, these findings also suggest that failure to signal a program should not be interpreted as

precluding an interview invitation, particularly because most program directors anticipated interviewing non-signaling applicants.

This study has several limitations. First, as a voluntary survey, it is subject to response bias, and program directors with stronger opinions regarding preference signaling may have been more likely to participate. Second, although 171 program directors completed the survey, this represents only a subset of the more than 500 orthopaedic fellowship programs in the United States and may not fully reflect national perspectives. Third, our analyses evaluated program directors' perceptions rather than objective outcomes, such as interview offers, applicant rankings, or match results. Finally, because this survey was conducted during the inaugural fellowship signaling cycle, program directors' perceptions and use of signaling may evolve as familiarity with the process increases.

Conclusion

The inaugural use of preference signaling in the fellowship match had mixed views among program directors. Despite the heterogeneity, fellowships programs with a larger volume of applicants had more favorable perceptions on signaling, and subspecialties with larger applicant volumes such as adult reconstruction and sports medicine had more favorable viewpoints on signaling. These findings suggest that signaling may be used as a mechanism to reduce the burden of reviewing applications in high volume fellowship programs and subspecialties.

Declarations

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None

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Tables

Table 1. Characteristics of responding orthopaedic fellowship programs (N=171).

Characteristic	Mean ± SD	Median (IQR)	Range	n (%)
Program characteristics				
Total applicants to program	68.4 ± 44.6	60 (32–90)	4–250	
Applicants who signaled program	19.2 ± 22.3	12 (6–27)	0–200	
Interview invitations extended	27.4 ± 12.6	25 (20–35)	2–85	
Accepted interviews from signaling applicants	13.4 ± 13.0	10 (5–20)	0–100	
Current fellows in program	2.0 ± 1.3	2 (1–3)	0–8	
Signal rate	0.28 ± 0.23	0.21 (0.14–0.39)	0.00–1.00	
Fellowship subspecialty				
Sports medicine				31 (18.1)
Trauma				23 (13.5)
Pediatrics				13 (7.6)
Arthroplasty				43 (25.1)
Tumor				2 (1.2)
Shoulder and elbow				7 (4.1)
Foot and ankle				25 (14.6)
Hand				11 (6.4)
Spine				16 (9.4)
Geographic region				
Northeast				39 (22.8)
Northwest				10 (5.8)
Midwest				53 (31.0)
Southeast				30 (17.5)

Characteristic	Mean ± SD	Median (IQR)	Range	n (%)
Southwest				39 (22.8)

IQR, interquartile range; SD, standard deviation. Signal rate was calculated as applicants who signaled the program divided by total applicants.

Table 2. Program director attitudes toward signaling

Item	Response	n (%)
Signaling improved the process	Yes / No	94 (55%) / 77 (45%)
Anticipate use next cycle	Yes / No	114 (67%) / 57 (33%)
Interview non-signalers next cycle	Yes	122 (71%)
	No / Not sure	16 (9%) / 33 (19%)
Usefulness for screening	Very important	24 (14%)
	Important	51 (30%)
	Neutral	35 (21%)
	Slightly important	22 (13%)
	Not important at all	39 (23%)
Anticipated importance next cycle	As important	96 (56%)
	More important	43 (25%)
	Less important	32 (19%)

Table 3. Attitudes toward signaling by orthopaedic fellowship subspecialty, ordered by perceived improvement in the application process.

Subspecialty	n	Improved, %	Anticipate use, %	Usefulness (1–5)	Median applicants
Arthroplasty	43	81%	81%	3.88	97
Sports medicine	31	77%	84%	3.52	90
Spine	16	62%	62%	3.12	52
Trauma	23	52%	70%	2.83	60
Tumor	2	50%	50%	4.00	26
Pediatrics	13	31%	69%	2.08	35
Hand	11	27%	55%	2.27	65
Foot and ankle	25	16%	32%	1.84	30
Shoulder and elbow	7	14%	43%	2.14	25

Usefulness was reverse-scored such that higher scores indicate greater perceived usefulness. Small subspecialty groups, particularly tumor (n=2) and shoulder and elbow (n=7), should be interpreted cautiously.

Table 4. Multivariable logistic regression models of program director attitudes toward signaling.

Outcome	Predictor	Adjusted OR	95% CI	P value
Anticipated use next cycle	Total applicants, per 10	1.30	1.13–1.48	<.001
	High-demand subspecialty	1.52	0.65–3.56	.339
Improved application process	Total applicants, per 10	1.14	1.03–1.26	.013
	High-demand subspecialty	4.18	1.90–9.22	<.001

High-demand subspecialty was defined as sports or arthroplasty. Total applicant volume was scaled per 10 additional applicants. OR, odds ratio; CI, confidence interval.

Figures

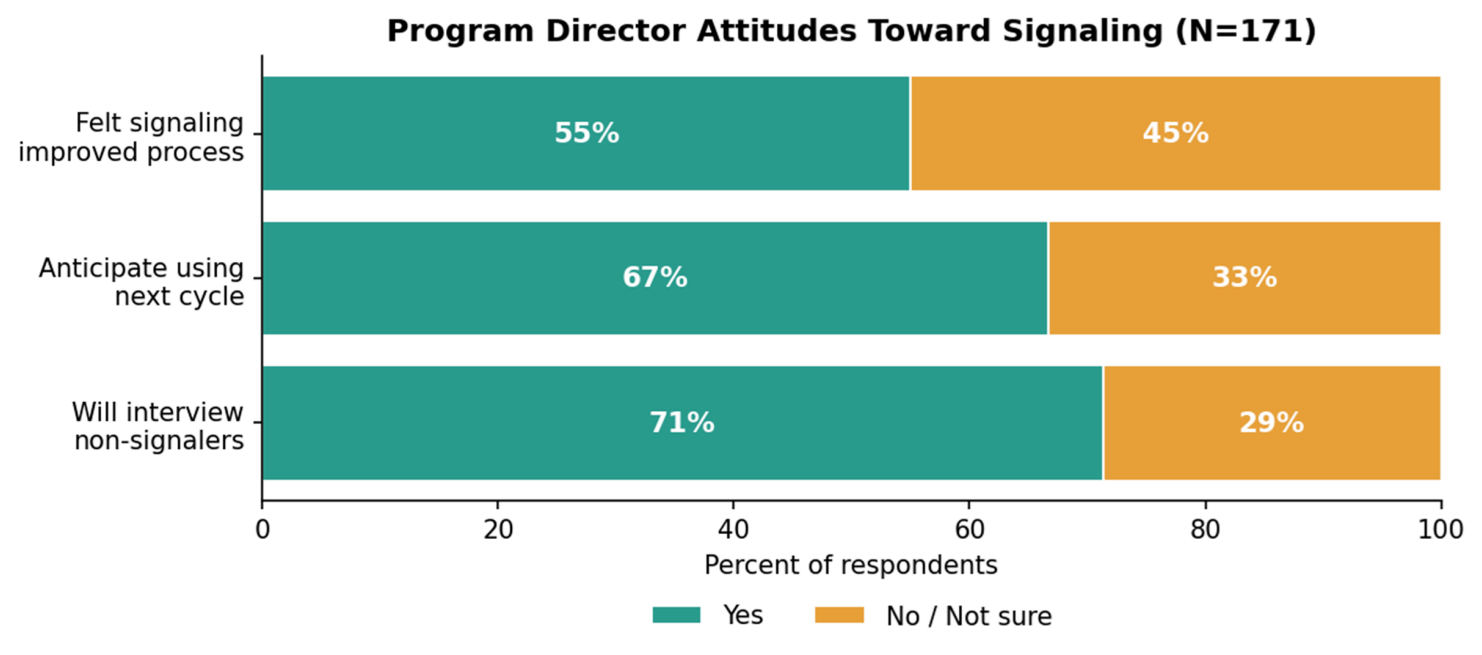


Figure 1

Program directors' perceptions of preference signaling during the inaugural orthopaedic fellowship application cycle. Bars represent the percentage of respondents selecting each response category.

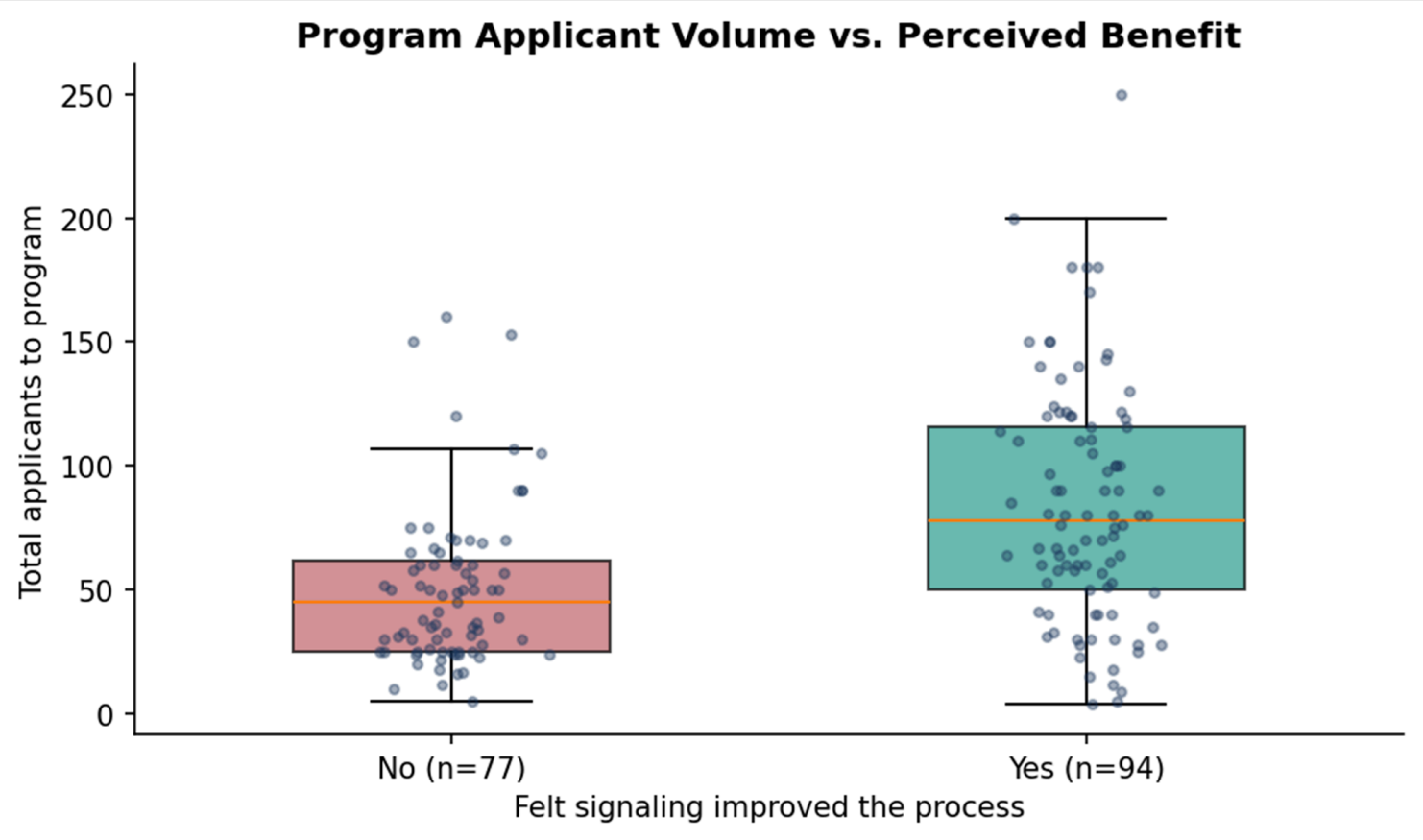


Figure 2

Perceived benefit of signaling in relation to the total applicants per program. Boxes represent the interquartile range (IQR), the horizontal line within each box indicates the median, whiskers represent 1.5 x IQR, and individual points represent single observations.

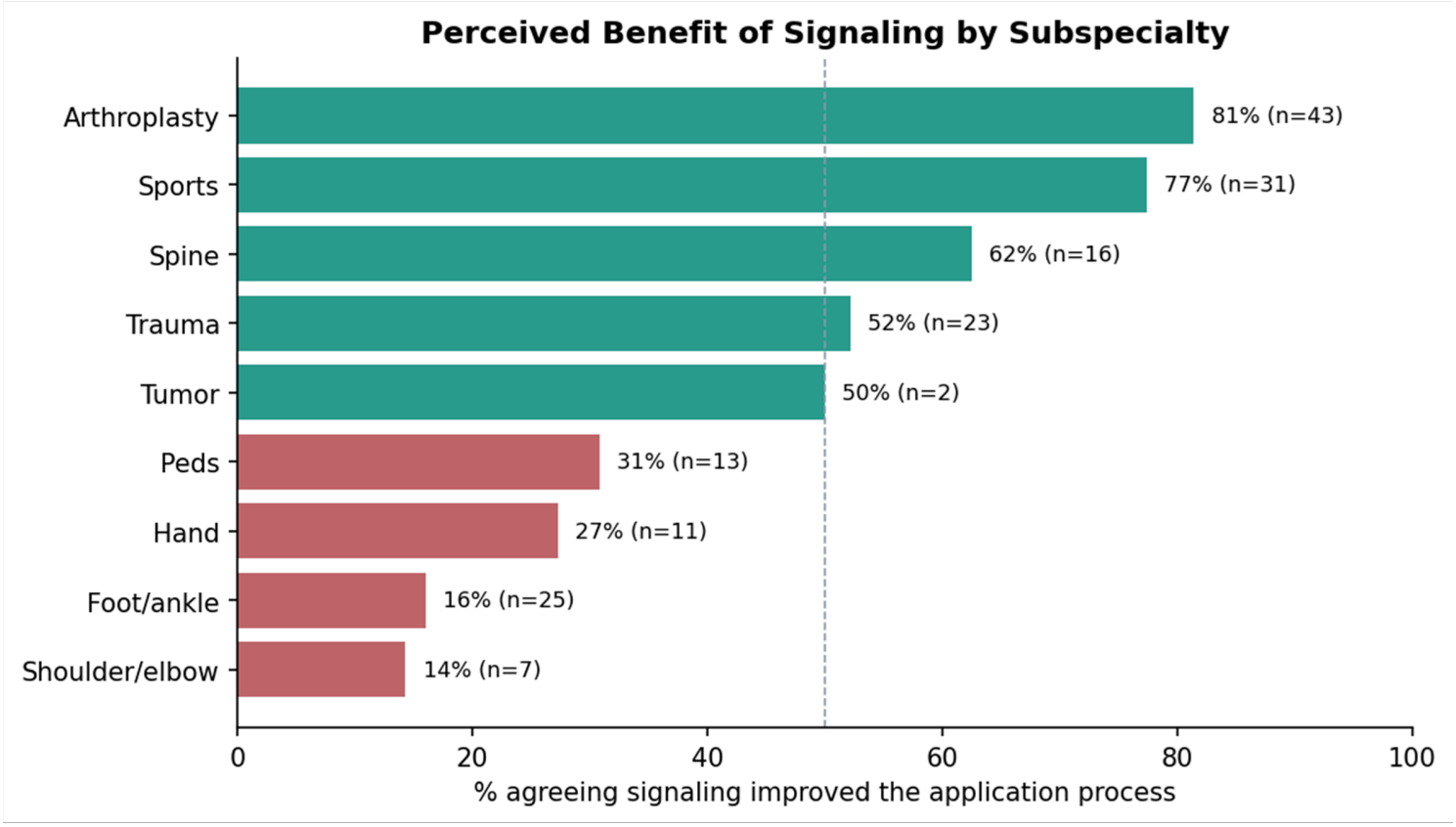


Figure 3

Perceived signaling benefit according to each subspecialty. Bars represent the percentage of respondents reporting signaling improved the application process. The vertical dashed line represents 50% of respondents. Green and red bars represent specialties with≥ 50% and < 50% agreement, respectively.