

THE ORTHOPAEDIC FORUM



ORTHOPAEDIC RESIDENT-SELECTION CRITERIA

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During the last several years, questions have been raised about the process and criteria that are used in the selection of applicants for orthopaedic residency programs, and it has been suggested that this process needs to be critically examined and revised¹⁻⁵. In an effort to improve the resident-selection process, the factors involved in the recruitment of residents have been extensively studied for over thirty years^{1,2,4,5-10}.

Most practical information about resident-selection criteria that is accessible to program directors, applicants, and medical school advisors is acquired from surveys of residency program directors⁵. However, there are limited data in the existing literature regarding the views of orthopaedic program directors on the criteria that are utilized to select residents. Wagoner and Suriano reported the most comprehensive data to date on resident-selection criteria, as assessed by program directors across fourteen different medical specialties; however, less than one-third of the orthopaedic directors who were sampled returned the questionnaire⁵. Clark et al. evaluated the characteristics of successful applicants to orthopaedic residency programs by reviewing the applications and letters of recommendations of orthopaedic residency candidates; however, in that study, there was no direct input from program directors³.

Criticism of deficiencies in the orthopaedic resident-selection process has continued to grow since 1984, when the Steering Committee on Resident Selection, sponsored by the American Orthopaedic Association, found that one in six resident selections made by orthopaedic program directors was thought to be inappropriate and that one in twelve was considered to be a serious mistake^{3,11,12}. Simon recently commented on the vexing nature of the orthopaedic resident-selection process by claiming: "I have not become better at it after twenty-five years."¹² Calls for an overhaul of the resident-selection process continue to intensify^{2,5,8,12}. An assessment of the orthopaedic literature reveals a serious lack of objective data that evaluate the resident-selection process across multiple programs. To best evaluate potential problems in the resident-selection process, an objective basis for making possible changes should first be established.

Evaluating the Resident-Selection Process: The Orthopaedic Residency Program Directors' Survey

In an effort to obtain objective data regarding orthopaedic resident-selection criteria, a study was performed at our institution with use of a two-part questionnaire¹³, which was mailed to the directors of 156 orthopaedic surgery

residency programs across the country. The first part of the questionnaire consisted of a list of twenty-six items to be rated, and the second part was a ten-question survey (Appendix). In the first part, respondents were asked to rate the importance of twenty-six separate criteria for resident selection on a scale of 1 to 10, with 10 indicating the most important. Items for the questionnaire were based initially on previous reports, in which resident-selection criteria that were used by program directors across multiple medical specialties were evaluated^{2,5,7}. A review of the orthopaedic literature provided additional specialty-specific selection criteria that had been found to be important in the application process^{3,13,14}. In the second part of the questionnaire, program directors were asked to answer four multiple-choice and four true-false questions regarding their opinions on the importance of the personal statement, membership in Alpha Omega Alpha, letters of recommendation, and the interview process. The program directors were also asked to indicate the percentage of current residents in their program who were members of Alpha Omega Alpha and the percentage of current residents who had completed a rotation as a medical student at their institution prior to the resident match.

A total of 109 (70%) of the 156 program directors completed and re-

turned the questionnaires. The results from the twenty-six-item rating list and the multiple-choice questions in the ten-question survey are presented in Tables I and II, respectively¹³.

What Selection Criteria Do Orthopaedic Program Directors Value Most?

Academic Criteria

Wagoner and Suriano found that, as a

specialty becomes more competitive, its residency programs rely more heavily on academic credentials when screening applicant pools^{1,5,6,9}. Orthopaedics, which ranks among the most competitive surgical subspecialties, has been shown to place the highest value on objective criteria, such as United States Medical Licensing Examination (USMLE) scores, class rank, and membership in Alpha Omega Alpha, in

screening applicants for residency programs^{3,5,6,13}. Orthopaedic program directors are particularly prone to emphasize the value of the applicant's cognitive knowledge. This is demonstrated by the Residency Review Committee's requirement that, to maintain accreditation, orthopaedic surgery residency programs must have a pass rate of $\geq 75\%$ on the Part-I certification examination of the American Board of

TABLE I Ranking of the Twenty-six Resident-Selection Criteria According to the Results of the Questionnaire Completed by Orthopaedic Residency Program Directors

Rank	Score*	Resident-Selection Criteria
1	7.88 ± 1.71 (n = 109)	Rotation at director's institution
2	7.78 ± 1.48 (n = 109)	USMLE Part-I score
3	7.77 ± 1.34 (n = 108)	Rank in medical school
4	7.55 ± 1.57 (n = 109)	Formality/politeness at interview
5	7.35 ± 1.39 (n = 109)	Personal appearance of candidate
6	7.11 ± 2.12 (n = 102)	Performance on ethical questions at interview
7	7.01 ± 1.94 (n = 108)	Letter of recommendation by orthopaedic surgeon
8	6.92 ± 1.90 (n = 109)	Candidate is Alpha Omega Alpha member
9	6.47 ± 1.71 (n = 109)	Medical school reputation
10	6.25 ± 2.10 (n = 109)	Dean's letter
11	5.84 ± 2.26 (n = 108)	Personal statement
12	5.74 ± 2.56 (n = 107)	Failed first attempt at matching to an orthopaedic residency program
13	5.67 ± 2.46 (n = 106)	Telephone call placed on candidate's behalf
14	5.66 ± 1.97 (n = 109)	Candidate has published research
15	5.50 ± 2.14 (n = 108)	Candidate participated in a dedicated research experience
16	5.13 ± 1.89 (n = 108)	Letter of recommendation from nonorthopaedic surgeon
17	4.93 ± 2.20 (n = 109)	Candidate is MD/PhD
18	4.83 ± 2.13 (n = 109)	Reputation of undergraduate institution
19	4.61 ± 2.38 (n = 108)	Undergraduate grade-point average
20	4.44 ± 2.16 (n = 107)	Appearance of curriculum vitae
21	4.30 ± 2.15 (n = 109)	Letter of recommendation from a senior resident
22	3.94 ± 2.48 (n = 109)	Candidate has a relative affiliated with director's program
23	3.56 ± 2.12 (n = 108)	Candidate has an undergraduate engineering major
24	3.26 ± 2.41 (n = 108)	Thank-you letter from candidate
25	2.32 ± 2.22 (n = 66)	Performance on manual skills testing during interview
26	1.78 ± 1.76 (n = 64)	Evaluation by psychologist/psychiatrist during interview

*The values are given as the mean and the standard deviation. N = number of respondents.

Orthopaedic Surgeons by residents who take it for the first time^{12,15}. Our study supports the notion that program directors highly value candidates' academic credentials, because USMLE scores, medical school class rank, and Alpha Omega Alpha membership were all among their top ten selection criteria¹³ (Table I).

Clark et al. reported that membership in Alpha Omega Alpha was one of the strongest predictors of a successful application to an orthopaedic residency program; however, <20% of the successful candidates in their study were members⁵. Wagoner and Suriano concluded that membership in Alpha Omega Alpha is likely to

carry considerable weight with orthopaedic program directors in the initial screening of large candidate pools⁵. Simon remarked on the orthopaedic program directors' utilization of USMLE scores and Alpha Omega Alpha membership status when deciding on which applicants to select for interviews¹². Our study found that the majority (54%) of residents who matched to orthopaedic programs during the last three years were members of Alpha Omega Alpha. Furthermore, a majority (65%) of the responding program directors in our study reported that $\geq 50\%$ of their matching residents during the past three years were members of Alpha

Omega Alpha¹³. Membership in Alpha Omega Alpha continues to be highly valued by orthopaedic residency program directors, as is evident from these percentages and by its rating among the top ten selection criteria in the first part of our questionnaire¹³ (Table I). However, membership in Alpha Omega Alpha is certainly not a requirement for gaining admission to an orthopaedic residency program as 30% of the program directors in our study evaluated candidates regardless of their membership status¹³ (Table II).

The Medical Student Orthopaedic Clerkship

Performing a medical school rotation in

TABLE II Responses to the Four Multiple-Choice Questions on the Program Directors' Survey

	Distribution of Responses*
Question 1 (n = 105)	
The most important aspect of a letter of recommendation is that :	
The letter is written by an orthopaedic surgeon	2%
The letter is written by a well-known orthopaedic surgeon	10%
The letter is overwhelmingly positive	34%
The letter is written by someone whom I know	54%
Question 2 (n = 105)	
The most important aspect of a personal statement is:	
To gain insight into the applicant's decision to pursue orthopaedics	6%
To gain insight into the applicant's ability to write and to communicate effectively	32%
To learn more about the candidate's personal interests and background	43%
I do not feel that the personal statement is very important in candidate evaluation	19%
Question 3 (n = 107)	
The interview process at our institution can best be characterized as having:	
Emphasis on getting to know the applicant	99%
Emphasis on problem-solving and/or manual skills	0%
Emphasis on ethical issues	1%
Emphasis on psychological testing	0%
Question 4 (n = 107)	
How important is AOA membership when evaluating candidates?†	
Only applicants who are AOA members are offered an interview	1%
>75% of the candidates offered interviews are AOA members	26%
50% to 75% of the candidates offered interviews are AOA members	29%
<50% of candidates offered interviews are AOA members	14%
Candidates are evaluated regardless of their AOA status	30%

*N = number of program directors responding. †AOA = Alpha Omega Alpha.

orthopaedic surgery at the program director's institution was rated the most important selection criterion by program directors in our study¹³. Wagoner and Suriano reported comparable results in their study of the ranking of academic criteria in resident selection by program directors⁵. They found that the most important academic criterion was the grade that the candidates received in their orthopaedic senior elective⁵. Simon argued that a candidate's best chance of matching to an orthopaedic residency program that sponsors a medical student clerkship is to perform the clerkship at that institution¹². In 1986, Wagoner et al. found that 86% of the program directors in different medical and surgical specialties gave preference to students who had done well in an elective in the program director's specialty and hospital⁹. The wealth of literature highlighting the importance of a medical school clerkship raises concern about the impact of the residency application process on the students' education, since students may spend a considerable portion of their senior year taking electives in the specialty and at the hospital that they hope to match for their postgraduate training^{9,16}. Concerns regarding the consequences of students' using their senior-year electives to "audition" at desirable residency programs at the expense of a well-rounded medical education are discussed below^{2,5,16}. However, the results of our study further emphasized the value that orthopaedic program directors place on a rotation in the director's specialty and hospital¹³. In addition to giving a rotation at the director's institution the highest ranking among all of the selection criteria, the responding program directors reported that the majority (56%) of residents who matched to their orthopaedic program during the previous three years had performed a rotation in orthopaedics at their institution while attending medical school¹³.

The Interview

The interview has been heralded as the single most important selection crite-

on in previous surveys of program directors in different medical specialties^{8,9}. However, in more recent literature, the interview process has been highly criticized. Clark et al. reported that the personal interview was a very unreliable predictor of the future performance of residents, even after careful efforts were made to structure the interview so that a more uniform evaluation of the candidates was possible^{3,4,17}. Simon disparaged the current interview process used to screen applicants to orthopaedic residency programs, calling them "fly-by" interviews that give no indication of the ethics and professionalism of the candidate¹². The results of our study suggest that program directors do place substantial value on the interview process, especially with regard to its potential in the evaluation of a candidate's formality, politeness, ethical reasoning, and personal appearance¹³ (Table I). All but one director in our survey reported that the interview process at their institution was geared toward getting to know the applicant¹³ (Table II). Although it is clear that directors highly value aspects of the personal interview, the efficacy of the current interview process in predicting the performance of future residents remains very much in question^{3,4,12}.

Scherl et al. stated that the interview process can be evaluated in one of two ways: either as independent from the chart review (i.e., the playing field is leveled among the candidates who are invited to the interview) or as one component of a system that incorporates both the interview and the chart review⁶. We found that most orthopaedic residency programs fall into the latter group, as only 22% of the responding program directors thought that their interview committee considers candidates to be on equal footing once they have been selected for an interview¹³. In an effort to better quantify differences in the interview process among orthopaedic residency programs, we found that 2% of the programs had a psychiatrist or psychologist on their selection committee, 5% included testing of manual skills as

part of the interview process, and 18% used clinical scenarios during the interview process¹³.

Letters of Recommendation

Authors of multiple studies have criticized the use of letters of recommendation in the resident-selection process^{3,10}. Clark et al. indicated that reference letters are virtually all laudatory, seldom contain useful information, and have not been found to correlate with the resident's performance^{3,18}. Dirschl and Adams measured the interobserver reliability of faculty evaluations of letters recommending applicants for an orthopaedic training program and found variability among the faculty members' interpretations of the letters¹⁹. Deans' letters have been described as vague, inconsistent, and unreliable predictors of a resident's performance^{9,18,20}. Regardless of critical reports, letters of recommendation are still considered by many authors to be valuable in the screening of applicants^{3,4,10,21}. Similar to findings in prior reports, we found that letters of recommendation are considered most meaningful when they are written by faculty who are within the specialty that the candidate is applying to or are known personally by the program director^{6,12,13}.

The "Holy Grail" of the Resident-Selection Committee: Are There Effective Predictors of a Resident's Performance?

Resident-selection committees have long sought to predict the performance of future residents but have had little documented success in doing so^{3,14,18}. Academic criteria, letters of recommendation, and the applicant interview have all been criticized as being unreliable predictors of an applicant's performance during his or her residency^{3,12,14}. On the contrary, attributes (characteristics or qualities) that constitute an applicant's affective domain, such as integrity, reliability, diligence, commitment, respect, and interpersonal skills, are now being heralded as important predictors of a resident's performance^{12,14,22,23}. But what exactly is the affective domain, and how can it best be measured?

Ethics, Professionalism, and Communication Skills: The Importance of the Affective Domain

Applicants' personal and professional values are often referred to in educational terminology as their affective domain^{3,24}. Since Lippert et al.²⁴ introduced this concept into the orthopaedic literature in 1983, support for its importance has continued to grow. Clark et al. suggested that a deficiency in the affective domain is the most common factor leading to discipline or dismissal of a resident, and the affective behavior of an individual may be the most important indicator of his or her ability to function professionally as an orthopaedic surgeon^{3,24}. As a result of their findings in 1989, Clark et al. questioned the relative lack of attention given to an applicant's character and personality traits during the selection process³. Dale et al. found that a considerable number of applicants to orthopaedic residency programs falsified research citations on their applications²⁵. Those authors emphasized the seriousness of such misrepresentation by applicants and the potential consequences; furthermore, they urged orthopaedic residency programs to address the misrepresentation in a manner that leaves no doubt as to the program's standard of integrity²⁵. Wagoner and Suriano urged medical students to be as concerned with their personal and professional development as they are with their academic achievements, given the strong consideration that program directors ascribe to factors that comprise the affective domain of the candidate⁵.

While most sources agree on the importance of a candidate's affective domain, they continue to be ambiguous about the best way to assess it. A reasonable approach to the evaluation of a candidate's affective domain may begin with personal interaction and direct observation^{3,22,26}. We found that program directors placed substantial weight on selection criteria that involved personal interaction with, and direct observation of, the applicant. In our survey, four of the six selection criteria that were rated most highly by program di-

rectors either directly evaluated a component of the candidate's personal and professional values or allowed for personal interaction with the candidate (Table I)¹³. Performing a clerkship at the program director's institution, which arguably provides the best current method for prolonged evaluation of a candidate's ethics, professionalism, and communication skills, was rated the most important criterion by program directors in our study (Table I)¹³.

Our findings may support the already troubling scenario in which applicants invest a large portion of their fourth year of medical school in "audition" clerkships in orthopaedics. Prior reports have strongly supported the belief that residency candidates cannot and should not assume numerous "audition" clerkships throughout their fourth year of medical school^{7,12}. We believe that resident-selection committees must find an appropriate method to evaluate a candidate's personal and professional values without requiring the student to complete a clerkship in their program. The personal interview, in its present form, does not appear to be a solution. As mentioned previously, the interview process that is used in orthopaedic resident selection today has been highly criticized as an unreliable and ineffective method for evaluating an applicant's ethics or professionalism^{3,4,12,17}. These observations beg the question, what are the alternatives to "audition" clerkships for obtaining an effective and efficient evaluation of a candidate's affective domain?

Objectifying the Subjective: Can the Affective Domain Be Measured?

Unfortunately, we have not found any easy answers to the questions surrounding the measurement of a candidate's affective domain. The relatively subjective nature of evaluating one's personal and professional values has made comparisons between the affective domains of different candidates difficult. Survey instruments have been used to evaluate orthopaedic surgeons and residents with respect to their knowledge of clinical

ethics; however, such studies do not measure ethical behavior²⁶. A candidate may understand how to act in a professional and ethical manner, but that does not mean that he or she will actually act that way^{14,27}. A more promising approach may involve the evaluation of a candidate's moral reasoning.

In the orthopaedic literature, Self and Baldwin reported on the assessment of applicants' moral reasoning as a potential predictor of their clinical performance¹⁴. They evaluated numerous published studies that had used a twenty to thirty-minute, objective paper-and-pencil test called the Defining Issues Test of Rest to assess moral reasoning^{14,28}. This early research suggested that superior moral reasoning does serve as an effective predictor of superior clinical performance and that moral reasoning can be assessed by an objective paper-and-pencil test¹⁴. Given the weight that resident-selection committees might give to such an examination, broader testing and longitudinal follow-up of tested students is merited before the use of such an instrument in the resident-selection process can be recommended¹⁴. Fueled by the encouraging results of the studies on the evaluation of moral reasoning, a further exploration of objective ways to measure the qualities that constitute a candidate's affective domain may be warranted as well^{14,20,24}.

Choosing the Right Residents: A Call for Help

The specialty of orthopaedic surgery annually fills a higher percentage of first-year positions through the National Residency Matching Program than any other specialty^{6,13,29}. Moreover, the number of applicants to orthopaedic residency programs consistently exceeds the available number of positions each year. In 2000, there were 1116 applicants for 554 postgraduate year-one (PGY-1) orthopaedic positions⁶. An oversupply of outstanding applicants creates intense competition among medical students for the limited number of these positions. This process overwhelms the resident-selection com-

mittees as well. Simon estimated that most orthopaedic residency programs receive nearly 100 applications from American medical school graduates for each position¹². The current system places too much emphasis on cognitive knowledge, including grades and USMLE scores, during the initial chart-screening process^{5,12,30}. The interview, letters of recommendation, and the personal statement have all been criticized for being inadequate methods for providing a proper evaluation of an applicant's affective domain^{3,4,12,13,17,19,20}. Although the evaluation of a candidate during a clinical clerkship may provide a good opportunity to examine a candidate's personal and professional values, it is not feasible or desirable for candidates to perform rotations at all of the programs to which they apply. The current resident-selection system has reached a point at which a substantial overhaul should be considered.

We agree with Simon's suggestion that professional help is needed in the resident-selection process. Program directors are not usually chosen for their ability to predict which candidates will make the best residents. A logical start would involve an organized approach by the American Orthopaedic Association and/or the American Academy of Orthopaedic Surgeons to educate members of resident-selection committees across the country about how to interview and select individuals who have high standards of ethics and professionalism¹².

Professional help in the resident-selection process ought not to be limited to the education of the resident-selection committee alone. The business industry relies on its human resources departments for expert advice on whom to hire. Similarly, legal teams often hire "jury experts" to gain a potential advantage during the jury selection process. Are orthopaedic resident-selection committees neglecting the potential for professional help? In our study, only 2% of the programs used a psychologist or psychiatrist in the personal interview process¹³. At the very least, the use of a

professional consultant in assessing applicants' personalities during the resident-selection process warrants further investigation.

Recommendations for selecting orthopaedic residency applicants with high moral and ethical values are nothing new^{3,14,31}. Strategies to better achieve this goal, however, remain rooted in their infancy. We hope that the data from our survey of program directors provide a foundation that residency programs can use to better evaluate their own selection process. As future developments in the field of orthopaedics will ultimately be a product of the applicants whom we accept today, a sustained and organized effort to improve upon the resident-selection process remains as vital as ever.

Appendix

 The twenty-six-item questionnaire and the ten-question program director survey are available with the electronic versions of this article, on our web site at www.jbjs.org (go to the article citation and click on "Supplementary Material") and on our quarterly CD-ROM (call our subscription department, at 781-449-9780, to order the CD-ROM).

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