

Ophthalmology Resident Selection: Current Trends in Selection Criteria and Improving the Process

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Objective: To document and assess current ophthalmology resident selection practices as well as to initiate discussion on how best to improve the process.

Design: Online survey comprising 56 questions.

Participants: Program directors, chairpersons, or members of the resident selection committee representing 65 United States ophthalmology residency programs accredited by the Accreditation Council on Graduate Medical Education.

Methods: Study participants completed an online, anonymous survey consisting primarily of multiple choice questions, with single or multiple answers.

Main Outcome Measures: Ophthalmology resident selection practices were evaluated and included: screening of applications, interview processes, selection factors, and formation of rank lists; recommendations given to applicants; and respondent satisfaction with the current selection process.

Results: As a group, survey respondents deemed the following factors most important in resident selection: interview performance (95.4%), clinical course grades (93.9%), letters of recommendation (83.1%), and board scores (80%). Statistical analyses deemed that the best predictors of resident performance are interviews, clinical course grades, recommendation letters, and ophthalmology rotation performance.

Conclusions: Ophthalmology resident selection is a relatively subjective process, continuing to rely heavily on cognitive factors. Because these factors are not always indicative of ultimate resident quality, it would be helpful if ophthalmology training programs improved selection practices to discern who most likely will become a successful resident and future ophthalmologist. Long-term studies correlating applicant attributes with residency and postresidency success are needed to recommend guidelines for a more standardized selection process.

Financial Disclosure(s): The author(s) have no proprietary or commercial interest in any materials discussed in this article. *Ophthalmology* 2010;117:1041–1047 © 2010 by the American Academy of Ophthalmology.

Studies across a number of medical specialties have shown the limited value of traditional cognitive measures (e.g., grades, reputation of medical school, United States Medical Licensing Examination [USMLE] scores) in predicting overall resident success. These cognitive measures may predict in-service and board examination performance (*Acad Med* 68 [2 Suppl]:S51–6, 1993)^{1–5}; however, noncognitive measures (personal traits such as work ethic and professionalism) may be equally or more predictive of overall resident performance across a number of specialties.⁶ The literature also suggests that reliability of noncognitive measures, at least in medical school admissions, has been problematic.⁷ After reviewing the literature, Lee et al⁶ reported that cognitive measures may be relied on far too heavily in competitive specialties such as ophthalmology.^{6,8,9} They proposed an implementation strategy to reengineer and improve the resident selection process in ophthalmology and to develop assessments that may be predictive of downstream resident performance.

The most common current resident selection practices among ophthalmology departments have not been reported. Obviously, there is variability in the type of applicants

sought out by each program, and there likely are a variety of methods for resident selection used by programs across the United States. The examination of how programs screen, interview, and rank applicants may yield useful information for improving the overall process. Ultimately, it would be desirable to be able to identify the following: (1) which applicants are most likely to thrive as residents in a given program; (2) which applicants perform well as future ophthalmologists and academicians; (3) which applicants display the highest level of professionalism, as demonstrated through a foundation of clinical competence, communication skills, and ethical and legal understanding; and (4) which applicants have the aspiration to excellence, humanism, accountability, and altruism.¹⁰ Similarly, it would be extremely valuable if we could identify which applicants are more likely to become problem residents or incompetent ophthalmologists.

To that end, this survey study was designed to obtain baseline data concerning the ophthalmology resident selection process. The expectation is for these results to serve as a starting point for future efforts aimed at revising the resident selection process which may lead to selection of

residents who are able to provide a higher level of care to patients and will contribute more to the practice and accumulation of new knowledge in the field of ophthalmology.

Materials and Methods

Survey

This study was granted exempt status by the Institutional Review Board of the University of Pennsylvania Health System. A survey consisting of 56 questions regarding residency applicant selection criteria and processes was created on SurveyMonkey.com. Nine questions pertained to demographic data, 11 to initial screening practices, 17 to structure of interview day and interview format, 4 to selection factors, 7 to formation of the rank list, 5 to advice given to applicants, and 3 to satisfaction level with current selection process. Some questions had multiple parts. All were multiple choice questions, some with a single answer (response) possible and some with multiple responses possible. Some questions provided the opportunity for additional comment. The questions were developed first independently by 2 of the authors (NJV and TU) and then refined with input from 2 other authors (SN and PJT). Specific wording was agreed on before administering the survey to ensure that the expected information would be extracted. The survey was administered to ophthalmology residency program directors, department chairpersons, or members of the resident selection committees at participating institutions. All responses were kept completely anonymous. Subjects were recruited using a single e-mail sent to a listserv of all 119 ophthalmology residency program directors in the United States. No inducements were provided for completion of the survey. A brief statement describing the intended use of data gathered from the survey informed respondents that their participation constituted their voluntary consent to the study.

Statistical Analysis

Two-tailed unpaired *t* tests were performed to assess significance of multiple binary factors in the resident selection process in association with respondent belief in predictive value of rank lists for resident performance. Pearson correlation coefficients were computed for various factors to determine their association with perceived predictive value of rank lists for resident performance. *P* values for correlation coefficients were computed using the Student *t* distribution. Only factors found to be statistically significant ($P < 0.05$) are detailed in "Results."

An estimate of optimal weights on applicant characteristics based on their value in predicting resident performance was generated as follows. Part 1 of question 49 (Table 1) of the survey asked respondents to estimate the correlation between their applicant rankings and subsequent resident performance within their programs. As such, these correlation estimates represent the coefficients of a linear model of perceived resident performance as a function of the importance assigned by respondents to various applicant characteristics. An extensive set of applicant character-

Table 1. Part 1 of Question 49 of Survey

49. Please rate your feelings about the following statements (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, (5) strongly agree:
1. I have found there has been a strong correlation between the highest ranked applicants in our program and our best performers during residency.

Table 2. Question 16 of Survey

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| 16. In considering resident applicants please rate how each of the following factors feature in your decision making process: (1) relatively unimportant, (2) somewhat important, (3) of average importance, (4) very important, or (5) probably among the most important information. |
| 1. College attended and college GPA |
| 2. Medical School attended |
| 3. Preclinical course grades in med school |
| 4. Clinical course grades in medical school (i.e., honors in medicine and surgery) |
| 5. AOA status |
| 6. Recommendation letters |
| 7. Dean's letter |
| 8. Board scores |
| 9. Scholarly activity |
| 10. Having a PhD |
| 11. Research activity |
| 12. Personal statement |
| 13. Career objectives/goals |
| 14. Honors and awards |
| 15. Extracurricular activities |
| 16. International and/or community service history |
| 17. Performance on interview |
| 18. Likelihood to come (i.e., fit for your program, geographic considerations) |
| 19. Performance on elective or student rotation in your department |
| 20. Legacy in your program |
| 21. Parent is an ophthalmologist |
| 22. Musical ability |
| 23. Leader or high achiever in sports |
| 24. Phone calls to colleagues |
| 25. Personal contact to you by a colleague |

AOA = American Optometric Association; GPA = grade point average; PhD = Doctor of Philosophy.

istics and the relative weights placed on each were explored in question 16 (Table 2). A linear combination of the correlation estimate vector with the matrix of respondent weights on applicant characteristics (yielded by question 16) generated the predictions of the linear model discussed above. These predictions are estimates of the optimal weights on applicant characteristics for maximization of resident performance. Matlab (The Mathworks, Inc., Natick, MA) was used to perform these computations.

Results

Response Rate and Respondent Demographics

A total of 65 individuals (each from a different institution) participated in the study, representing 55% of the 119 Accreditation Council for Graduate Medical Education accredited residency programs: 75.4% were program directors, 7.7% were chairs, 3.1% were both program directors and chairs, and 13.8% were neither program directors nor chairs but served on the resident selection committee. The greatest number of responses came from Northeast/Mid-Atlantic programs (43.1%) and Midwestern program (24.6%). There was a wide range in the size of the participating programs with 27 (41.5%) offering 2 to 3 residency positions per year, 24 (36.9%) offering 4 to 5 positions, and 14 (21.5%) offering 6 or more positions. Forty-one (67.2%) of 61 programs received 300 or more applications in 2007 and 23 (37.7%) of 61 programs received 400 or more applications. Twenty-nine (48.3%) of 60 respondents reported an increased number of applications compared with prior years (not all respondents answered every question).

Initial Screening

On average, programs reported interviewing 10% to 20% of their applicants. The vast majority of programs (87.7%) rank more than 75% of those applicants interviewed, with 56.9% ranking over 90% of applicants.

Twenty-five percent of programs include a nonfaculty, nonphysician member (e.g., education coordinator) in the screening process for first pass review. In most programs (51.6%), a committee shares the responsibility of reviewing applications, and 20.3% of programs have all applications reviewed by the program director. Most programs (64.5%) do not provide screeners of applications with specific guidelines for selection. Eighty-six percent of programs offer interviews to all of their own medical students. When screening, only 11% group applicants by medical school. Most programs (51.6%) routinely interview most applicants who do audition electives at their institutions. A cutoff for USMLE board scores was used by 28.6% of respondents; 16 (89%) of 18 such programs use a 2-digit cutoff of 80 to 90, 1 uses a cutoff of 95, and 1 uses a cutoff of 97. Half of programs with a USMLE board score cutoff offered 2 to 3 positions per year, and the other half offered 4 or more. Many programs reported occasionally (52%) or very often (16%) offering interviews to applicants who did not make the cutoff but for whom a colleague contacts them and makes a personal appeal. However, 8% reported never doing this. Most programs (53.2%) never ask fellow program directors which students from their institutions are worthy of an interview. However, many (43.5%) rarely or occasionally do so, and 2 (3.2%) of 62 programs reported they always or often do so.

As a group, survey respondents rated the following selection factors as very important or among the most important information: interview performance (95.4%), clinical course grades (93.9%), recommendation letters (83.1%), and board scores (80.0%). The following factors were considered least important: musical ability; having a parent as an ophthalmologist, leader, or high achiever in sports; and having a PhD. Eighty-six percent of respondents believe that having a PhD is not important (38%) or of little (17%) or average (31%) importance. In addition, only 7 (11.5%) of 61 respondents believe that having a PhD correlated strongly with ultimately choosing an academic career.

The Interview

As stated previously, the greatest weight was given to interview performance. However, interview styles vary greatly from program to program. Most programs offer interviews on Fridays (56%), Mondays (39.1%), weekends (37.5%), or a combination thereof. Forty-two percent offer 3 interview dates, and 23% offer 4 or more interview dates. The greatest number of respondents (38.1%) reported that the total amount of time spent interviewing each applicant was 1 hour or more, and 33.3% reported a total amount of 15 minutes. Most (57.8%) conduct interviews with 1 (28.1%) or 2 (29.7%) faculty members per applicant, but a large number (42.2%) have 3 or more faculty members and 3.1% have 7 or more faculty members interview each applicant. In 87% of programs, the program director interviews every applicant; in 71%, the chair interviews every applicant; in 64%, all committee members interview all candidates. Only 3.3% reported giving specific assignments during the interview (e.g., one interview group talks about career plans and another about hobbies and interests, etc.). Most (79%) reported not providing interviewers with specific guidelines for selection. Six (9.2%) of 65 programs require an eye examination, and 2 (3.1%) test manual dexterity of interviewees.

Of the information obtained during the interview, respondents ranked as most important the likelihood of the applicant to fit in

and the applicant's facility in discussing his or her application. The possibility of unearthing a weakness in the application, the applicant's thoughts about his or her career plans, and how well the applicant responded to stressful questions were moderately important.

Most programs (57%) reported including a social event (in addition to breakfast or lunch) with residents, but without faculty, and 33% included both residents and faculty in the event. Ninety-four percent of programs provide a formal informational session for applicants (92% with a presentation by the program director and 65% with a presentation by the chair), and 95% offer a tour. Ninety-seven percent of programs unofficially involve residents in the selection process (e.g., feedback from tours and social events). Fifty-nine percent of programs formally involve residents in interviews, and in 70% of these programs, residents are voting members of the selection committee.

Letters of Recommendation

Seventy percent believe that the most important letters are written by other ophthalmologists, especially writers known to the committee. Certain buzz words (e.g., superior, outstanding, top 5%) are viewed as important but not critical, but 80% of respondents reported wanting a standardized letter.

Ranking

Fifty-six percent reported their selection committee members ranked applicants at the end of each interview day, although 54% reported that the final rank list was not a numerical combination of those rank lists. Thirty-six percent reported that the rank list is often or usually refined by the program director, 36% reported frequent modification by the chair, and 28% reported frequent modification by both the program director and the chair. When finalizing their rank list, 16% of respondents often or always contact colleagues for input, 53% occasionally or rarely contact colleagues, and 31% never do. Only 14% expect or desire thank you letters, and only 3% are influenced by letters stating that their program is the candidate's first choice. Sixty-nine percent of respondents reported that based on their recollection of their performance as a medical student, they believed that they would likely interview and match at their own program today.

Recommendations Given to Applicants

In considering recommendations given to applicants, 73.7% encouraged highly qualified applicants to apply to 10 to 20 programs, 59.6% encouraged average or solid applicants to apply to 21 to 30 programs, and 43.6% encouraged lower-end applicants to apply to 31 to 40 programs. Most programs (60.7%) recommended that applicants attend 6 to 10 interviews. A year of research before applying to residency was viewed by 64% as helpful for pushing a borderline applicant into the matched pool, by 25% as making a good application into a great application, and by 30% as being of little value in improving the chance of matching. Many (41%) believe a year of research should be carried out only if a student is truly interested in a research or academic career.

The vast majority of programs (73%; 44 of 60) do not have a required rotation in ophthalmology. However, the largest programs were more likely to have a required a rotation in ophthalmology: 46% of large programs (6 or more positions) and 20% of small programs (2–3 positions). Overall, 40% of respondents reported strongly encouraging students to complete audition electives and 46.7% reported doing so only in special circumstances (e.g., geographic restrictions for matching). However, of respondents from the largest programs, only 23.1% encouraged students to complete

audition electives, and 61.5% do so only in special circumstances. Respondents reported encouraging applicants to obtain recommendation letters from ophthalmologists in their own departments (97%), a research preceptor (59%), a subinternship attending (44%), a second member of their department (43%), or a combination thereof.

Respondent Satisfaction

Forty-two (65.6%) of 64 preferred the current system of early match separated from the National Resident Match Program. Eighty-one percent of those surveyed are satisfied (25.4% neutral and 55.6% pleased) with the Centralized Application Service, and only 14.3% require supplemental application materials specific to their institution. Satisfaction with the Centralized Application Service was correlated significantly with satisfaction with the rank list's predictive value of best performers in residency ($P = 0.0240$).

In addition, 47.6% believe that the Centralized Application Service organized material in a user-friendly fashion, and 38.1% are happy with the subheadings and presentation of material. However, 75.0% reported that they preferred an interactive, online database that allowed applications to be sorted and grouped by selected criteria and reviewed online. More than 95% of respondents believe that much of the information they need could be condensed to a single page (schools, board scores, grade point average, honors and awards, American Optometric Association membership, publications, letter writers). Additionally, 80% of respondents reported wanting a standardized letter including information such as length and type of contact with the applicant, specific strengths, specific weaknesses, suitability of the candidate for the letter writer's own program, and some estimate of where this applicant stands compared with other applicants whom the letter writer has supported. A statistically significant correlation

was found between those who provided interviewers with specific guidelines for selection and satisfaction with the rank list's predictive value of best performers in residency ($P = 0.0212$).

Current resident selection practices may be flawed. Only 29 (47.5%) of 61 respondents agreed or strongly agreed that there has been a strong correlation between the highest ranked applicants and the best performers during residency. Only 23 (37.7%) of 61 agreed or strongly agreed that there has been a strong correlation between the highest ranked applicants and the best performers subsequent to residency. There was a statistically significant correlation between those who believed that the highest ranked applicants were the best performers during residency and those who believed that these applicants were the best performers subsequent to residency ($r = 0.8228$; $P = 7.3 \times 10^{-15}$). However, 65% of respondents reported that there is very little difference among the top 20 applicants ranked and that they would probably be happy with any of them, whereas 25% disagreed with this statement. The vast majority (58%) reported being much more comfortable ranking and matching an applicant with whom they had had contact during a rotation. To determine which applicant characteristics were most predictive of perceived performance as a resident, a weighted sum was performed as detailed previously in "Materials and Methods." The results of this analysis (Fig 1) demonstrate that the most importance likely should be placed on interviews, clinical course grades, recommendation letters, and ophthalmology rotation performance. United States Medical Licensing Examination scores were ranked as less important than these 4 in perceived predictive value for resident performance.

Discussion

The present study documents current practices in resident selection among ophthalmology residency programs in an

Computed Optimal Weights of Applicant Characteristics Based on Perceived Performance as a Resident

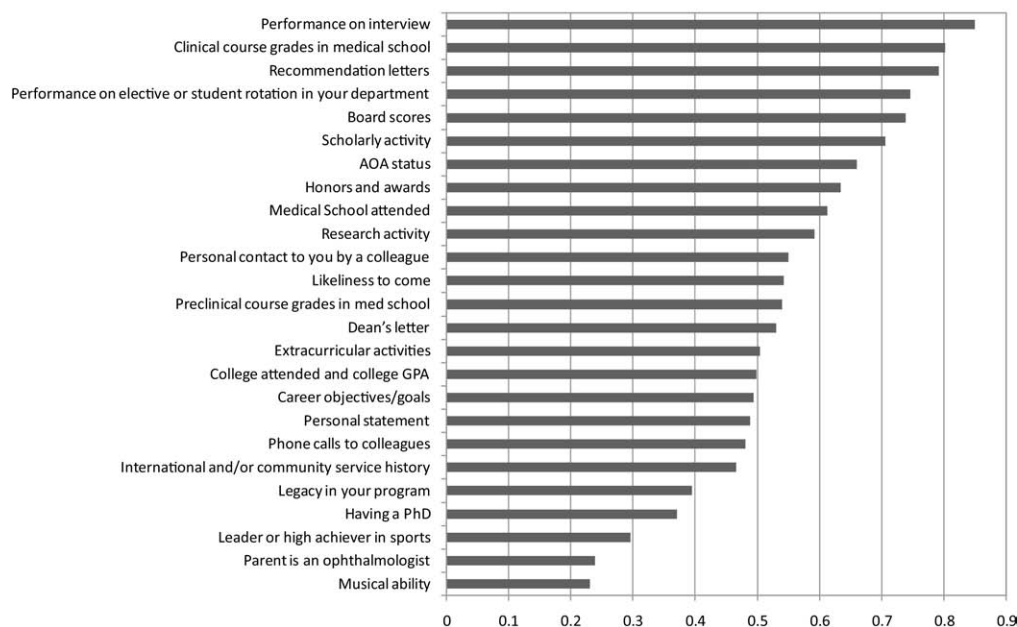


Figure 1. Bar graph demonstrating the optimal weights of applicant characteristics based on perceived performance as a resident using data obtained from part 1 of question 49 and question 16. AOA = American Optometric Association; GPA = grade point average; PhD = doctor of philosophy.

attempt to begin addressing the need for possible revision of resident selection criteria and for optimizing the process for both applicants and programs. As reported in “Results,” there is a wide variability in selection practices among residency programs, from the screening process, to the interview day, to formation of the rank list.

In this study, respondents placed the greatest weight on interview performance. However, interview styles vary greatly from program to program, so how do we know whether our own interview style is effective in accurately assessing the suitability of an applicant? In addition, personal biases likely are inherent to the interview process. Also, do programs have a specific method of selecting interviewers, and how do we know that the interviewers have the same selection goals as the program as a whole? Many studies have shown that the traditional unstructured interview does not select reliably for factors that correlate with job performance in residency.^{2,11–18} Some studies have shown that behavior-based interviewing adds considerable predictive usefulness to the low prediction demonstrated by traditional interviews.^{19,20} This study revealed that 96.7% of ophthalmology residency programs surveyed have an unstructured interview process, without specific assignments during the interview, and that 79% do not provide any guidelines for selection to interviewers. This may be problematic, especially among programs in which interviews may not last long enough to glean behavioral characteristics predictive of future performance during residency.

According to the survey responses, clinical course grade also commonly is weighted heavily in the selection process. As with other cognitive data, academic grade performance may be predictive of subsequent performance on formalized testing, but it has been poorly predictive of overall resident clinical performance, as well as subsequent career performance.^{2,3,21–23}

Survey respondents also deemed recommendation letters as one of the most important factors in selecting residents. However, these letters often reiterate the cognitive metrics of applicants, may provide incomplete or misleading information, do not always demonstrate direct supervision, and often do not provide meaningful comparisons to colleagues.^{3,24–26} In addition, resident applicants select their most likely supporters as recommendation writers and faculty members may decline to write a letter if they are unable to write a strong recommendation. Thus, it is not surprising that the literature has shown low interrater reliability of evaluation of personal traits based on recommendation letters.^{27,28} It is widely agreed that recommendation letters are highly subjective and it is no surprise that 80% of survey respondents desired a standardized letter, including information such as length and type of contact with the applicant, specific strengths, specific weaknesses, suitability of the candidate for the letter writer’s own program, and some estimate of where this applicant stands compared with other applicants whom the letter writer has supported.

The fourth important factor identified in the survey was USMLE performance. Ophthalmology Match data show that although the number of ophthalmology residency applicants over the past decade (1998–2008) has fluctuated with no significant trend, the average number of applica-

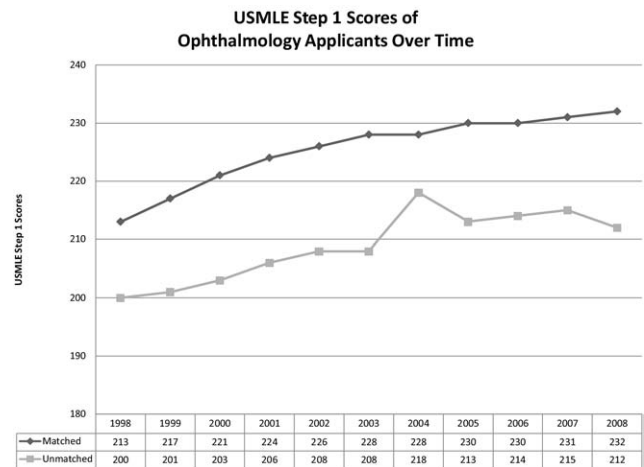


Figure 2. Graph showing the rising United States Medical Licensing Examination (USMLE) step 1 scores of matched and unmatched applicants over time.

tions per student has increased steadily from 30 in 1998 to 48 in 2008. In addition, mean USMLE step 1 scores of matched and unmatched applicants have increased steadily (Fig 2). This suggests increasing competitiveness of the field and also a greater reliance on quantifiable cognitive measures. In a 1985 survey completed by ophthalmology and otolaryngology residency program directors, 78% reported that USMLE step 1 scores were used as a factor in selection, and 51% reported that scores were used to decide whom to call for interviews.²⁹ Scores were used more commonly for interview decision and as a selection factor in highly and moderately competitive programs and academic programs.²⁹ The original purpose of the National Board of Medical Examiners was to provide high-quality examinations acceptable for licensing purposes by state agencies, not for precise ranking of medical students. Also, other factors used in resident selection (e.g., dean’s letter, the chair’s letter, Alpha Omega Alpha election) often are impacted by board performance. Although there are a few reports to the contrary,^{30,31} in general, the USMLE step 1 score has not been shown to correlate well with future resident performance, although it may predict performance on formalized testing.^{1–3,5,20,32,33}

This study is further evidence that with increasing numbers of applications received and overall increasing competitiveness of applicants, there is an increasing emphasis on quantifiable cognitive measures (clinical course grades and board scores) in ophthalmology resident selection. Interviews and recommendation letters, also considered among the most important selection factors, provide opportunities to assess noncognitive domains, but are highly subjective and nonstandardized, and many different methods are used throughout the United States in ophthalmology resident selection. The current system may be flawed, because this study shows that there still seems to be a discrepancy between the highest ranked applicants and the best performers during and after residency, with most programs reporting very little difference among the top 20 applicants. Poor correlation between rank list order and subsequent

residency performance has been observed in other competitive specialties including orthopaedics and radiology.^{2,34,35} This suggests the need for better tools or different practices for resident selection. However, some may argue convincingly that too much time and effort already is spent on the process and that differences among the top applicants are not significant enough to warrant revamping. Also, not all would agree that standardization would improve the resident selection process, especially because different programs may be looking for different qualities in applicants.

To improve the efficiency of the screening and selection process, most programs (75%) desire an interactive web-based database that allowed for sorting and grouping applicants by selected criteria with online review. In addition, more than 95% of respondents also desire a single sheet with specific information for each candidate (schools, board scores, grade point average, honors and awards, American Optometric Association membership, publications, letter writers, etc.). A more structured interview process to assess better a candidate's personal and behavioral characteristics may make the interview process less subjective. This study demonstrated a statistically significant correlation between those who provided interviewers with guidelines for selection and satisfaction with the rank list's predictive value of best performers in residency ($P = 0.0212$), providing further evidence that structure within the interview process may be beneficial. In addition, 80% of survey respondents desired standardization of recommendation letters, which may improve their validity and predictive value. The weighted sum performed to determine which applicant characteristics were most predictive of resident performance suggests that the most importance likely should be placed on interviews, clinical course grades, recommendation letters, and ophthalmology rotation performance. United States Medical Licensing Examination scores ranked after these 4 in predictive value for resident performance, further suggesting that they should not be weighted as highly as they currently are. Although there is a generally agreed-on policy among residency directors to discourage excessive audition electives, this study suggests many programs (58%) are most comfortable ranking and matching applicants with whom they had contact during a rotation. Thus, the audition elective does have value and a more uniform policy toward such electives would be helpful in guiding students. Finally, long-term studies correlating applicant attributes with successful residency performance as well as postresidency career success are warranted. Postresidency performance is difficult to assess, especially for those who go into private practice and have limited interaction with colleagues. Programs may define success in different ways, for example, surgical outcomes, patient satisfaction, prominence in academics or research careers, monetary success, and so forth. With no consensus on the meaning of success, it becomes difficult to standardize the application process. Obviously, each program tailors its resident selection process to its perception of the characteristics necessary for its own meaning of success. Thus, it may be equally or more important for each program to evaluate the success of its own selection process as it is for us to evaluate the selection process as a whole.

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Footnotes and Financial Disclosures

Originally received: March 31, 2009.

Final revision: July 15, 2009.

Accepted: July 27, 2009.

Available online: January 27, 2010.

Manuscript no. 2009-445.

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Financial Disclosure(s):

The author(s) have no proprietary or commercial interest in any materials discussed in this article.

Supported in part by an unrestricted departmental grant from Research to Prevent Blindness, Inc., New York, New York.

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