EDUCATIONAL ADVANCES

Selection Criteria for Emergency Medicine Residency Applicants

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Abstract. **Objectives:** To determine the criteria used by emergency medicine (EM) residency selection committees to select their residents, to determine whether there is a consensus among residency programs, to inform programs of areas of possible inconsistency, and to better educate applicants pursuing careers in EM. **Methods:** A questionnaire consisting of 20 items based on the current Electronic Residency Application Service (ERAS) guidelines was mailed to the program directors of all 118 EM residencies in existence in February 1998. The program directors were instructed to rank each item on a five-point scale (5 = most important, 1 = least important) as to its importance in the selection of residents. Follow-up was done in the form of e-mail and facsimile. **Results:** The overall response rate was 79.7%, with 94 of 118 programs responding. Items ranking as most important (4.0–5.0) in the selection process included: EM rotation grade (mean ± SD = 4.79 ± 0.50), interview (4.62 ± 0.63), clinical grades (4.36 ± 0.70), and recommendations (4.11 ± 0.85). Moderate emphasis (3.0–4.0) was placed on: elective done at program director's institution (3.75 ± 1.25), U.S. Medical Licensing Examination (USMLE) step II (3.34 ± 0.93), interest expressed in program director's institution (3.30 ± 1.19), USMLE step I (3.28 ± 0.86), and awards/achievements (3.16 ± 0.88). Less emphasis (<3.0) was placed on Alpha Omega Alpha Honor Society (AOA) status (3.01 ± 1.09), medical school attended (3.00 ± 0.85), extracurricular activities (2.99 ± 0.87), basic science grades (2.88 ± 0.93), publications (2.87 ± 0.99), and personal statement (2.75 ± 0.96). Items most agreed upon by respondents (lowest standard deviation, SD) included EM rotation grade (SD 0.50), interview (SD 0.63), and clinical grades (SD 0.70). Of the 94 respondents, 37 (39.4%) replied they had minimum requirements for USMLE step I (195.11 ± 13.10), while 30 (31.9%) replied they had minimum requirements for USMLE step II (194.27 ± 14.96). Open-ended responses to "other" were related to personal characteristics, career/goals, and medical school performance. **Conclusions:** The selection criteria with the highest mean values as reported by the program directors were EM rotation grade, interview, clinical grades, and recommendations. Criteria showing the most consistency (lowest SD) included EM rotation grade, interview, and clinical grades. Results are compared with those from previous multispecialty studies. **Key words:** emergency medicine education; internship and residency; research education. ACADEMIC EMERGENCY MEDICINE 2000; 7:54–60

INCREASING numbers of quality applicants coupled with a relatively fixed number of residency positions make residency selection a time- and resource-intensive process.[1] The recent institution of the Electronic Residency Application Service (ERAS),[2] the Internet-based application system, may make application review even more labor-intensive. This dilemma raises the issue of which criteria are most helpful in selecting emergency medicine (EM) residents.

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Addressing this issue requires that the current practice of resident selection be investigated to determine which criteria are presently being used by EM residency programs across the United States. Since the inception of EM as a separate specialty in 1972, many studies have assessed general criteria that program directors use to select residents.[3–6] Unfortunately, at the time these studies were conducted, EM was still an emerging specialty, and therefore, was not included in many of these investigations. A majority of these studies were carried out in the areas of internal medicine, obstetrics/gynecology, pediatrics, psychiatry, family medicine, and surgery. Other studies sought to include a wide range of primary care and specialty residencies, but these studies lacked sufficient sample size to draw meaningful conclusions. Two multispecialty studies by Wagoner and colleagues,[6,7] published in 1986 and 1999, included 7 and 36 EM

program directors, respectively. These data, however, were part of a multidisciplinary study, which sought to draw generalized conclusions not specific to EM. Because a majority of the current literature concludes that there are interdisciplinary differences in the criteria used to select residents, extrapolation of results from these multispecialty studies for use in EM is not necessarily justified.[3–6,8,9] Because of these differences and because of the lack of consistency in the literature, this study was undertaken to determine which criteria are important in selecting EM residents.

METHODS

Study Design. This was a survey study of EM residency directors. Because of its voluntary nature, it was considered exempt from informed consent.

Survey Content and Administration. A 21-item questionnaire was developed based on the new ERAS application,[2] and from personal and anecdotal experiences of residency directors. The surveyed items related to the importance of the applicants' medical school, grades, board scores, residency interview, personal statement, recommendations, Alpha Omega Alpha Honor Society (AOA) status, elective rotation done at the program director's institution, awards/achievements, publications, interest expressed in the program director's institution, and extracurricular activities. Grades were further subcategorized into basic science, clinical, and EM rotations. Board scores were further broken down into U.S. Medical Licensing Examination (USMLE) step I and step II. After each subsection regarding board scores, there was an open response statement that read "Do you have an absolute minimum score requirement? If so, please list." The last item on the questionnaire was an open-response section, "other," in which the respondents were given the opportunity to enter any information that they believed to be relevant, not included, or not adequately addressed in the previous items.

Although many studies show higher response rate with personal and telephone contact over mailed questionnaires,[10,11] because of time and cost constraints, a mailing approach was chosen, with follow-up in the form of e-mail and facsimile.

The questionnaire design was based on previous research that reported a higher response rate with a shorter form length, shorter responses, and less intimidating appearance.[12–14] Each item, except the open-response section of board scores, but including the item "other," was to be ranked on a scale of 1 to 5, with 1 signifying "least important" and 5 signifying "most important." These numerals were placed to the side of each item and the respondents were instructed to circle the appropriate response. The questionnaire was formatted to fit neatly on one page in double-spaced format.

The questionnaires were distributed to program directors of all 118 EM residency programs in existence in February 1998 as reported by the Society for Academic Emergency Medicine.[3] The mailings were addressed directly to the program director who was instructed that he or she or anyone else "intimately familiar" with the selection process should complete the form. In addition, the respondents were ensured that their responses would be anonymous and that they would be tracked only for purposes of follow-up. This was accomplished by arranging the programs in alphabetical order and assigning a number from 1 to 118 to each one. This number was used for all further references to the program so that anonymity would be ensured when follow-up for nonrespondents was undertaken. It is well documented in the literature that follow-up can increase the return rate after an initial trial of mailed questionnaires.[11,12] Follow-up in this study was done in the form of e-mail and facsimile. E-mail addresses were published for 21 of the nonresponding program directors and these were used for the initial follow-up. This was followed by contact via facsimile of all of the remaining program directors from whom a response was not obtained.

Data Analysis. Data were compiled into mean, standard deviation (SD), and range; all graphs were created using Microsoft Excel, Office '97 (Microsoft, Inc., Redmond, WA). The responses to board score minimums came in three types: absolute, percentile, and pass/fail. In each case, the response was converted to its percentile or absolute number using conversion data published by USMLE.[15] Likewise, "pass" responses were converted to absolute and percentile data using pass/fail data published by USMLE for the most applicable test dates pertaining to this application period (part II—1997; part I—1996).

RESULTS

There were 94 respondents out of a total of 118 programs, with a total return of 79.7%. The responses are presented in Table 1. Items were considered "most important" if the mean score was 4.0 to 5.0, "moderately important" if the score was 3.0 to 4.0, and "least important" if the score was less than 3.0. Standard deviations were used to determine consistency of responses. Criteria showing the highest consistency included EM rotation grade (SD 0.50), interview (SD 0.63), and clinical grades (SD 0.63). The least consistent items were

TABLE 1. Questionnaire Results

	Mean	SD	Median	Range
Emergency medicine rotation grades	4.79	0.50	5	3–5
Interview	4.62	0.64	5	2–5
Clinical grades	4.35	0.70	4	2–5
Other	4.23	1.17	5	1–5
Recommendations	4.11	0.85	4	2–5
Grades (overall)	3.95	0.64	4	2–5
Elective at the program director's institution	3.76	1.25	4	1–5
Board scores (overall)	3.35	0.77	3	1–5
USMLE* step II	3.34	0.93	3	1–5
Interest expressed	3.30	1.19	3	1–5
USMLE step I	3.28	0.86	3	1–5
Awards/achievements	3.16	0.88	3	1–5
AOA† status	3.01	1.09	3	1–5
Medical school attended	3.00	0.85	3	1–5
Extracurricular activities	2.99	0.87	3	1–5
Basic science grades	2.88	0.92	3	1–5
Publications	2.87	0.99	3	1–5
Personal statement	2.75	0.96	3	1–5

*USMLE = U.S. Medical Licensing Examination.
†AOA = Alpha Omega Alpha Honor Society.

elective done at the program director's institution (SD 1.25), interest expressed at the program director's institution (SD 1.19), and AOA status (SD 1.09).

Of the 94 respondents, 37 (39.4%) reported a minimum requirement for USMLE step I, while 30 (31.9%) reported a minimum requirement for USMLE step II. The minimum acceptable board score reported for USMLE step I was 175 (6th percentile, $n = 1$), the maximum 231 (85th percentile, $n = 1$), with an average of 195.11 ± 13.09. This corresponds to a mean of the 24th percentile, ±17 percentile rankings, with a range of 79 percentile rankings (Fig. 1). The minimum acceptable board score reported for USMLE step II was 170 (passing/7th percentile, $n = 4$), the maximum 229 (85th percentile, $n = 1$), with a mean of 194.27 ± 14.96. This corresponds to the 31st percentile, range of 78 percentile rankings (Fig. 2).

Forty (42.6%) of the 94 respondents expanded on the questionnaire with written comments. The open-ended responses were grouped into three subcategories: career plans/goals, personal characteristics, and medical school performance (Table 2).

DISCUSSION

EM-related Criteria. Our results suggest that the most important criteria in EM resident selection are those that are specifically related to EM, with EM rotation grade (4.79 ± 0.50) the most important factor. This is an appropriate and meaningful finding, and suggests the importance of student performance in the environment in which he or she hopes to practice. The literature supports this finding. Several other studies indicate that performance in an elective specific to the residency selected is one of the most important criteria for residency selection. Studies also show that performance in medical school tasks similar to those required by residency correlates highly with postgraduate performance.[8,16–21]

The applicant interview (4.62 ± 0.64) is also an important selection factor for EM residents, as it is for other specialties.[3,5–7,22] Much concrete and personal information about the applicant's interactive skills and mannerisms can be obtained from the interview. Similarly, the interview provides the opportunity to obtain more information or clarify deficiencies in the interviewee's application. Some interviewers also use this time to test the interviewee's composure, asking a nontraditional question, or offering a simple clinical scenario. Finally, the interview affords the applicant the opportunity to express items not specifically mentioned in the application, including hobbies, interests, volunteer activities, and previous exposure to the medical field.

The letter of recommendation is also an impor-

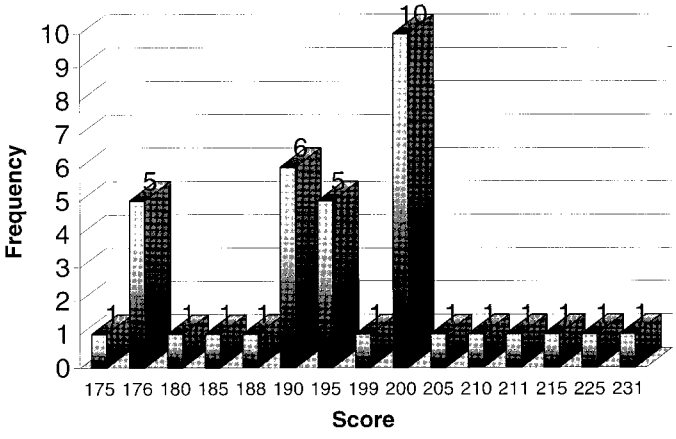

Figure 1. USMLE step I minimum requirements.

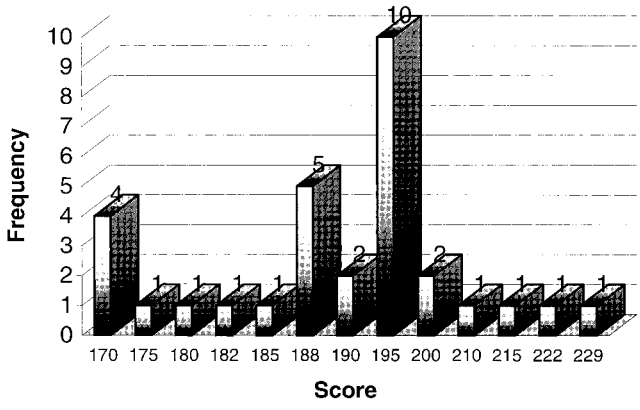

Figure 2. USMLE step II minimum requirements.

tant selection factor (4.11 ± 0.85) and ranked as the fourth most important factor in our study. Recommendations, along with the interview, have often been thought to be one of the most important selection factors of residency applicants. In a 1986 multispecialty publication, Wagoner and colleagues ranked letters of recommendation in order of importance based on questionnaire responses. Most highly ranked was a letter of recommendation from a faculty member in the residency program to which the applicant was applying, followed closely by a letter from a chair of a department in the applicant's chosen subspecialty. Letters from these individuals provide invaluable information on how the faculty views a known applicant. The study by Wagoner et al. also listed the dean's letter, a letter from a clinical faculty member in the respondent's specialty, and a letter from a clinical faculty member in another subspecialty as important.[6]

The dean's letter provides information on preclinical and clinical performance as well as on extracurricular activities. It also provides information based on clinical evaluations, personal interactions with the dean, or a scheduled interview of the applicant conducted by the dean, with the sole purpose of constructing the letter. Some deans' letters convey class rank, and most offer an overall impression or recommendation. There are varying views on the value of the dean's letter. Proponents point out the value of preclinical and clinical evaluation summaries in providing information on the overall performance of the applicant. They also cite the importance of relative class rank, as conveyed in the dean's letter. Finally, they point to the overall recommendation, which is often included at the end of the letter, as a coded statement recommending the applicant "with reservation," "highly," "very highly," or "without reservation." These statements often correlate to the student's class rank if one hasn't been previously mentioned. Opponents of the dean's letter most often describe it as overly verbose, almost always providing only positive impressions, and usually omitting important shortcomings such as class failures, years of nonadvancement, ethical inappropriateness, and other negative characteristics. Class rank is only presented in 30% of deans' letters and although as many as 85% of these letters include encrypted summary sentences, only 15% actually give a code to its meaning.[23–30]

The final two EM-related items shown by our study to be important in resident selection are the performance at an elective done at the program director's institution (3.76 ± 1.25) and the applicant's interest expressed in the program director's institution (3.30 ± 1.19). It is important, however, to note that the mean scores of these two items had the largest SDs of all responses, suggesting much variation between residency programs in the way they consider these issues. Many programs obviously value an elective done at their own institutions. It seems likely that a rotation performed at the program director's institution will provide an opportunity for the program to observe the student at work in his or her potential residency environment. It also enables observation of the applicant's

TABLE 2. Open Responses

I. Career-related/goal-related	48
Future plans	14
Contributing to specialty	2
Indigent care	2
Local ties	4
Spanish-speaking	4
Commitment to EM*	19
Interest for EM	4
Teaching interests	2
Research interests	2
Insight career choice	6
EM experience	15
EMT†/paramedic	5
Nurse	3
Managerial	1
Volunteer community work	2
Research	1
Service	1
Hospital	2
II. Personal characteristics	39
Personality	7
Well-rounded	1
Interpersonal skills	4
Attitude	1
Character	13
Integrity	4
Maturity	3
Humanistic values/ideas	1
Patient advocate	1
Helping others	1
Work ethic	14
Teachability	3
Organizational skills	1
Team player	1
Motivation	1
Reliability	1
Responsibility	1
Hard working	1
Goals accomplished	3
Amorphous	5
Gut feel	1
Fit	4
III. Medical school performance	23
Dean's letter	5
Class rank	2
Competitive medical school	2
American school	3
Recommendations from EM	7
Clinical performance	1

*EM = emergency medicine.
†EMT = emergency medical technician.

interaction with the faculty, staff, and other residents, as well as his or her participation in conferences and meetings. From the student's point of view, it provides an excellent opportunity to gain exposure to the prospective program, and provides the student with insight into his or her fit within a particular hospital environment. These interactions may leave a lasting impression on the program that carries into the selection meetings. This is the ideal outcome of any such rotation as it adds a face and a personality to an application and may actually help to overcome shortcomings within a student's application.

Simply expressing an interest in the institution's residency program is seen as a moderately important selection factor. Indeed, this ranks above USMLE step I scores, and just below step II based on average responses. It is a common practice for applicants to send letters, telephone residency directors, and visit institutions in an attempt to favorably impress residency directors, and express their aspirations of becoming a resident, or of their intention of ranking a program highly. Although traditionally regarded as common etiquette, it appears from this study that this practice may actually be at least moderately important in the final evaluation of a student's application.

Performance Criteria. The most important performance criteria is the EM rotation grade (4.79 ± 0.50). This is followed closely by clinical grades (4.36 ± 0.70). Many studies have attempted to determine whether clinical performance in medical school predicts postgraduate performance. Some have shown little or no correlation between objective measures of performance and postgraduate success.[16,22,31,32] The majority, however, have shown at least a moderate predictive value of clinical grades with respect to postgraduate performance.[17–19,23,33–35] This relationship is less apparent with respect to preclinical grades. Preclinical classes provide information on medical concepts, but rarely relate to providing daily patient care. High grades in these courses may indicate that the student is responsible and diligent, but few conclusions can be inferred as to his or her eventual performance as a houseofficer. In fact, a majority of the literature suggests that there is little, if any, correlation between basic science/preclinical grades and postgraduate performance.[16–18,22,31,32,35] Our study suggests that EM program directors generally regard preclinical grades (2.88 ± 0.93) as less important in the selection process.

Medical schools place much emphasis on the results of the USMLE step I and step II to show that medical students have acquired a minimum amount of knowledge required to advance to the postgraduate level. A passing grade is required on these tests as well as step III in order to become a licensed physician. Because of their length, these tests approach >95% reliability.[17] As these tests are "standardized," many residency programs use these tests as both screening tools and as a means of interapplicant comparison of knowledge acquired in medical school. A moderate to high correlation between USMLE scores and postgraduate performance has been described,[16,17,21,36] especially in regard to USMLE step II. Some studies suggest that higher scores on USMLE steps I and II are predictive of higher scores on step III, as well as inservice exams.[19,36,37] In our study, a moderate emphasis was placed on board scores as a selection factor. A minimum score was required by 39.4% of the respondents for USMLE step I (195 ± 13), and 31.91% stated they had a minimum requirement for step II (194 ± 15), with most responses lying between passing and 50th percentile. Although setting a minimum requirement does not imply that it is being used as a screening tool, some programs may be initially screening applicants on the basis of their USMLE scores. However, to appropriately use the USMLE as a screening tool would require data indicating that applicants performing below the specified cutoff point perform significantly worse than those performing above the cutoff.[38]

Publications and AOA membership were the least important performance criteria for EM residency selection. Few citations find an association between AOA status and postgraduate performance.[16,34] Our study indicates that there is an inconsistent use of AOA status (3.01 ± 1.09) in EM residency selection. Similarly, publications (2.87 ± 0.99) seem to be relatively unimportant in the selection process, ranking near the bottom relative to all other criteria. Successful publication may contribute to the overall impression of maturity, work ethic, and ability to complete a task. However, in a recent study by Gurudevan and Mower, it was found that publications were cited in only 32% of EM applications; and 20% of those who cited publications (6.6% of applicants) misrepresented them. This number increased with increasing number of publications; applicants claiming five or more publications misrepresented citations 64% of the time.[39] The relatively high SD in our study suggests that publications are valued to differing degrees by different institutions.

Additional Criteria. Although the personal statement was ranked as the least important factor in selecting residents (2.75 ± 0.96) (Table 1), it affords the applicant the opportunity to express himself or herself in any manner that is believed appropriate. Likewise, although extracurricular activities rank relatively low (2.99 ± 0.87), this information provides insight into the applicant's in-

terests, hobbies, and activities outside of medical school. The lack of awards and achievements is often a source of stress for applicants, although this criterion was seen as only moderately important (3.16 ± 0.88). Finally, the medical school attended was found to be of moderate importance (3.00 ± 0.85). The meaning of this finding, however, is unclear, since the wording of the survey item did not allow for uniformity of response.

Open Response. The majority of the career-related/goal-related responses obtained as open comments pertained to the applicant's commitment to EM, EM experience, and future plans. There was a wide range of responses related to personal characteristics, which dealt mainly with work ethic, character, and personality. A majority of the open responses (with the exception of those related to the applicant's medical school) would likely be obtained during the interview or from letter of recommendation, further emphasizing the importance of these components of the student's residency application.

Limitations and Future Questions

Surveys are intrinsically prone to response bias, because respondents have both conscious and subconscious tendencies built into their responses. This is particularly apparent in our results regarding the importance of the applicant's medical school. We expected, based on Association of American Medical Colleges data, a bias for U.S. allopathic medical schools; however, this was not seen in this study. It is possible that response bias is at least partially responsible for this finding.[40] Another shortcoming of this study, as previously mentioned, is the low response rate for some items, such as a minimum requirement for USMLE steps I and II. It is unclear whether the nonresponders do not have minimums or whether they do not want to disclose the fact that they have them. Therefore, although a mean value is calculated for this response, its importance is unclear.

Further studies are needed to predict subsequent EM resident performance based on selection factors considered important by residency programs. A prospective study to determine which criteria are predictive of superior performance as a resident and attending would be difficult, but would substantiate the use of these criteria in the selection process or provide an impetus for changing the process. A retrospective look at the true values (mean, absolute minimum) required for admission to individual programs might be helpful for student applicants and program directors in evaluating qualifications. Further studies should also be done to determine the true prevalence of selection bias with respect to medical school attended and to point out the true importance of foreign vs U.S. and osteopathic vs allopathic medical schools. Last, research has been started by Girzadas et al.[41] with regard to the standardized letter of recommendation (SLOR) vs the narrative letter of recommendation. Further studies are needed to determine exactly how SLORs can be best utilized.

Conclusions

To our knowledge, our study is the first expressly dedicated to the evaluation of the selection criteria for EM residents. The most important selection criteria are EM rotation grade, interview, clinical grades, and recommendations. Criteria showing the most consistency among programs (lowest SD) included the EM rotation grade, interview, and clinical grades.

Special appreciation is extended to all residency program directors who responded to the study questionnaire. Their time and cooperation are greatly appreciated and are the basis for this article.

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