

Evidence-Based Selection of Surgical Residents



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KEYWORDS

• Recruitment • Resident • Selection • ABSITE • USMLE

KEY POINTS

- It is crucial for programs to determine their unique desired applicant characteristics.
- Cognitive measures, such as letters of recommendation and United States Medical Licensing Examination step 2, may predict both academic and clinical success in residency.
- Noncognitive attributes, such as personality, grit, and personal interaction, may be the strongest predictors of overall residency success.
- Personal interviews, whether traditional or virtual, are crucial to establishing the concept of fit within a program.

INTRODUCTION

The goal of every surgery residency selection committee should be to find candidates who have characteristics to become competent and safe surgeons. To identify ideal candidates, both cognitive achievements and noncognitive attributes must be examined. Programs may seek specific traits, but some qualities of accomplished surgeons are nearly universal:

- In-depth knowledge of medical pathophysiology and surgical techniques
- Benevolent and professional personality
- Strong communication skills
- Ability to work in teams
- Commitment to professional development
- Technical proficiency

Other characteristics are unique to individual programs. For example, one training program may seek out candidates with extensive research experience, whereas another may favor applicants with ties to the local community. It is imperative that

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programs first decide on these desired characteristics, and develop a recruitment plan to fulfill them.

There are 2 main components of the residency applicant's dossier: application and interview. Pinpointing match-worthy candidates from an increasingly deep and similar applicant pool can be daunting, and begins with application review. Cognitive achievements appearing in the Electronic Residency Application Service (ERAS) application are often easily stratified and make up most of the paper application. These cognitive achievements include United States Medical Licensing Examination (USMLE) scores, clerkship academic performance reviews, Medical Student Performance Evaluation, letters of recommendations, medical school grades, personal statement, publications/presentations, and extracurricular activities. These metrics predominantly assess knowledge and academic aptitudes, and form the basis for interview selection. The 2020 National Residency Matching Program (NRMP) Program Directors survey examined factors that program directors use to select applicants for an interview. The 4 most common factors cited in selecting applicants to interview are ^{1,2}:

- USMLE step 1 score
- Letters of recommendation in the specialty
- USMLE step 2 Clinical Knowledge (CK) score
- Personal statement

However, when ranking applicants, the 4 most common factors cited from the NRMP Program Directors survey are largely noncognitive¹:

- Interpersonal skills
- Interactions with faculty during interview
- Interactions with house staff during interview
- Feedback from current residents

This list suggests that noncognitive factors strongly influence ranking candidates.³ It also highlights the perceived importance of both applicant components. Cognitive successes are frequently used to determine an applicant's ability to succeed academically, whereas the interview is used to determine fit within a specific program. In layman's terms, many use the paper application to answer the question, "Can the candidate make it?" However, the interview answers, "Can the candidate make it here?" This article examines evidence-based recruitment factors consistent with excelling in surgical training.

DISCUSSION

Candidate Selection: Cognitive Achievements and the Application

USMLE step 1 and step 2 clinical knowledge scores predict academic performance in residency

Program directors commonly cite the USMLE step 1 score as the most important factor in selecting applicants for an interview.¹ Several studies have shown a relationship between higher USMLE scores and American Board of Surgery (ABS) In-training Examination (ABSITE), as well as first-time ABS Qualifying Examination pass rates.^{2,4-6} Studies evaluating the relationship of USMLE scores with clinical performance during residency have been mixed.⁶⁻⁸ Several studies suggest the lack of correlation between USMLE step 1 and clinical success is because the examination is not designed to test clinical skill acquisition.⁸ However, other studies have shown that USMLE step 1 scores do correlate with improved manual dexterity, suggesting some academic crossover to the noncognitive realm of success.^{6,9}

USMLE step 1 becomes a pass/fail test in January 2022, potentially creating additional challenges. The scoring change was proposed to encourage a more balanced assessment of interviewees.¹⁰ Several studies have evaluated program director perspectives regarding the change to pass/fail, and found that most program directors disagreed with the scoring change and thought that it will make it more difficult to objectively compare applicants. Program directors also stated that this change will shift the emphasis to USMLE step 2 CK score.^{11–13}

Despite several studies showing surgical program director disapproval of the USMLE's 2022 scoring changes, it may be a blessing in disguise. Like USMLE step 1, step 2 CK scores do seem to be predictive of academic performance in residency.^{5,8,14,15} Maker and colleagues¹⁶ showed that residents with higher step 2 CK scores are more likely to pass the ABS Certifying Examination. Although step 2 CK scores lack overall correlation with leadership ability, they do correlate with both patient care and interpersonal and communication skills milestones, suggesting a stronger link to clinical performance than step 1.^{17,18}

Medical school performance/grades predict academic performance in residency

Much like USMLE score, medical school grades and clinical clerkship evaluations have shown correlation to ABS examination scores, but do not significantly predict clinical performance during residency.^{2,6,7,19}

Grade inflation has become an increasingly widespread issue that can confound the validity of using preclerkship and clerkship grades as determinants for interview invitation.^{20–23} Grading variability, both between schools and within schools, results in wide-ranging possibilities in which graders can delineate and document either poor or superior performance.²⁴ Further, assigning meaning to these scores/grades is an even more daunting task when evaluating applicants. Several methods to combat grade variability have been suggested, but they have yet to be universally implemented.²⁵

Letters of recommendation predict clinical performance

Multiple studies have examined what make a letter great. These factors include personal relationships with letter writers, certain key descriptors used (such as outstanding, or superior), and medical school of origin.² One of the most important concepts a letter can convey is the desire to train the applicant. The phrases “We plan to recruit this candidate,” or “I give my highest recommendation” have been shown to be the most important phrases in letters.²⁶ Using the 6 core competencies, outlined by the Accreditation Council on Graduate Medical Education (ACGME), to define clinical performance success, several studies have shown letters of recommendation to be predictive of clinical performance.^{2,18} Further, global performance metrics have also strongly correlated with letter quality, suggesting that letters of recommendation are a key component to determining future success.²⁷

However, letters of recommendation are fallible. Applicants choose their letter writers, who may inflate applicant performance, creating challenges in deciphering the applicants' true abilities.²⁸ Standardized letters of recommendation have attempted to diminish these issues; however, many investigators argue that standardized letters actually worsen performance inflation.²⁹ Instead, some suggest that letters should include the context in which letter writers know the student, character and personality traits of the applicant, along with any red flags or professionalism issues and an overall recommendation.³⁰

Prior nonmedical success predicts future medical success

Participating in extracurricular activities, such as team sports, is clearly desired by many surgical program directors.³¹ It is common for programs to seek individuals

who have excelled at something outside of medicine. Whether it be playing a musical instrument, participating in sports, or showing entrepreneurship, excelling at a high level in some other arena before medicine is an indicator of drive, will, determination, and grit. In a study of general surgery residents, those who had a unique skill were more likely not only to complete a surgical residency but also to perform well.⁷ Similarly, a history of playing team sports has inversely correlated with attrition, and predicted success.^{32,33} It is not only the presence of a specific preexisting skill set but the effort that it took to reach proficiency of that skill that is important. Of equal importance is possessing the passion for a surgical career, just as the candidate may have shown passion for a prior achievement. This point is where the cognitive and noncognitive domains cross over to begin to form an overall impression of a surgical residency applicant.

Candidate Selection: Noncognitive Abilities and the Interview

Manual dexterity is more than hand-eye coordination

Surgical selection has not conventionally included dexterity evaluation, even though this attribute is important to surgical practice.³⁴ Some programs have begun including dexterity and psychomotor assessments in the selection process to improve engagement and robustness of the process.^{35,36} Although some studies show correlations between dexterity and clinical performance only in novices, others have shown a high degree of correlation with operative skill at the end of training.^{37,38} Further, applicants with a high baseline level of dexterity progress quicker in training, and therefore graduate as more competent surgeons.^{39,40} In contrast, those who lack manual psychomotor skills may consume more educational resources, take longer to meet educational goals, and may divert education from other trainees. These studies suggest that dexterity and surgical skill testing should be included in the interview process.

Personality testing predicts success

Personality assessments may be beneficial in determining future success and identifying red flags in applications. For example, the narcissism personality index may be used to identify maladaptive behaviors before meeting candidates in the interview.⁴¹ The Myers-Briggs “intuitive” and “think” preferences have been shown to be associated with later success in a surgical career.² Emotional intelligence, defined as a disposition or ability of individuals to perceive and process the emotions of themselves and others, has been linked to favorable outcomes in the business world and also more recently in the health care arena. The Trait Emotional Intelligence Questionnaire (TEIQue) has shown correlations between emotional intelligence and final rank position, and suggests emotional intelligence is a desired characteristic.⁴² Higher emotional intelligence scores have also been correlated to improved performance, enhanced well-being, and less burnout in residency training.^{42–44}

The Big 5 personality traits have been used to predict successful residents through identification of extroversion, conscientiousness, and emotional stability.⁴⁵ The Big 5 are frequently combined with grit analyses. Individuals with high levels of grit have high tendencies to persevere through short-term setbacks, and are focused to achieve their future goals. The Big 5 and the Grit Scale have been studied in many industries during the recruitment phase of employment, with both showing correlations to later success.^{45–48} Grit also seems to delineate desirable personality characteristics. A recent meta-analysis of grit studies found that, although grit by itself was not strongly correlated with performance, it was very strongly correlated with conscientiousness, a characteristic found in successful surgeons.⁴⁹ Following Duckworth and colleague's⁴⁶

publication on grit, testing for grit and other personality traits has significantly increased. This increase has sparked concerns over applicants purposefully skewing answers toward perceived desirable answers. This phenomenon is not new and has been extensively studied in the business and psychology literature.^{50,51} Most experts agree that, in general, individuals skew their scores to portray themselves in a positive manner. Despite the human tendency to please, personality tests still remain a valid quantitative measure to delineate desirable personality characteristics of applicants for surgical residency.

Preinterview materials focus recruitment efforts

Preinterview questionnaires and assessments have been used in business for many years. Preinterview assessments may reduce the number of interviewees and improve the ability to match those interviewed. In this way, preinterview questionnaires can allow a more focused approach. Recently, the potential benefits of preinterview assessments, whether they be questionnaires, essays, knowledge or personality examinations, or institution-specific supplemental applications, have been realized by residency programs. Completion rates are typically high, and individuals who do not complete the assessments typically have lower standardized test scores, and are likely less-desired candidates.⁵² Therefore, preinterview material completion may self-select candidates with a higher likelihood of matching at any individual program.

The interview

Much has been written about the concept of fit, when discussing job performance and placement. Remarkably accurate assessments can be made in a short period of time when determining whether a candidate is right for a program. The difficulty lies within the definition of what fit and right mean from a quantitative standpoint. Although numerical scoring is nearly impossible when describing an intangible feeling, there are data to support the gut instincts of interviewers. Thin slicing is a concept of taking small segments or fragments of information and making immediate over-arching decisions.⁵³ Surgeons are typically accustomed to thin slicing, because they do it frequently during emergency procedures or situations, where rapid decisions are made based on limited information. Multiple studies in a variety of disciplines have shown a high degree of predictable candidate success, or failure, after a brief interaction.^{54–57} Some have shown that accurate predictions can be made even after viewing a single still photograph of a candidate.⁵⁴ These findings emphasize the importance of personal interaction during the residency recruitment process, and highlights the necessity of interviews.

Despite the impressive accuracy of the interviewer's initial reaction to a candidate, traditional face-to-face interviews have inherent issues with subjectivity, reliability, and interviewer concordance. Multiple attempts have been made to normalize these issues, including using group interview techniques, structured interviews, behavioral questioning, and blinded interviews.^{58–60} Group interviews can save time and money, and have become increasingly common, because they allow programs to assess the interaction within the group of candidates and with the interviewer. Clinical (behavioral) scenarios are often used, and teamwork, as well as communication and problem-solving skills, can be assessed.⁶¹ Structured interviews can decrease the variability of interview reactions and improve concordance by assigning questions or topics to individual interviewers.⁶² The behavioral interview method seems readily amenable to assess for emotional intelligence.⁵⁹ Behavioral interviews typically provide a clinical scenario, often with no correct answer, and ask candidates to describe their approaches to the problem. Questions can be customized to target emotional

intelligence facets that are considered essential in a surgical trainee. Blinding interviewers to application data, such as USMLE scores, effectively decreases biases toward cognitive measures, such as grades and scores.^{63–65} Although bias favoring academic success is limited by blinding, it can be argued that it should not be. After all, a key component to overall success is academic success.⁶⁶

Virtual interviews

With the recent pandemic, virtual interviews and interactions have become widespread, which presents multiple issues with resident recruitment. First, the virtual environment can be cumbersome for programs and candidates alike. Second, technical aspects of conducting mass virtual interviews are typically outside the realm of expertise for many program directors and coordinators. Third, traditional interviews are costly to the candidates, and thus were self-limited in number by financial constraints. With virtual interviews, there is very little cost or time added for each subsequent virtual interview.⁶⁷ This serious consequence will undoubtedly lead to programs being flooded with candidate applications, and will create difficulties in deciding who to interview, who has a real interest in the program, and who to rank.⁶⁸

Virtual preapplication meetings using social media platforms have been a way for programs to determine the interest of applicants. The generally informal virtual meet-and-greets typically address some frequently asked questions and allow candidates to learn more about an individual program before applying,⁶⁹ which bodes well for both parties. Limited experience has shown some positive results, and typically are best when the groups are small.⁷⁰ Virtual happy hours, as they are sometimes referred to, may also help fill the void left by the lack of the preinterview dinner.

Panel interviews have also made a comeback in the virtual environment, likely because of the ease of structure. A panel interview may consist of multiple, or even all, faculty members interviewing a single candidate. From a candidate standpoint, this can increase anxiety. From a program standpoint, it allows a single interview to be conducted for each candidate, which may streamline the rank process, which is often completed immediately following interviews. Single interviews may be added to diversify the interview day.⁷¹

SUMMARY

Every year surgery residency programs are tasked with recruiting ideal residency applicants. The task of teasing out those individuals who will excel in surgery is challenging, because most medical students are already high performers. This article suggests that many criteria used during recruitment have both benefits and detriments to the process. One likely explanation is the vast differences in focus between residency programs. What makes a great resident in one program may not do so in another program. Once a program determines what is important, then the task of identifying those characteristics begins.

Using components of the application and interview, commonly sought-after attributes, such as academic prowess, technical and communication skills, professionalism, and benevolence, may be identified. USMLE step 2 CK scores are useful to determine both current and future academic performance, as well as clinical performance.^{6–8,18} Strong letters of recommendation and excellence in extracurricular activities before medical school should also be emphasized during application review because they both showed positive correlation to future resident performance.

Once the cognitive abilities of an applicant meet a program's standards, the personal interview is an effective way to delve into the applicants personality and identify any red flags that may hinder the applicant's achievement during residency.⁴¹

Extroversion, conscientiousness, emotional stability, and high emotional intelligence scores have been correlated to improved performance, enhanced well-being, and less burnout in residency training.^{42–45}

The interview remains essential, because a remarkably accurate assessment of fit can be made in a short period of time. To help determine whether a candidate is the right fit, programs can use group, blinded, behavioral, or structured interviews.^{59,61,62} With the recent pandemic, virtual interviews are becoming common, and retain both the good and bad traits of traditional interviews.

DISCLOSURE

The authors have nothing to disclose.

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