

Integrated Plastic Surgery Applicant Review: Important Factors and Selection Criteria

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Summary: Matching into integrated plastic surgery residency is highly competitive. Applicants to these programs are among the most accomplished graduating medical students, consistently demonstrating some of the highest United States Medical Licensing Examination scores, mean numbers of research publications, and rates of Alpha Omega Alpha Honor Medical Society membership. The applicant review process requires programs to rely on a number of objective and subjective factors to determine which of these qualified applicants have the most potential for success. We outline these factors, discuss their correlation with resident performance, and provide our institution's applicant review process both for applicants hoping to optimize their applications for success in the National Resident Matching Program and for program faculty hoping to optimize their resident selection process. (*Plast Reconstr Surg Glob Open* 2020;8:e2892; doi: [10.1097/GOX.0000000000002892](https://doi.org/10.1097/GOX.0000000000002892); Published online 17 July 2020.)

INTRODUCTION

Integrated plastic surgery residency remains one of the most competitive specialties in the National Resident Matching Program (NRMP).¹ Although the number of integrated plastic surgery positions and the match rate of US senior applicants to these positions has dramatically increased over the last 10 years, applicants to integrated plastic surgery programs remain consistently among the most accomplished graduating medical students, reporting some of the highest United States Medical Licensing Examination (USMLE) Step 1 and Step 2 scores, rates of membership in the Alpha Omega Alpha (AOA) Honor Medical Society, and research productivity (Table 1).²⁻⁶ The objective of the applicant review process is to identify qualified candidates who will excel and succeed in their residency program, ultimately leading to the graduation of competent plastic surgeons. With the increasing number of capable applicants applying to integrated plastic surgery programs, programs must rely on standardized criteria to select applicants for interview and to rank those best fit for their respective programs.

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In this article, we review the objective and subjective factors that influence the evaluation and selection of integrated plastic surgery residency applicants and describe our institution's process. A comprehensive understanding of the most important criteria that programs have successfully used in resident selection and those criteria that have proved to correlate with resident performance may serve as a useful tool for both future candidates looking to achieve success in the highly competitive match and for faculty looking to refine their institution's resident selection process.

OBJECTIVE FACTORS

Objective criteria are often considered the first in the applicant review process, as they are most directly comparable between applicants and can be used to effectively narrow the field of candidates. The most important and commonly cited objective criteria considered in selection of plastic surgery applicants are research productivity, USMLE scores, AOA membership, and medical school reputation.^{1,3,5-8}

Research Productivity

Integrated plastic surgery applicants consistently have historically reported some of the highest mean numbers of publications, abstracts, and research experiences among graduating medical students, and their research productivity has only continued to rise.^{1,4,8} The mean number of publications authored by matched plastic surgery applicants has increased considerably over the last decade (3.4 in 2007 versus 14.2 in 2018).^{3,6} However, a 2006 study reported that, while applicants with one or more

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Table 1. Outcomes of US Allopathic Seniors in the NRMP Match

	Applicants Matched to Plastic Surgery	Applicants Unmatched to Plastic Surgery	Applicants Matched to All Specialties	Applicants Unmatched to All Specialties
Mean USMLE Step 1 score	249	239	233	224
Mean USMLE Step 2 score	254	248	246	236
Mean number of research experiences	5.4	5.1	3.2	3.3
Mean number of abstracts, presentations, and publications	14.2	14.9	5.7	5.0
Percentage AOA membership	44.5%	12.5%	17.0%	6.4%
Percentage graduating from a top 40 medical school	40.4%	29.2%	31.9%	22.5%

Charting Outcomes in the Match: US Allopathic Seniors. National Resident Matching Program; July 2018.

publications received significantly more interview invitations than those with none, the quantity of an applicant's publications did not correlate with the number of interview invitations.⁹ In 2018, unmatched applicants reported a mean of 14.9 abstracts, presentations, and publications, while matched applicants reported 14.2.⁶ It is possible that applicants with a large number of publications may have deficiencies in other areas of their applications, and that application reviewers take into account the quality of a publication and the extent of the author's involvement in the evaluation of an applicant's research productivity.⁹

With a strong emphasis on research, there is a new rise in the number of students taking time off from medical school to pursue dedicated research fellowships.^{1,3} Mehta et al¹ recently reported that, on average, research fellows publish 5.25 articles and give 5.4 oral presentations and 3 poster presentations per year, exceeding the productivity expectations of polled faculty. Most importantly, the match rate from 2013 to 2016 for those who completed a research fellowship was significantly higher than that for those who did not (97% versus 81%). Only 21% of research fellows matched at the same institution where they completed their fellowships.

USMLE Step Examination Scores

Just as plastic surgery applicants' research productivity has increased, candidates' mean USMLE scores have continued to rise over the last 10 years (234 in 2007 versus 249 in 2018).⁶ Now, many programs use an applicant's performance on the USMLE Step 1 (and to a lesser degree Step 2) as an important first-line screening tool in application review. In 2008, 48.8% of plastic surgery program directors surveyed reported using a minimum USMLE Step 1 score (range, 190–240; mode, 220–229) as a cutoff to prescreen applicants. Interestingly, those who used cutoff scores reported to be more satisfied with their current resident selection processes than those who did not, with no correlation to the specific cutoff score used.¹⁰ Utilization of this screening cutoff is supported by literature in other fields (namely general surgery, neurosurgery, radiology, and orthopedic surgery) as USMLE Step 1 scores greater than 220–230 are strong predictors of passing professional licensing examinations taken at the end of residency training.^{11–13}

Beyond their use as a screening tool, it is unclear exactly how USMLE scores factor into the applicant selection process. Nevertheless, both USMLE Step 1 and

Step 2 scores have been shown to positively correlate with the number of interview invitations an applicant receives, and a higher score may give applicants a competitive edge.⁹

In February 2020, the decision was made to transition score reporting for Step 1 from a 3-digit numerical score to a pass/fail score, effective January 2022. The Invitational Conference on USMLE Scoring made these recommendations with the purpose of reducing the current overemphasis on USMLE Step 1 performance in resident selection and, instead, allowing scores to be used for their intended purpose of demonstrating medical licensure eligibility.¹⁴

Step 1 scores are a very large part of the initial applicant review process. It is possible that, in the absence of numerical Step 1 scores, Step 2 CK scores will effectively, and perhaps unintentionally, serve the role of screening tool and more weight will be put on other factors, such as research, clinical grades, and letters of recommendation. Previously, residency program directors ranked USMLE Step 2 scores as a "Tier 2" factor in ranking an applicant (behind "What letters of recommendation say," "Who says it," AOA membership, USMLE Step 1 score, Clinical grades, and research experience), while other studies failed to even address Step 2 CK scores as a significant factor in applicant selection.¹⁰ This change may be beneficial as other specialties have shown that Step 2 scores correlate better with in-training examination scores, internship performance, and with the odds that a physician will not receive an official sanction for problematic practice behavior.^{15–17}

AOA Membership

Integrated plastic surgery applications routinely report some of the highest rates of AOA membership.^{3,6} This honorary membership was once thought to be the most important objective criterion in assessing an applicant's academic potential but has taken on relatively less importance in recent years.^{3,7} While still of value and associated with match success, AOA membership demonstrated decreasing relative match index from 2009 to 2014 and was found to be a weak predictor of success in the match.^{3,7} This shift in importance is likely due to institutional variability in AOA availability and selection criteria, as well as increasing applicant competitiveness in other areas. Clerkship grades have been shown to positively correlate with performance in residency and have been reported

to be a more important measure of applicant competency than USMLE scores; however, these grades are only one element of AOA selection.^{8,18}

Medical School Reputation

Medical school reputation is another important factor in the review of plastic surgery applicants, and from 2009 to 2014, graduation from a top 40 US allopathic medical school took on added significance in the integrated plastic surgery match.^{3,5,8} This trend is likely multifactorial. Acceptance to a reputable medical school may speak to an applicant's academic potential, and many of these institutions have existing plastic surgery programs, which offer students impactful research opportunities and the ability to build relationships with research mentors who may provide strong letters of recommendation.³

Although residency programs use an applicant's medical school as an objective measure to further differentiate among qualified applicants, studies have found no relationship between medical school reputation and performance in residency.⁸ In fact, program directors who reported the highest levels of satisfaction with the applicant selection process placed less emphasis on candidate's medical school reputation and more emphasis on subjective qualities.¹⁰

SUBJECTIVE FACTORS

Objective credentials provide reviewers with a preliminary assessment of an applicant's academic potential; however, many studies have demonstrated a poor correlation between these values and performance as a resident.⁷ More subjective factors, including high-quality letters of recommendation, performance on plastic surgery rotations, and the interview itself, are critical in assessing an applicant's ability to integrate into a residency program and his or her clinical potential.

Letters of Recommendation

The importance of letters of recommendation in the application process is well established, with resident selection committees often relying on the word of a trusted colleague or accolades of a giant in the field to evaluate unfamiliar applicants.^{18,19} High-quality letters of recommendation are consistently regarded as one of the most important factors in applicant selection.^{3,10,18,20} High-quality letters are defined as those that are written by a reputable plastic surgeon who knows the applicant well and that can effectively speak to an applicant's character, work ethic, and potential.¹⁹ Generic letters written by a well-known plastic surgeon and letters written by an un reputable author are ineffective.¹⁹ In a 2008 survey of members of the American Association of Plastic Surgeons, Liang et al¹⁸ found that a strong letter from a well-known plastic surgeon was considered the most important factor in resident selection, while a strong letter written by an unknown author was the least important factor. In a 2008 survey, program directors reported that "what letters of recommendation say" and "who says it" are among the most important candidate

qualities, ranked only behind performance on an away rotation and performance in an interview.¹⁰

Letters of recommendation should ideally provide information about positive characteristics that may not be gathered from other aspects of a candidate's application. Character traits consistently valued by program directors and academicians involved in the resident selection process include honesty, work ethic, empathy, humor, maturity, compassion, and the ability to be a team-player.^{18,19}

Performance on Away Rotations

Away rotations are critical in the application and selection process for fourth-year medical students applying to integrated plastic surgery programs as they allow applicants to explore their "fit" at different programs and to potentially improve the competitiveness of their applications.^{1,21} A significant assessment of an applicant's clinical potential and other subjective characteristics occurs during these rotations before formal application review. In 2014, 94% of applicants completed a plastic surgery sub-internship as a visiting fourth-year student, and this number is likely only increasing. Both the majority of applicants and program directors felt that 2 (36.2% of applicants and 52.5% of program directors) or 3 (29.5% of applicants and 32.5% of program directors) away rotations are necessary.²¹

If they make a positive impression, applicants known to a program before the application process have a competitive advantage in the match over applicants of similar academic merit. Away rotations are a method for applicants to demonstrate interest in a given program and make themselves known, which is particularly important for those who do not have a plastic surgery program at their home institution.²¹ In 2014, 27% of postgraduate year 1 positions were filled by applicants who had completed an away rotation at the institution where they matched, while 17% were filled by applicants who attended their home program.²¹ In a study conducted by Drolet et al,²¹ 42 program directors surveyed on residency selection criteria ranked strong performance on an away rotation (defined by characteristics such as strong work ethic, availability, and thorough preparation for cases and conference) and perceived good fit higher than the strength of a candidate's overall application. With "perceived fit" being a critical component in resident selection, program directors report that interaction with residents (50%) and faculty (47.5%) are the most important away rotation activities considered in applicant evaluation.²¹

The Interview Process

The interview is a critical step in the resident selection process that allows faculty to assess a candidate's communication skills, professionalism, personality, and career goals.⁸ Given the relatively small size of plastic surgery divisions and departments, each faculty member is often able to interact with an applicant and provide perspective on their potential and fit. In 2018, an applicant's probability of matching was 90% with 12 contiguous ranks and almost 100% with 20 contiguous ranks, suggesting that an applicant should aim for approximately 12 interviews to ensure

the best probability of successful matching, after which there is diminished return on each interview completed.⁶

Commonly referenced qualities of a successful plastic surgeon include a solid knowledge base, good clinical judgment, and proficient technical ability.¹⁹ Liang et al¹⁸ found that American Association of Plastic Surgeons members considered intelligence, dexterity, and spatial sense as the second most important applicant evaluation criterion (after only a high-quality letter of recommendation). Although technical skills are critical in surgical practice, most programs do not include skill evaluation in the applicant review process.^{22,23} In otolaryngology residency interviews, programs have reported testing applicants' technical skills through soap-carving and microvascular anastomosis simulations. While performance in soap-carving exercises has no correlation with a resident's visuospatial ability and manual dexterity,^{24,25} Moore et al²⁶ found a significant correlation between an applicant's performance in microvascular anastomosis simulation and performance in microvascular cases as a resident.

During the interview, most of the allotted time is spent by applicants answering questions about themselves,²⁰ especially with regard to a candidate's career goals. An interest in teaching or pursuing an academic career has been found to be among the most important subjective criteria in resident selection, as many programs hope to train academic surgeons who will advance the field.^{7,27} This is potentially problematic if applicants feel pressured to misrepresent themselves in the interview setting. In a survey of 118 recently matched plastic surgery residency applicants, 83% reported affinity for an academic career in the interview, while only 70% reported "true" plans to pursue a career in academics.²⁸

Overall, 54.6% of program directors surveyed in 2008 reported that a candidate's interview performance was indicative of his or her performance as a resident. These respondents were more likely to feel "very satisfied" or "somewhat satisfied" with their resident selection processes,¹⁰ indicating that those who place emphasis on a candidate's interview performance in the creation of a rank order list were more satisfied with their match results.

PARTICIPANTS INVOLVED IN THE APPLICANT REVIEW PROCESS AND GENERATION OF THE RANK ORDER LIST

While the selection process varies greatly between individual plastic surgery programs, across the board, program directors and chairmen are the 2 primary decision makers in the resident selection process.¹⁰ After interviews are completed, candidates are ranked on a rank order list, which is then submitted to the NRMP before the match. In a survey of 43 program directors, 72.1% of program directors report that the quality of a resident was consistently well predicted by his or her rank order position, 47.4% reported that program directors were the primary rank order list generators, and 36.4% reported that chairmen were the primary rank order list generators.

At all programs, residents have a role in the interview process via interaction with the applicants on tours and

during social functions, and 79.5% of program directors reported that residents play a significant role in rank order list generation.¹⁰ Involvement of part-time faculty and staff members (eg, program coordinators and mid-level providers) in the interview process has been anecdotally reported. Within neurosurgery, interviews are conducted by part-time faculty at 41.3% of programs and by staff members at 26% of programs.²⁹

OUR INSTITUTION'S APPLICANT REVIEW PROCESS

Much of the information provided to integrated plastic surgery residency candidates regarding the applicant review process is anecdotal. Below, our institution's applicant review protocol for this past year's application cycle is outlined to provide transparency and to provide applicants with information for success in the match.

Applications are first prescreened with a USMLE Step 1 score cutoff of 245. This cutoff varies significantly between institutions¹⁰ but, with the caliber of applicants today, still leaves a significant number of qualified applications to be reviewed. The applications are then divided evenly among faculty members participating in the applicant review process, including the program director. Each faculty member is given a set number of applicants he or she may select to invite for a formal interview (eg, 5 of 20). These decisions are based on academic performance (USMLE scores, AOA membership, and performance on clinical rotations), letters of recommendation, and perceived fitness, which may be gathered from extracurricular activities, hobbies, and the applicant's personal statement. Students with stellar performances on a sub-internship or who are well-liked by residents and/or faculty in the program are given priority. If, after review of a given batch of applications, a faculty member feels that he or she may need an additional "spot" for a deserving candidate, this concern is brought to the entire committee for consideration.

Two interview dates are held on consecutive days. All members of the core faculty (including the program chair and program director), many associated clinical professors, and the incoming chief residents interview each applicant. Interviews are 12 minutes long, with each interviewee being interviewed by 3 faculty members at a time. An applicant social, held on the evening between interview dates, gives candidates the opportunity to meet with residents and faculty in a more casual environment. Immediately after the interview process, all interviewers, including the chief residents, meet to create the rank order list.

CONCLUSIONS

Integrated plastic surgery remains one of the most competitive specialties in the NRMP match. With hundreds of outstanding applicants, program directors and faculty involved in the applicant review process must rely on a number of objective and subjective factors to identify those with the greatest potential to excel in their program and to graduate as proficient plastic surgeons. These include academic potential (reflected in USMLE

scores and research productivity) and clinical potential (reflected in high-quality letters of recommendation and strong performance on away rotations). With this information, we hope that candidates are better equipped to navigate the residency application and interview process and that programs have insight into the application qualities, which may be indicative of success in residency.

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