Implications of Pass/Fail Step 1 Scoring: Plastic Surgery Program Director and Applicant Perspective

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Background: As early as 2022, United States Medical Licensing Examination Step 1 results will be reported as pass or fail, rather than as 3-digit numeric scores. This survey examines the perspectives of plastic surgery applicants and program directors (PD) regarding this score reporting change.

Methods: A 24-item survey was distributed to integrated applicants from the 2018−19 and 2019−20 application cycles. An analogous 28-item survey was sent to integrated and independent plastic surgery training program directors. Data were analyzed using summary tables and marginal homogeneity tests.

Results: 164 applicants (33.2%) and 64 PDs (62.1%) completed the survey. Most applicants (60.3%) and PDs (81.0%) were not in favor of the score reporting change. As a result of binary scoring, a majority of respondents anticipate that residency programs will use Step 2 CK scores to screen applicants (applicants: 95.7%, PDs: 82.8%), prioritize students from more prestigious medical schools (applicants: 91.5%, PDs: 52.4%), and that dedicated research time will become more important (applicants: 87.9%, PDs: 45.3%). Most applicants (66.4%) and PDs (53.1%) believe that there will be an increase in plastic surgery applicants. Applicants and PDs anticipate that the top 3 metrics used by programs when deciding to offer an interview will change as a result of binary Step 1 scoring.

Conclusions: Most plastic surgery applicants and PDs do not support the change in United States Medical Licensing Examination Step 1 scoring to pass or fail. The majority believe that other metrics (such as Step 2 CK scores, research experience, and medical school reputation) will become more important in the application process. (Plast Reconstr Surg Glob Open 2020;8:e3266; doi: 10.1097/GOX.0000000000003266; Published online 17 December 2020.)

INTRODUCTION

United States Medical Licensing Examination (USMLE) Step 1 scores are an important component of the residency application process, particularly in competitive specialties.1 Step 1 scores have been positively correlated with receiving plastic surgery residency interview invitations and with an applicant’s success in matching.2–5 In turn, plastic surgery training programs routinely match applicants with Step 1 scores approximately 1 SD above the national mean.1,2

Given its significance in residency matching, Step 1 performance creates considerable stress and anxiety.6 There has been increasing emphasis on Step 1 preparation in undergraduate medical education, with students purchasing costly resources and dedicating additional time to study for the Step 1 examination.7 Unfortunately, socioeconomic status disparities in accessing resources may contribute to demographic differences in Step 1 performance by race and gender.8–10 Consequently, Black and Latinx medical students may be disproportionately excluded from surgical careers, as many surgical training programs use minimum Step 1 scores for screening applications.11–15

To address the overemphasis of Step 1 performance in residency selection and minimize demographic differences in Step 1 performance, the Federation of State
Medical Boards and the National Board of Medical Examiners moved to change score reporting for the USMLE Step 1 to pass/fail (P/F) beginning as early as January 2022. This paradigm shift will have significant ramifications for the plastic surgery residency application process. This study characterizes the perspectives of plastic surgery program directors (PD) and recent applicants regarding how this change will affect the plastic surgery residency application process.

METHODS

Survey Design

Two analogous survey instruments were designed to assess applicant and PD perspectives regarding P/F USMLE Step 1 scoring (Table 1). The surveys were then pilot tested and internal validity was assessed. The final survey instruments utilized a combination of Likert scales, rank orders, multiple-choice, and free text questions. The surveys were distributed by email, using the Qualtrics (Provo, Utah) and REDCap (Research Electronic Data Capture, Nashville, Tenn.) platforms. Review of the electronic consent form and successful completion of the survey was considered consent for participation. This study received institutional review board (IRB) exemption from the Ohio State University Office of Responsible Research Practices (IRB #2020E0286) and the Vanderbilt University IRB (IRB #200355).

Survey Respondents

Email addresses for PDs of integrated (n = 80) and independent (n = 54) plastic surgery residency programs were gathered from publicly-available ACGME documents and institutional websites. PDs who direct both program types (n = 31) were included only once. Three survey rounds were issued to 103 PDs over a 3-week period.

Email addresses of all integrated plastic surgery applicants (n = 493) from 2 consecutive integrated plastic surgery residency application cycles (2018–2019 and 2019–2020) were compiled. Four survey rounds were issued over a 2-week period.

Statistical Analysis

Continuous variables were analyzed for mean, median, mode, SD, and quartiles. Ordinal and categorical variables were summarized in tables. Marginal homogeneity tests were utilized to detect changes in metrics for interview selection. Statistical analysis was performed using Microsoft Excel (Redmond, Wash.) and IBM SPSS Version 25.0 (Armonk, N.Y.), and *P < 0.05* was considered statistically significant.

RESULTS

Program Director Response Rate and Demographics

Sixty-four PD responses were obtained (response rate = 62%), including 40 integrated PDs, 8 independent PDs, and 16 dual-program PDs. Mean PD age was 49 years, and 31% were identified as women. The mean tenure as PD was 6.4 years.

Applicant Response Rate and Demographics

A total of 164 applicants (33.2%) completed the survey. Mean applicant age was 28 years, and 48% identified as female. An estimated 69.5% of applicants self-identified as White or Caucasian, 18.9% as Asian, 3.7% as Black or African American, and 5.5% as Hispanic or Latino. Almost all applicants (98.2%) graduated from allopathic US medical schools. Over a third (34.8%) had participated in a dedicated research experience, defined as a contiguous period no less than 12 months, where one is conducting research (basic, translational, or clinical) related to biomedicine or healthcare, but not actively pursuing a health professional degree. In total, 25.6% of applicants had no cumulative medical-school–related debt; 54.3% reported debt greater than $100,000, and 17.1% reported debt greater than $300,000 (Table 2).

Applicant and PD Perspectives regarding Binary Step 1 Scoring

Most respondents viewed the score reporting change unfavorably (applicants: 60.3%, PDs: 81.0%) (Tables 3 and 4). Most PDs (82.8%) believe the change will make objective comparison of applicants more difficult. Nearly all applicants (91.5%) agreed the change will benefit students from more prestigious medical schools, and most PDs (52.4%) agreed that an applicant’s medical school will become more important in screening and selection. While most applicants (87.9%) believe the change will increase the importance of dedicated research, only some PDs (45.3%) shared this belief. Most respondents felt this change will increase the importance of numeric Step 2 CK scores (applicants: 73.2%, PDs: 87.5%), and most anticipate that Step 2 CK will become a required application component (applicants: 96.3%, PDs: 82.8%). Furthermore, 95.7% of applicants feel programs will use Step 2 CK to screen applicants for interview invitation. Most disagreed that socioeconomic disparities in the application process will diminish as a result of this change (applicants: 56.1%, PDs: 57.8%). Opinions were split on whether this change will improve student well-being. Most respondents felt there will be more applicants to integrated plastic surgery as a result of the reporting change (applicants: 86.4%, PDs: 53.1%).

Current and Future Metrics for Selecting Applicants for Residency Interviews

Respondents overwhelmingly selected numeric Step 1 scores (n = 185), letters of recommendation (n = 184), and away rotations (n = 136) as the current top 3 most important metrics (MIMs) that programs would consider when offering a residency interview (Table 3). Research was the 4th most selected MIM (n = 77). When asked to rank the top 3 MIMs following the USMLE Step 1 scoring change, respondents selected letters of recommendation (n = 189), away rotations (n = 134), and numeric Step 2 CK scores (n = 129) (Table 5). Research (n = 87) and an applicant’s medical school (n = 75) were the 4th and 5th most selected MIMs after the score reporting change. The MIMs before the change differed significantly from those
Table 1. Survey Questions

| Part | Question | Description |
|------|----------|-------------|
| I.   | Changing the USMLE Step 1 score reporting to P/F | Is a good idea |
|      | Will increase the importance of Step 2CK scores in selecting applicants | |
|      | Will put international medical graduates at a disadvantage | |
|      | Will positively impact the application process | |
|      | Will make objective evaluation of applicants easier | |
|      | Will improve medical student well-being | |
|      | Will decrease socioeconomic disparities in the application process | |
|      | Will decrease medical student knowledge of basic sciences | |
|      | Will prioritize students from higher-ranked medical schools | |
| II.  | Currently, what do you believe are the top 3 metrics a program uses when deciding to extend a residency interview | |
|      | Applicant’s medical school | Dean’s letter |
|      | Letters of recommendation | Doing a rotation at a program |
|      | Research | Step 1 score (numeric) |
|      | Step 2CK score (numeric) | Clerkship grades |
|      | Society memberships | Leadership experience |
| III. | Following the USMLE Step 1 score reporting change to P/F, what do you believe will be the top 3 metrics a program will use when deciding to extend a residency interview | |
|      | Applicant’s medical school | Dean’s letter |
|      | Letters of recommendation | Doing a rotation at a program |
|      | Research | Step 1 score (P/F) |
|      | Step 2CK score (numeric) | Clerkship grades |
|      | Society memberships | Leadership experience |
| IV.  | As a result of changing USMLE Step 1 score reporting to P/F | Step 2CK will be required as part of the residency application process |
|      | An applicant’s medical school will be more important in screening and selection | |
|      | Programs are likely to screen applicants based on Step 2CK scores | |
|      | Step 2CK will also be changed to P/F | |
|      | A new standardized examination will be created for evaluating applicants | |
|      | There will be more medical students applying to integrated plastic surgery residency | |
|      | More applicants will apply to at least one other specialty in addition to plastic surgery | |
|      | It will be more important to take time off from medical school to participate in research | |
|      | My application will be more competitive for integrated plastic surgery residency | |
| V.   | Demographic Information (age, gender identity, medical school type, race, ethnicity, dedicated research experience, cumulative medical school debt) | |

For perspective on this change to the plastic surgery application process.

Plastic surgery is one of the most competitive specialties, with match rates for US seniors of 74% in 2019 and 62% in 2020. Matched integrated applicants often have high USMLE scores, multiple research publications, and above-average rates of Alpha Omega Alpha membership. USMLE scores even correlate with success in the independent applicant match, despite being nearly a decade old. Nearly all PDs (94%) currently use Step 1 scores for residency interview selection, with a mean importance rating of 4.1/5.0. Therefore, it is crucial to understand how plastic surgery PDs and applicants will respond to binary USMLE Step 1 scoring.

The USMLE scoring change is unlikely to reduce the competitiveness of the integrated plastic surgery match. Meanwhile, most applicants and PDs are not in favor of the scoring change. With 94% of US medical students passing the USMLE Step 1 on the first attempt, PDs will need to use other metrics to distinguish accomplished applicants. Most applicants suspect—and PDs agree—that numeric Step 2 CK scores will replace Step 1 as an objective measure for programs to screen and compare applicants. This delays the stress of high-stakes testing for medical students. Overall, applicants’ and PDs’ perspectives captured by our survey suggest the proposed goal of reducing “the current overemphasis on USMLE performance” will not be accomplished by this scoring change alone.

A priority of the Invitational Conference on USMLE Scoring was to address demographic differences that exist in USMLE performance. Historically, Step 1 has produced statistically significant gender differences, with men scoring higher than women, even when controlling for undergraduate performance measures. Furthermore, Black and Latinx students score lower on average than their White and Asian counterparts. In plastic surgery, it is common to use Step 1 “cut-off” scores to screen applications, with one study of plastic surgery PDs revealing that approximately 50% utilize a median cut-off score between 220 and 229. By eliminating the Step 1 numeric score, most respondents feel that the number of applicants to integrated plastic surgery will increase. As the mean USMLE Step 1 score for matched integrated plastic surgery applicants has remained steadily above the 80th percentile for over a decade, the scoring change may result in a more diverse set of applicants applying for plastic surgery. While the ultimate influence on applicant diversity remains unclear, we are hopeful that the scoring change can open the field of plastic surgery to applicants from more diverse backgrounds.

The reporting change could, however, magnify socioeconomic disparities in the application process. Most respondents believe that programs will prioritize applicants from more prestigious medical schools after Step 1 is reported as P/F. Students from higher socioeconomic status are more likely to attend prestigious medical schools, suggesting the scoring change may benefit this group at the expense of students from lower socioeconomic status. Students from less prestigious medical schools, as well as
international medical graduates, may be at a greater disadvantage. As one PD replied, “This [change] is going to hurt [applicants] from lower income backgrounds, who have the knowledge and skills to do well, but don’t come from a top-tier program and thus can’t get letters from big names and can’t afford the cost of multiple away rotations.”

Several factors already impose financial burdens on plastic surgery applicants, including completing away rotations, applying broadly, and dedicating time to research.

Table 2. Applicant Demographics (n = 164)

| Category                          | n     | %   |
|----------------------------------|-------|-----|
| **Gender identity**              |       |     |
| Female                           | 78    | 47.6|
| Male                             | 85    | 51.8|
| Gender-variant/non-conforming    | 1     | 0.6 |
| **Type of medical school**       |       |     |
| Allopathic (M.D.)                | 161   | 98.2|
| Osteopathic (D.O.)               | 3     | 1.8 |
| **Race**                         |       |     |
| American Indian                  | 1     | 0.6 |
| Asian                            | 31    | 18.9|
| Black or African American        | 6     | 3.7 |
| White or Caucasian               | 114   | 69.5|
| Other                            | 12    | 7.3 |
| **Ethnicity**                    |       |     |
| Hispanic and/or Latino           | 9     | 5.5 |
| **Dedicated research experience**|       |     |
| Yes                              | 57    | 34.8|
| No                               | 42    | 25.6|
| **Cumulative medical education debt** |   |     |
| No debt                          | 42    | 25.6|
| Less than $50,000 USD            | 21    | 12.8|
| $50,001–$100,000 USD             | 12    | 7.3 |
| $100,001–$200,000 USD            | 31    | 18.9|
| $200,001–$300,000 USD            | 30    | 18.3|
| >$300,000 USD                    | 28    | 17.1|

Table 3. Applicant Sentiments Regarding Step 1 Score Reporting Change

| Statement                                                                 | Strongly Agree | Agree | Neither Agree Nor Disagree | Disagree | Strongly Disagree |
|---------------------------------------------------------------------------|----------------|-------|----------------------------|----------|-------------------|
| Changing the USMLE Step 1 score reporting to P/F...                       |                |       |                            |          |                   |
| Is a good idea                                                            | 9.8%           | 13.4% | 16.5%                      | 34.1%    | 26.1%             |
| Will increase the importance of Step 2CK scores in selecting applicants  | 73.2%          | 21.3% | 1.2%                       | 2.4%     | 1.8%              |
| Will positively impact the application process                            | 4.9%           | 7.9%  | 26.2%                      | 42.1%    | 18.9%             |
| Will prioritize students from higher ranked medical schools               | 62.8%          | 28.7% | 6.1%                       | 0.6%     | 1.8%              |
| Will make objective evaluation of applicants easier                       | 1.2%           | 4.9%  | 9.8%                       | 47.0%    | 37.2%             |
| Will improve medical student well-being                                  | 15.9%          | 28.0% | 23.2%                      | 26.8%    | 6.1%              |
| Will decrease socioeconomic disparities in the application process        | 6.7%           | 12.2% | 25.0%                      | 33.5%    | 22.6%             |
| As a result of changing USMLE Step 1 score reporting to P/F...            |                |       |                            |          |                   |
| Step 2CK will be required as part of the residency application process    | 64.0%          | 32.3% | 1.8%                       | 1.2%     | 0.6%              |
| Programs are likely to screen applicants based on Step 2CK scores         | 62.2%          | 33.3% | 2.4%                       | 0.6%     | 1.2%              |
| Step 2CK will also be changed to P/F                                      | 8.5%           | 12.8% | 33.5%                      | 36.6%    | 8.5%              |
| It will be more important to take time off from medical school to participate in research | 47.0%          | 40.9% | 7.9%                       | 3.7%     | 0.6%              |
| A new standardized examination will be created for the purpose of evaluating applicants | 1.8%           | 12.8% | 29.3%                      | 42.7%    | 13.4%             |
| There will be more medical students applying to integrated plastic surgery residency | 26.2%          | 40.2% | 19.5%                      | 14.0%    | 0.0%              |
| More applicants will apply to at least one specialty in addition to plastic surgery | 15.2%          | 41.5% | 33.5%                      | 9.1%     | 0.6%              |
| My application will be more competitive for integrated plastic surgery residency | 5.5%           | 14.0% | 26.2%                      | 36.6%    | 17.7%             |

Table 4. Program Director Sentiments regarding Step 1 Score Reporting Change

| Statement                                                                 | Agree | Neutral | Disagree |
|---------------------------------------------------------------------------|-------|---------|----------|
| Changing the USMLE Step 1 to P/F:                                         |       |         |          |
| Is a good idea                                                            | 4.8%  | 14.3%   | 81.0%    |
| Will make it more difficult to objectively compare applicants              | 82.8% | 6.3%    | 10.9%    |
| Will increase emphasis on Step 2 CK scores in selecting applicants for my program | 87.5% | 3.1%    | 9.4%     |
| Will put international medical graduates at a disadvantage                | 45.5% | 45.2%   | 11.3%    |
| Will decrease socioeconomic disparities in the application process        | 4.7%  | 37.5%   | 57.8%    |
| Will decrease medical student knowledge of the basic sciences             | 29.7% | 50.0%   | 20.3%    |
| Will improve medical student well-being                                  | 15.6% | 37.5%   | 46.9%    |
| As a result of changing USMLE Step 1 to P/F:                               |       |         |          |
| I will now require applicants to submit Step 2 CK scores with ERAS        | 82.8% | 7.8%    | 9.4%     |
| Where an applicant goes to medical school will be more important in screening and selection for my program | 52.4% | 22.2% | 25.4% |
| There will be more students applying to plastic surgery residency         | 53.1% | 29.7%   | 17.2%    |
| It will be more important for applicants to take time off from medical school to participate in research | 45.8% | 34.4% | 20.3% |
| Step 2 CK should also be changed to P/F                                   | 4.8%  | 9.5%    | 85.7%    |
Table 5. Perceived Top Three Metrics for A Residency Interview before and after the Step 1 Score Reporting Change*

| Metric (in descending frequency) | #1 | #2 | #3 | Δ |
|---------------------------------|----|----|----|---|
| Letters of recommendation       | 91 | 39.9| 91 | +4|
| Step 1 score (numeric)          | 91 | 39.9| 91 | +4|
| Away rotation                   | 47 | 23.7| 47 | +10|
| Research                        | 54 | 23.7| 54 | +10|
| Applicant’s medical school      | 18 | 7.9 | 18 | -18|
| Clerkship grades                | 18 | 7.9 | 18 | -18|
| Step 2CK score (numeric)        | 18 | 7.9 | 18 | -18|

While none of these factors are mandatory, all correlate with a successful match.29–31 Integrated applicants already complete a mean of 2.1 away rotations, spending an average of $3,591 on each rotation29,30,32 and may feel obligated to pursue more away rotations if more students enter the applicant pool. Second, applicants may feel obligated to apply more broadly to maximize their chances of a successful match. In 2018, matched applicants ranked 13.7 programs,2 and as a result, the plastic surgery residency interview process can regularly cost $10,000 or more.31 Lastly, respondents feel that a dedicated research experience will become more important.11,29 Limited access to dedicated research experiences due to time and cost may exclude diverse applicants who do not have the means or ability to pursue such opportunities. The resulting financial burden of these secondary effects cannot be ignored, especially as these costs may exacerbate socioeconomic disparities. The plastic surgery community should mitigate financial barriers to entry, or else risk excluding well-suited candidates from socioeconomically diverse backgrounds. Ultimately, additional reforms are needed to address the racial and socioeconomic disparities present in the residency selection process.

Several limitations may lessen the applicability of these results. First, our results may not represent all integrated plastic surgery applicant population, as the applicant response rate was 33.2%. Respondents identifying as White or Caucasian were moderately over-represented (69.5% compared with 53% from the Electronic Residency Application Service (ERAS) 2015–2019 demographics data). Respondents identifying as Black or African American or Hispanic, Latino, or Spanish origin were moderately under-represented (survey = 3.7% and 5.5% respectively, compared with 6.2% and 8.4% respectively from ERAS demographics data). Additionally, women were modestly over-represented (47.6% compared with 41.2% from ERAS demographics data). Second, the applicant survey did not differentiate between US graduates and international medical graduates or between matched and unmatched. Responses may differ between these groups, though the purpose of our study was to characterize general sentiments among the entire applicant pool. Finally, our data are limited by the applicability of prospective psychometric data assessing opinions, attitudes, and forward-looking perspectives of recent applicants. These conclusions will need to be investigated longitudinally to assess the ultimate outcomes of this scoring change.

Historically, USMLE Step 1 numeric scores have played a major role in the plastic surgery training pathway.33 As scores will be reported as P/F, it is critical for plastic surgery programs and future applicants to consider other metrics for distinction. Applicants and PDs both anticipate that Step 2 CK, research, and an applicant’s medical school will replace the Step 1 numeric score in applicant evaluation. While it remains to be seen whether this paradigm shift will improve residency selection, we are hopeful that additional reforms can produce a more equitable plastic surgery application process.

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REFERENCES
1. Sue GR, Narayan D. Generation y and the integrated plastic surgery residency match: a cross-sectional study of the 2011 match outcomes. Plast Reconstr Surg. 2013;131:1–5.
2. National Residency Matching Program – Charting Outcomes in the Match. 2018. Available at: https://www.nrmp.org/wp-content/uploads/2018/06/Charting-Outcomes-in-the-Match-2018-Seniors.pdf. Accessed April 4, 2020.
3. Rogers CR, Gutowski KA, Munoz-Del Rio A, et al. Integrated plastic surgery residency applicant survey: characteristics of successful applicants and feedback about the interview process. Plast Reconstr Surg. 2009;123:1607–1617.
4. Kling RE, Kling RR, Agi C, et al. A closer look at the 2013 to 2014 integrated plastic surgery match. Plast Reconstr Surg. 2016;137:624e–629e.
5. LaGrasso JR, Kennedy DA, Hoehn JG, et al. Selection criteria for the integrated model of plastic surgery residency. Plast Reconstr Surg. 2008;121:121e–125e.
6. Green M, Angoff N, Encandela J. Test anxiety and United States medical licensing examination scores. Clin Teach. 2016;13:142–146.
7. Carmody JB, Rajasekaran SK. On step 1 Mania, usmle score reporting, and financial conflict of interest at the national board of medical examiners. Acad Med. 2019;1.
8. White CB, Dey EL, Fantone JC. Analysis of factors that predict clinical performance in medical school. Adv Health Sci Educ Theory Pract. 2009;14:455–464.
9. Kleshinski J, Kluder SA, Shapiro JI, et al. Impact of preadmission variables on USMLE step 1 and step 2 performance. Adv Health Sci Educ Theory Pract. 2009;14:69–78.
10. Cuddy MM, Swanson DB, Clauser BE. A multilevel analysis of examinee gender and USMLE step 1 performance. Acad Med. 2008;83(10 Suppl):S58–S62.
11. Janis JE, Hatef DA. Resident selection protocols in plastic surgery: a national survey of plastic surgery program directors. Plast Reconstr Surg. 2008;122:1929–1939.
12. Nguyen AT, Janis JE. Resident selection protocols in plastic surgery: a national survey of plastic surgery independent program directors. Plast Reconstr Surg. 2012;130:459–469.
13. Rubright JD, Jodoin M, Barone MA. Examining demographics, prior academic performance, and united states medical licensing examination scores. Acad Med. 2019;94:364–370.
14. McCarthy JG, Warren SM, Bernstein J, et al.; Craniosynostosis Working Group. Parameters of care for craniosynostosis. Cleft Palate Craniofac J. 2012;49 Suppl:1S–24S.
15. Williams M, Kim EJ, Pappas K, et al. The impact of United States Medical Licensing Exam (USMLE) step 1 cutoff scores on recruitment of underrepresented minorities in medicine: a retrospective cross-sectional study. Heal Sci Reports. 2020;3:1–8.
16. Change to pass/fail score reporting for Step 1. https://www.usmle.org/pdfs/incus/incus_summary_report.pdf. Accessed November 4, 2020.
17. Barone MA, Filak AT, Johnson D, et al. Summary Report and Preliminary Recommendations from the Invitational Conference on USMLE Scoring (InCUS), March 11-12, 2019. Available at: https://www.usmle.org/pdfs/incus/incus_summary_report.pdf. Accessed March 1, 2020.
18. Borsting EA, Chim JH, Thaller SR. An updated view of the integrated plastic surgery match. Ann Plast Surg. 2015;75:556–559.
19. National Resident Matching Program. Results and data: 2019 main residency match. Available at: https://mk0nrmp3oyqui6wqfm.kinstacdn.com/wp-content/uploads/2019/04/NRMP-Results-and-Data-2019_04112019_final.pdf. Accessed April 29, 2020.
20. National Residency Matching Program. Advance Data Tables: 2020 Main Residency Match. 2020. Available at: https://mk0nrmp3oyqui6wqfm.kinstacdn.com/wp-content/uploads/2020/03/Advance-Data-Tables-2020.pdf. Accessed April 18, 2020.
21. Super N, Tieman J, Boucher K, et al. Recent trends in applicants and the matching process for the integrated plastic surgery match. Ann Plast Surg. 2013;71:406–409.
22. Azoury SC, Kozak GM, Stranix JT, et al. The independent plastic surgery match (2010-2018): applicant and program trends, predictors of a successful match, and future directions. J Surg Educ. 2020;77:219–228. doi:
23. Makhoul AT, Pontell ME, Ganesh Kumar N, et al. Objective measures needed – program directors’ perspectives on a pass/fail USMLE step 1. N Engl J Med. 2020;382:2389–2392.
24. National Board of Medical Examiners. 2018 Performance Data. 2018. Available at: https://www.usmle.org/performance-data/default.aspx#2018_overview. Accessed March 6, 2020.
25. National Residency Matching Program – Charting Outcomes in the Match. 2011. Available at: https://www.nrmp.org/wp-content/uploads/2013/08/chartingoutcomes2011.pdf. Accessed April 17, 2020.
26. National Residency Matching Program – Charting Outcomes in the Match. 2014. Available at: https://www.nrmp.org/wp-content/uploads/2014/09/Charting-Outcomes-2014-Final.pdf. Accessed April 4, 2020.
27. Silvestre J, Serletti JM, Chang B. Racial and ethnic diversity of U.S. plastic surgery trainees. J Surg Educ. 2017;74:117–123. doi:
28. Drolet BC, Brower JP, Lifchez SD, et al. Away rotations and matching in integrated plastic surgery residency: applicant and program director perspectives. Plast Reconstr Surg. 2016;137:1337–1343.
29. Mehta K, Sinno S, Thanik V, et al. Matching into integrated plastic surgery: the value of research fellowships. Plast Reconstr Surg. 2019;143:640–645.
30. Tafsinia KK, Orra S, Bassiri Gharb B, et al. Applying to integrated plastic surgery residency programs: trends in the past 5 years of the match. Plast Reconstr Surg. 2016;137:1344–1353.
31. Claiborne JR, Cranford JC, Swett KR, et al. The plastic surgery match predicting success and improving the process. Ann Plast Surg. 2013;70:698–703.
32. Molina Burbano F, Pasiek C, Torina PJ, et al. Away rotations in plastic and reconstructive surgery: a survey of program directors. Plast Reconstr Surg. 2020;145:235e–236e.
33. Nagarkar P, Pulikkottil B, Patel A, et al. So you want to become a plastic surgeon? What you need to do and know to get into a plastic surgery residency. Plast Reconstr Surg. 2013;131:419–422.