



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

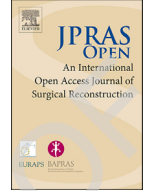
Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



ELSEVIER

Contents lists available at ScienceDirect

JPRA Open

journal homepage: [www.elsevier.com/locate/jpra](http://www.elsevier.com/locate/jpra)

## Original Article

# A Leadership Perspective on the Plastic and Reconstructive Surgery Residency Application Cycle During the COVID-19 Pandemic

Abhishek Jain<sup>a</sup>, Geoffrey Brown<sup>b</sup>, H. Todd Hudson<sup>a,b</sup>,  
Ashish Patel<sup>b</sup>, Fernando A. Herrera<sup>a,b,c,\*</sup>

<sup>a</sup> College of Medicine, Medical University of South Carolina, Charleston, SC 29425

<sup>b</sup> Division of Plastic Surgery, Medical University of South Carolina, Charleston, SC, 29425

<sup>c</sup> Ralph H Johnson Veterans Affairs Medical Center, Charleston, SC 29425

## ARTICLE INFO

*Article history:*

Received 17 August 2022

Accepted 3 October 2022

Available online xxx

*Keywords:*

COVID

Residency Match

Plastic Surgery Applicants

## ABSTRACT

*Introduction:* The purpose of this study was to identify leadership perspective on the impact of COVID-19 Plastic and Reconstructive Surgery (PRS) residency application cycle in 2020 and its future implications.

*Methods:* A survey was sent to residency program leaders (RPL), consisting of program directors and division chiefs/chairs. The survey was sent weekly for 4 weeks and remained open for 28 days.

*Results:* A total of 156 PRS RPL were emailed. Response rate was 24% (38/156). A total of 68% were division chiefs/chairs, and 42% were program directors. Ten percent were both division chiefs/chairs and program directors. Among them, 78% were male. Eighty-seven percent of RPLs reported changes in the number of away rotations, of which 91% reported less away rotations. Only 27% of programs provided virtual away rotations (VAR), and 88% of RPLs were not comfortable writing letters of recommendation after VARs. Hundred percent of cases reported that VARs influenced whether an applicant received an interview. A total of 24 RPLs (63%) reported no changes in how they viewed applications due to the pandemic. However, 5 (13%) reported USMLE scores were more important, 4 (11%) reported research was more important, and 4 (11%) reported LORs were more important. Sixty-six

\* Corresponding Author: Fernando A. Herrera, Professor of Surgery, Medical University of South Carolina, 96 Jonathan Lucas St, CSB 404, Charleston, SC 29425.

E-mail address: [herreraf@musc.edu](mailto:herreraf@musc.edu) (F.A. Herrera).

<https://doi.org/10.1016/j.jptra.2022.10.001>

2352-5878/© 2022 Published by Elsevier Ltd on behalf of British Association of Plastic, Reconstructive and Aesthetic Surgeons. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Please cite this article as: A. Jain, G. Brown, H.T. Hudson et al., A Leadership Perspective on the Plastic and Reconstructive Surgery Residency Application Cycle During the COVID-19 Pandemic, JPRA Open, <https://doi.org/10.1016/j.jptra.2022.10.001>

percent did not feel they relied heavily on home institution candidates. Seventy-six percent found virtual interviews to be effective in evaluating applicants, and 71% reported they would add virtual interviews in future interviews.

**Conclusions:** During the 2020-2021 PRS residency application cycle, fewer away rotations were offered, and formerly in-person activities were moved to virtual platforms. Virtual activities caused difficulty assessing candidates for many residency programs.

© 2022 Published by Elsevier Ltd on behalf of British Association of Plastic, Reconstructive and Aesthetic Surgeons.

This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

## 1 Introduction

2 The COVID-19 pandemic led to a worldwide quarantine, limiting travel, and in-person interactions.  
3 Prior to the pandemic, the National Residency Matching Program (NRMP) application process relied  
4 heavily on in-person activities (away rotations and interviews) to assess candidates prior to the match.  
5 A recent study discussed the disadvantages of virtual activities due to the candidates' inability to di-  
6 rectly interact with house staff, become familiar with the campus, and immerse themselves in the  
7 culture of the university.<sup>1</sup> Additionally, several studies also noted that the numbers of away rotations  
8 offered prior to match day had decreased due to the American Council of Academic Plastic Surgeons  
9 (ACAPS) recommendation that away/visiting rotations be cancelled for the 2020 application cycle.<sup>2,3</sup>  
10 The loss of away rotations and in-person interviews invites the question of how these factors im-  
11 pacted the application process. The purpose of our study was to obtain a leadership perspective, from  
12 residency program leaders (RPL), consisting of program directors and division chiefs, on the changes  
13 to the Plastic and Reconstructive Surgery (PRS) residency application cycle in 2020 caused by the  
14 COVID-19 pandemic.

## 15 Methods

### 16 Study Design

17 A survey questionnaire was designed using the Research Electronic Data Capture software (RED-  
18 Cap ®) to gather data pertinent to the 2020 PRS residency application cycle during the COVID-19  
19 pandemic. The multiple-choice survey included a varying number of questions based on participant  
20 responses, and respondents were de-identified. Questions were grouped by the following categories:  
21 demographics, visiting/away rotations, application selection, and interview processes during the 2020  
22 match cycle.

### 23 Participants

24 All PRS training programs accredited by the Accreditation Council of Graduate Medical Education  
25 (ACGME) were identified. The ACGME.org website was accessed, and specific programs were identified  
26 by specialty.<sup>4</sup> RPL, consisting of program directors and the division chiefs or chairmen depending on  
27 the status of the program, were identified using each program's publicly available website. The insti-  
28 tutional email addresses of RPLs were identified by searching publicly available information on the  
29 internet.

### 30 Data collection

31 Using REDCap ® software, a secure survey was sent via email to the 156 RPLs of each ACGME  
32 accredited training program. The secure emails were initially sent on August 8, 2021 with a direct

33 link to the survey as well as a statement describing the purpose of the study and that participation  
34 was voluntary. Additional emails were sent weekly as a reminder to all remaining participants for 4  
35 weeks. All completed surveys were de-identified, recorded, and included for data analysis.

#### 36 *Data Analysis*

37 All data analysis was conducted with REDCap software. Data were grouped by the following cat-  
38 egories: demographics, visiting/away rotations, applicant selection, and interview processes. Demo-  
39 graphic data and responses to survey questions were recorded as frequencies and percentages.

## 40 **Results**

### 41 *Demographics*

42 A total of 156 RPLs were identified and emailed. A number of 38 participants completed our survey,  
43 resulting in a 24% response rate. There were 30 male (79%) and 8 female (21%) respondents. Most  
44 respondents were over the age of 40 (97%), with 16 (42%) aged 41-50, 10 (26%) aged 51-60, and 11  
45 (29%) over the age of 60. Only 1 (3%) respondent was under the age of 40. Over 80% of respondents  
46 had been in practice for more than 11 years. A number of 22 (58%) were division chiefs or chairmen,  
47 12 (32%) were program directors, and 4 (10%) held both positions. A total of 26 (68%) RPLs had only an  
48 integrated training program, 3 (8%) had only an independent program, and 9 (24%) had both program  
49 types. The 38 responding RPLs were from institutions in 23 different states.

### 50 *Visiting/Away Rotations*

51 The majority of respondents reported changes in the number of away rotations during the 2020  
52 residency application cycle compared to previous years, with 91% reporting a decrease in away rota-  
53 tions offered. When asked about participating in virtual away rotations (VAR), only 8 (27%) RPLs re-  
54 ported providing them. Of those that reported having VARs, 37.5% reported a VAR duration of 4 weeks,  
55 50% reported a duration of 2 weeks, and 25% reported a duration of 1 week. These rotations included  
56 journal clubs (100%), online lectures (100%), networking events (75%), research meetings (63%), virtual  
57 rounds (50%), morning reports (37.5%), and live stream surgeries (13%). The majority of RPLs (88%)  
58 reported that they were not comfortable writing a well-supporting letter of recommendation after  
59 VARs, most frequently due to not enough interaction with the candidate (43%) and not able to assess  
60 their hands-on skills (43%). However, 100% of RPLs reported that VARs influenced whether applicants  
61 received interviews.

### 62 *Applicant Selection*

63 RPLs saw more residency applications for the 2020 cycle than previous years, and 87% reported  
64 increasing their programs' social media presence for recruiting purposes. Sixty-three percent (24)  
65 reported no change in evaluating the different aspects of residency applications compared to prior years.  
66 Of the RPLs reporting changes in the way they assessed applications, 4 (11%) reported placing more  
67 weight on research, 4 (11%) reported placing more weight on letters of recommendation, and 3 (8%)  
68 reported placing more weight on USMLE Step 1 (Fig. 1). Notably, 34% of RPLs reported relying more  
69 heavily on home-institution candidates, 13% reported relying less on visiting/away rotations, and 5%  
70 reported relying less on interviews in their assessment of candidates.

### 71 *Interview Processes*

72 All 38 responding RPLs reported that their programs participated in virtual interviews. Zoom was  
73 the most frequently used platform with 77% of programs using this software (Fig. 2). Many styles of  
74 virtual interviews were used by programs including virtual hang-out rooms (76%), virtual one-on-one  
75 interviews (71%), and virtual group interviews (47%) (Fig. 3). A total of 5 (13%) RPLs reported having

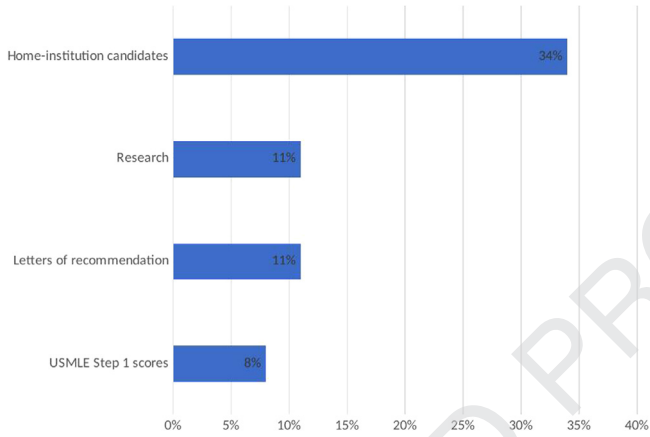


Fig. 1. Application factors weighted more heavily during the 2020 PRS Match

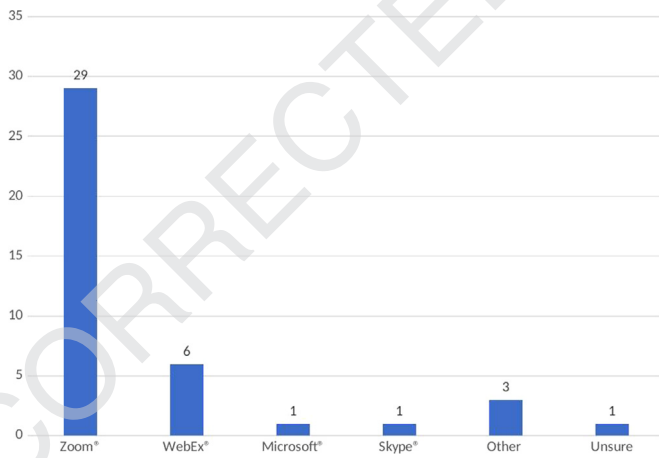


Fig. 2. Video conferencing platforms used during the 2020 PRS virtual interview cycle

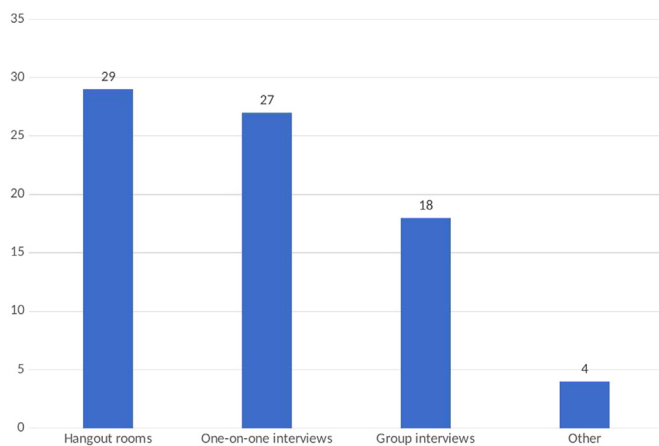


Fig. 3. Frequency of virtual interview types conducted during the 2020 PRS virtual interview cycle

76 technical issues during the interviews, resulting in a total of 10 interviews having to be rescheduled.  
77 Overall, most respondents (76%) found virtual interviews effective for evaluating applicants. The RPLs  
78 that did not find virtual interviews effective reported the following reasons: inability to assess in-  
79 terpersonal communication skills with colleagues (89%), inability to assess nonverbal communication  
80 skills (78%), and inability to establish rapport with the applicant (67%). Seventy-one percent of RPLs  
81 reported that they would add virtual interviews to future interview cycles for the following reasons:  
82 cost effectiveness (85%), time efficiency (67%), and convenience (67%).

## 83 Discussion

84 The COVID-19 pandemic affected the 2020 NRMP residency match for PRS in several ways, most  
85 notably a reduction in the number of away rotations offered and a lack of in-person interviews. His-  
86 torically, away rotations have been thought to play a significant role in the match process. Aiyer et al.  
87 showed that applicants who were able to complete at least two away rotations were more likely to  
88 successfully match into a competitive specialty. Their study looked at orthopedic surgery applicants  
89 and found that more than 50% of matched applicants ended up matching at either their home pro-  
90 gram or one of the programs at which they completed an away rotation.<sup>5</sup> Unfortunately, most RPL  
91 (91%) in our study reported a reduction in away rotations offered. Our findings are consistent with  
92 what other competitive specialties experienced as well. For example, Quesada et al. found a decrease  
93 in the number of away rotations offered by otolaryngology residency programs.<sup>6</sup>

94 Obtaining quality letters of recommendation was also an issue, as Raj et al. discussed the increased  
95 difficulty in getting “critical” letters of recommendation from well-respected plastic surgeons during  
96 the pandemic.<sup>7</sup> Our study results echo this statement, with 88% of RPLs reporting not feeling comfort-  
97 able in writing letters of recommendation for students after VARs, attributed to a lack of interaction  
98 with students to assess their interpersonal skills and hands-on abilities. Perhaps as a compensatory  
99 measure, our study found 87% of RPLs reported increasing their programs’ social media presence to  
100 increase recruitment during the 2020 cycle. Bekeny et al. discussed using social media as a screening  
101 tool for candidates, while Boyd et al. discussed using personality tests to better understand candidates  
102 and determine whether they are a good fit for a particular program.<sup>8,9</sup>

103 The transition from in-person to virtual interviews was the other major change caused by the  
104 COVID-19 pandemic. All programs who responded to our survey participated in virtual interviews, as  
105 recommended by the AAMC. Despite initial concerns over virtual interviews, 71% of RPLs reported  
106 that they would use virtual interviews again in the future due to convenience, time efficiency, and  
107 cost reduction (especially, for applicants). Sarac et al. found that roughly 90% of applicants reported  
108 spending less than \$500 on interview-related costs, compared to an average \$6500 spent during the  
109 2018 and 2019 application cycles. The authors also found that 68% of RPLs were satisfied with virtual  
110 interviews. However, despite a 68% satisfaction rate, 76% of program directors still prefer in person  
111 interviews.<sup>10</sup>

112 Applicant preferences regarding virtual interviews have been assessed in other studies.<sup>10,11,12,13</sup>  
113 Sarac et al. found that 76% of applicants preferred in-person interviews.<sup>10</sup> Further, Bamba et al. found  
114 that applicants who attended an in-person group interview were more satisfied with the interview  
115 process when compared to the virtual group.<sup>11</sup> Hemal et al. found that 80% of applicants preferred  
116 having a virtual preinterview social to meet residents, and 60% applicants wanted to meet the entire  
117 faculty virtually on interview day. The authors also found that applicants preferred shorter interview  
118 days with back-to-back interviews.<sup>12</sup> This is consistent with the suggestions of Patel et al. who pro-  
119 posed that programs limit interview activities to one day, claiming that multiple days of events for  
120 applicants lead to significant interview fatigue. Additionally, Patel et al. found that applicants pre-  
121 ferred smaller group sessions during preinterview socials as it encouraged discussion and allowed for  
122 better interaction between applicants and residents.<sup>13</sup>

123 Recently, several groups have published papers in attempt to maximize students’ success in match-  
124 ing during the virtual interview process.<sup>14,15,16,17</sup> Phillips et al. provided interview etiquette advice  
125 along with virtual interview do’s and don’ts for students to follow when interviewing for PRS training  
126 programs, with a focus on being prepared, humble, and engaged. They also reaffirm the importance of  
127 testing out technology prior to interviews and having backup plans in the event of technological fail-

128 ure.<sup>14</sup> Additionally, Rodoni et al. provided suggestions to help mentors and mentees successfully navigate the match during the COVID-19 pandemic, including identifying needs, managing expectations, 129 and utilizing team mentorship.<sup>15</sup> Serebrakian et al. conducted a study looking at the effect of including a webinar providing information about changes to the application process and interviews, finding 130 that applicants felt better about their chances of matching after attending.<sup>16</sup> Interestingly, Sarac et al. 131 and Dean et al. found that even differences in camera quality and room lighting could affect match 132 probability.<sup>17,18,19</sup> Sarac et al. further discussed that candidates' medical schools providing standardized 133 equipment and rooms for students to use during interviews could be advantageous.<sup>17,18</sup> Overall, 134 it appears that candidates should discuss how to optimize their interview environment and audio- 135 visual quality with their home institutions to improve their chances of matching.<sup>17,18</sup> 136

137 Changes at the policy level have been proposed to improve the interview process in this new 138 virtual setting.<sup>20,21</sup> Hammoud et al. discussed implementing methods such as encouraging holistic 139 review of applicants, limiting the number of applications, and allowing programs to temporarily opt 140 out of the NRMP "All In" policy to contract with applicants from their own institution to alleviate 141 match-related stress.<sup>20</sup> Asaad et al. suggested that policy changes should occur at the AAMC level, 142 including limiting the number of interviews an applicant can attend to create more equal opportunity 143 amongst applicants.<sup>21</sup> 144

145 Our study has several limitations to mention. The primary limitation of our study is the low response 146 rate of only 38 out of 156 responses. In addition, the email addresses of all RPLs were gathered 147 from publicly available email directories and program websites from over 80 institutions. We are 148 unaware of the maintenance schedules of these directories/websites, and believe it is possible that invalid 149 email addresses from unmaintained sources may account for a small portion of the unanswered 150 surveys. We also believe it is possible that institutional restrictions against non-preapproved email 151 senders may have restricted the release of our survey to some recipients' inboxes. It is also possible 152 that some of our data is skewed by reporting as bias, as our data consisted of subjective reports rather 153 than objective data points. Lastly, our data on personal experience with virtual interviews came from 154 faculty only. It is important for future studies to further assess applicant experiences for adequate 155 comparison.

156 Overall, the 2020 residency application cycle experienced many changes due to the COVID-19 pandemic. 157 Less away rotations were offered, and in-person activities were moved to virtual platforms. 158 Despite this, our study data indicate that most leaders within PRS residency programs did not change 159 how they assessed applications, and only a minority relied more heavily on home-institution candidates. 160 We also found that some of the changes made due to COVID-19 may be here to stay, with many 161 programs endorsing that they would continue to use components of a virtual interview process in future 162 cycles for reasons outside of social distancing. As COVID-19 remains a major public health issue 163 worldwide, limitations on away rotations and increased virtual aspects of the residency application 164 process will likely to continue for the foreseeable future. Though these changes may not impact how 165 programs form rank lists to the degree originally speculated, it is important for both candidates and 166 programs to understand how best to navigate the NRMP match under these new circumstances.

## 167 Declaration of Competing Interest

168 None

## 169 Funding Disclosure Statement

170 None Declared

## 171 Ethical Approval

172 Not Required

173 **Supplementary materials**

174 Supplementary material associated with this article can be found, in the online version, at doi:10.  
175 1016/j.jptra.2022.10.001.

176 **References**

- 177 1. Fodje T, Choo E. Applying for residency in the time of COVID-19. *Lancet*. 2020;396(10264):1718.  
178 2. Tucker AB, Pakvasa M, Shakir A, Chang DW, Reid RR, Silva AK. Plastic surgery away rotations during the coronavirus disease  
179 pandemic: A virtual experience. *Ann Plast Surg*. 2021;29 Published online October.  
180 3. Asaad M, Glassman GE, Allam O. Virtual rotations during covid-19: An opportunity for enhancing diversity. *J Surg Res*.  
181 2021;260:516–519.  
182 4. Accreditation Council for Graduate Medical Education. Plastic surgery - integrated programs. Available at: [https://apps.  
183 acgme.org/](https://apps.acgme.org/). Accessed January 4, 2021.  
184 5. Aiyer AA, Granger CJ, McCormick KL, et al. The impact of covid-19 on the orthopaedic surgery residency application process.  
185 *J Am Acad Orthop Surg*. 2020;28(15):e633–e641.  
186 6. Quesada PR, Solis RN, Diaz RC, Kraft SM. Otolaryngology residency application during the sars-cov-2 (COVID-19) pandemic.  
187 *Otolaryngol Head Neck Surg*. 2020;163(1):89–90.  
188 7. Raj S, Abu-Ghname A, Davis MJ, Maricevich RS. The covid-19 pandemic: Implications for medical students and plastic  
189 surgery residency applicants. *Plast Reconstr Surg*. 2020;146(3):396e–397e.  
190 8. Bekeny JC, Nigam M, Fan KL, Baker SB, Song DH. The well-rounded applicant in a square hole: Social media during the  
191 covid-19 application cycle. *Plast Reconstr Surg Glob Open*. 2021;9(1):e3147.  
192 9. Boyd CJ, Inglesby DC, Corey B, et al. Impact of covid-19 on away rotations in surgical fields. *J Surg Res*. 2020;255:96–98.  
193 10. Sarac BA, Shen AH, Nassar AH, et al. Virtual interviews for the integrated plastic surgery residency match: The program  
194 director perspective. *Plast Reconstr Surg Glob Open*. 2021;9(7):e3707.  
195 11. Bamba R, Bhagat N, Tran PC, Westrick E, Hassanein AH, Wooden WA. Virtual interviews for the independent plastic surgery  
196 match: A modern convenience or a modern misrepresentation? *J Surg Educ*. 2021;78(2):612–621.  
197 12. Hemal K, Sarac BA, Boyd CJ, Runyan CM, Gosman AA, Janis JE. Applicant preferences for virtual interviews: Insights from  
198 the 2020-21 integrated plastic surgery application cycle. *Plast Reconstr Surg Glob Open*. 2021;9(7):e3732.  
199 13. Patel V, Azoury SC, Morrison SD. Zooming between interviews: An equitable approach to virtual plastic surgery interviews.  
200 *Ann Plast Surg*. 2021;86(1):3.  
201 14. Phillips BT, Gosman AA, Maricevich RS, Rodriguez ED, Rohrich RJ. The plastic surgery residency interview revisited: Virtual  
202 interviews and beyond. *Plast Reconstr Surg*. 2020;146(5):1209–1211.  
203 15. Rodoni BM, Eyrich NW, Fessell DP. Covid-19 & the residency match: The added importance of mentoring. *Ann Surg*.  
204 2020;272(2):e151–e152.  
205 16. Serebrakian AT, Ortiz R, Christensen JM, et al. Webinar during covid-19 improves knowledge of changes to the plastic  
206 surgery residency application process. *Plast Reconstr Surg Glob Open*. 2020;8(10):e3247.  
207 17. Sarac BA, Calamari K, Janis J. Virtual residency interviews: Optimization for applicants. *Cureus*. 2020;12(10):e11170.  
208 18. Sarac BA, Janis JE. Virtual interviews in plastic surgery. *Plast Reconstr Surg Glob Open*. 2021;9(8):e3749.  
209 19. Dean RA, Patel AA, Shen AH, Griffith LP, Lance SH. Preparing for plastic surgery residency interviews in a virtual era. *Plast  
210 Reconstr Surg Glob Open*. 2020;8(10):e3178.  
211 20. Hammoud MM, Standiford T, Carmody JB. Potential implications of covid-19 for the 2020–2021 residency application cycle.  
212 *JAMA*. 2020;324(1):29–30.  
213 21. Asaad M, Rajesh A, Kambhampati PV, Rohrich RJ, Maricevich R. Virtual interviews during covid-19: The new norm for  
214 residency applicants. *Ann Plast Surg*. 2021;86(4):367–370.

215