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Integrated vascular surgery applicants’ perspectives of virtual residency interviews during the coronavirus disease 2019 application cycle

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ABSTRACT

Background: In agreement with Association of American Medical Colleges guidelines, the 2020 to 2021 integrated vascular surgery (I-VS) residency interviews were conducted virtually. In the present study, we collected data about the virtual interview process from the applicant’s perspective, including preferences for interview format and the virtual resources they found most helpful.

Methods: An anonymous, online survey study of medical students who had been accepted into I-VS residencies during the 2020 to 2021 application cycle was performed. The survey contained questions about applicant behavior during the virtual application cycle, their perception of the virtual interviews, the utility of the virtual format, their preferences, and the virtual resources they found the most helpful for determining their rank list.

Results: Of 72 applicants, 38 (18 women, 19 men, and 1 declined to answer) had completed the survey for a 57.2% response rate. The average number of programs interviewed was 25 to 30 (31%). More than one-half (55%) of the respondents had responded that they had interviewed at more programs than they would have had the interviews been in person. More than one-half of the applicants (55%) reported that they preferred remote interviews with the option to visit in-person at their top choice programs compared with the use of all remote interviews (21%) or all in-person interviews (18%). Most had somewhat or strongly agreed (79%) that virtual interviews allowed them to properly gauge a residency program and provided adequate opportunities to interact with the residents (65%). The online resources the applicants found the most helpful in determining their rank lists were attending educational conferences, prerecorded videos from faculty and residents, and the program’s social media platforms.

Conclusions: The results from the present study have illuminated the current trends and attitudes of I-VS applicants for virtual interviews, including the virtual resources they found the most useful. Virtual interviews were a preferred method of interviewing and allowed applicants to assess a residency program and interact with the current residents. These variables should be considered by the program leadership when developing protocols for upcoming application cycles. (J Vasc Surg 2023;77:634-9.)

Keywords: COVID-19; Integrated vascular; Match; Virtual interviews

The coronavirus disease 2019 (COVID-19) pandemic affected all aspects of our healthcare system, including graduate medical education. Because of the social distancing guidelines, national organizations had encouraged programs to defer in-person interactions for the 2020 to 2021 residency application cycle.1,3 As such, residency interviews were conducted virtually using video conferencing platforms.

The interview is one of the most important aspects of the residency application process. Both formal and informal interactions during the day and in-person dinners the night before have been cited as important for determining whether programs were considered a good “fit” from both the applicants’ and the interviewers’ perspectives.4,5 Although virtual interviews have become increasingly popular and even the norm in other industries, they have...
remained rare in the healthcare field. Before the COVID-19 pandemic, little precedence was available on how best to conduct virtual interviews for residency or fellowship applications. Therefore, the drastic change in the interview format has resulted in questions regarding its validity, feasibility, and acceptability.

The use of a virtual format for residency interviews has significant advantages, including reduced costs for both applicants and programs and the creation of a more accessible process. The increased cost of in-person interviews is primarily related to travel expenses (ie, airfare, gas, hotels). Although some institutions provided complimentary hotels, and most have provided meals, these practices were not uniform or consistent. In addition, travel expenses were not covered or reimbursed by programs. In addition, costs for food and other expenses will be accrued during the travel time.

Despite the cost-effectiveness of virtual interviews, applicants and programs were also concerned about the effectiveness of these changes, in particular because the interview provides critical opportunities for applicants and programs to evaluate one another for an ideal match.

Although the pandemic was the impetus for the change in interview format, the Association of American Medical Colleges (AAMC) has recommended continuing with the virtual format to improve equity and decrease the costs for applicants. Although the pandemic limitations on travel have lessened, it is essential to understand the applicants’ perspectives and trends toward this interview format to identify programmatic strengths and student needs and areas for improvement. Some data from other medical fields are available regarding medical students’ and program directors’ perspectives on the virtual interview process. However, it is unclear whether these prior data would be generalizable to our field. Integrated vascular surgery (I-VS) residency applications are unique in the limited number of programs and positions available each year. Therefore, our research focused on I-VS applicants’ experience during the first virtual interview cycle. The aim of the present study was to collect data about the virtual interview process from the applicants’ perspective, including their preferences for the interview format and the virtual resources they found the most useful.

METHODS

In May 2021, an anonymous survey (Appendix, online only) was e-mailed to medical students who had been accepted into I-VS residencies for the 2020 to 2021 application cycle. The number of I-VS positions has increased from 66 in 2016 to 75 in 2020 and 79 in 2021. The medical students were identified from Society for Vascular Surgery’s March newsletter of accepted applicants, the residency programs’ online and social media platforms, and other public social media platforms. The applicants were encouraged to participate in the anonymous survey via the use of social media interactions, such as GroupMe groups. The anonymous online survey was e-mailed to 72 applicants. The e-mail addresses for eight accepted applicants could not be identified. In addition, one of us (M.C.) was an applicant during the 2020 to 2021 cycle, and her responses were included in the present analysis. The electronic questionnaire contained branching logic and a maximum of 17 questions and was administered via SurveyMonkey. The survey contained questions about the applicant’s behavior during the virtual application cycle, including their perceptions of virtual interviews, the utility of the virtual format, their preferences, and the virtual resources they had found the most helpful for determining their rank list. The institutional review board at the University at Buffalo exempted the present study.

Statistical analysis. The categorical data are reported as frequencies and percentages. Weighted averages and standard deviations were calculated for all ratings using Likert scales. Statistical analysis was performed using IBM SPSS Statistics (IBM Corp, Armonk, NY).

RESULTS

In 2021, 79 applicants were matched into I-VS residency programs. We were able to distribute the survey to 72 applicants, 38 of whom had completed the survey, for a response rate of 52.7%. Of the 38 respondents, 18 were women, 19 were men, and 1 declined to answer (Table I).

Interview behavior. The largest percentage of applicants had attended 25 to 30 interviews (31%). Most applicants (60.5%) had applied to both I-VS and general surgery programs. Most of the respondents (55%) also agreed that they had interviewed at more programs.
than they would have if the interviews had occurred in-person. In addition, 14% of the survey respondents had ranked a program in their top five that they would not have even interviewed at with in-person interviews.

When asked to report their agreement on a Likert scale of 1 to 5 (1, strongly disagree; to 5, strongly agree), 79% of the respondents had strongly or somewhat agreed that remote interviews allowed them to properly gauge a residency program (weighted average, 3.57 ± 2.2). When asked whether remote interviews provided adequate opportunities to interact with the current trainees, 69% strongly or somewhat agreed (weighted average, 3.48 ± 3.2).

**Interview preferences.** When asked about their preferences, 21% of the respondents had exclusively preferred remote interviews, and 18% had exclusively preferred in-person interviews. However, most respondents (51%) preferred a combination, such that they could interview remotely but have the option to visit their top choices (Fig 2). Two respondents declined to answer the question about their interview preferences.

The applicants who reported preferring remote interviews valued the decreased cost of not having to travel (100%), the increased flexibility with scheduling dates (88%), and the ability to attend more interviews (63%; Fig 3). In contrast, those who had preferred in-person interviews prioritized their ability to directly observe the program culture (100%), visit the program’s geographic location (86%), and eliminate the potential risk of technical difficulties affecting the interview interactions and influencing the applicant’s and interviewer’s impressions (57%; Fig 4).

**Virtual away rotations and online resources.** Ten respondents (26%) had participated in a virtual away rotation. Of these 10 respondents, 8 had ranked the program higher. When asked about the benefits of virtual away rotations, the applicants who had participated in a virtual away rotation commented on the increased interactions with faculty and trainees and the educational opportunities to learn more about the field of vascular surgery. However, many cited the lack of structure as a disadvantage to virtual away rotations.

The participants were also asked about various virtual resources that they had found helpful in determining their rank lists. The most frequently used virtual resources were grand rounds, the program’s social media platforms, and virtual informational sessions. The resources ranked the most helpful were virtual educational conferences (weighted average, 4.13 ± 2.7), virtual informational sessions (weighted average, 4.12 ± 2.6), social media platforms (weighted average, 4 ± 2.6), and virtual away rotations (weighted average, 4 ± 3.1; Table II).

**DISCUSSION**

In the present study, we aimed to describe the applicants’ perspectives regarding the virtual interview process during the COVID-19 pandemic. Although the pandemic is no longer the sole reason for the alteration in the interview process, the findings from the present study should be considered because they will continue to affect the ongoing remote interviews. The results of the present study have shown that most respondents had interviewed at 25 to 30 programs, and most had interviewed with more programs because of the virtual format. The number of interviews had increased from the previous application cycle, in which medical students who had matched into an I-VS program had interviewed in-person at a median of 17 contiguous programs. The AAMC has, again, recommended strictly virtual interviews for the 2022 to 2023 interview cycles for all specialties, citing multiple issues, including equity and cost, as the primary reasons to continue the current remote

| Table I. Participant demographics |
|-------------------------------|
| **Demographic** | **No. (%)** |
| **Sex** |  |
| Male | 19 (50) |
| Female | 18 (47.4) |
| Declined to answer | 1 (2.63) |
| **Age, years** |  |
| <26 | 6 (15.7) |
| 27-29 | 25 (65.7) |
| 30-34 | 7 (18.4) |
interview process. The AAMC has also reported that after two successful cycles of remote interviews, they found that applicants had had more flexibility in scheduling and had missed less time from classes, in addition to realizing cost savings.\(^1,3\) They have also recommended additional research to determine whether inequities might exist with the virtual process and to determine methods to mitigate those issues.\(^3\)

The increased number of attended interviews has raised some concerns by program faculty that applicants will attend interviews at more programs than they would consider ranking or attending thereby, possibly limiting spaces for other applicants who might be truly more interested in the program.\(^7,8\) Although this is a valid concern, residency programs have also increased the number of applicants interviewed during the virtual cycle. According to the National Residency Match Program (NRMP) report on the virtual experience, one-third of programs had endorsed increasing the number of invitations extended and applicants interviewed and ranked.\(^9\) Although these data included information from all residencies and were not specific to vascular surgery, the data suggest an increase in involvement from residency programs that mirrors the increased numbers seen in our sample. In addition, all I-VS residency positions were filled for the 2021 and 2022 application cycles, suggesting that this process was successful for the programs.\(^10,11\) At present, no data are available regarding the "fit" of the trainees who had matched remotely vs. the "fit" of the trainees who had matched via the standard, in-person interview format.

Overall, the I-VS residency applicants embraced the virtual interview process. Most of our respondents selected it as their preferred method of interviewing. These applicants valued the decreased cost and increased flexibility of virtual interviews. The financial burden of in-person interviews cannot be understated. A study from the previous application cycle showed that more than one-half of
Compared with other specialties, few I-VS programs are
rated by the NRMP and is not an option currently.

require a change to the rank order submission date for
rank lists had already been submitted. This would
invited for a second look at programs after the program
To create more equitable outcomes, students could be
nor has it been recommended, at present, by the AAMC.

a process that was not available at that time of our study,
hybrid approach, with interviews occurring virtually and
virtual interviews.

not seem to affect most respondents
interaction of their program. Overall, these disadvantages did
websites that could better depict the geographic loca-
with current residents. They could also curate videos and
platforms, and activities that allow applicants to interact
seek to incorporate social events, the use of social media
interviews continue for future cycles, programs should
adversely. It can also be dif-
view days affect the program
terpersonal relationships through a computer screen
can be dif-
 Engaging in group conversations or assessing
most preferred the option to visit their top-ranked pro-
emphasized the importance of visiting the location of
programs. Some administrators might be less comfort-
develop an accurate, up-to-date online presence for their
ment, regardless of the interview format. In the future,
importance of online resources for residency recruit-
...Table II. Participant responses on perceived usefulness of virtual offerings

| Virtual offering            | Strongly disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Strongly agree | Total | Weighted mean ± SD |
|-----------------------------|-------------------|-------------------|----------------------------|---------------|---------------|-------|-------------------|
| Tours                       | 1 (3.23)          | 5 (16.1)          | 3 (9.68)                   | 19 (61.3)     | 3 (9.68)      | 31 (81.6) | 3.58 ± 2.93       |
| Prerecorded videos          | 0 (0)             | 1 (3.23)          | 3 (9.68)                   | 22 (70.97)    | 5 (16.13)     | 31 (81.6) | 3.67 ± 2.44       |
| Virtual away rotation       | 1 (10)            | 1 (10)            | 0 (0)                      | 3 (30)        | 5 (50)        | 10 (26.3) | 4.0 ± 3.70        |
| Information sessions        | 0 (0)             | 1 (4)             | 0 (0)                      | 19 (76)       | 5 (20)        | 25 (65.8) | 4.12 ± 2.64       |
| Grand rounds                | 1 (3.45)          | 5 (17.2)          | 6 (20.7)                   | 12 (41.4)     | 5 (17.2)      | 29 (76.3) | 3.52 ± 2.2        |
| Education conferences       | 0 (0)             | 1 (4.35)          | 3 (13)                     | 11 (47.8)     | 8 (34.8)      | 23 (60.5) | 4.13 ± 2.72       |
| Social media                | 0 (0)             | 2 (7.14)          | 3 (10.7)                   | 16 (57.1)     | 7 (25)        | 28 (73.7) | 4 ± 2.55          |

SD: Standard deviation.
Data presented as number (%).
Percentages calculated from number of participants who had evaluated a particular virtual offering (n < 38).
Percentage calculated from total number of participants (n = 38).

I-VS applicants had paid >$4000 in interview-related ex-
penses. Furthermore, one-third of the applicants had
declined interviews because of financial restraints. The
use of virtual interviews will significantly reduce the
cost of interviewing for both applicants and programs
and can help create a more equitable application cycle
for those experiencing socioeconomic barriers.

Despite valuing virtual interviews, the participants also
emphasized the importance of visiting the location of
the programs (18% preferred in-person interviews, and
most preferred the option to visit their top-ranked pro-
grams). Engaging in group conversations or assessing
interpersonal relationships through a computer screen
can be difficult. Respondents also noted a concern about
the potential for technical difficulties during their inter-
view days affect the program's impression of them
adversely. It can also be difficult to understand the hospi-
tal environment without visiting a program. If virtual in-
terviews continue for future cycles, programs should
seek to incorporate social events, the use of social media
platforms, and activities that allow applicants to interact
with current residents. They could also curate videos and
websites that could better depict the geographic loca-
tion of their program. Overall, these disadvantages did
not seem to affect most respondents' preference for vir-
tual interviews.

The recommendations for future cycles could include a
hybrid approach, with interviews occurring virtually and
applicants having the option to visit locations in-person,
a process that was not available at that time of our study,
nor has it been recommended, at present, by the AAMC.
To create more equitable outcomes, students could be
invited for a second look at programs after the program
rank lists had already been submitted. This would
require a change to the rank order submission date for
programs by the NRMP and is not an option currently.
Compared with other specialties, few I-VS programs are
available, and the change could be coordinated in
collaboration with the Association of Program Directors
in Vascular Surgery, even without approval or sanction
from the NRMP. Applicants can also visit the program's
city and hospital outside the standard interview process.
The concern with spontaneous, unstructured visits is
whether this would bias programs toward applicants
who had visited over those who had not visited or could
not afford to visit.

Virtual electives had a positive effect on most of those
who had participated during the COVID-19 pandemic,
with 80% of participants ranking the site of the virtual
rotation higher on their rank list. Applicants who had
participated in a virtual interview stated that the
strengths of the program included the opportunity to
interact with the current faculty and residents. However,
the limitations included poor organization with unclear
didactic schedules and expectations. Furthermore,
because in-person electives are again feasible, it is un-
clear whether virtual electives will be maintained and
whether they will continue to have an effect on appli-
cants' ranking of programs.

Most applicants used online resources outside of the
interview day to learn more about the programs. The
most popular resources in our survey included virtual
grand rounds, programs' social media platforms, and vir-
tual informational sessions. These results highlight the
importance of online resources for residency recruit-
ment, regardless of the interview format. In the future,
it will be necessary for program directors to continue to
develop an accurate, up-to-date online presence for their
programs. Some administrators might be less comfort-
able using social media platforms but should seek the
assistance of technology-knowledgable residents,
program coordinators, and other faculty. Care is required
to ensure that any online content development aligns
with institutional social media policies.
The findings from our study have highlighted the perspectives and trends that have not been previously studied in the current literature. However, the present study had several limitations. Our study was a single-year, cross-sectional survey study. In addition, our response rate was 52.7%. Therefore, a selection bias could have been present regarding those who had chosen to participate in the present study. Also, the survey was sent only to accepted applicants and might not reflect the preferences of the applicants who had not been successful in applying to I-VS programs. The survey was not e-mailed to those who had applied but had not matched owing to an inability to obtain an accurate list and the e-mail addresses of those individuals. Therefore, we could not evaluate the differences in the responses from applicants who had matched into an I-VS program vs those who had not matched. We also did not assess the effects of the virtual process on the faculty and programs to obtain their perspective.

CONCLUSIONS

To our knowledge, the present study is the first to investigate vascular surgery residency applicants’ trends and attitudes during the first virtual interview cycle. Most applicants had interviewed at 25 to 30 programs and had accepted more interviews at more programs than they would have if attending in-person interviews. The virtual interview format was a preferred method of interviewing for the accepted applicants. However, most applicants would have preferred to interview virtually but maintain the option to visit their top choices in person. The virtual resources the applicants found most useful were virtual educational conferences, virtual informational sessions, programs’ social media platforms, and virtual away rotations. These variables should be considered by the program leadership when developing protocols for upcoming application cycles. However, questions have arisen regarding the futility of virtual away rotations now that traveling bans and social distancing restrictions have been lifted. Additional research is necessary to assess the preferable and feasibility of a hybrid approach (remote interviews with the option for applicants to visit in person) for future interviews.

AUTHOR CONTRIBUTIONS

Conception and design: MC, LH
Analysis and interpretation: MC, NS, TL, LH
Data collection: MC, LH
Writing the article: MC, NS, TL
Critical revision of the article: MC, NS, TL, LH

Final approval of the article: MC, NS, TL, LH
Statistical analysis: MC, NS, TL, LH
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Overall responsibility: MC

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Additional material for this article may be found online at www.jvascsurg.org.
APPENDIX (online only).

Survey questions

Q1. What is your age?
  <26 years
  27-29 years
  30-34 years
  >35 years

Q2. What is your gender?
  Male
  Female
  Other

Q3. What is your race/ethnicity?
  White
  Black or African American
  Native American
  Alaskan Native
  Asian
  Native Hawaiian or Pacific Islander
  Hispanic or Latino
  Other

Q4. How many integrated vascular programs did you interview with?
  <5
  6-10
  11-15
  16-20
  21-24
  25-30
  >31

Q5. If interviews had been in person, how many integrated vascular programs would you have interviewed at (assuming you received a similar number of invitations)?
  <5
  6-10
  11-15
  16-20
  21-24
  25-30
  >31

Q6. How highly did you rank the programs that you would likely not have interviewed at had the interviews occurred in person?
  Top 5
  6-10
  11-15
  >15

Q7. Did you dual apply to general surgery?
  Yes
  No

Q8. How many general surgery programs did you interview with?
  <5
  6-10
  11-15
  16-20
  21-24

Q9. If there were not a global pandemic, would you prefer
  All remote interviews
  All in-person interviews
  Remote interviews with the option to visit/interview for top choices
  Other (please specify)

Q10. Why did you select the above answer (all remote interviews)?
  Decreased cost due to absence of travel and hosting expenses
  Ability to attend more interviews
  Increased flexibility for interview times and dates
  Other (please specify)

Q11. Why did you select the above answer (all in-person interviews)?
  Opportunity to directly observe program culture
  Ability to visit the location
  Technical difficulties can affect the interview interaction and influence impressions
  Other (please specify)

Q12. Why did you select the above answer?
  Remote interviews with option to visit/interview for top choices (free response)

Q13. Please rate how strongly you agree with the following comment:
  Virtual interviews allowed me to properly gauge a residency program
  Strongly agree
  Somewhat agree
  Neither agree or disagree
  Somewhat disagree
  Strongly disagree

Q14. Please rate how strongly you agree with the following comment:
  Remote interviews provided adequate opportunities to interact with current trainees
  Strongly agree
  Somewhat agree
  Neither agree or disagree
  Somewhat disagree
  Strongly disagree

Q15. How helpful were the following practices for gaining familiarity with a residency program (using the following rating: very helpful; somewhat helpful; neither helpful or unhelpful; somewhat unhelpful; strongly unhelpful; not available or did not participate):
  Virtual tours of hospital
  Prerecorded videos
  Virtual subinternship
  Virtual information sessions before interviews
  Virtual grand rounds
  Virtual educational conferences
  The program’s social media platform

Q16. Did you participate in a virtual subinternship?
  Yes
  No
Q17. If yes, did this change how you ranked the program?
   Higher
   Lower
   No change

Q18. If yes, please list the positive qualities of your virtual subinternship

Q19. Please list areas of improvement for your virtual subinternship