

Learning From the 2021 Ophthalmology Match: Virtual Residency Matching During the COVID-19 Pandemic

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ABSTRACT

Background The effect of virtual interviews on residency match outcomes during the COVID-19 pandemic is unknown. Examining the ophthalmology match may help inform all specialties undergoing virtual interviews.

Objective To determine the impact of allopathic applicant match characteristics in the first year of the virtual residency Match process.

Methods Using the Association of University Professors of Ophthalmology match database, a retrospective review was conducted of all allopathic applicants to ophthalmology residency programs in the United States from the 2016 through the 2021 match cycles. Demographic information, interview numbers, and match outcomes were compared between the 2016-2020 (in-person) and 2021 (virtual) cycles.

Results A total of 3343 allopathic applicants were analyzed. Applicants in the 2021 Match applied to significantly more programs than 2016-2020 applicants did (78.7 ± 23.6 vs 73.1 ± 22.7 , $P < .001$). Among matched and unmatched applicants, there was no significant difference in the number of interviews granted or completed. There was a significant reduction in the match rate between the 2016-2020 and 2021 Match cycles (81.3% vs 76.6%, $P = .0009$). A subanalysis of applicants who went to medical schools with ophthalmology residency programs ($N = 2308$) found that the home institution match rate was significantly higher for the 2021 Match compared to the aggregate 2016-2020 Matches (26.1% vs 20.6%, respectively, $P = .015$).

Conclusions Significantly more applicants to ophthalmology residency programs matched at their home institutions in the 2021 virtual match cycle compared to the previous 5 years without influencing the interview numbers granted and attended.

Introduction

The 2020-2021 residency Match process for all specialties was profoundly affected by the COVID-19 pandemic, with halted clinical rotations and away rotations, limitations in United States Medical Licensing Examination (USMLE) availability, and mandates for virtual interviews to prevent the spread of infection.¹ Now, even after the height of the pandemic, residency programs from each specialty face the challenge of continuing fully virtual interviews, returning to in-person interviews, or adopting a hybrid approach. To inform the future of the residency Match, and to contribute to the development of a new standardized interview process, recognizing the impact of a fully virtual match process is crucial. The virtual interview process may have shifted the factors that program leadership considered when ranking applicants; for instance, information regarding social skills and nonverbal cues is more

difficult to obtain from video conference interactions.^{2,3}

To explore the impact of virtual interviews on the residency Match, a single specialty—ophthalmology—was explored as a prototype. For the first time in their nearly 45-year coordination of the ophthalmology match, the Association of University Professors of Ophthalmology (AUPO) and the San Francisco Match mandated a completely virtual interview process for the 2021 Match. All interviews were held via video conferencing software to comply with social distancing recommendations established by the Centers for Disease Control. Further, clinical rotations, sub-internships, and away rotations were all halted due to the Association of American Medical Colleges advisory against clinical activities, leading some programs to offer virtual away rotations.

With the virtual interview system came important changes to the Match as a whole (BOX).⁴ Importantly, applicants could attend up to 2 interviews per day because each virtual interview was allotted a half day. On the other hand, applicants could participate in a maximum of only 20 interviews, the first time an

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interview cap was instituted in the ophthalmology match, and which was enforced through the San Francisco Match interview scheduling platform. Further, because the process was completely virtual, applicants did not have the opportunity to meet faculty or current residents in person, nor could they formally tour each facility and city. Finally, except for those without an ophthalmology department at their own institution, applicants could no longer travel to other programs for formal “audition rotations” due to travel restrictions. They could, however, participate in virtual rotations at certain programs in order to be involved in didactics via video conferencing.^{5,6} The lack of in-person interviews and audition rotations may lead programs to rank their own medical students high on their match lists, although there is no data available in the literature to corroborate this.

The effect of online interviews on ophthalmology match outcomes—and residency Match outcomes across all specialties—during the COVID-19 pandemic is unknown. This study, a collaboration between Duke Eye Center researchers and the AUPO Match Oversight Committee, compared the outcomes of the virtual interview process to the previous 5 years of the ophthalmology match (2016-2020 cycles). Our primary hypothesis was that significantly more applicants would match at their home institutions during the virtual application cycle, when compared to prior years, due to programs being more familiar with their own medical students. Further, it was hypothesized that applicants would participate in significantly more interviews by virtue of being able to schedule up to 2 virtual interviews per day and not being subject to the typical travel and financial constraints of the live interview process.

Methods

In collaboration with the AUPO Match Oversight Committee, de-identified data were obtained regarding all allopathic applicants to the ophthalmology residency match from 2016 to 2021. International medical graduates (IMGs) and osteopathic students were excluded from this study in order to focus on allopathic applicants, who form the largest pool of applicants to ophthalmology residency programs.

Several different parameters were compared between the 2016-2020 (in-person) and 2021 (virtual) interview processes, including demographic information, interview numbers, and match outcomes. Mean USMLE Step 1 and 2 Clinical Knowledge (CK) scores, number of IMG applicants, and number of interviews granted and completed (among matched, unmatched, and all applicants) were compared between the 2016-2020 and 2021 match cycles, using independent

Objectives

To determine the impact of allopathic applicant match characteristics in the first year of the virtual ophthalmology residency match process.

Findings

Significantly more applicants to ophthalmology residency programs matched at their home institutions in the 2021 virtual match cycle compared to the previous 5 years without influencing the interview numbers granted and attended.

Limitations

This study was limited to one specialty and assesses only one year of a virtual match process.

Bottom Line

While more applicants matched at their home institutions during the virtual match process, it is unclear if virtual interviews themselves led to this finding, and it will be important to understand applicant perspectives on how virtual interviews impacted their rank choices and perceptions of residency programs.

samples *t* tests and ANOVA tests. Chi-square tests were used to compare percentage of applicants matching at the institution where they attended medical school or in the same state or region in which they attended medical school between the 2016-2020 and the 2021 match groups.

This retrospective, de-identified study received an exempt designation by the Institutional Review Board at Duke University Medical Center.

Results

Demographics of the Match

A total of 3343 allopathic applicants were analyzed in the 2016-2021 match cycles (TABLE 1). The mean USMLE Step 1 and Step 2 CK scores were significantly higher for 2021 applicants compared to the aggregate 2016-2020 applicants (TABLE 1; $P=.02$, 95% CI -3.323, -0.260 and $P<.001$, 95% CI -4.622, -1.703, respectively). Finally, there was no significant difference in the percentage of applicants with USMLE Step 2 CK scores at the time of application

Box Key Changes to the 2021 Ophthalmology Match in Response to the COVID-19 Pandemic

1. Extension of application deadline and rank list submission by 1 month.
2. Addition of a database on the San Francisco Match website (SFmatch.org) with information about each residency program.
3. Centralized interview scheduling system wherein an applicant can schedule 2 interviews per day.
4. Interview cap of 20 per applicant.
5. Completely virtual interview process.

TABLE 1
Demographics of US Allopathic Applicants to Ophthalmology Residency (N=3343)

Demographic	2016	2017	2018	2019	2020	2016-2020	2021	P Value
Number of applicants (N)	571	522	538	563	543	2737	606	...
Gender, female, N (%) ^a	190 (39.6)	181 (38.3)	208 (43)	202 (40.2)	190 (37.8)	971 (39.8)	210 (37.2)	.41
USMLE Step 1 score, mean±SD (median)	240.3±20.5 (243)	239.2±25.4 (242.5)	241.5±22.8 (244.5)	242.4±16.8 (244)	243.9±13.6 (246)	241.5±20.2 (244)	243.43±13.2 (246)	.02
Applicants with USMLE Step 2 scores, N (%)	454 (79.5)	330 (63.2)	348 (64.7)	371 (65.9)	354 (65.2)	1,857 (67.8)	417 (68.8)	.65
USMLE Step 2 Score, mean±SD (median)	247.1±13.8 (250)	247.8±17.2 (251)	250.5±13.4 (252)	250.7±12.2 (252)	251.4±12.3 (252)	249.4±13.9 (251)	252.6±12.7 (254)	<.001
Overall match rate, N (%)	446 (78.1)	437 (83.7)	446 (82.9)	449 (79.8)	446 (82.1)	2,224 (81.3)	464 (76.6)	.009

^a The percent of female applicants was calculated from applicants who provided their genders, total N=3007. A total of 336 applicants did not provide their genders.

between 2016-2020 and 2021 applicants (67.8% vs 68.8%, $P=.65$, 95% CI 0.059, 0.311).

Interview Numbers

TABLE 2 illustrates the number of applications submitted, number of interviews granted, and number of interviews attended in the 2016-2020 and 2021 match cycles. Applicants participating in the 2021 Match applied to significantly more programs than 2016-2020 applicants (78.7 ± 23.6 vs 73.1 ± 22.7 , $P<.001$, 95% CI -7.903, -3.330). Among all applicants, matched applicants, and unmatched applicants, there was no significant difference in the number of interviews granted or completed.

Match Outcomes

There was a significant reduction in the overall match rate among all allopathic applicants between the aggregate 2016-2020 and 2021 match cycles (TABLE 1; 81.3% vs 76.6%, $P=.009$, 95% CI 0.075, 0.498). A sub-analysis of applicants who attended medical schools with ophthalmology residency programs (N=2308) was conducted to determine the rate of home institution, same state, and same region match. The 2021 Match showed the highest proportion (26.1%) of applicants matching at their home institutions among the 2016-2021 match cycles and represented a statistically significant increase (TABLE 3; $P=.02$, 95% CI 0.059, 0.558) when compared to the mean 2016-2020 home institution match rate of 20.6%. However, there was no significant difference in the percentage of applicants who matched in the same state or region as their medical schools.

Discussion

This single-specialty analysis of the virtual ophthalmology match found that the national match rate for allopathic applicants significantly dropped in the ophthalmology match, from 81.3% from 2016-2020 to 76.6% in 2021. This drop mirrors recent data from the National Resident Matching Program (NRMP), which in the 2021 match showed an overall reduction in the match rate for all residency program applicants from 80.8% (2020) to 78.5%.⁷ The number of available residency spots increased from 469 to 499 from 2016 to 2021, a 6.4% increase, while the number of allopathic applicants to ophthalmology residencies during the same time frame actually declined from 571 to 543, a 4.9% reduction.⁸

These trends would suggest an increase in the match rate; however, the number of applications submitted per applicant has steadily increased by 11.8% (from 70.5 in the 2016 Match to 78.8 in the 2021 Match).

TABLE 2

Mean Number of Applications Submitted, Interviews Granted, and Interviews Attended Per Allopathic Applicant to Ophthalmology Residency, by Match Year

	2016	2017	2018	2019	2020	2016-2020	2021	P Value
Mean applications submitted								
All applicants	70.5±25.3	70.5±23.8	72.1±23.5	75.1±24.7	77.0±23.8	73.1±24.4	78.8±24.7	<.001
Matched applicants	69.9±23.5	71.7±22.3	72.1±21.8	75.6±22.9	76.3±22.3	73.1±22.7	78.7±23.6	<.001
Unmatched applicants	72.8±30.8	64.4±30.1	72.5±30.8	73.1±30.8	80.5±29.5	72.9±79.1	79.1±28.0	.03
Mean interviews granted								
All applicants	10.9±6.0	10.5±5.7	10.9±6.0	10.7±6.0	10.0±4.9	10.6±5.7	10.3±6.4	.20
Matched applicants	12.3±5.3	11.8±5.1	12.3±5.4	12.2±5.5	11.2±4.3	12.1±5.2	11.9±6.0	.65
Unmatched applicants	4.6±3.6	3.6±2.8	4.2±3.7	4.6±3.4	4.3±3.2	4.3±3.4	4.8±4.1	.14
Mean interviews completed								
All applicants	9.5±5.2	9.8±4.9	9.8±4.8	9.5±4.8	10.0±4.9	9.7±4.9	9.7±5.7	.96
Matched applicants	10.9±4.2	11.0±4.3	10.9±4.2	10.8±4.2	11.2±4.3	11.0±4.2	11.3±5.3	.18
Unmatched applicants	1.3±5.3	3.6±2.9	4.1±3.5	4.3±3.4	4.3±3.2	4.2±3.9	4.6±3.9	.25

Note: P values represent independent sample t tests between the aggregate 2016-2020 Match cycles and the 2021 cycle. Total N for matched applicants was 2688, while total N for unmatched applicants was 655.

We suspect that the increase in applications per allopathic applicant, which drives more competition for individual programs, is a key cause of lower national match rates. Another factor is a rise in the allopathic graduates' match rates; in ophthalmology, the match rate for this group increased from 51% in 2020 to 63% in 2021.⁸ Interestingly, there was a drop in the match rate for both US osteopathic seniors (53% in 2021 from 55% in 2020) and for international applicants (35% in 2021 from 48% in 2020), which is a similar trend in the residency programs participating in the NRMP match system.^{7,8}

USMLE Step 1 and 2 CK scores, as well as number of applications submitted per applicant, continued to increase from 2016 through 2021. This is likely a long-term trend reflecting the competitiveness of the residency Match and unlikely to be a direct result of the pandemic, as also demonstrated in other specialties.^{1,9}

Significantly more applicants matched at their home institutions in the 2021 ophthalmology match compared to the prior 2016-2020 match cycles ($P=.015$). While we cannot conclude that virtual interviews alone caused this shift in home institution match rates, it is one possible explanation for this finding. Program leaders were more familiar with their own institutions' applicants through clinical rotations, research involvement, and in-person interactions throughout medical school. Conversely, applicants may be more comfortable matching at their home institutions, as they have direct in-person exposure to faculty, residents, and facilities that was unfortunately lost in the virtual interviews. Further, the absence of informal interactions with current program residents and faculty impaired the ability to determine how well a program's culture and the applicants' personal attributes align.¹⁰⁻¹² Together,

TABLE 3

Percentage of Allopathic Applicants Matching at the Ophthalmology Residency Program of Their Medical Schools, Same State as Their Medical Schools, and Same Regions as Their Medical Schools, Among Matched Applicants Whose Medical Schools Have Affiliated Ophthalmology Residency Programs

	2016	2017	2018	2019	2020	2016-2020	2021	P Value
Number of applicants (N)	379	375	389	383	384	1910	398	-
Overall match rate, N (%)	446 (78.1)	437 (83.7)	446 (82.9)	449 (79.8)	446 (82.1)	2224 (81.3)	464 (76.6)	.009
Percent matching at home institution	20.1	21.6	18.0	20.9	22.7	20.6	26.1	.015
Percent matching in same state as medical school	36.4	33.9	32.4	32.6	36.5	34.3	37.4	.24
Percent matching in same region ^a as medical school	59.9	60.8	57.1	60.3	58.1	59.2	58.8	.88

Note: P values represent chi-square tests between the aggregate 2016-2020 Match cycles and the 2021 cycle.

^a Regions were defined by the US Census Bureau with designations of Northeast, Midwest, South, and West.

these factors may have contributed to more applicants matching at their home institutions.

In terms of financial impacts of a virtual match process, the mean cost for residency interviews to the ophthalmology match was \$2,320.96,¹³ whereas previous published studies suggest an average cost of \$5,700 to \$6,600 for in-person ophthalmology match cycles.^{14,15} By eliminating the costs (both financial and time) associated with travel and lodging, applicants may struggle less with their already staggering medical school debt burden, which averages over \$200,000 per student in the United States as of 2021.^{15,16}

This study is one of the first to analyze the outcomes of the virtual match on the residency Match outcomes, and while it focuses on ophthalmology, it may provide information for all specialties as they make decisions regarding their match processes. Still, many questions remain. Our study is limited by the fact that only one virtual match cycle was compared to prior non-virtual match cycles. However, the characteristics of applicants in the 2 cohorts were remarkably similar. Our study is also limited to one subspecialty of medicine; further exploration into all subspecialties may give a holistic understanding of a potential paradigm shift to a virtual match. Further, this study is not able to determine causality—that is to say, we cannot definitively claim that the virtual process alone contributed to higher home institution match rates. This de-identified study also does not delineate reapplicants to ophthalmology residency, such that an applicant may be represented in more than 1 year of data if they failed to match in a previous year.

Another limitation is the absence of applicant perspectives on the virtual interview process. The literature is mixed in other specialties in terms of applicant satisfaction with virtual interviews in other specialties, with some studies finding a favorable outlook^{17,18} and others suggesting a negative impact on program rankings.¹⁹⁻²¹ Within ophthalmology, one recent survey study found that most applicants (71.2%, N=126) and program directors (78.6%, N=22) preferred in-person interviews.¹³ Unpublished data from the 2021 AUPO survey revealed that 39.5% of applicants agreed that future interviews should be all virtual, while 33.9% disagreed, and 26.6% were neutral. It will be important to understand applicant perspectives on how virtual interviews impacted their rank choices and perceptions of residency programs.

Conclusions

Although the COVID-19 pandemic necessitated the implementation of virtual interviews for the 2021 and

upcoming 2022 ophthalmology match cycles, significantly more applicants matched at their home programs in the 2021 cycle. However, this increase did not significantly impact the interview numbers granted and attended.

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