Abstract

Objective

To review changes made by otolaryngology residency program directors (PDs) during the 2020-2021 National Resident Matching Program (NRMP) match cycle and describe their attitudes toward the 2021-2022 match cycle.

Methods

Cross-sectional study using an anonymous 31-item online survey in Research Electronic Data Capture (REDCap) with questions regarding the 2020-2021 NRMP match. This survey was distributed to 125 PDs from Accreditation Council for Graduate Medical Education (ACGME)-accredited otolaryngology residency programs.

Results

Thirty-three PDs responded (26.4%). Of the PDs, 78.8% had an online info-session prior to the start of the cycle, and 30.3% reported that an increased number of applicants contacted them compared to the prior cycle. There were no changes made in Step 1 criteria (72.7%), and 81.8% reported no changes in interview selection. Of the PDs, 54.5% reported interviewing more candidates. Respondents reported a decreased cancellation rate (66.7%) and cost of recruiting (87.9%); 87.9% said that they did not change the way they developed their rank order list (ROL), and 84.8% reported matching at their usual level compared to prior years. Of the respondents, 42.4% reported making a change that was an overall improvement for their program. Of the PDs, 34.4% were unsure whether they would sustain virtual interviews in 2021-2022, 25% stated that they would not incorporate virtual interviews, and 40.7% stated that they would incorporate a virtual interview in some part of the cycle.

Conclusion

Otolaryngology PDs approached virtual interviewing in different ways. Despite the changes made, applicants can find comfort in knowing that match outcomes were perceived as typical by a majority of PDs.
match, according to the NRMP data [1,2]. All 350 spots were filled in 2021, while only 348 were filled in 2020. This was not due to a lack of applicants, as there was an increase in otolaryngology residency applicants between the 2020 and 2021 cycles. A total of 559 applications were submitted for the 2021 cycle, compared to 505 during the 2020 cycle [1,2].

Historically, otolaryngology remains one of the most competitive fields in the NRMP, with successful match rates of 69.3% and 62.6% in 2020 and 2021, respectively [1,2]. Based on the rising trend in applicant numbers and the stagnant number of residency positions, it is clear that the competitiveness of the specialty is not changing. The purpose of our survey was to identify the changes that were made to the 2020-2021 match cycle and identify the residency programs’ perspectives on match outcomes. Ultimately, this study hopes to equip otolaryngology program directors (PDs) and future otolaryngology applicants with effective strategies as they continue to adapt to changes in the residency application cycle as a result of COVID-19.

Materials And Methods

PDs of Accreditation Council for Graduate Medical Education (ACGME)-accredited otolaryngology programs (n = 125) were asked via email to complete a 31-item survey regarding the 2020-2021 NRMP Residency Match. Study data were collected and managed using Research Electronic Data Capture (REDCap) electronic data capture tools hosted at the University at Buffalo. More information regarding REDCap can be accessed on the REDCap website [3].

The cross-sectional survey was distributed in May 2021 and was open for two months, with weekly email reminders sent to nonresponders. The survey consisted of five sections: social media outreach, interviewee selection, interview process, post-interview review and outcomes, and demographics. Data was recorded in REDCap and ultimately analyzed using Statistical Package for the Social Sciences (SPSS) version 27.0 (IBM Corp., Armonk, NY, USA). Frequencies were calculated, and means with 95% confidence intervals were determined when necessary. This study was approved by the University at Buffalo Institutional Review Board.

Results

A total of 33 out of 125 otolaryngology PDs participated in the study, with a 26.4% response rate. The majority of the PDs were located in the Northeast (n = 10, 30.3%) and the South, including Puerto Rico (n = 10, 30.3%), and 36.4% (n = 12) had more than 10 years of experience (Table 1). PDs reported interviewing for 1-6 residency positions, with the majority interviewing for three positions (n = 9, 27.3%) (Table 1).
### Demographics

| Location of program                  | Number of PDs (n (%)) |
|-------------------------------------|-----------------------|
| Northeast                           | 10 (30.3)             |
| Midwest                             | 6 (18.2)              |
| West                                | 6 (18.2)              |
| South (including Puerto Rico)       | 10 (30.3)             |
| No response                         | 1 (3)                 |

| Years as PD                         | Number of PDs (n (%) |
|-------------------------------------|----------------------|
| <5 years                            | 9 (27.3)             |
| 6–10 years                          | 11 (33.3)            |
| >10 years                           | 12 (36.4)            |
| Unknown                             | 1 (3)                |

| Number of positions available for 2021 match cycle | Number of PDs (n (%)) |
|---------------------------------------------------|-----------------------|
| 1                                                 | 2 (6.1)               |
| 2                                                 | 6 (18.2)              |
| 3                                                 | 9 (27.3)              |
| 4                                                 | 7 (21.2)              |
| 5                                                 | 4 (12)                |
| 6                                                 | 1 (3)                 |
| Unknown                                           | 4 (12.1)              |

**TABLE 1: Demographics**

Changes in social media use and virtual outreach were reported. Of those who reported having a social media account, 14 (42.4%) reported creating a new social media account for the 2020-2021 interview cycle (Table 2), while six (18.2%) reported accounts that were created prior to the cycle. Virtual informational sessions prior to interview season were reported by 78.8% (n = 26) of PDs, and 21.2% (n = 7) reported production of an informational video (Table 2). The most frequently used social media accounts were Instagram (n = 15, 39.4%) and Twitter (n = 7, 21.2%) (Table 2).

2022 Siddiqui et al. Cureus 14(3): e23258. DOI 10.7759/cureus.23258
PDs also answered questions about changes that may have occurred in their process of selecting applicants for interview invitations. Step 1 criteria during the 2019–2020 cycle remained unchanged for the interview selection process for 72.7% (n = 24) of programs (Table 3). Twenty-seven PDs (81.8%) reported no changes in applicant interview selection procedures (Table 3). However, 51.5% (n = 17) reported changes in interviewee selection based on "signaling," including two PDs reporting the use of signaling as a tiebreaker (Table 3). Only five (15.2%) reported viewing applicant StarOto videos. Of the PDs, 54.5% (n = 18) reported an increase in the number of interviewees, but the majority of PDs reported not changing the number of interviewers or the time interviewees spent with interviewers (Table 4). Compared to 2019–2020, 66.7% (n = 22) of PDs reported fewer interview cancellations (Table 4).

**TABLE 2: Changes in social media outreach**

| Social media use                              | Number of PDs (%) |
|-----------------------------------------------|-------------------|
|                                               | Yes (n (%))       | No (n (%))       |
| Existence of a social media account prior to March 2020 | 13 (39.4)         | 20 (60.6)        |
| Social media account created in 2020          | 14 (42.4)         | 6 (18.2)         |
| Social media platforms use                     |                   |                  |
| Instagram                                     | 13 (39.4)         | 20 (60.6)        |
| Twitter                                       | 7 (21.2)          | 26 (78.8)        |
| Facebook                                      | 3 (9.1)           | 30 (90.9)        |
| Changes in virtual interaction                |                   |                  |
| Creation of applicant informational video     | 7 (21.2)          | 26 (78.8)        |
| Online info-session prior to interview season  | 26 (78.8)         | 7 (21.2)         |
| Virtual social event for selected interviewees| 26 (78.8)         | 7 (21.2)         |

**TABLE 3: Changes in interviewee selection**

| Change in interview selection procedure*      | Yes (n (%)) | No (n (%)) |
|-----------------------------------------------|-------------|------------|
| Viewed StarOto videos of applicants           | 6 (18.2)    | 27 (81.8)  |
| Changed list of interviewees based on signaling| 17 (51.5)  | 16 (48.5)  |
| Change in Step 1 criteria                    | 8 (24.2)**  | 24 (72.7)  |
| More applicants reached out by email this year compared to previous years | 10 (30.3) | 14 (42.4)**|

*Change in applicant interview selection procedure: one responded more holistic review and five responded incorporated signaling as a tiebreaker (×2), signaling helped, only interviewed signals, and signals helped.
**Change in Step 1 criteria: one responded not sure.
***More applicants reached out: nine responded not sure.
TABLE 4: Interview logistics

The cost of recruiting significantly decreased, according to the majority of participants (Table 4). Despite the virtual nature of the interview, items of value were still sent to interviewees by all but one PD. Items included meal vouchers (n = 7, 21.2%), imprinted items (n = 10, 30.3%), and academic items (n = 1, 3%). It was unclear if some programs sent out multiple items to applicants.

The process by which the PDs developed their rank order list (ROL) was unchanged in 87.9% (n = 29) of respondents, and 84.8% (n = 28) felt that they matched at their typical level on their ROL (Table 5). Of the respondents, 42.2% (n = 14) felt as though a change was made during the 2021-2020 interview cycle that was an overall improvement for their program (Table 6), and 48.4% (n = 16) of programs reported matching no candidate considered to be part of groups underrepresented in medicine, but 16.2% (n = 6) reported matching more such candidates than in 2019-2020 (Figure 1).

**TABLE 5: Post-interview selection and match outcomes**

*ROL change: one respondent was unsure.

**Participants were asked to specify what specific changes they employed that improved their program.
TABLE 6: Changes made by PDs that proved beneficial

| Beneficial changes made by PDs          |
|----------------------------------------|
| Group virtual interviews               |
| Real-time review and scoring system of interview candidates to utilize in the daily and final ranking |
| Increased virtual/online presence      |
| Increased content on website           |
| Virtual learning session prior to interviews |
| Targeting of underrepresented in medicine candidates for interview invites |
| Signaling                              |
| Shortened interview times              |
| Held interviews on days other than Friday and Saturday |
| Virtual meet-and-greets                |
| Pre-recorded information sessions      |

In terms of future changes in the application process, 40.7% (n = 13) of the respondents reported that if they had complete control over the recruitment process, then they would opt to include virtual interviews as either the sole interview, another type of interview adjunct to in-person ones, or a pre-interview before an in-person interview (Figure 2). Specific responses to this are shown in Table 6.

FIGURE 1: Matching outcomes for URM applicants

---

2022 Siddiqui et al. Cureus 14(3): e23258. DOI 10.7759/cureus.23258 6 of 9
Discussion

The applicant review process for residency is intricate and complex, with each program employing its own individual algorithm to select candidates for interviews and subsequent ranking. The unprecedented restrictions brought forth on travel and in-person meetings related to the COVID-19 pandemic resulted in modifications to this algorithm. Numerous sources speculated what this would mean for the match cycle; a pre-cycle survey of otolaryngology applicants showed that 54.1% felt less confident in matching [4]. We divided our questionnaire into the following categories: social media outreach, interviewee selection, interview process, post-interview review and outcomes, and demographics.

Otolaryngology residency programs have had an increasing social media presence over the last decade, with as many as 61% of programs having at least one social media profile [5]. Many of these social media accounts were established prior to the March 2020 pandemic in the United States. Goshtasbi et al. showed that a large majority of otolaryngology residency programs preferred Instagram and Twitter over Facebook and that 67.2% of those Instagram accounts and 20% of those Twitter accounts did not exist prior to March 2020 [6]. Our survey showed an even split between old and new social media accounts created after March 2020, with Instagram and Twitter making up a large percentage of utilized platforms. These social media accounts had a larger role for PDs, as well as applicants who no longer had the opportunity to physically assess compatibility to a program. A post-match applicant and PD survey conducted by the National Resident Matching Program (NRMP) showed that applicants were most concerned about determining if a program was a good fit based on web materials [7].

Otolaryngology Preference Signaling was a newly instituted concept that began in October 2020. The program allowed otolaryngology applicants to "signal" five programs they were most interested in attending, with the intention of facilitating matches based upon interest. This concept stems from the very successful signaling program employed within the field of business and finance, where job applicants similarly signal their interest to employers [8]. Updated match data from June 2021 shows that all programs participated in this initiative and that applicants who signaled were four times more likely to receive interviews from their signaled programs as compared to non-signaled programs [9]. We found that five of the six PDs who reported changes in applicant interview selection procedures cited signaling as the major change. With the rising number of applications for otolaryngology residency spots, signaling appears to be a valuable tool that will allow programs to prioritize those applicants who have a genuine interest in their programs and will allow applicants to separate themselves among a large pool. For PDs, this can serve as an additional tool in distinguishing applicants who have otherwise similar resumes. StarOto was another initiative that began its pilot program during the 2020-2021 match cycle; applicants were mentored by volunteer faculty members from institutions across the country as they created a video of themselves giving a short otolaryngology-related talk [10]. Our survey showed that only 15.2% of PDs viewed the StarOto videos of applicants.

Pre-interview communication is a more traditional avenue that many applicants take to express their interest in particular programs. Almost a third of PDs noticed an increase in applicants reaching out
electronically to them compared to the prior cycle. Prospective applicants to otolaryngology programs
surveyed last year expressed concern about a potential increase in the number of applications submitted per
applicant, as well as the number of interviews attended per applicant [4]. This assumption, if true, would
result in the cycle being much more competitive as fewer applicants would use more interview slots. This
perception may explain why more than half of our respondents chose to interview more candidates than the
previous year.

One major anticipated perk for the virtual cycle was the potential decrease in financial cost for applicants.
According to the Association of American Medical Colleges (AAMC), the average amount an applicant
spends on the entire interview season is about $4,000, ranging anywhere from $1,000 to $12,000 [11,12]. The
post-match NRMP survey showed that over half of the applicants found the decreased cost of interviews to be
a very important factor when it came to interview logistics. Other factors such as increased efficiency, the
ability to attend more interviews, and the flexibility of interview dates were also deemed very important by a
majority of respondents [7]. Cutting interview costs is a tremendous aid for those lacking the financial
resources to attend distant in-person interviews, helping to create a more even playing field for a candidate
pool with variations in socioeconomic status. Similar to interviewees, according to our data, the majority of
PDs also reported a reduction in recruiting costs as a result of the virtual format of the interviews. Some
estimates show average savings to be about $500 to $1,000 per interview per applicant [13].

This brings us to the main question - did the changes made during the 2020-2021 match cycle prevail? Only a
quarter of PDs were against any form of virtual interviews in future cycles, indicating that virtual interviews
may have a role in the future. This may be as adjuvant interviews, "pre-interviews," or even the sole
evaluation.

The need for virtual interviews allowed faculty to "think outside the box" and challenge their local traditions
surrounding residency selection. One PD stated that the changes they made allowed their program to focus on
recruiting underrepresented minority (URM) applicants. This may have reflected social and political
events taking place in the USA in 2020 that brought racial and ethnic disparities to the forefront. As a result,
many URM mentoring programs and travel grants were instituted in 2021 to encourage the recruitment of
more URM otolaryngology applicants. As of 2020, out of all the surgical subspecialties, otolaryngology and
thoracic surgery continue to have the lowest mean matriculation of URM residents [14].

With vaccination rates increasing and mandates becoming less strict, the future of the match remains
uncertain. The Otolaryngology Program Directors Organization (OPDO) recommends that individual
residency programs decide whether they would like to return to in-person interviews, continue with virtual
interviews, or have a hybrid procedure during the 2021-2022 match cycle [15]. The ACGME, a member of the
Coalition of Physician Accountability, has also recommended that all residency programs conduct their
interviews virtually for the upcoming cycle [16]. At this time, it is unsure how many programs have opted out
of virtual interviews, despite the recommendations. Nonetheless, it is evident that the virtual nature of the
prior cycle presented many advantages to both applicants and PDs.

Limitations
This study only had a response rate of 26.4% of PDs. Thus, it may not be representative of the majority of
otolaryngology programs. However, surveys addressing the same group have had similar response rates
[17,18]. The margin of error is high, but despite that, there is still useful information for participants in the
next otolaryngology match cycle. Additionally, the survey questionnaires were subjective, and respondents
may have felt uncomfortable providing certain information about their programs, despite the anonymity of
the survey.

Conclusions
The virtual nature of the 2020-2021 otolaryngology match cycle presented some advantages to both
applicants and PDs. Programs addressed the challenges in different ways. Economic advantages may have
been important for particular programs and probably also for applicants with fewer financial resources.
Despite the drastic changes that occurred during the cycle due to the pandemic, PDs felt that match
outcomes were similar to prior years.

Additional Information
Disclosures

Human subjects: Consent was obtained or waived by all participants in this study. University at Buffalo IRB
(UBIRB) issued approval STUDY00005460. The UBIRB has determined on April 28, 2021, that the research is
exempt according to 45 CFR Part 46.104. There is no expiration date. Animal subjects: All authors have
confirmed that this study did not involve animal subjects or tissue. Conflicts of interest: In compliance with the
ICMJE uniform disclosure form, all authors declare the following: Payment/services info: All authors have
declared that no financial support was received from any organization for the submitted work. Financial
relationships: All authors have declared that they have no financial relationships at present or
within the previous three years with any organizations that might have an interest in the submitted work.
Other relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

References

1. National Resident Matching Program: Charting outcomes in the match, 2021 Main Residency Match. (2020). Accessed: July 20, 2021: https://mkhrmp3oyqui6wqfm.kinstacdn.com/wp-content/uploads/2021/05/MRM-Results_and-Data_2021.pdf.
2. National Resident Matching Program. Advanced data tables, 2021 Main Residency Match. (2021). Accessed: July 20, 2021: https://mkhrmp3oyqui6wqfm.kinstacdn.com/wp-content/uploads/2021/05/MRM-Results_and-Data_2021.pdf.
3. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG: Research electronic data capture (REDCap)--a metadata-driven methodology and workflow process for providing translational research informatics support. J Biomed Inform. 2009, 42:377-81. 10.1016/j.jbi.2008.08.010
4. Izreig S, Tobari SI, Kasle DA, Rahmati RW, Manes RP: Otolaryngology match 2020-21: survey of prospective applicants in the setting of COVID-19. Ann Otol Rhinol Laryngol. 2021, 130:450-8. 10.1177/0003489420952470
5. Ahmadnezhadi S, Xie DX, Ward BK, Bryson PC, Byrne P: OHNS residency program and applicant social media presence during the COVID-19 pandemic. Ann Otol Rhinol Laryngol. 2021, 130:961-5. 10.1177/0003489420979397
6. Goshtasbi K, Tsutsumi K, Berger MH, Kuan EC, Tjoa T, Haidar YM: Otolaryngology residency programs’ rising social media presence during the COVID-19 pandemic. Laryngoscope. 2021, 131:E1457-9. 10.1002/lary.29299
7. Results of the 2021 NRMP program director survey. (2021). Accessed: July 15, 2021: https://www.nrmp.org/wp-content/uploads/2021/11/2021-PD-Survey-Report-for-WWW.pdf.
8. Chang CW, Pletcher SD, Thorne MC, Malekzadeh S: Preference signaling for the otolaryngology interview market. Laryngoscope. 2021, 131:E744-5. 10.1002/lary.29151
9. Otolaryngology Program Directors Association: Updates on preference signaling. (2021). Accessed: July 30, 2021: https://opdo-hns.org/mpage/signaling-updates.
10. New platform helps aspiring residents showcase skills. (2021). Accessed: July 30, 2021: https://news.vumc.org/2021/04/22/new-platform-helps-aspiring-residents-showcase-skills/.
11. The cost of interviewing for residency. (2021). Accessed: July 18, 2021: https://students-residents.aamc.org/financial-aid-resources/cost-interviewing-residency.
12. Ehrlich H, Boneva D, Mckenney M, Elkhuli A: Virtual interviews for the 2020-2021 National Residency Matching Program during the COVID-19 pandemic: a curse or blessing?. Am Surg. 2021, 87:700-1. 10.1177/0003134820954830
13. Davis ME, Afari A, Crawford K, MacDonald BV, Watson D: Novel implementation of virtual interviews for otolaryngology resident selection: reflections relevant to the COVID-19 era. OTO Open. 2021, 5:2473974X20988254. 10.1177/2473974X20988254
14. Nieblas-Bedolla E, Williams JR, Christopher B, Kweon CY, Williams EI, Jimenez N: Trends in race/ethnicity among applicants and matriculants to US surgical specialties, 2010-2018. JAMA Netw Open. 2020, 3:e2023509. 10.1001/jamanetworkopen.2020.23509
15. Otolaryngology Program Directors Association: 2021-2022 Recruitment Season Recommendations. (2021). Accessed: August 30, 2021: https://acgme.org/Portals/0/PDFs/Virtual%20Rec_COVID%20Only_Final3.pdf.
16. Vanstreet T,.Callaham S, O’Brien D, Carr MM: Program directors’ opinions about otolaryngology resident teaching medical school anatomy. Cureus. 2020, 12:e10999. 10.7759/cureus.10999
17. O’Brien DC, Carr MM: Current wellness practices among otolaryngology residents. Otolaryngol Head Neck Surg. 2018, 159:258-65. 10.1177/0194599818782488