

Virtual Away Rotations for Aspiring Otolaryngologists to Combat the Impact of COVID-19 on the Match

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ABSTRACT

Objective: The cancellation of audition rotations during the COVID-19 pandemic has limited fourth year students' exposure to the breadth and depth of otolaryngology and narrowed their perspective of the nuances that differentiate the training experience at different residency programs. We introduce a virtual rotation for fourth year medical students applying into otolaryngology and describe its utility in enhancing access even beyond a pandemic year.

Methods: The virtual rotation is offered through the Otolaryngology-Head and Neck Surgery Department at Boston Medical Center. The curriculum incorporated telemedicine, outpatient clinics, sign-out, didactic learning, and an evidence-based medicine assignment. Student participants were surveyed regarding how the rotation enhanced their exposure to the program, field-specific learning, and improved their application for the Match.

Results: In our experience, virtual audition rotations are successful in satisfying the primary objectives of audition rotations including supplementing the education of fourth year medical students and more fully informing the match process.

Conclusion: Virtual rotators were successfully able to gain exposure to a wide range of otolaryngologic problems, practice outpatient management skills, and develop professional relationships with attending physicians. Therefore, virtual rotations should be considered as a mechanism to increase equity and accessibility to high-quality otolaryngology education.

INTRODUCTION

Due to the emergence of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), and the subsequent and ongoing COVID-19 pandemic, there have been major disruptions in the traditional methods of undergraduate medical education [1]. While most third-year medical students have returned to direct patient care with minimal deviations from the typical educational structure, medical education continues to be drastically altered for the typical fourth-year student and in particular, those applying into otolaryngology-head and neck surgery (OHNS) [2]. Notably, a challenge that has affected fourth year medical students and residency programs alike is the limitation or altogether cancellation of "audition rotations," also colloquially known as "away rotations" [3].

On April 27, 2020, a joint statement by the SUO/AADO/OPDO encouraged students to avoid audition rotations and subsequently most institutional policies prohibited students from participating in audition clerkship rotations, unless a student did not have a home program [4]. This decision was made to comply with social distancing guidelines, to preserve personal protective equipment, and to prioritize safety of students and faculty. A secondary factor was to maintain equity in the system, as some students would be disadvantaged by variations in the regional and institutional responses. Cancellation of audition rotations in otolaryngology were particularly warranted as otolaryngologists and medical students face a heightened risk of contracting COVID-19 due to upper airway manipulation and mucosal disruption [5].

As the COVID-19 pandemic continues there is ongoing uncertainty regarding the future of audition rotations. During the 2021-2022 academic year, the Association of American Medical Colleges (AAMC) updated their recommendation to allow up to one away rotation per learner, per special-

ty. According to the AAMC, in 2019 the matched otolaryngology applicant participated in two away rotations on average [6]. It is within the realm of possibility that the limitation and cancellation of audition rotations will continue to affect future match cycles. Students rely on audition rotations to ensure their confidence in specialty selection, learn about what criteria are important to prioritize in a program, gain both practical skills and knowledge in the field to prepare for their internship year, and express interest to specific programs. From a residency program perspective, the authors acknowledge that audition rotations play an important role in the residency application process as a way to evaluate a medical student's knowledge, skills, and fit for a program. In a survey of otolaryngology program directors (PD), 72.4% of PDs stated audition rotations were either "extremely" or "very" important in evaluating candidates, and without audition rotations, PDs are unable to comprehensively assess candidates [7]. It is not surprising that a previous survey of matched applicants found that thirty-six percent matched at an institution where they had previously done an away rotation [8].

Adaptability and innovation allowed residency programs to more comprehensively assess candidates and achieve a successful 2021 otolaryngology match [9]. Unfortunately, even in pre-pandemic application cycles, away rotations may be prohibitively expensive for some applicants, estimated at nearly \$1,800 for otolaryngology applicants in 2015 [8]. Virtual audition rotations are an innovative method that can accomplish the goals of both the applicant and the residency program. Successful virtual rotations for home students have been reported in ophthalmology, radiology, and otolaryngology [10-12]. This model has been reported as not only feasible, but of high educational value. Students that rotated through a virtual radiology rotation reported increased confidence in their ability to integrate imaging into their future practice [11]. Likewise, students that rotated through a virtual ophthalmology rotation had ample oppor-

Table 1. An Overview of a Two-Week Virtual Elective Schedule

Time	Monday	Tuesday	Wednesday	Thursday	Friday
Week 1					
Morning	<ul style="list-style-type: none"> Welcome meeting to set clerkship expectations EMR orientation 	<ul style="list-style-type: none"> Outpatient clinic via iPad with physician B 	<ul style="list-style-type: none"> Tumor Board Telemedicine clinic with physician D 	<ul style="list-style-type: none"> Telemedicine clinic with physician F 	<ul style="list-style-type: none"> Grand Rounds Telemedicine clinic with physician B
Afternoon	<ul style="list-style-type: none"> Telemedicine Clinic with physician A Sign-out with residents 	<ul style="list-style-type: none"> Telemedicine Clinic with Physician C Sign-out with residents 	<ul style="list-style-type: none"> Outpatient clinic via iPad with physician E Didactics Conference Sign-out with residents 	<ul style="list-style-type: none"> Telemedicine clinic with physician G Sign-out with residents 	<ul style="list-style-type: none"> Outpatient clinic via iPad with physician C Sign-out with residents
Week 2					
Morning	<ul style="list-style-type: none"> Outpatient Clinic with Physician G 	<ul style="list-style-type: none"> Outpatient clinic via iPad with physician B 	<ul style="list-style-type: none"> Tumor Board Telemedicine clinic with physician D 	<ul style="list-style-type: none"> Telemedicine clinic with physician F 	<ul style="list-style-type: none"> Present at Grand Rounds Telemedicine clinic with physician B
Afternoon	<ul style="list-style-type: none"> Telemedicine Clinic with physician A Sign-out with residents 	<ul style="list-style-type: none"> Telemedicine Clinic with Physician C Sign-out with residents 	<ul style="list-style-type: none"> Outpatient clinic via iPad with physician E Didactics Conference Sign-out with residents 	<ul style="list-style-type: none"> Telemedicine clinic with physician G Sign-out with residents 	<ul style="list-style-type: none"> Outpatient clinic via iPad with physician C Sign-out with residents

EMR, electronic medical record.

tunities to hone their presentation skills, participate in research, and ultimately obtain a meaningful letter of recommendation for their residency application [10]. Virtual rotations provided to home medical students can easily be adapted for students at different institutions, thus offering these students the educational value with the added benefit of allowing residency programs to more comprehensively assess this cohort of candidates.

Our goal is to describe the design, successes, and shortcomings of the virtual audition rotation established at our institution and offer experience-based suggestions for other institutions that plan to establish similar experiences to fourth-year students.

MATERIALS AND METHODS

Design

This study was approved by the BUSM Institutional Review Board (IRB # H-41961). The virtual elective in OHNS was designed to provide medical students the opportunity to improve their clinical acumen in anticipation of the start of residency, as well as build professional relationships with members of our department. Individualized experiences, in which the virtual rotator (VR) was one-on-one with a faculty member were prioritized when developing the curriculum in order to best accomplish both of these goals. The clerkship curriculum included outpatient clinic, telemedicine clinic, didactic learning, and evidence-based assignments. Table 1 outlines an overview of a 2-week virtual elective schedule.

Outreach and Enrollment

The virtual elective in OHNS was offered in a similar fashion as in-person audition rotations through American Association of Medical Colleges' (AAMC) Visiting Student Learning Opportunities (VSLO) system. Medical student interest in the elective was generated through our residency program's social media platforms and posts in Otomatch (<http://www.otomatch.com>), an OHNS interest forum. Accepted virtual rotators are granted access to the electronic medical record (EMR) to fully incorporate them into the care team and assist in clinic workflow.

Outpatient Clinics

An outpatient clinic experience was created with a combination of a tablet computer with webcam capabilities mounted on a rolling stand and our institution-licensed, Health Insurance Portability and Accountability Act compliant, video-conferencing platform to allow communication between the student, the attending physician, and the patient (Figure 1).

Our department conducts video conferences via Zoom (Zoom Video Communications Inc., San Jose, California). The VR is assigned patients by the attending physician or resident physician in a manner that is conducive to the clinic workflow. With the help of the attending, junior resident, scribe, or medical student rotating on the OHNS service, the tablet computer is transported between exam rooms. The patient is asked to consent to a virtual interview and the VR is introduced to the patient. The VR is able to take a medical history, generate a differential diagnosis, and formulate a plan to present to the attending physician. Although the VR cannot perform a physical examination, these parts of the patient encounter are assisted by other members of the team. After presenting the findings and plan, the student observes the entirety of a patient encounter and is able to experience many of the same teaching opportunities or skills assessments that one would have during an in-person rotation. The VR can also assist in documenting the patient encounter with remote EMR access.

Telemedicine

Guidelines for resident participation in OHNS telemedicine clinics during the COVID-19 pandemic have previously been described by our department [13]. This model was adapted to incorporate VRs as well as residents into telemedicine clinics. Residents have returned to in-person clinical responsibilities, but there has been a lasting shift in clinical practice to telemedicine visits in many cases. Therefore, there is an ample opportunity for VRs to be involved in telemedicine clinics and gain one-on-one learning experience with an attending preceptor. VRs require two devices capable of making video conference calls and EMR access, as well as a cell phone. Our department conducts telemedicine visits via a combination of Zoom and Doximity (Video Dialer Beta, Doximity Inc., San Francisco, California). Patients who consent to this format are video called by the VR



Figure 1. A tablet computer with webcam capabilities mounted on a rolling stand to facilitate virtual outpatient clinics.

on one device to obtain a medical history. The case is then presented to the attending over a second device. Lastly, the VR then joins the attending for the full telemedicine visit on the first device. Afterward, the physician and VR can debrief about the patient encounter over the phone or video conference. The VR can also assist in documenting the patient encounter with remote EMR access.

Didactic Learning and Grand Rounds

VRs are expected to attend virtual multidisciplinary head and neck tumor board, virtual OHNS grand rounds, and resident didactics throughout the rotation. Many OHNS departments have transitioned to a video conference platform; however, for those departments that have resumed in-person conferences, VRs can still be included via a video-conferencing platform. VRs also participate in one-on-one teaching sessions ranging from twenty to thirty minutes with attending otolaryngologists and chief residents at the end of each clinical session on a previously agreed upon topic. For those subspecialties that utilize archived video exams (e.g., laryngology), the “share screen” function was particularly useful to demonstrate various types of pathology to the VR during these one-on-one sessions.

Patient Sign-Out

Students are expected to virtually attend and participate in the evening sign-out with the resident team during the elective. A junior resident or third-year medical student rotating on the OHNS service can utilize the screen-share function on video conferencing platforms to share the inpatient list with the VR and discuss treatment plans. VRs are expected to

learn about the inpatients using virtual EMR access and learn about management decisions.

Evidence-Based Assignment

VRs are expected to learn how to practice evidence-based medicine and display competency through one of two options of the students choosing either a written report or oral case presentation. Regardless of format, topics should be approved by the chief resident or clerkship director beforehand. Written reports should be one page and presentations should be less than 10 minutes. Both formats should present a patient, define their workup to disease identification, and then use evidence-based medicine principles to build a rationale for the patient’s management plan. Presentations are during the institution’s OHNS morning conference via video conference.

Survey of Virtual Rotators

Following completion of the 2020-2021 Match application cycle, participants in the virtual curriculum received an anonymous questionnaire surveying their experience with the rotation. These students were fourth year medical students at ACGME-accredited United States medical schools applying into otolaryngology residency. Participants were asked to respond to a series of questions by selecting a number ranging from 1 (greatly disagree) to 5 (greatly agree), with a rating of 3 indicating neutrality. The survey questions are displayed in Figure 2.

RESULTS

Of eight students who participated in the rotation, six responded to the voluntary survey, with a response rate of 75%. Complete survey questions and the mean response are displayed in Figure 2. Based on survey results, impressions of the rotation were overwhelmingly positive. Notably, with a mean rating above 4 (agree), all individuals positively expressed the ability to form new relationships with attending physicians, learn about the nuances of the hosting institution’s residency program, and enhance their interviewing, presentation, and outpatient management skills. Five of six (83%) of respondents agreed (rating 4) that a virtual rotation would have utility even during a non-pandemic year. Three respondents (50%) believed that the rotation enhanced their residency application.

DISCUSSION

Restrictions that have arisen in response to the COVID-19 pandemic have limited the opportunities for fourth-year medical students to gain clinical exposure in otolaryngology, as well as build professional relationships in preparation for the match cycle. While medical students have had to overcome these obstacles, residency programs also have had to adapt by re-designing the process that guides their candidate selection. In years past, personal knowledge of the applicant, letters of recommendation, and rotation within the department have been the most substantial criteria to influence candidate selection [14]. With sincere acknowledgement of these match factors, the authors created a novel virtual OHNS elective to provide fourth-year medicals students interested in the residency program the opportunity to build professional connections with the staff and hone their otolaryngology clinical acumen.

In our experience, adequately assessing the performance of virtual rotators was not considerably different than assessing in-person rotators. The virtual rotation was graded pass/fail, as are many in-person rotations at accredited medical schools. Rather than a traditional grade, students were evaluated for professionalism, fund of knowledge, presentation skills, ability to work in a team, interpersonal skills, and ability to display refinement of skills. Faculty were unable to assess each student’s proce-

Participation in the Virtual Otolaryngology Rotation

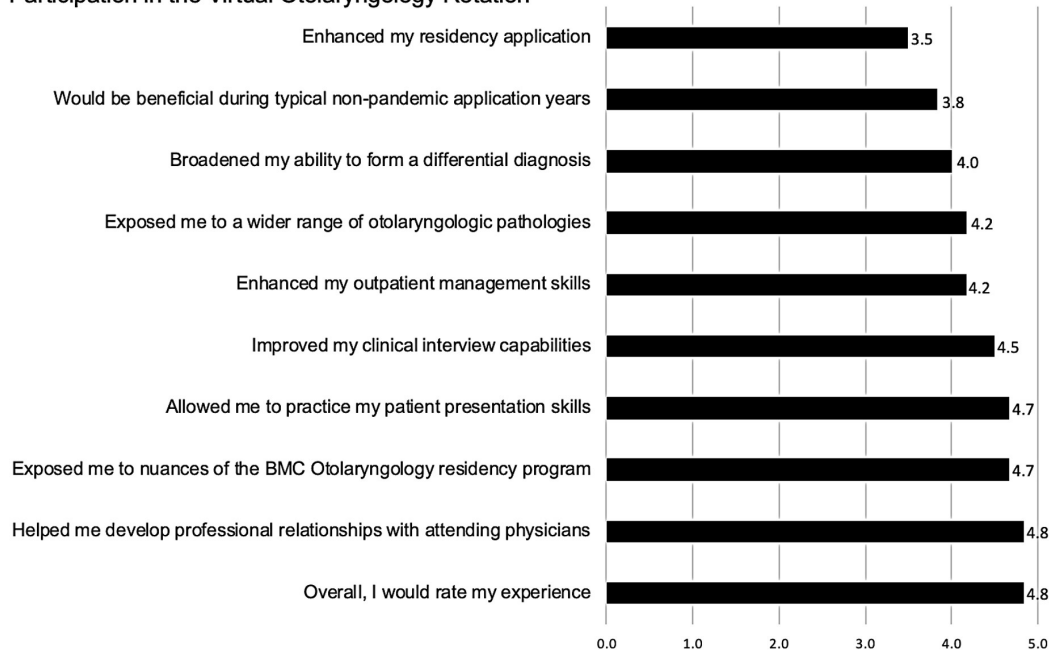


Figure 2. Results of participant survey regarding their participation in the virtual elective. Participants were asked to what extent they agree with the following statements by selecting a number ranging from 1 (greatly disagree) to 5 (greatly agree). Results for six individuals who responded to the voluntary survey are shown.

dural skills, but other aspects of evaluating rotators were unvaried.

The benefits to the first students that have participated in this virtual elective have been numerous, and successfully ensured a learning environment free of occupational exposure for medical student trainees during the COVID-19 pandemic. From a clinical perspective, most fourth year medical students rotating in-person with an OHNS department spend a substantial amount of time on the head and neck oncology service in the operating room. VRs with the department had already participated in an in-person acting internship at their home institution, and thus, most of their otolaryngology knowledge and skills were catered toward head and neck oncology. The virtual elective gave students the opportunity to develop outpatient management skills and gain experience in a wider breadth of otolaryngology practice. Student involvement in clinics of all subspecialties of OHNS increased student preparedness to care for an array of head and neck pathologies as well as preparation for the workflow of a clinic day.

Both in-person outpatient clinics with the assistance of virtual conferencing platforms and telemedicine clinics were formatted such that students were able to build skills in clinical interviewing, presenting patients, developing differential diagnoses, and outpatient management. Involvement in telemedicine clinics also enabled VRs to acquire the skills necessary to deliver virtual otolaryngologic care in the future. Both clinic formats allowed VR to get one-on-one time with attendings, arguably even more so than during in-person rotations, and facilitated valuable feedback sessions.

If audition rotation restrictions continue into future match cycles, the knowledge and skills gained during a virtual rotation successfully augment those gained during an in-person rotation at the home institution. In our experience, it is pertinent to note the workflow in telemedicine clinics facilitated VR involvement more naturally and seamlessly compared to in-person outpatient clinics via virtual conferencing platforms. With this in mind, a virtual rotation may be more easily developed at institutions with a robust telemedicine clinic volume.

Finally, a virtual rotation allows learners from distant environments to participate with only an internet connection and widely available connected devices. This has the potential to improve access to distant institutions at little to no cost to the learner and can be used in the future to facilitate not only United States trainee education, but a global audience as well. Therefore, virtual learning rotations also enhance equity by extending learning opportunities and exposures to other residency programs amongst applicants who may otherwise forego these opportunities due to various limitations.

Although the virtual rotation successfully broadened the otolaryngologic knowledge base of the VRs and allows for networking with faculty, it cannot fully replace in-person clerkships. Students are unable to perform physical examinations and develop procedural skills in the operating room, and similarly, attendings are unable to fully appraise the students' surgical skills. We acknowledge these limitations, and there is no substitute for hands-on learning through operative experience and direct patient care. However, virtual rotations dramatically decrease costs compared to traditional away rotations, increase the opportunity for exposure to more programs, and enhance patient management and presentation skills.

Students also have a much more limited interaction with residents and may be unable to fully determine whether they are an ideal personality fit with their potential colleagues. VR involvement in evening sign-out allows the student to interact with residents, albeit in a more restricted fashion. In the near term, the number of institutions capable of offering virtual rotations is also unlikely to match the demand to enroll in a virtual rotation, as fewer rotators can be accommodated at one time due to the number of clinic sessions available.

Future changes in our virtual elective may include incorporating a virtual operating room experience, as previously described by a publication from the University of Pennsylvania [10]. A streaming camera mounted to an attending or resident's head to capture the surgical view, in combination with a virtual conferencing platform, can be used to create a virtu-

al surgical educational experience [10]. The joint statement by the SUO/AADO/OPDO mandated letters of recommendation must come from the students' home institution for the 2020-2021 match cycle [4]. It is yet to be determined to what extent letters of recommendation from a virtual elective would be valued by residency programs.

CONCLUSION

There are inherent challenges and limitations to a virtual rotation in OHNS, but our experience has overall been beneficial to applicants and our department, and we encourage other programs to consider developing virtual audition rotations.

ARTICLE INFORMATION

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