



Design and Impact of a Novel Otolaryngology Virtual Sub-Internship in the Time of COVID-19

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ABSTRACT

Objective: To discuss the design and impact of a novel otolaryngology virtual sub-internship created as a substitute for the visiting electives that were suspended due to the COVID-19 pandemic.

Methods: A two-week virtual elective was designed and registered with the Visiting Student Learning Opportunities (VSLO) program. The virtual elective consisted of two blocks held during the first two weeks of August and again during the first two weeks of September. A total of 12 medical students enrolled, 5 in August and 7 in September. Surveys were distributed at the beginning and end of the rotation to obtain feedback and assess impact.

Results: Over the course of the rotation students participated in a total of approximately 60–70 hours of virtual interactive sessions including clinical and surgical lectures, resident Q&A panels, hospital and home virtual tours, alumni information sessions, faculty “Meet & Greets” and structural/organizational program overviews. Each visiting student delivered an end-of-rotation presentation to the department on a clinical topic or research interest of their choice. Post-rotation survey data suggests the virtual rotation was an important and meaningful opportunity for visiting students to better understand the program structure and culture. Students reported that the rotation was influential in the creation of their rank lists and should continue to be offered even after in-person sub-internships resume.

Conclusion: Although there is no substitute for an in-person visiting sub-internship, a well-designed virtual elective can be an interactive, worthwhile and impactful alternative during these challenging times.

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INTRODUCTION

In-person away electives are a critical tool for senior medical students applying to residency programs. They allow for students to fully immerse themselves into an unfamiliar program, learning first-hand about the culture, infrastructure, strengths and weaknesses of a place they may one day call home. These electives are an equally important opportunity for otolaryngology programs to assess and evaluate students in a meaningful way prior to the application cycle. The COVID-19 pandemic has resulted in the suspension of away electives, depriving students and programs of this valuable tool. Virtual educational experiences have become an important substitute for the in-person away elective, acting as an opportunity for residency programs to reach potential student applicants while showcasing their strengths and possible new changes or developments [1–3]. Virtual “Town Halls,” “Webinar Sessions” and “Program Q&A’s” have become quite common. While these have utility, they are brief snapshots and do not provide the meaningful, reciprocal interactions between students and a program that are distinctive of in-person away electives and are so important in the application process. In addition, they cannot replace the invaluable education an in-person sub-internship provides.

In an effort to create a unique alternative during the 2020 sub-internship season, the Mount Sinai Hospital Department of Otolaryngology designed and implemented an immersive, interactive two-week virtual sub-internship experience as a substitute for the visiting electives that were suspended due the COVID-19 pandemic. Here we describe the structure and impact of this novel otolaryngology virtual program.

METHODS

A two-week virtual elective was designed and registered with the Visiting Student Learning Opportunities (VSLO) program. The elective consisted of a two-week experience, with a mixture of clinical and surgical lectures, resident Q&A panels, hospital and home virtual tours, alumni information sessions, faculty “Meet & Greets” and structural/organizational program overviews. The Zoom® virtual platform was employed for all meetings and lectures. Attendings and residents volunteered their time to participate in daily sessions. To accommodate the schedules of attendings and residents virtual sessions were approximately an hour in length and were held in grouped morning and evening blocks. A sample of the curriculum is outlined in **Table 1**. The experience was held twice, from August 3rd–10th and again August 31st–September 11th.

Table 1 Course curriculum.

WEEK 1	
Day 1	
AM Hour 1	Intro & Welcome to Otolaryngology @ Mt Sinai
AM Hour 2	Program Overview – Rotation Sites; NYEE/MSH Merger; Fellowships
AM Hour 3	Clinical Lecture Series – Introduction to Head & Neck Surgery at Mount Sinai Hospital
PM Hour 1	Resident Spotlight – A Day in the Life of An ENT Resident at Mount Sinai (Part 1)
PM Hour 2	Resident/Rotator Meet & Greet (PGY 1–3)
Day 2	
AM Hour 1	Clinical Lecture Series – Surgery of the Sinuses & Skull Base – How Far Have We Come
AM Hour 2	Clinical Lecture Series – Whats New in Facial Plastic Surgery
PM Hour 1	COVID-19 @ Mount Sinai Hospital – The Otolaryngology Team Response
PM Hour 2	Clinical Lecture Series – Innovations in Neurotology/Endoscopic Ear Surgery/Exoscope
PM Hour 3	Resident & Fellow Meet & Greet
Day 3	
AM Hour 1	Clinical Lecture Series – Novel Diagnosis & Management in Meniere’s Disease
PM Hour 1	Clinical Lecture Series – Cochlear Implantation
PM Hour 2	Resident/Rotator Virtual Small Group Session – Starting and/or Raising a Family During a NYC Residency
PM Hour 3	Resident/Rotator Virtual Small Group Session – Transitioning to Life in NYC – Q&A (Moving to NYC/Housing; Navigating NYC)

(Contd.)

Day 4	
AM Hour 1	Dept of Otolaryngology Grand Rounds
AM Hour 2	Clinical Lecture Series – Laryngology: Introduction to Stroboscopy
PM Hour 1	Surgical Spotlight – Endoscopy Middle Ear Surgery.
PM Hour 2	Faculty Virtual Meet & Greet
Day 5	
AM Hour 1	Student Rotator Presentations (Part 1)
AM Hour 2	Chairman & Program Director Meet & Greet
PM Hour 1	Faculty Meet & Greet
PM Hour 2	Mount Sinai Hospital Tour
PM Hour 3	Virtual Happy Hour
WEEK 2	
Day 1	
AM Hour 1	Surgical Spotlight: Free Flap
AM Hour 2	Challenging Surgical Cases in ENT
AM Hour 3	Home Program Discussion (Student Driven)
PM Hour 1	Faculty Virtual Meet & Greet
PM Hour 2	Advanced Practice Providers @ Mount Sinai Hospital – Meet & Greet/Q&A
Day 2	
AM Hour 1	Clinical Lecture Series – Head & Neck – HPV Oropharyngeal Carcinoma
AM Hour 2	Clinical Lecture Series – Pediatric Otolaryngology – Safely Managing the Pediatric Airway
PM Hour 1	Sinai MS4 Student Insights
PM Hour 2	Research @ Mount Sinai (Resident Perspective)
Day 3	
AM Hour 1	Opportunities for Mission Trips & Service
AM Hour 2	Resident/Rotator Virtual Small Group Session – “How to Succeed as a 2020/2021 ENT Applicant”
AM Hour 3	Surgical Spotlight: Hurdles & Obstacles in Surgery of the Skull Base
PM Hour 1	Surgical Spotlight: Otology/Neurotology
PM Hour 2	Meet & Greet – Get to know the Fellows
Day 4	
AM Hour 1	Student Rotator Presentations (Part 2)
AM Hour 2	Surgical Spotlight – Laryngology: Glottic Neoplasms
PM Hour 1	Alumni Session ~ Q&A
PM Hour 2	Virtual Happy Hour

Anonymous voluntary surveys were distributed at the beginning and end of the rotation to evaluate the effectiveness and impact of the rotation. Surveys were created using RedCap and included the questions listed in **Table 2**. Participants were asked to rate knowledge about the residency program, hospital environment and community, in addition to their perceived comfort with the Mount Sinai Otolaryngology residents using a 5-point Likert scale, with 1 being the least knowledge/comfort and 5 being the most. Participants also rated how they felt about the program and how it would factor into their residency-decision making process. Student’s paired t-tests were used to calculate statistical significance, with $p < 0.05$ deemed significant. The study was determined to be exempt by the Icahn School of Medicine at Mount Sinai Internal Review Board.

PRE-SURVEY
I know about the ENT program structure and clinical rotations at Mount Sinai
I am aware of the educational opportunities (didactics, courses, conferences) offered to residents at Mount Sinai
I am aware of the housing options available to residents at Mount Sinai
I know about the research opportunities at Mount Sinai
I know about the income, meal and educational stipends, and travel reimbursements offered to residents at Mount Sinai
I feel like I know about what it is like to live and work in NYC
I feel like I know what the day in the life of a Mount Sinai ENT resident looks like
I know what the hospitals and resident working environments look like
I feel like I would get along with the residents at Mount Sinai
POST-SURVEY
I know about the ENT program structure and clinical rotations at Mount Sinai
I am aware of the educational opportunities (didactics, courses, conferences) offered to residents at Mount Sinai
I am aware of the housing options available to residents at Mount Sinai
I know about the research opportunities at Mount Sinai
I know about the income, meal and educational stipends, and travel reimbursements offered to residents at Mount Sinai
I feel like I know about what it is like to live and work in NYC
I feel like I know what the day in the life of a Mount Sinai ENT resident looks like
I know what the hospitals and resident working environments look like
I feel like I would get along with the residents at Mount Sinai
I enjoyed the Mount Sinai Virtual Away elective
This opportunity was helpful in learning more about the program
This opportunity will factor into my ranking lists
This opportunity should be continued as a supplementary experience even when in-person Sub-I's can resume
Additional comments, suggestions?

Table 2 Pre and Post-Surveys.

RESULTS

A total of 12 students enrolled in the experience, five in the August block and seven in September. All students completed both pre-elective and post-elective surveys. Post-elective survey data is listed in **Table 3** and suggested significant improvement in the student rotators' familiarity with the residency program, including the rotation structure, educational opportunities, housing options, research productivity, medical mission programs and financial stipends. They also endorsed increases in their perception of what it would be like to be a resident in the program and what it may be like to live as an otolaryngology resident in New York City. Participants rated that after completion of the elective they reported that they would get along well with Mount Sinai residents. Importantly, all students relayed that this opportunity would strongly factor into their residency rank lists. Overall, students enjoyed the elective. They stated it was a helpful experience in learning more about the program. Interestingly, they suggested that the elective should continue to be offered as a supplementary experience even when in-person sub-internships resume. Rotators specifically commented that the elective was "a bright spot in a dark year", "fantastically organized and smoothly executed," and "a great experience." All comments are listed in **Table 4**.

DISCUSSION

The COVID19 pandemic has forced educators to reevaluate their approach to education, mentorship, and to this year's residency application cycle [1-5]. In-person away electives have been an important experience for both residency programs and applicants to learn about

	PRE	POST
I know about the ENT program structure and clinical rotations at Mount Sinai	2.00 ± 0.60	4.75 ± 0.45
I am aware of the educational opportunities (didactics, courses, conferences) offered to residents at Mount Sinai	1.83 ± 0.58	4.67 ± 0.49
I am aware of the housing options available to residents at Mount Sinai	2.00 ± 0.95	4.75 ± 0.45
I know about the research opportunities at Mount Sinai	2.00 ± 0.85	4.67 ± 0.49
I know about the income, meal and educational stipends, and travel reimbursements offered to residents at Mount Sinai	1.50 ± 0.52	4.67 ± 0.49
I feel like I know about what it is like to live and work in NYC	3.92 ± 1.00	4.58 ± 0.51
I feel like I know what the day in the life of a Mount Sinai ENT resident looks like	2.17 ± 0.39	4.67 ± 0.49
I know what the hospitals and resident working environments look like	2.25 ± 0.75	4.00 ± 1.13
I feel like I would get along with the residents at Mount Sinai	3.58 ± 1.00	4.92 ± 0.29
I enjoyed the Mount Sinai Virtual Away elective	4.92 ± 0.29	
This opportunity was helpful in learning more about the program	4.92 ± 0.29	
This opportunity will factor into my ranking lists	5.00 ± 0.00	
This opportunity should be continued as a supplementary experience even when in-person Sub-I's can resume	4.25 ± 0.75	

Table 3 Results from Pre and Post-surveys. Participants were asked to rate knowledge about the residency program, hospital environment and community, in addition to their perceived comfort with the Mount Sinai Otolaryngology residents using a 5-point Likert scale, with 1 being the least knowledge/comfort and 5 being the most. Participants also rated how they felt about the program and how it would factor into their residency-decision making process. Student's paired t-tests were used to calculate statistical significance, with $p < 0.05$ deemed significant.

I absolutely loved this experience and really appreciated residents and faculty taking the time to show us what Mt. Sinai is all about. I think the lectures were fantastic and meet and greets were great ways to get to know residents and faculty. I think encouraging virtual rotators to get to know each other outside of the virtual elective early on would be an excellent addition.

As a group of five I felt like the residents and attendings actually got to know me. I would not change the size.

Great experience! Really appreciate you all putting this together during this unconventional year. The elective was also super educational about ENT topics in general, with awesome lectures from the attendings. For example, I'm leaving the elective with a much better understanding of ear anatomy than I had going into it.

This was an excellent opportunity to have in a very challenging year. The sessions were well thought out. Possibly the greatest advantage is that this allowed students to figure out how to interact with strangers over zoom, which will be norm for this application cycle.

What a bright spot in a dark year. Thanks for the opportunity!

Fantastically organized and smoothly executed. Gave a fantastic introduction to Mt. Sinai and the culture of the residents and the residency as a whole.

I loved the virtual Sub-I. It was well-organized, and it showed just how much Sinai is willing to invest in medical education. The one-on-one time we had with faculty including the chair was really meaningful and interesting. I thought it was a well-rounded experience. I think the time with alumni was an interesting perspective. It was great to see how well everyone interacted with each other. This experience put Sinai at the top of my list in terms of where I want to end up. I came into it thinking the program might be good, but I was nervous about living in NYC and the size of the resident classes. All of my hesitations were dispelled very quickly.

Great, well-organized elective that provided a lot of useful information about the resident experience and opportunities.

Table 4 Comments about Virtual Away Elective.

each other. As a rotator or acting intern students are immersed fully into the daily clinical and academic ongoings of a particular program. Additionally, these away electives are important educational experiences for medical students looking for additional exposure to the field, an opportunity even more critical for those students without an otolaryngology program at their home institution [6, 7]. Without these away electives, students are less equipped to make important decisions about what specialty to enter and where to pursue residency.

In the absence of in-person visiting electives, virtual educational experiences have emerged, acting as an opportunity for residency programs to reach potential applicants. While virtual "Town Halls" and "Informational Webinars" certainly have value, they do not provide those meaningful interactions between students and programs that are so important in the application process. In addition, they cannot replace the invaluable education an in-person sub-internship provides. Though the research on virtual education in surgical residency training

is limited, recent publications in the neurosurgery and general surgery literature highlight concern among students and residents as to the impact of the COVID-19 pandemic on training [8] and also the success of virtual educational programs in helping to mitigate the loss of in-person sub-internships [9, 10].

In an effort to create a unique alternative during the 2020 sub-internship season, the Mount Sinai Hospital Department of Otolaryngology designed and implemented an immersive, interactive two-week virtual sub-internship experience. The program ran daily on Zoom® with sessions split into morning and afternoon blocks to limit fatigue of the participants. A wide array of sessions were offered, ranging from educational didactics by experts in the field, to resident-led “happy hours” that were purely social in nature. In order to maximize the student experience, the program sessions were divided into three main categories: (1) clinical lectures/virtual surgery walk-throughs, (2) information/Q&A sessions on program structure and resident lifestyle, (3) social resident and faculty “Meet and Greets” with applicants. Additionally, as would normally be commonplace in an in-person elective, students had the opportunity to showcase themselves and their work by presenting short research presentations to the entire department. Students were encouraged to use the first few minutes of these presentations as an occasion to share a bit about themselves, their backgrounds, hobbies and goals. Throughout the elective there were specific opportunities for applicants to meet the department chair and program director, to meeting with current Mount Sinai 4th year medical students to obtain a “behind-the-scenes” thoughts on the department, and sessions with program alumni to gain perspective about paths taken after graduation from the program. The number of participants was intentionally capped to maximize interaction and engagement and allow for applicants and program members to get to know each other as they would in an in-person setting.

The reception to the program was immensely positive. Surveys administered before and after the experience indicated significant increases on a five-point Likert scale for every question asked. Students walked away from the program being more aware of the program structure, clinical and research opportunities, and about the culture of the residency program and what it is like to live in New York City. They enjoyed the experience, thought it was helpful, and uniformly indicated that it would factor into their ranking lists. Interestingly, most participants believed that this opportunity should remain available as a supplementary experience even when in-person Sub-internships resume in the future, highlighting its utility and participant satisfaction.

Although there is no substitute for an in-person visiting sub-internship, a well-designed virtual elective can be an interactive, worthwhile and impactful alternative during these challenging times. Limiting enrollment, providing a well-blended session schedule with both clinical and non-clinical sessions and including an end of rotation case presentation improves program fidelity and makes for a more positive student experience.

COMPETING INTERESTS

The authors have no competing interests to declare.

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