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Virtual Subinternships in the COVID Era: Lessons Learned from Three Institutional Experiences

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Summary: After the cessation of all in-person visiting rotations during the coronavirus 2019 pandemic, many programs developed virtual rotations as an alternative for the recruitment and education of prospective applicants. In this study, we developed a consortium of three institutions each with a unique virtual subinternship and prospectively surveyed participating students in order to reflect and improve upon future rotations. All students participating in virtual subinternships at three institutions were administered the same pre subinternship and post subinternship electronic surveys. Subinternship curricula were developed independently at each respective institution. Fifty-two students completed both surveys, for an overall response rate of 77.6%. Students' primary objectives were to evaluate their fit with the program (94.2%), interact with residents (94.2%), gain faculty mentorship (88.5%), and improve didactic knowledge (82.7%). Postrotation surveys revealed that over 73% of students reported having met all of these objectives over the course of the rotation. On average, students ranked programs 5% higher overall after the rotation ($P = 0.024$). Postrotation results showed that the majority (71.2%) of students perceived the virtual subinternship as slightly less valuable than in-person subinternships but that all students would participate in a virtual subinternship again. Student objectives can be successfully met using the virtual format for subinternships. The virtual format is also effective in enhancing the overall perception of a program and its residents. Although students still prefer in-person subinternships, our results suggest that virtual rotations are more accessible and very capable of meeting student goals. (*Plast Reconstr Surg Glob Open* 2023; 11:e4935; doi: 10.1097/GOX.0000000000004935; Published online 24 March 2023.)

INTRODUCTION

In 2020, the Coalition for Physician Accountability, in coordination with the Association of American Medical Colleges, recommended halting all in-person away rotations and interviews.¹ Before the pandemic, nearly 95% of plastic surgery applicants participated in multiple visiting subinternships.² In-person experiences serve as an

educational bridge between medical student and intern. They allow students to signal their interest in specific programs and evaluate one's "fit" for given programs.^{2,3} An applicant's performance on away rotations is one of the most important factors considered by a program director in developing a rank list.^{2,4} On average, 67% of integrated plastic surgery interns went to medical school or participated in an away rotation at the institution where they matched.³

In response to the recommendations released by the Coalition for Physician Accountability, some institutions developed virtual alternatives for the recruitment and education of prospective applicants.⁵ This study aimed to analyze the efficacy and outcomes of plastic and reconstructive surgery virtual rotations via a consortium of three institutions, with independently developed virtual subinternship curricula.

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METHODS

All students participating in virtual subinternships at three institutions during summer and fall 2020 were provided with two anonymous online surveys via Qualtrics (Provo, Utah): one survey was sent before the rotation started, and one was sent after completion. (See **appendix, Supplemental Digital Content 1**, which displays the prerotation survey questions. <http://links.lww.com/PRSGO/C505>.) (See **appendix, Supplemental Digital Content 2**, which displays the postrotation survey questions. <http://links.lww.com/PRSGO/C506>.) Student objectives were considered met if they ranked 4 or 5 on a Likert scale of 1 (objective not met) to 5 (objective definitely met).

Virtual curricula from each institution included participation in department conferences, at least one student presentation to the department, subscribing to the American Society of Plastic Surgeons Education Network, and social engagement with residents and faculty. Other components including rotation duration (4 weeks part-time at institution A; 2 weeks full-time at institutions B and C), number of activity hours per week, number of students per rotation iteration, suture laboratory sessions, and one-on-one faculty and/or resident mentorship differed amongst the institutions (**Table 1**).

Analysis included paired *t* test and McNemar test for continuous and dichotomous variables, Fisher exact tests for categorical variables, one-way ANOVA to examine differences across, symmetry testing to examine differences before versus after completion of a given rotation, and logistic regression to determine predictors for successful achievement of objectives. Statistical analysis was performed using STATA, v.15 (StataCorp, College Station, Tex.) with significance defined as *P* less than 0.05.

SURVEY RESULTS

Sixty-seven students participated in one of the virtual subinternships. Fifty-two students completed both surveys, yielding a response rate of 77.6%. Students learned about virtual subinternship opportunities most commonly via Instagram (38.5%) and word of mouth (23.1%). Students reported participating in an average of 2.8 virtual subinternships (SD 1.21) and spending an average of 22.3 hours (SD 12.9) preparing for and participating in subinternship activities weekly.

STUDENT OBJECTIVES

Prerotation, students reported their top objectives in virtual subinternships were to (1) evaluate fit with a given program (94.2%), (2) interact with residents (94.2%), (3) gain mentorship with faculty (88.5%), and (4) improve didactic knowledge of plastic surgery (82.7%). Postrotation, over 73% of respondents endorsed meeting these four primary objectives. Logistic regression

Takeaways

Question: Did virtual subinternships meet the objectives of prospective plastic and reconstructive surgery applicants?

Findings: Students' primary objectives included program fit, interaction with residents, faculty mentorship, and improved didactic knowledge. Most participants reported that these objectives were met on their virtual rotations. Although students felt virtual rotations were slightly less valuable than in-person rotations, all students would participate in a virtual subinternship again.

Meaning: Although students prefer in-person subinternships, virtual rotations are more accessible and capable of meeting student goals.

revealed that students completing a virtual subinternship with institutions A and C were significantly more likely to indicate that they had met the goal of gaining mentorship with faculty (OR 30, *P* = 0.004; OR 72, *P* < 0.001 respectively). The odds of successfully meeting the faculty mentorship goal were 51 times higher when students participated in a rotation that offered one-on-one mentoring (*P* < 0.001, 95% CI 8.26–314.92). Length of rotation was not a predictor of meeting any of the objectives (**Table 1**).

STUDENT PERCEPTIONS OF INSTITUTION

At the close of a virtual subinternship, rotators were significantly more likely to consider a program's residents to be a strength of the program (*P* = 0.011) and significantly less likely to consider a program's research opportunities (*P* = 0.0253) or geographic location (*P* = 0.0455) to be weaknesses of the program. Students' percentile ranking of programs significantly increased throughout the virtual rotation, with postrotation rankings being an average of 4.7 points higher than prerotation rankings (*P* = 0.0236) (**Table 2**).

PERCEIVED VALUE OF VIRTUAL SUBINTERNSHIP

Prerotation survey results show that all respondents thought the virtual subinternship would be much less valuable (17.3%), slightly less valuable (63.5%), or equally as valuable (19.2%) as an in-person rotation. All respondents reported that they would participate in a virtual subinternship again, but most respondents (87.8%) would not participate in a virtual subinternship in lieu of an in-person rotation (**Table 3**).

VIRTUAL SUBINTERNSHIPS: DO THEY WORK?

This study suggests that virtual subinternships are a novel and effective way to achieve most students' goals in

Table 1. Course Components and Objectives by Institution

| Course Components | Institution A | | Institution B | | Institution C | |
|----------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| | 4 wk | 2 wk | 2 wk | 2 wk | 2 wk | 2 wk |
| Length | 4 wk | 2 wk | 2 wk | 2 wk | 2 wk | 2 wk |
| No. students (total) | 16 | 21 | 21 | 30 | 30 | 30 |
| No. respondents (total) | 11 | 16 | 16 | 25 | 25 | 25 |
| Scheduled activity (h/wk) | 4-6 | 16 | 16 | 25 | 25 | 25 |
| Maximum no. students/rotation | 4 | 4 | 4 | 3 | 3 | 3 |
| One-on-one mentoring | Yes | No | No | Yes | Yes | Yes |
| Case presentations | Yes | Yes | Yes | Yes | Yes | Yes |
| Student presentation | Yes | Yes | Yes | Yes | Yes | Yes |
| Participation in didactics | Yes | Yes | Yes | Yes | Yes | Yes |
| Social engagement with residents | Yes | Yes | Yes | Yes | Yes | Yes |
| Suture laboratory | Yes | No | No | Yes | Yes | Yes |
| Student Objectives | % Selecting Objective | % Achieving Objective | % Selecting Objective | % Achieving Objective | % Selecting Objective | % Achieving Objective |
| Gain mentorship with faculty | 82 | 91 | 81 | 25 | 96 | 96 |
| Gain research opportunities | 0 | 27 | 44 | 25 | 60 | 72 |
| Interact with residents | 100 | 91 | 88 | 75 | 96 | 92 |
| Experience day-to-day schedule | 18 | 27 | 81 | 50 | 80 | 48 |
| Gain procedural/suturing skills | 9 | 36 | 31 | 13 | 56 | 56 |
| Improve didactic knowledge | 55 | 91 | 100 | 94 | 84 | 100 |
| Evaluate fit with program | 91 | 91 | 94 | 82 | 96 | 96 |

Table 2. Student Perceptions of Programs

| | Student Perceptions of Program | | | | |
|-----------------------------|--------------------------------|-------|--------------|-------|---------------|
| | Prerotation | | Postrotation | | P |
| | n | % | n | % | |
| Strengths | | | | | |
| Residents | 15 | 28.8% | 27 | 51.9% | 0.0105 |
| Faculty | 23 | 44.2% | 29 | 55.8% | 0.1573 |
| Program size | 2 | 3.8% | 3 | 5.8% | 0.6547 |
| Research opportunities | 15 | 28.8% | 8 | 15.4% | 0.1967 |
| Global health opportunities | 15 | 28.8% | 3 | 5.8% | 0.0013 |
| Geographic location | 14 | 26.9% | 5 | 9.6% | 0.0126 |
| Weaknesses | | | | | |
| Residents | 3 | 5.8% | 1 | 1.9% | 0.1573 |
| Faculty | 1 | 1.9% | 0 | 0.0% | 0.3173 |
| Program size | 28 | 53.8% | 21 | 40.4% | 0.0522 |
| Research opportunities | 7 | 13.5% | 2 | 3.8% | 0.0253 |
| Global health opportunities | 19 | 36.5% | 20 | 38.5% | 0.8084 |
| Geographic location | 9 | 17.3% | 5 | 9.6% | 0.0455 |

P values in bold indicate a significant difference between pre- and postrotation scores.

subinternships. Participation in virtual subinternships can increase the positive perception of residents within a program and decrease the negative perception of program components like research opportunities and geographic location of the participating programs. Offering 1:1 virtual mentorship is key in achieving subinternship goals and should be incorporated into curricula going forward. Additionally, virtual interactive skills labs may address shortcomings related to formal assessment of student’s clinical and surgical skills, although this will be evaluated further in future iterations to definitively demonstrate efficacy.

THE FUTURE OF VIRTUAL SUBINTERNSHIPS

Virtual surgical subinternships, while not replacing in-person rotations, provide a bridge for students who are unable to participate in physical rotations, creating equity amongst students. Continued coronavirus restrictions and the financial limitations of in-person subinternships will likely progress the demand for virtual opportunities. These institutions’ experiences suggest that virtual subinternships, may decrease travel costs, enhance equity amongst applicants with respect to access to programs outside their home institution, offer more didactic and mentorship opportunities, and ultimately achieve the goals of most subinterns. Therefore, we believe that programs should continue to offer virtual learning opportunities, even with a return to in-person subinternships.

In future iterations of this study, incorporating pre- and postassessments, collecting additional data delineating the variation in rotation content across institutions, and exploring match outcomes would be beneficial additions. Finally, adopting a more precise term that identifies these educational forums as uniquely different from in-person subinternships is a task well suited for educational leadership.

Table 3. Perceived Value of Virtual Subinternship

| | Perceived Value of Virtual Subinternship | | | | P |
|---|--|-------|--------------|--------|--------|
| | Prerotation | | Postrotation | | |
| | n | % | n | % | |
| Perceived value of virtual subinternship relative to in-person subinternship | | | | | 0.1091 |
| Much less valuable | 9 | 17.3% | 3 | 5.8% | |
| Slightly less valuable | 33 | 63.5% | 37 | 71.2% | |
| Equally as valuable | 10 | 19.2% | 9 | 17.3% | |
| Slightly more valuable | 0 | 0.0% | 2 | 3.8% | |
| Much more valuable | 0 | 0.0% | 1 | 1.9% | |
| Would you participate in a virtual subinternship again? | | | | | — |
| Yes | — | | 52 | 100.0% | |
| No | | | 0 | 0.0% | |
| Would you participate in a virtual subinternship in lieu of an in-person subinternship? | | | | | — |
| Yes | — | | 5 | 12.2% | |
| No | | | 36 | 87.8% | |

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DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

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