Virtual Shadowing Program for Preclinical Medical Students

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Abstract
Our annual summer shadowing program for preclinical medical students faced significant challenges due to COVID-19-related safety and resource concerns during Summer 2020. We created a pilot 7-week virtual shadowing program with the goal of providing virtual observational clinical experiences to increase students’ clinical exposure and understanding of medical specialties. Faculty and preclinical medical students were matched via student preference selection and mentor availability. A practice guide was developed that outlined suggested virtual shadowing procedures. Afterward, participating faculty and students were surveyed on their experience. Overall, both faculty and students found the program effective and experienced limited technological difficulty.

Keywords Virtual · Shadowing · COVID · Preclinical · Specialty choice

Background
In Spring 2020, medical schools were forced to modify their curricula due to the COVID-19 pandemic, most halting in-person clinical rotations and direct patient contact for weeks to months [1]. While much of the concern surrounding the impact of the pandemic on medical education has focused on third- and fourth-year clerkships [2], the pandemic’s impact on preclinical students has not been well explored. In particular, in-person shadowing during the preclinical years can facilitate specialty career choice and enhanced clinical skills. Studies have shown that early patient contact in medical training has positive impacts on students’ comfort with clinical settings and patient care [3, 4]. Students who shadow are able to give context to their training early and are motivated to learn more in the classroom [3]; they also self-report improved medical knowledge, improved quality of interactions with other health professionals and patients, and improved history and physical examination skills [5]. Furthermore, early exposure to different clinical settings through shadowing experiences may allow students to explore and form decisions about future specialty choice [6, 7].

At George Washington University School of Medicine and Health Sciences, we host an annual voluntary summer shadowing program for medical students between years 1 and 2 for the aforementioned benefits. However, the pandemic introduced challenges of student safety, availability of PPE, limited faculty availability, physical distancing needs, and increased telehealth visits. In response, we created a virtual shadowing program with the goal of providing virtual observational clinical experiences to increase preclinical students’ clinical exposure and understanding of medical specialties and assessed student and faculty feasibility, acceptability, and experiences.

Activity
Our pilot, 7-week virtual shadowing program took place from June to August 2020. In May 2020, full-time faculties were recruited to participate through the faculty listserv and were asked to list their availability and preferences for number of students they could precept. No interested faculty members were excluded. Subsequently, all first-year students were notified about the virtual shadowing program with a list of available faculty preceptors. Interested students were matched to faculty preceptors based on student-provided preferences. A best practice guide was developed and distributed to...
preceptors that listed recommended process steps, after no other such resources were found upon literature and internet searches. Two models were provided for virtual interactions: one allowing the student to join in on an existing telemedicine encounter and one model for virtually including students during in-person clinic visits. Most preceptors were matched with multiple students. Scheduling of shadowing sessions was left to the discretion of student and preceptor. Most providers at our institution used Zoom for telehealth visits. For surgical specialties, students only shadowed during clinic days; we were unable to support virtual operating room access.

Upon conclusion of the shadowing program, students and faculty were surveyed electronically to evaluate the effectiveness of the program and to elicit improvements. Survey contents were piloted by both students and faculty and included questions about program logistics, suggestions for improvement, and student participation and engagement with the program.

We analyzed survey data using descriptive statistics. Free-text analysis was performed for open-ended comments via an inductive approach that utilized comment content to drive coding and thematic development, a similar approach to one used by Cunningham and Wells [8]. The comments were initially divided into two categories: student and faculty responses. Second-order coding involved organizing comments into themes of positive and negative. Lastly, third-order coding was based on the content of the comment itself. Themes were created based on the subjects being addressed (e.g., comments about the students/preceptors or comments about the program itself). Finally, subthemes were created from identifying patterns in each theme. For example, for “positive qualities of students,” student engagement was mentioned in six comments and was identified as a subtheme. A representative comment was selected for each subtheme. Coding discrepancies were resolved through discussion. This study was considered exempt from review by the George Washington University Institutional Review Board.

Results/Discussion

Forty-eight (48) students and 22 faculty participated, of which 26/48 (54%) students and 13/22 (59%) faculty completed surveys. Faculty represented a spectrum of specialties, from primary care to subspecialty surgery. See Table 1 for respondent characteristics and selected results. Most faculty respondents (61%) were matched with two students. The majority of responding students (58%) shadowed faculty 5 or more times over the course of the program, while 19% shadowed 3–4 times. Many students participated remotely while outside of the local school region (12/26; 46%). On a 5-point Likert scale, 81% strongly agreed with the statement “I enjoyed the shadowing experience,” while the remaining respondents agreed. Ninety-two percent of students agreed or strongly agreed that they were engaged with shadowing and 92% agreed or strongly agreed that they gained increased knowledge of their preceptor’s specialty. All but one student (96%) agreed that they would recommend the program to a peer, while the remaining student was neutral. Most faculty respondents (77%) agreed that they would participate in the program again. Both faculty and students experienced limited technological difficulties.

Free-text analysis of positive comments from students (Fig. 1) revealed positive assessment of their preceptors and the program. Students appreciated the mentorship aspect of the program. Most students had positive comments for their preceptors and felt that an active effort was made to engage and teach them during patient encounters. When it came to the program itself, free-text analysis showed exposure to different specialties as the most common benefit. We also performed a free-text analysis for suggestions for improvement by students (Fig. 1). These suggestions primarily focused on suggestions for the preceptors, mainly through increasing student preparation by providing educational resources and access to electronic medical records prior to shadowing. Some students also commented on improvements that could be made to the program logistics, like improved communication by faculty with students and expansion of the number of participating faculty.

Free-text analysis of faculty responses (Fig. 2) showed that the most consistent praise was high levels of student engagement. Other faculty members praised the virtual shadowing format, noting that it made it easier to teach students and coordinate multiple students shadowing. Faculty suggestions for improvement (Fig. 2) noted unprofessionalism in the students who shadowed them and commented on logistical improvements that could be made to the program.

Overall, our virtual shadowing program that was created out of necessity due to the COVID-19 pandemic was well received by both students and faculty and accomplished our goals of providing clinical exposure to preclinical students and increased understanding of medical specialties. We were surprised by how many faculty members were willing to try the virtual format and the rarity of technological difficulties encountered by both students and faculty. While we did not specifically ask faculty whether they participated using established telemedicine visits versus streaming in-person visits, it appears that the faculty primarily chose to use telemedicine visits. Most students participated in 5 or more shadowing sessions during the program, and we believe that...
the flexibility of the program led to this high participation rate.

The flexibility and accessibility of the program are made more salient by the survey results showing that over 50% of students were outside of the DC metropolitan area. In addition, time is an often-cited barrier to clinical teaching in medical schools; some faculty reported having increased time for teaching during virtual sessions compared to typical in-person clinic sessions.

Limitations of this educational innovation include the relatively small numbers of participating students and faculty. Our faculty mainly used the video conferencing platform Zoom; results may not be generalizable to other platforms. Some comments from students and faculty suggested that better expectation setting was needed for both parties. Additional recruitment of faculty may allow for more individualized, in-depth experiences for students.

In sum, we found that virtual shadowing can be used to expand preclinical students’ access to clinical observational experiences, allowing for meaningful, flexible, and remote learner participation.
Fig. 1 A free-text analysis of positive and critical feedback by students
Fig. 2 A free-text analysis of positive and critical feedback by physician preceptors. (1) Touchworks are an electronic medical record (EMR) system.
Declarations

Ethics Approval This study was considered exempt from review by the George Washington University Institutional Review Board.

Conflict of Interest The authors declare no competing interests.

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