

Creating Virtual Learning for 3-Year Accelerated MD Students During the COVID Pandemic

Shou Ling Leong, MD | Jessica A. Parascando, MPH | Erika VanDyke, MPH | Alyssa Anderson, MD | Lawrence Kass, MD, MEd | Jennifer Grana, DO | Eric Messner, PhD, FNP-BC

PRiMER. 2022;6:33.

Published: 8/24/2022 | DOI: 10.22454/PRiMER.2022.422339

Introduction

In March 2020, with the onset of the COVID-19 pandemic and in compliance with recommendations from the Association of American Medical Colleges (AAMC),^{1,2} Penn State College of Medicine (PSCOM) suspended all in-person patient encounters for medical students. To keep education on track, PSCOM transitioned to a virtual learning format.

In a 2021 review, Park et al reported that 84.2% of published articles on the development of virtual learning were targeted for clinical clerkships.³ Article topics included virtual clerkships,⁴⁻⁶ telemedicine,⁷⁻¹¹ virtual rounds,^{5,7,12,13} virtual acting internships,^{14,15} and virtual electives for visiting students.^{16,17} While there have been many reports on virtual learning during the pandemic,³ there is a paucity of reports addressing how accelerated programs responded to the pandemic. This qualitative study reports the strategies used and the effects of virtual learning on accelerated MD students at PSCOM.

Methods

The PSCOM Institutional Review Board approved this study (Study#15567).

PSCOM offers 3-year accelerated MD programs where students achieve graduation competencies in 3 years instead of 4.¹⁸⁻²⁰ Because of this shortened time frame, students in these accelerated programs are especially threatened by the loss of learning opportunities resulting from pauses in clinical exposure. To minimize the impact, remote learning was developed with the goal of front-loading knowledge and skills acquisition, to allow the students to function at a higher level once in-person learning resumed. Accelerated students participated in additional virtual learning activities, including telemedicine, virtual hospital rounds, virtual emergency rounds, and COVID-19 acute care clinic (virtually), to afford them additional clinical exposure to increase clinical skills competencies.

Our focus in developing virtual learning activities was to simulate in-person activities. Due to safety concerns, medical students were not allowed to participate in the care of patients with or under investigation for COVID-19 in-person. Virtual involvement in the COVID-19 acute care clinic allowed the unique advantage of engaging students with a patient population they otherwise would have been unable to care for. Faculty mentored students on the practice of oral presentations with a focus on clinical reasoning. Family medicine inpatient faculty felt that virtual student involvement mirrored in-person student involvement well (Table 1).

All five students enrolled in a PSCOM 3-year accelerated program were invited to participate in a semistructured interview at the completion of all clerkships. Questions asked about perception of the virtual learning experiences, comparative strengths and weaknesses of the clerkship activities, and recommended changes. Table 1 lists descriptions of the virtual learning environments.

Following the Standards for Reporting Qualitative Research framework, we transcribed and analyzed student comments using NVivo 12 (NVivo, QSR International, Cambridge, MA).

Results

A total of four interviews were conducted (response rate=80%). Three themes emerged from the data (Table 2).

Theme 1: Virtual Medical Training Is Considered the Strongest When Physicians Leverage Video Technology and Provide Individualized Feedback.

Participants enjoyed virtual interaction with patients and immediate feedback from the preceptors and clinicians, making the experience feel genuine and similar to in-person visits.

Theme 2: For Virtual Medical Training, Small Group Sessions Were Preferred Over Large Group Didactic Zoom Sessions.

Students' least appreciated virtual activity was large-group Zoom didactic sessions where there was little to no engagement, leaving students feeling distracted and/or fatigued.

Theme 3: In Both the Virtual and Traditional In-Person Learning Environment, Medical Students Craved Additional Opportunities for Engagement With Faculty, Physicians, and Peers.

Participants emphasized the wish for more engagement and feedback from faculty and clinicians as a way to better utilize time and resources in both the virtual and traditional in-person learning environment.

Conclusions

The COVID-19 pandemic has significantly disrupted medical education.²¹ The pause in in-person learning recommended by the Liaison Committee on Medical Education was a major challenge to keeping education on track, especially for 3-year accelerated MD programs. Virtual learning provides alternatives for this challenge. The students in Penn State's accelerated MD program successfully graduated on time. Students felt that virtual learning gave them the skills needed when they returned to in-person clinical encounters. Just as with in-person learning, students yearn for timely feedback. Engagement and authentic learning experiences were key to success. Interestingly, students noted that in-person clerkship rotations are no guarantee of meaningful participation, citing examples of long waits in the operating room without active participation.

Overall, these findings help us as educators to design learning experiences that are most likely to be effective in virtual learning. Moving forward, with purposeful planning, all learning experiences, virtual or in-person, should be associated with meaningful engagement and timely feedback.

Tables and Figures

Table 1: Description of Virtual Activities and Faculty Comments of the Experiences

Virtual Learning Clinical Arena	Clinical Description	Rationale
COVID-19 outpatient clinic	Students joined the in-person COVID-19 acute care clinic via virtual means (Zoom). This clinic was utilized early in the pandemic to provide outpatient care to COVID-19 positive and Person Under Investigation (PUI) patients. Providers utilized iPads in patient rooms to facilitate discussion between students, patients, and faculty.	During the COVID-19 pandemic, students were not allowed to interact with COVID-19 positive and Person Under Investigation (PUI) patients. This activity offers a unique opportunity for the student to: <ul style="list-style-type: none"> • Be on the front line as patients were assessed in the ambulatory setting • See the full spectrum of the COVID-19 disease process from mild symptoms that were manageable in the outpatient setting to more severe symptoms requiring coordination of care to the inpatient setting • Learn while being protected from potential exposure
Virtual (master educator) rounds in the emergency department	Using Zoom on an iPad, students observed a resident taking a history and performing a physical exam on patients. They also gathered data in the EMR. The students would then practice note writing and oral presentation skills with attending physicians based on cases observed with an emphasis on clinical reasoning.	During the pandemic, students had limited opportunities to work in the ED due to safety concerns. This activity was in the format of a virtual master educator round, allowing for an in-depth discussion and practice of the skill of oral presentation. The oral presentations were delayed until later in the day after observing the history and physical. This allowed for detailed discussions of the philosophy and thought process behind how to structure and deliver an oral presentation. Students also worked as a team to collect clinical data from the EMR and learn from their peers as they do their presentations.
Outpatient family medicine clinic	Students were brought in virtually to outpatient family medicine clinics. Preceptors utilized iPads and telecommunication technology to bring students into exam rooms with patients. Students were assigned patients the day prior to their scheduled clinic time by their clinical preceptor. They would perform a detailed chart review ahead of the visits. When the patient is in-person in the clinic, they would obtain the patient history either synchronously in the patient room with the preceptor, which facilitated direct observation and feedback on communication skills, or asynchronously by calling the patient prior to the visit and presenting history to the preceptor.	This activity simulates in-person visits allowing students to: <ul style="list-style-type: none"> • Do a detailed chart review the day before, yielding a good understanding of the patient's care before the visit • Work on history taking allowing for similar conversations that they would have in the room both for complex chronic history taking and focused histories for acute problems In appointments where patient is in-person and the student is virtual, it was a bit cumbersome for the preceptor, often necessitating two devices being brought into the patient room. This paved the way to bring quarantined students into clinic later in the pandemic.
Outpatient family medicine telehealth clinic	Students were invited into telehealth appointments where all three parties (students, faculty, and patients) were virtual. Students were able to actively participate in these appointments with clinical preceptors. Workflows were similar to the above described for outpatient family medicine clinic, except all parties involved were virtual.	This activity simulates in-person visits allowing students to: <ul style="list-style-type: none"> • Practice oral presentations and note-writing in 'real time' and get feedback from preceptors, very similar to the workflow in a traditional in-person setting. • Learn the practice of telemedicine with limitation of doing a detailed physical exam in virtual visits There were technology challenges bringing all three parties (student, attending and patient) together virtually.
Family medicine inpatient service virtual rounds	Students were assigned a patient to review for morning rounds. Students joined the inpatient team in a group Zoom meeting for morning hand-off and for discharge planning with the social worker and care coordinator. Students interviewed their patients on the iPads via Zoom, and then rejoined the family medicine multidisciplinary team for rounds. They received feedback on their presentations and plans of care, and feedback on their progress notes after attending review.	This activity simulates in-person hospital rounds and offers the student opportunity to see patients, practice presentations, develop differential diagnosis and participate on interdisciplinary rounds remotely. The team felt that virtual rounds were similar to having the students in-person. With restrictions on visitors, many patients enjoyed interactions with students, helping to reduce the feeling of isolation.

Abbreviations: ED, emergency department; EMR, electronic medical record.

Table 2: Student Themes and Representative Quotes

Representative Quotes
<p align="center">Theme 1: Virtual medical training is considered the strongest when physicians leverage video technology and provide individualized feedback.</p>
<p>“One thing I thought worked really well was the standardized patient virtual kind of experience with one of the doctors or with one of the residents. I had a doctor, one of the colorectal surgeons, I’m blanking on his name now. I thought he was exceptionally good at going over what went well and walking through how he thought about it. Just having some kind of smaller numbered time with a physician who talks about clinical reasoning has always been really valuable to my education and my building differentials and clinical thought.” -Student 1</p>
<p>“So for the virtual activities I think for it to be very effective the preceptor who you are working with and seeing patients has to try to treat the experience as if it were in person. If your preceptor is not considering it like an in-person experience you won’t get that same experience. So I’ll give an example. I worked with [Provider] from Family Medicine by virtual medicine/Telehealth and he kind of approached it the same way that we did when I worked with him in person at the clinic. So typically we’ll come in on this day and see these patients coming in on the schedule which would allow me to read up on the patients coming in; read their charts and be aware of what’s coming in. And then in the clinic I would go in and see the patients, come out and present to him my findings and my plan, and then we’ll go in and see the patients together. Now [Provider] treated Telehealth the same exact way whether it was on Zoom or on demand, he gave me the schedule of the patients coming in. He even allowed me to call them the night before their scheduled Telehealth visit just letting them know this visit is going to take place, and what they should expect. Now the day of the appointment I would initiate the appointment with the patient. Get the same information I would get like in person. Do as much of the virtual physical exams that I can. And then [Provider] would join and I would share my history findings, my physical exam findings, and then my plan, and we would approach it the same way we would have done it in person. So if the preceptor does that I feel like students can have just as good of an experience through the virtual patient care experiences as they would in person.” -Student 3</p>
<p>“So the best scenarios were when attendings would allow me as the student to lead the appointment. So there were a couple doctors who would give me the MRN beforehand and I could review the patient. Then I would lead the patient on AMWELL with the physician available. I would lead most of the interview and physical exam to the best of my ability. And then they would chime in if they needed additional information. And then it would be great if afterwards we would have a little bit of a debrief where we could talk about the clinical reasoning with just the physician and myself.” -Student 4</p>
<p align="center">Theme 2: For virtual medical training, small group sessions were preferred over large group didactic Zoom sessions.</p>
<p>“I think it’s just the overall experience of sitting in one room, at home, on your computer all day for like... I mean we were on Zoom some days for like 8 to 10 hours a day. Whether we were on Zoom or doing virtual activities, even people who work desk jobs don’t stay on their computer that long. So I mean I used to work in a corporate company, and I wouldn’t sit at my desk as long as I did when I was virtual for clerkships. So that was the hardest part; just sitting and having to listen and trying to get something from it. But ultimately I don’t think that, especially adult learners, are meant to learn in that way. If that makes sense?” -Student 4</p>
<p>“Um a barrier for me, the biggest barrier I think is the attention, keeping the attention of the students. When you have 150 students; so I’m just speaking to the indirect portion right now. It’s just hard every single day, it’s hard every day to be on 4 to 6 hours of Zoom learning difficult clinical material. This is the stuff that has a lot of gestalt to it. It’s not stuff you can just put on paper and expect people to learn. So it is challenging to learn that. And keeping your attention while you could be doing something else is just very, very difficult. That was a major challenge. For me that was the biggest one. I can work 80 to 100 hours a week on a clinical rotation and be totally fine. But put me on Zoom 5 days out of the week for 6 hours and I’m exhausted at the end of the day.” -Student 2</p>
<p align="center">Theme 3: In both the virtual and traditional in-person learning environment, medical students craved additional opportunities for engagement with faculty, physicians, and peers.</p>
<p>“Yeah so the downsides are there’s a lot of waiting around and a lot of dead space on the in-person clerkships. Some services are better than others with this but a lot of times students find themselves waiting around, standing in the operating room, not doing anything, can’t see anything, not scrubbed in, and it’s essentially a waste of time. I’ve had cases where I’ve stayed in the room for 12 hours because that’s what is expected of me but didn’t get to see anything about the case, didn’t get to scrub in or anything. So stuff like that. And then other days when there’s clinic and certain attendings might not want students to see patients and it ends up being a shadowing experience. So I think engagement is the downside of the direct clerkship. I think you need to have ways to make it more engaging.” -Student 2</p>

Acknowledgments

The authors thank Jessica Wolfe Connor for conducting the interviews and Joy Bowen for providing project management assistance for this study.

Financial Support: This research was supported by the Health Resources and Services Administration (HRSA) T0BHP30010, “A Campaign for Primary Care: Transforming Medical Education Today, to Develop the Leaders of Tomorrow,” Leong (PI).

Presentations: This research was presented virtually at the 2021 Consortium of Longitudinal Integrated

Clerkships Conference on October 10-13, 2021 and the 2021 North American Primary Care Research Group Annual Meeting November 19-23, 2021.

Corresponding Author

Shou Ling Leong, MD

500 University Drive, Hershey, PA 17033. 717-531-8187

sleong@pennstatehealth.psu.edu

Author Affiliations

Shou Ling Leong, MD - Department of Family and Community Medicine, Penn State College of Medicine, Hershey, PA

Jessica A. Parascando, MPH - Department of Family and Community Medicine, Penn State College of Medicine, Hershey, PA

Erika VanDyke, MPH - Department of Medicine, Penn State College of Medicine, Hershey, PA

Alyssa Anderson, MD - Department of Family and Community Medicine, Penn State College of Medicine, Hershey, PA

Lawrence Kass, MD, MEd - Department of Emergency Medicine, Penn State College of Medicine, Hershey, PA

Jennifer Grana, DO - Department of Family and Community Medicine, Penn State College of Medicine, Hershey, PA

Eric Messner, PhD, FNP-BC - Department of Family and Community Medicine, Penn State College of Medicine, Hershey, PA

References

1. Guidance on Medical Students' Participation in Direct In-person Patient Contact Activities. Association of American Medical Colleges; 2020. Accessed March 13, 2022. <https://www.aamc.org/system/files/2020-08/meded-August-14-Guidance-on-Medical-Students-on-Clinical-Rotations.pdf>
2. (AAMC) AAoMC. Important Guidance for Medical Students on Clinical Rotations During the Coronavirus (COVID-19) Outbreak. Association of American Medical Colleges; 2020. Accessed March 13, 2022. <https://www.aamc.org/news-insights/press-releases/important-guidance-medical-students-clinical-rotations-during-coronavirus-covid-19-outbreak>
3. Park H, Shim S, Lee Y-M. A scoping review on adaptations of clinical education for medical students during COVID-19. *Prim Care Diabetes*. 2021;15(6):958-976. doi:10.1016/j.pcd.2021.09.004
4. Rydel TA, Bajra R, Schillinger E. Hands off yet all in: a virtual clerkship pilot in the ambulatory setting during the COVID-19 pandemic. *Acad Med*. 2021;96(12):1702-1705. doi:10.1097/ACM.0000000000004127
5. Bala L, Kinross J, Martin G, et al. A remote access mixed reality teaching ward round. *Clin Teach*. 2021;18(4):386-390. doi:10.1111/tct.13338
6. Bhatia RK, Cooley D, Collins PB, Caudle J, Coren J. Transforming a clerkship with telemedicine. *J Osteopath Med*. 2021;121(1):43-47. doi:10.1515/jom-2020-0131
7. Gummerson CE, Lo BD, Porosnicu Rodriguez KA, et al. Broadening learning communities during COVID-19: developing a curricular framework for telemedicine education in neurology. *BMC Med Educ*. 2021;21(1):549. doi:10.1186/s12909-021-02979-z
8. Jumreornvong O, Yang E, Race J, Appel J. Telemedicine and medical education in the age of COVID-19. *Acad Med*. 2020;95(12):1838-1843. doi:10.1097/ACM.0000000000003711
9. Muntz MD, Franco J, Ferguson CC, Ark TK, Kalet A. Telehealth and medical student education in the time

- of COVID-19—and beyond. *Acad Med*. 2021;96(12):1655-1659. doi:10.1097/ACM.0000000000004014
10. Safdieh JE, Lee JI, Prasad L, Mulcare M, Eiss B, Kang Y. Curricular response to COVID-19: real-time interactive telehealth experience (RITE) program. *Med Educ Online*. 2021;26(1):1918609. doi:10.1080/10872981.2021.1918609
 11. Weber AM, Dua A, Chang K, et al. An outpatient telehealth elective for displaced clinical learners during the COVID-19 pandemic. *BMC Med Educ*. 2021;21(1):174. doi:10.1186/s12909-021-02604-z
 12. Chao TN, Frost AS, Brody RM, et al. Creation of an interactive virtual surgical rotation for undergraduate medical education during the COVID-19 pandemic. *J Surg Educ*. 2021;78(1):346-350. doi:10.1016/j.jsurg.2020.06.039
 13. Sukumar S, Zakaria A, Lai CJ, Sakumoto M, Khanna R, Choi N. Designing and implementing a novel virtual rounds curriculum for medical students' internal medicine clerkship during the COVID-19 pandemic. *MedEdPORTAL*. 2021;17:11106. doi:10.15766/mep_2374-8265.11106
 14. Shoemaker MM, Lippold C, Schreiber R, Levy B. Novel application of telemedicine and an alternate EHR environment for virtual clinical education: A new model for primary care education during the SARS-CoV-2 pandemic. *Int J Med Inform*. 2021;153:104526. doi:10.1016/j.ijmedinf.2021.104526
 15. Whiles BB, Kowalik CG, Mirza M, Wyre H, Thurmon KL. When virtual becomes reality: short term impressions of a two-week virtual urology sub-internship program. *Can J Urol*. 2021;28(6):10907-10913.
 16. Mason MW, Aruma JC. An orthopaedic virtual clinical clerkship for visiting medical students: early successes and future implications. *J Surg Educ*. 2022;79(2):535-542. doi:10.1016/j.jsurg.2021.09.019
 17. Villa S, Janeway H, Preston-Suni K, et al. An emergency medicine virtual clerkship: made for COVID, here to stay. *West J Emerg Med*. 2021;23(1):33-39. doi:10.5811/westjem.2021.11.54118
 18. Cangiarella J, Fancher T, Jones B, et al. Three-year MD programs: perspectives from the consortium of accelerated medical pathway programs (CAMPP). *Acad Med*. 2017;92(4):483-490. doi:10.1097/ACM.0000000000001465
 19. Leong SL, Cangiarella J, Fancher T, et al. Roadmap for creating an accelerated three-year medical education program. *Med Educ Online*. 2017;22(1):1396172. doi:10.1080/10872981.2017.1396172
 20. Leong SL, Gillespie C, Jones B, et al. Accelerated 3-year MD pathway programs: graduates' perspectives on education quality, the learning environment, residency readiness, debt, burnout, and career plans. *Acad Med*. 2021.
 21. Sandhu P, de Wolf M. The impact of COVID-19 on the undergraduate medical curriculum. *Med Educ Online*. 2020;25(1):1764740. doi:10.1080/10872981.2020.1764740