

2021

The upfront cost of translating graduate medical education into a virtual platform

Ronak Mistry

Pennsylvania Hospital of the University of Pennsylvania, rmistry91@gmail.com

Alex Glaser

Pennsylvania Hospital of the University of Pennsylvania, alexander.glaser@penmedicine.upenn.edu

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Recommended Citation

Mistry R, Glaser A. The upfront cost of translating graduate medical education into a virtual platform. *Advances in Clinical Medical Research and Healthcare Delivery*. 2021; 1(2). doi: 10.53785/2769-2779.1018.

ISSN: 2769-2779

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The upfront cost of translating graduate medical education into a virtual platform

Author ORCID ID:

Ronak Mistry: <https://orcid.org/0000-0002-5490-2742>

Abstract

Graduate medical education was drastically disrupted by the COVID-19 pandemic. With a halt on all in-person educational sessions in response to the need for social distancing, residency programs across the country scrambled to develop virtual curricula with some difficulty, given the limited guidance to creating online learning platforms prior to the onset of the pandemic. In-person Socratic discussions have always been the cornerstone of internal medicine training. Here, we discussed our experiences of translating the in-person model and to a virtual platform, highlighting the upfront financial burden that doing so can have. Time will need to pass before we can fully appreciate the profound impact, or lack thereof, of remote learning on GME.

Keywords

virtual learning; internal medicine; didactics; morning report; technology

Cover Page Footnote

N/A

In December of 2019, the novel SARS-CoV19 virus was identified in the Wuhan province of China.¹ The first case of COVID-19, as the virus colloquially became known, was then diagnosed in the United States on January 20, 2020¹, but it took until March 10th for the disease to reach our local community in Philadelphia.² The city was quick to react, and the Philadelphia Superintendent of Schools implemented a two week city-wide school closure on March 16th³; however, by the end of March it was clear that transitioning to an all-virtual learning environment was the safest path forward.⁴ This timeline was mirrored around the country, and the consequences of transitioning to virtual school have been well documented in public media – from parents becoming teachers, to technology hurdles, to cost.^{5,6}

In a similar narrative, although less widely publicized, graduate medical education (GME) was drastically disrupted. Our hospital halted all in-person educational activities in the end of March, and our Office of GME declared emergency pandemic status on March 28th. We scrambled to maintain educational opportunities for our learners and, while some professions welcomed the elimination of travel for professional education, medicine's thousands of years of in-person connection and bedside teaching did not lend itself easily to the virtual world. Prior to the pandemic, you would often find handfuls of learners hovering over a coughing patient on attending rounds, or groups of 50 eating lunch together while participating in case presentations, formal lectures, or traditional chalk-talks. Certainly, online education in GME existed prior to March 2020 – syndicated Podcasts, Twitter accounts and threads, medical society online content – however, local residency education models still relied heavily on in-person didactics. As an illustration of the field's lack of preparation, consider that the annual Association of Program Directors of Internal Medicine (APDIM) meeting agenda in 2019 highlighted a

workshop called “In Defence of the Exam: Bedside Teaching in 2019”⁷ and only had one workshop discussing the integration of web-based applications *into* didactic lectures, not in place of.⁸ Similar to our educational colleagues in the Philadelphia school system, we were not ready for the disruption of the COVID-19 pandemic.

Our residency program, like all around the country, had to not only respond to the increasing needs of our patients, but also find ways to translate our educational model to a virtual world. Here, we will discuss our approach to each problem that we foresaw or encountered when developing our virtual didactic platform. We will also detail the costs associated with our technologic interventions. A summary of our findings can be found in **Table 1**.

At the start of the pandemic, our initial focus was on simply replacing in-person daily didactics with a tele-casted alternative via the BlueJeans platform (Verizon Communications, New York, NY); There are many videoconferencing software options, and BlueJeans was our preferred option because it was also used by our hospital system for telehealth, so faculty members and residents were familiar with the interface. By repurposing the software for didactics, faculty discussants and resident presenters would create slides for their case to cast virtually as they gave their talk. This was adopted quickly, however, it became clear that relying heavily on slideshows eroded the classic interactive elements of a case presentations; our residents felt the talks were less diagnostically engaging and often contained more information than could be digested in a single session.

With this feedback in mind, our next focus was on ways to re-introduce a virtual whiteboard for the moderator to visibly track sets of differential diagnoses or return to a “chalk-talk” format rather than slideshows. We used funds from our program to purchase an Apple iPad and Apple Pencil (Apple, Cupertino, CA) then, using the Simple Whiteboard app (Qrayon, LLC, Seattle, WA), we were able to screenshare the virtual whiteboard over BlueJeans. This addition allowed us to engage our residents, particularly when discussing case presentations. Similar to our former in-person method, we were again able to pause and allow learners to share their thoughts regarding significant findings, building differentials, and formulating assessments and plans. The use of the whiteboard app via screenshare also lent itself to traditional didactic chalk-talks, which was particularly helpful for topics that are more difficult to present in a slideshow format, such as when discussing physiology, mathematical equations, differential diagnoses, and statistical analysis.

These interventions – telecasting via BlueJeans and adding a virtual white board – were sufficient to bridge our educational experience through the first wave of the pandemic. However, as we entered the summer and our conferences became a hybrid of in-person and virtual attendance, a new problem arose: balancing in person and virtual audience participation during the same educational session. Once in-person attendance increased, we found it was hard to support group discussion and those in the live audience could not be heard by the virtual. To allow for better audience participation, we integrated the audience response software Poll Everywhere (Poll Everywhere, San Francisco, CA). The audience members, both virtual or live, would answer questions via text message and the results would display on the screen. This change provided equity of participation between virtual and live attendants, engaged learners in a more Socratic

approach to differential diagnosis development, kept audience attention, and instantaneously provided feedback to the presenter on the audience's level of understanding. Beyond polling software, we also purchased a room sensing Bluetooth-enabled mic (Jabra, Copenhagen, Denmark) to ensure any in-person discussions were audible to the virtual attendants.

The upfront financial implications associated with transitioning to virtual learning were substantial, and do not capture the person-hours required for faculty training. We were fortunate that our health system provided the BlueJeans software as part of the transition to telemedicine; but, for instance, the popular meeting option, Zoom, can cost \$150 per year for a single subscription. Furthermore, in our case, the purchase of an Apple iPad and Pencil had a \$1200 price tag and the Jabra mic was \$100. A free version of Poll Everywhere was used, but paid subscriptions to allow for more participant access are \$700 per year. These costs were partially offset by savings in other areas of the residency budget, for example traveling to conferences; however, as health systems have consistently continued to lose money due to COVID-19,⁹ every expense remains under scrutiny. Subsequent projected costs will be limited primarily to fees associated with licenses for videoconferencing software, as the technological infrastructure has already been purchased.

Beyond the upfront financial commitment, we suspect that virtual learning will have unrealized costs for resident education. Our residents gave positive feedback to the changes we made in our virtual education, and many enjoyed having an option to gather virtually; for example, during quarantines after COVID exposures, those at home often chose to remain engaged in conference. Now, following vaccination, we have been

allowed to return to in-person conferences, but our residents almost unanimously continue to attend virtually. Our residents feel they are able to better balance education with service when attending virtually, but one can imagine the myriad of potential distractions that divert their attention when they are not physically present. Ultimately, it is too soon to tell how our educational mission has been affected, and our annual In-Training Exam scores and American Board of Internal Medicine exam pass rates will be instructive markers over the coming years.

The COVID-19 pandemic has presented many challenges. As we discussed here, GME was greatly impacted, with notable disruption in daily resident didactic educational activities. The need for social distancing and concerns about viral spread required programs to quickly adapt to online platforms with little guidance from academic literature. These changes required increased flexibility on the part of the programs and financial investments. It is too soon to tell how this new model of learning in GME will affect resident outcomes. Ongoing research will be required to assess just this, as well as continued sharing of best-practices as we continue to re-imagine GME in the future.

Conflict of interest: The authors declare that they have no conflict of interest.

Table 1. Problems encountered when developing an online learning platform, our solutions, and the associated financial implications

Problem	Solution	What we hoped to accomplish	Associated Cost
Inability to gather for conference due to social-distancing requirements	Videoconferencing software, BlueJeans (Verizon Communications, New York, NY)	Virtual dispersion of daily conferences.	Cost rolled into telehealth platform by health system; Individual subscriptions and licenses can vary in cost depending on platform utilized
Inability to analyse case presentations and give didactic lectures via chalk-talks	Apple iPad and Apple Pencil (Apple, Cupertino, CA) and Simple Whiteboard app (Qrayon, LLC, Seattle, WA)	Recreation of a white board in a virtual platform.	Apple iPad and Pencil: \$1200 Simple Whiteboard: \$0
Need for more audience participation during didactic lectures	Audience response software, Poll Everywhere (Poll Everywhere, San Francisco, CA)	Real-time audience response software which allowed for equal participation of virtual and in person learners. Also ensured learners were engaged with the discussions and the presenter was able to obtain feedback about topics that were well-understood or if further clarification was necessary.	\$0 - \$700, depending on number of licenses required
Inability to hear in-person audience discussions online when conferences were hybridized	Bluetooth-enabled mic added to conference room, Jabra (Jabra, Copenhagen, Denmark)	Improve tele-casting of in-person discussions.	\$100

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