

Attendance at live vs virtual didactic sessions in a U.S. emergency medicine residency

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Abstract

Introduction: The changes to education settings brought on by the COVID-19 pandemic illustrated many benefits and challenges related to graduate medical education in the virtual setting. It is unknown how the education setting (live vs virtual) affects education conference attendance. Evaluating attendance is the first step toward investigating overall levels of learner engagement. We explored if there was a difference in attendance between the live and virtual settings in an emergency medicine morbidity and mortality (M&M) conference and didactic education sessions. **Methods:** Attendance data over a three-year period that began before the COVID-19 pandemic and continued through the end of 2022 was analyzed to compare participation in M&M and didactics between live and virtual conference days. **Results:** Attendance for the initial 90-minute M&M part of the conference day was significantly greater in the virtual setting compared to the live setting (CI: 1.15-1.26), with a 21%

increase in attendance. There was no significant difference in attendance between the live and virtual setting once lectures transitioned to the 3-hour didactic portion of the emergency medicine conference ($p=0.135$). **Conclusion:** The findings of this single center study were that attendance was similar in the live and virtual education settings as part of a structured emergency medicine didactic training curriculum. This is the foundational step in evaluating overall engagement between the two distinct learning environments and supports further investigation of the relative effectiveness of educational activities in these settings. The integration of virtual M&M education may allow more attendings and residents to attend those specific educational sessions.

Keywords

virtual learning, emergency medicine; clinical education; learner attrition; didactic lecture; in-person vs. online learning; graduate medical education

Date submitted: 31-July-2024

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Introduction

The COVID-19 pandemic forced medical educators to adapt curricula to the virtual learning space with over 99% of emergency medicine residents partaking in virtual didactics.¹ While virtual learning brings flexibility and efficiency, it may also impact learner attendance.

There is limited research on the differences between live and virtual conference attendance in the graduate medical education (GME) literature. Outside of GME, a study of undergraduate Norwegian business students demonstrated the virtual setting increased learner attendance,² while

Citation: Tomberg S, Dewispelaere W, Wogu A, Wang N. Attendance at live vs virtual didactic sessions in a U.S. emergency medicine residency. *Educ Health* 2024;37:383-388

Online access: www.educationforhealthjournal.org

DOI: 10.62694/efh.2024.150

Published by The Network: Towards Unity for Health

other studies in primary/secondary education and undergraduate/graduate education have linked virtual learning to decreased learner engagement, chronic absenteeism, lower test performance and decreased attendance compared to in-person lectures.^{3,4,5,6,7} Reasons for this decline include lack of learning community, distractions (other work/social media/entertainment), and the mental and physical exhaustion associated with video conferencing known as “Zoom fatigue.”^{1,8,9,10,11}

This paper compares attending and resident physician attendance between live and virtual settings in an emergency medicine residency

didactic program over a three-year period that spans the pre-pandemic, intra-pandemic and endemic COVID-19 phases; to our knowledge there are no other studies that make a similar comparison. First, we study the difference in participation in our morbidity and mortality (M&M) conference between live and virtual settings. M&M is robustly attended by residents and attendings and warrants a separate analysis. We also explore the difference in attendance in the didactic education sessions that follow M&M in live vs. virtual settings. These sessions are predominantly attended by residents.

Methods

This study examines attendance in an emergency medicine didactic program over a three-year period. The dataset begins in January 2020 before the COVID-19 lockdowns when conferences were exclusively live. From March 2020 through the summer of 2021 all learning was in the virtual environment. Starting in the summer of 2021, the ongoing emergency medicine conference was a hybrid of virtual and live sessions. There were no significant changes to the curriculum or attendance requirements over the course of the study.

Our emergency medicine conference is held every week (except for holidays) and starts with a 90-minute M&M session, followed by three-hours of didactic lectures which cover core emergency medicine topics. There is no integration of asynchronous learning into the didactic sessions. Attendings and residents affiliated with our residency program log their attendance for each M&M and didactic lecture into an online Airtable database (San Francisco, CA). Attending physicians are obligated to attend 50% of M&M conferences, and residents are obligated to attend 70% of total conference time (M&M and didactics) through each academic year. There were 68 residents and up to 149 faculty/fellows employed during each academic year.

Attendance data were extracted at five points during the conference day: 7:30am represents attendance

during the 90-minute M&M conference that opens each session, and the remaining data points are didactic lectures occurring at 9:15am, 10:00am, 11:00am and 12:00pm. Each conference day was recorded as being live or virtual.

As a formal statistical analysis, we used generalized estimating equations (GEE) to fit marginal models with a Poisson family and long link function because of the lack of independence among repeated measures of outcome over the consecutive conference times.^{12,13,14} The GEE approach lets us fit a model for an average response for observations sharing similar covariate information as a function of the covariates and, at the same time, accounting for within conference date correlation among repeated measures.^{15,16,17} The independent working correlation was picked as the best working correlation structure. For each of the fitted marginal models, appropriate odds ratios (OR) and 95% confidence intervals (95% CI) were generated. All analyses were performed using R Statistical Software (version 4.2.2; R Foundation for Statistical Computing, Vienna, Austria).

The study was approved by the Colorado Multiple Institution Review Board as part of an established exemption protocol for educational research in the University of Colorado Department of Emergency Medicine.

Results

Data was available for 156 conference days. In the study period there were 10 days where the conference was canceled and there is no data for those weeks. Attendance at M&M was 20 percent higher in the virtual setting compared to in-person (OR 1.20; 95% CI: 1.15-1.26, $p < 0.001$). There was a significant decrease in attendance between our M&M session (7:30am) and the beginning of didactics (9:15am) in both the live and virtual settings. After the transition to our didactic lectures at 9:15am, there was no significant difference in participation between live and virtual settings.

Table 1: Attendance at five time points throughout live and virtual conference days.

Time	Live				Virtual				p-value*
	n	[min, max]	median	mean (SD)	n	[min, max]	median	mean (SD)	
7:30am	64	(43, 91)	69.5	68.5 (10.7)	89	(43, 107)	84	82.4 (10.1)	<0.001
9:15am	64	(14, 63)	40	39.6 (9.1)	90	(13, 84)	43	41.9 (11.2)	0.14
10:00am	64	(14, 51)	34.5	34.0 (8.2)	90	(13, 53)	34.5	33.9 (8.5)	0.936
11:00am	64	(9, 43)	30	29.6 (7.4)	90	(9, 49)	29.5	29.6 (8.4)	0.966
12:00pm	63	(7, 43)	23	23.2 (7.1)	88	(4, 43)	24.5	24.6 (7.8)	0.24

* For testing whether there is no difference between average attendance at live and virtual conferences

Discussion

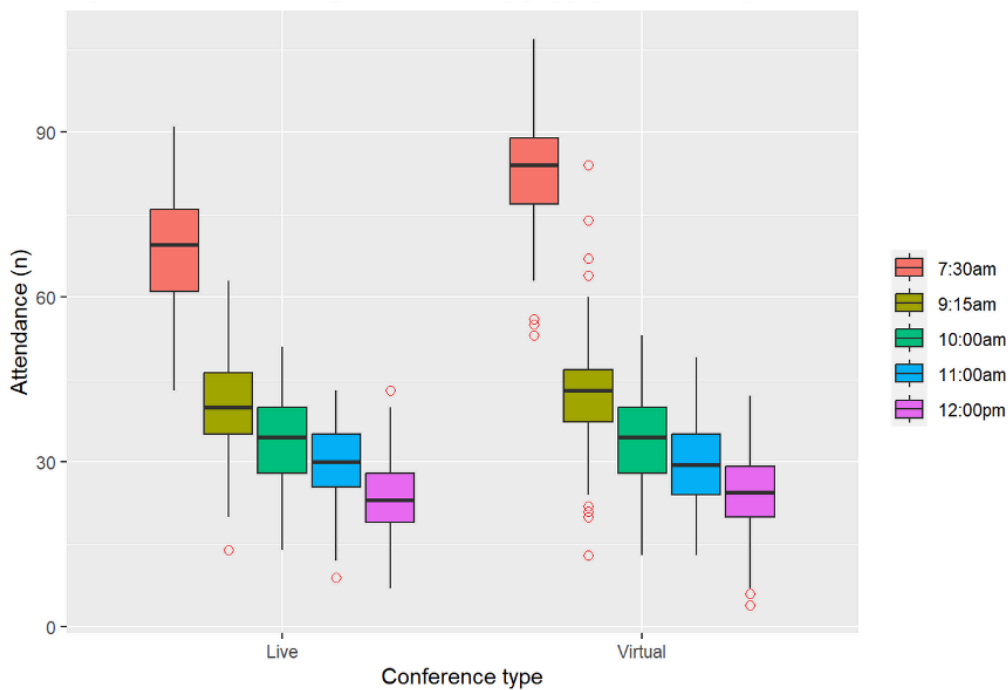
When evaluating engagement in educational initiatives, Appleton et al described three dimensions to measure learner engagement: behavioral, cognitive and affective. The behavioral component includes the baseline question of if learners attend a lecture.¹⁹ This study addresses if there is a difference in attendance in an emergency medicine residency community (attending and residents) between virtual and live didactic education settings. Answering this foundational question is the first step in the process of evaluating if there is a difference in learner engagement between live and virtual educational settings.

In this retrospective study, there was greater weekly M&M attendance in the virtual setting compared to the live setting. M&M is highly regarded among our residents and faculty, and the virtual setting likely made it easier to attend when participants had commitments that would have limited live participation. This is in keeping with previous literature that theorizes virtual learning encourages

attendance when learners are sick, have transportation limitations, have other academic tasks, or cannot attend due to other life demands.^{1,3,9,18}

In contrast to M&M, there was no significant difference in attendance between the live vs virtual settings for the remainder of the didactic education sessions. We expected a higher participation rate in the virtual setting. Didactics are a mixture of small-group/case-based sessions and large-group lectures that cover core emergency medicine topics defined by ABEM in the Model of the Clinical Practice of Emergency Medicine. It is likely that faculty participation drove the difference in attendance during M&M, and their absence during the didactic portion of conference, where there is more steady participation by residents, led to an equalization between the live and virtual settings. This aligns with faculty only being required to attend M&M, but not having a contractual obligation to be present for didactic lectures.

Figure 1: Mean attendance during live and virtual conference days from 7:30 to 12:00



Survey data from prior studies demonstrates that emergency medicine residents have a split preference for live vs virtual didactics. The live preference generally relates to community engagement and lack of distractions, and the virtual preference is driven by convenience.^{1,20} Studies in

other GME settings highlight both benefits and liabilities of virtual education related to learner engagement and performance.^{21,22,23} Exploring the interplay of virtual and live education is important because in 2022, 21% of undergraduate students in the United States strictly took online courses, while

32% engaged in hybrid live/virtual education.²⁴ We expect these trends to move into medical education as well. Finally, there is conflicting data on test performance between live and virtual settings across educational domains. Some studies show equivalence between settings,^{25,26} while others show that learners with low academic abilities primarily experience the negative impacts of virtual education.^{5,6,27} Given the constellation of findings in these studies, we believe that providing educational material in both the live and virtual settings can be done thoughtfully to limit negative consequences for learners.

Finally, our hypothesis was that greater participation in virtual M&M would translate into greater participation in the didactics lectures that follow. This did not occur, and was likely driven by attending physicians engaging in M&M more robustly in the virtual setting, but residents making up most of the participants who stay for didactic sessions in both settings.

Moving into the future, our residency plans on using a mix of virtual and live conference. In another study, this mix has been demonstrated to be the preference of both emergency medicine residents and attendings.²⁸ The current study demonstrates that resident attendance will likely not be impacted by continuing to educate in both venues.

Limitations

The main limitation of this study is that it does not examine aspects of educational engagement beyond the behavioral element of attendance. Previous studies in emergency medicine education literature have demonstrated that learners in the virtual setting participate in multiple non-educational activities and have distractions while learning at home that would not be present in a live conference.^{1,29} This study also relies on self-reported attendance, and both residents and attendings have incentives in their contracts to report attendance. Additionally, the structure of our institution's conference day is specific, and these findings may not be generalizable to other emergency medicine programs. Future studies can compare other metrics of learner engagement in behavioral, cognitive and affective realms between the virtual and live settings.

Conclusion

The findings of this single center study demonstrated that attendance was similar between the live and virtual didactic education sessions that are part of a structured emergency medicine didactic training curriculum. This is the foundational step in evaluating overall engagement between the two distinct learning environments and supports further investigation of the effectiveness of educational activities in these settings. The integration of virtual M&M may allow more attendings and residents to attend those educational sessions.

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