BRIEF CONTRIBUTION

Disaster medicine and pandemic response: A novel curriculum to improve understanding of complex care delivery during the COVID-19 pandemic

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Abstract

Background: Despite a 2009 recommendation from the AMA that disaster medicine and public health response training should be implemented in medical schools, anywhere from 31% to 47% of medical education programs lack a formalized disaster medicine curriculum. A need for disaster medicine response training for University of Alabama medical students in an appropriately socially distanced format was identified during the COVID-19 pandemic.

Methods: Our emergency medicine faculty in collaboration with the Federal Emergency Management Agency Center for Disaster Preparedness (FEMA CDP) created and implemented a novel virtual disaster medicine and pandemic response course for third-year medical students at the University of Alabama at Birmingham (UAB). The course was administered via a teleconferencing platform (Zoom, Zoom Video Communications, Inc.) in spring 2020 to more than 130 medical students.

Results: Using pre- and postcourse surveys, we assessed a change in student confidence levels for their ability to explain topics covered in the course and their understanding of a chosen disaster. The students reported an average increase of 2.183 on a 5-point scale, with a score of 5 representing "completely confident" and a score of 1 representing "not at all confident." This course established the feasibility of a virtual instructor-led training (VILT) format for disaster medicine education and provided a template for the delivery of over 300 courses to more than 4,000 first responders and medical professionals through the FEMA CDP.

Conclusions: Through collaboration with the FEMA CDP, our UAB faculty were able to successfully deliver a novel virtual disaster-preparedness and response course. The course resulted in subjective improvement of students' content understanding while also establishing the feasibility and effectiveness of a VILT format that could be readily applied to future courses in undergraduate medical education and beyond.
INTRODUCTION

The increasing frequency of disaster-level events in the past decade, including the rise of natural disasters, mass shootings, terrorist attacks, and a global pandemic, have reaffirmed the necessity of physician training in disaster-preparedness and response.\(^1\)\(^2\) The American Medical Association (AMA) put forth a policy statement in 2009 indicating that disaster medicine and public health response training should be implemented in medical schools and residency programs.\(^3\) Despite this recommendation, anywhere from 31% to 47% of medical education programs, including our own prior to this initiative, lack a formalized disaster medicine curriculum.\(^4\)\(^5\)

In spring 2020, the COVID-19 pandemic’s interruption of in-person clinical education created the opportunity to implement a socially distanced elective disaster medicine course for third-year medical students at the University of Alabama at Birmingham School of Medicine (UABSOM). Our primary objective was to design a socially distanced course that would educate our students on increasingly vital portions of the health care landscape including disaster medicine, public health, pandemic history, and patient care management, with a focus on COVID-19. The secondary objective was to assess student confidence in the material, as measured by an optional pre- and postcourse survey. The final objective was to assess the feasibility of administering a socially distanced course in partnership with Federal Emergency Management Agency Center for Disaster Preparedness (FEMA CDP).

METHODS

UABSOM is a public medical school with 186 students per class across four clinical campuses. The course was designed as a virtual self-selected elective for third-year students and was offered from May 4 to May 29, 2020. The course was administered by UABSOM faculty in the department of emergency medicine (EM). UABSOM course directors leveraged existing faculty expertise and sought partners to help develop content that would best meet our objectives. We reached out to the FEMA CDP, which has a number of training courses for health care providers. The course leadership reviewed existing curricula with the FEMA CDP and chose health system–level topics to best meet the objectives of the course.

The CDP helped to organize the course as a modified form of the recently formed expeditionary training curriculum, which was originally designed to provide on-site, just-in-time training at disaster sites. Using the expeditionary training model, modules were hand selected from the CDP content and combined with lectures designed and given by members of the UABSOM EM faculty.

The lectures were administered in a live virtual format, with students in attendance via remote login from their own homes using a teleconferencing platform (Zoom, Zoom Video Communications, Inc.). These lectures were given in a virtual instructor–led training (VILT) format that was already in the process of being developed at the CDP, but adapted to meet the goals and requirements of this course curriculum. Preceptors from both the CDP and the UABSOM were present for all lectures to augment and participate in discussion, both verbal or via the chat function of the online platform.

To improve engagement, students were divided into small group learning communities, with approximately 12 students per group. In these settings, 11 faculty members would meet virtually with students in their group each week to go over discussion questions based on recent lectures and reading material. Faculty members were given session guides with background information and talking points prepared by the course director to help facilitate discussion. Each faculty member spent an average of 1 hour of preparation time for the three small-group sessions. During the final week of the course, students gave capstone presentations to their small-group learning community based on selected topics inspired by course content. In total, the course consisted of 30 hours of didactic lectures and 5 hours of small-group discussion.

In terms of course content, topics covered a variety of both systems and included care coordination during times of resource strain, the governmental role in disaster medicine, epidemiology, risk assessments, and treatment of victims of natural disasters and chemical and biologic weapons exposure. We also added multiple lectures specifically related to pandemic management with a focus on the historical lessons learned; care of patients with COVID-19; and practical considerations such as telemedicine, PPE utilization, and resource rationing. Thus, our curriculum focused on both system- and individual provider–level disaster preparedness and response (see Data Supplement S1, available as supporting information in the online version of this paper, which is available at http://onlinelibrary.wiley.com/doi/10.1002/aet.2.10647/full).

Using pre- and postcourse surveys, we assessed a change in student confidence levels for their ability to explain topics covered in the course and their understanding of a chosen disaster. Students were able to choose from five options ranging from “completely confident” to “not at all confident.” The descriptive answer choices corresponded to numerical scores between 1 and 5. The UAB Institutional Review Board (IRB) reviewed the course and survey and granted IRB-exempt status.

RESULTS

From the FEMA CDP perspective, the UAB Medical School Disaster Medicine and Pandemic Response course was the first time their VILT format was utilized in any undergraduate medical training environment. It proved their model as an effective tool in allowing for a safe and viable educational alternative to live, in-person classes.

A total of 134 precourse responses and 81 postcourse responses were collected in our surveys. An improvement in student confidence was determined in all questions with the average increase of 2.183 on a 5-point scale. The greatest improvement was seen in confidence related to surge management techniques in health care demands during times of crisis (see Table 1). Administered during a time of quarantine, several students also noted appreciation that the course kept them
engaged in their academic community and empowered them with timely information during a medical event of historic importance.

**DISCUSSION**

With disaster-level events ever on the rise, disaster medicine education inclusion in medical student curriculums becomes increasingly relevant. In the midst of a global health care crisis arising from the spread of COVID-19, our medical school leadership identified a need for education of our students in management of not only the ongoing pandemic but in general disaster medicine tenets as well. This was in line with AMA recommendations. By collaborating with the FEMA CDP, our UAB faculty were able to administer a disaster medicine course covering the core tenets of disaster response in the health care setting as well as management approach during the ongoing COVID-19 pandemic. This pilot course translated into FEMA being able to deliver greater than 300 courses in the VILT format to more than 4,000 in the first 6 months following the conclusion of the course. An added benefit of the VILT format was the ease in which lecturers could be recorded, which could decrease the implementation workload of future course offerings. We plan to continue to offer this elective course in the future.

**LIMITATIONS**

A number of limitations bear mentioning. Collaboration with FEMA CDP was vital to the success of the course, which was greatly facilitated by existing relationships and the geographic proximity to the UAB School of Medicine. This level of collaboration with FEMA may not be feasible for all institutions. In addition, the outcomes data for the course was entirely subjective, with a postcourse survey response rate of 60%. Future courses may consider performing an objective analysis, such as a content examination.

**CONCLUSION**

Through collaboration with the Federal Emergency Management Agency Center for Disaster Preparedness, our University of Alabama at Birmingham School of Medicine faculty were able to successfully deliver a novel virtual disaster-preparedness and response course. The course resulted in subjective improvement of students’ content understanding while also establishing the feasibility and effectiveness of a virtual instructor-led training format that could be readily applied to future courses in undergraduate medical education and beyond.

**CONFLICT OF INTEREST**

NL is employed by the FEMA Center for Disaster Preparedness, which delivers educational content related to the subject matter. The other authors have no potential conflicts to disclose.

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**TABLE 1** Student confidence in material pre- and postcourse

| Question                                             | Precourse | Postcourse | Difference of means | p-value |
|------------------------------------------------------|-----------|------------|---------------------|---------|
| Triage methods in mass casualty situations           | 1.42 ± 0.11| 3.89 ± 0.17| +2.47               | <0.05   |
| COVID-19 preparedness in the ED                      | 1.55 ± 0.13| 3.99 ± 0.18| +2.44               | <0.05   |
| Surge management techniques in health care demand    | 1.46 ± 0.124| 3.98 ± 0.17| +2.52               | <0.05   |
| Previous pandemics’ impact on COVID-19 planning      | 1.48 ± 0.12| 3.95 ± 0.18| +2.47               | <0.05   |
| COVID-19 outpatient treatment                        | 2.04 ± 0.16| 4.14 ± 0.19| +2.10               | <0.05   |
| COVID-19 inpatient treatment                         | 1.91 ± 0.15| 3.94 ± 0.19| +2.03               | <0.05   |
| Role of government in medical disasters               | 1.87 ± 0.15| 3.63 ± 0.22| +1.76               | <0.05   |
| Role of telemedicine during a pandemic                | 2.16 ± 0.15| 4.15 ± 0.20| +1.99               | <0.05   |
| PPE use in patients with infectious disease           | 2.46 ± 0.17| 4.33 ± 0.18| +1.87               | <0.05   |

Note: Data are reported as mean ± SD.
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SUPPORTING INFORMATION
Additional supporting information may be found online in the Supporting Information section.

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