Developing an Asynchronous COVID-19 Course in Response to the Pandemic at the University of Colorado

Background

- In March 2020, medical students were removed from clinical work for safety and PPE.
- Medical students needed to be equipped with the most up-to-date knowledge regarding the SARS-CoV-2 virus.
- Students and faculty developed a novel course at the University of Colorado School of Medicine (CU SOM) to instruct on COVID-19 and serve our community during the pandemic.

Innovation Objective

To design and implement an interactive virtual course that effectively teaches future providers about SARS-CoV-2 and meets the needs of students, patients, and communities affected by the virus.

Methods

- 336 third and fourth-year medical students enrolled in this two-part four-week course:
  - Part A: Knowledge-based learning
    1. 8 asynchronous learning modules covering SARS-CoV-2 pathophysiology, clinical presentation, epidemiology and evolving treatment modalities.
    2. 4 synchronous weekly lectures focusing on epidemiology, crisis leadership, public health and societal impacts, and scientific strides in managing COVID-19.
  - Part B: Self-selected experiential learning:
    1. Research
    2. Medical Education
    3. Bioethics and Medical Humanities
    4. Service Learning

- Students completed two sets of evaluations:
  - Knowledge-based pre/post-tests on COVID-19 biology, epidemiology, and clinical course.
  - Post-pre survey assessing COVID-19 specific attitudes.

Results

Curriculum Structure

![Curriculum Structure Diagram](image)

- Orientation: Orientation Video, COVID-19 Pre-test, COVID-19 Attitudes Pre-test
- Mass General Hospital Ground Rounds - "A Coordinated Broadcast with response to COVID-19"
- American College of Physicians - Novel Coronavirus: A Physician's Guide
- Colorado Department of Public Health and Environment Review
- Social Determinants of Health, Ethical, and Legal Considerations Module
- Softskills: Personal Protective Equipment Overview
- Federal Emergency Management Agency Module
- Bioethics and Medical Humanities - Weekly Prompts, Weekly Virtual meetings, Publication of art or prose in Human Touch Journal
- Education - Educational project proposal, walks in progress summary, and final report, Final Zoom presentation
- Research - Journal Club #1 + Research Abstract, Journal Club #2 + Final Project Update, Weekly WIP meetings
- Service Learning - Weekly log of service learning opportunities and hours (15 hour minimum)

Figure 1. Overview of the course structure

Curriculum Evaluation: Knowledge Test

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Pre-Test Survey (n=289)</th>
<th>Post-Test Survey (n=230)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test</td>
<td>66.0%</td>
<td>88.9%</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

Table 1. Pre- vs. post-course knowledge-based test scores

Curriculum Evaluation: Attitudes Survey

Please respond to the below statements using the following agreement scale (strongly disagree, disagree, somewhat disagree, somewhat agree, agree, strongly agree)

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean Before (n=221)</th>
<th>Mean After (n=221)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>I see myself as a leader.</td>
<td>4.40</td>
<td>4.55</td>
<td>0.0816</td>
</tr>
<tr>
<td>I feel a deep sense of purpose in the work that I do.</td>
<td>4.62</td>
<td>4.87</td>
<td>0.0079</td>
</tr>
<tr>
<td>I appreciate that role that physicians can play outside of clinical work.</td>
<td>4.85</td>
<td>5.23</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>I can advocate for patients and communities.</td>
<td>4.76</td>
<td>4.99</td>
<td>0.003</td>
</tr>
<tr>
<td>I can critically evaluate the evidence emerging about COVID-19.</td>
<td>4.33</td>
<td>5.08</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>I can translate Colorado public health data into digestible knowledge for family and friends.</td>
<td>4.46</td>
<td>5.20</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>I am able to apply clinical learning to real-world scenarios.</td>
<td>4.83</td>
<td>5.08</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>I can support community members, families, and colleagues in the health profession during a pandemic response.</td>
<td>4.28</td>
<td>4.99</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>I can describe the role of public health in responding to pandemic situations.</td>
<td>4.32</td>
<td>5.18</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>I can summarize the implications of ethics and social determinants of health outcomes during COVID-19 pandemic.</td>
<td>4.24</td>
<td>5.14</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

Table 2. Summary of Post-pre survey comparing pre- vs. post-course attitudes

Discussion

- CU SOM leadership effectively and efficiently mobilized to develop a broad, adaptable curriculum during the COVID-19 pandemic.
- This unique curricula allowed students to:
  1. Self-select into one of four central pillars to create individualized learning goals.
  2. Directly apply course content to real-world applications and enrich their communities.
- This work highlights the positive impacts of medical student involvement in curriculum development, the application of experiential learning opportunities, and collective class efforts in supporting community projects.

Acknowledgements

We would like to acknowledge all those that participated in creation of the course content including multiple faculty across campus. We would also like to thank the contributions of the School of Medicine for helping create such a quick response within the course alongside the many community partners across Colorado who worked to enable students to join the effort in fighting of COVID-19 across the state.