Addressing Equity in Global Medical Education During the COVID-19 Pandemic: The Global Medical Education Collaborative

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Abstract

Problem
The COVID-19 pandemic has presented a unique set of challenges to medical education globally. Low- and middle-income countries (LMICs) have faced unique barriers in transitioning to virtual modalities, and many medical students in LMICs experienced dramatically reduced educational time. The authors created the Global Medical Education Collaborative (GMEC) to address this problem by providing free, online, case-based tutorials to medical students in LMICs during the pandemic.

Approach
The authors developed a needs assessment to gauge students’ educational requirements, which informed GMEC’s 2 primary goals: to provide free access to interactive online tutorials for students in LMICs and to bridge the physical distance between educators and learners via an online platform. A pilot program in Nigeria (April 26-May 26, 2020) helped inform the current strategy and logistics. Tutors and students were recruited via social media and medical education networks at the authors’ home institutions.

Outcomes
Within the first 2 months (April 26–June 26, 2020), 324 students representing 12 countries and 20+ medical schools joined GMEC. Additionally, 95 physicians and trainees joined as tutors and, collectively, delivered 52 tutorials. Students responded to a needs assessment querying confidence in various clinical domains, interest in covering clinical topics, barriers to virtual learning, and the effect of the pandemic on their education. Tutors held 1-hour, interactive tutorials over Zoom covering a variety of clinical topics. According to surveys, 91% of students (71 of 78) felt more confident in the material related to the tutorial’s topic after participating.

Next Steps
GMEC will continue to engage students, tutors, and collaborators to facilitate the delivery of innovative, high-quality tutorials to students affected by COVID-19 in LMICs. To ensure that the platform is sustainable and aligned with GMEC’s mission to promote equity in global medical education, the collaborative will need to be agile and responsive.

Problem
The COVID-19 pandemic has presented significant challenges to medical education globally. In settings with greater resources, medical schools and teaching hospitals quickly transitioned to online teaching and learning. Innovative approaches such as virtual bedside teaching for medical students, online curricula for anesthesia residents, and the integration of emerging technologies in virtual classrooms have been described. Earlier in the pandemic, Goh and Sandars wrote that “a transformative change in the current approach to medical education across the world is inevitable.” This inevitable transformation has been underscored by changes in the medical education workforce: physician—educators have been reallocated to clinical roles, and medical students have been removed from hospitals. Students have emphasized the need for continued education during the pandemic, which they hope will serve “not as a detriment to our education but as a learning experience, and one that will teach us how to be best prepared to help now and in the future.” Educating future health care providers during COVID-19 has become especially critical in low- and middle-income countries (LMICs), where provider shortages are greatest and where health care systems were already operating near capacity. The World Health Organization has called for increased eLearning in these settings to strengthen capacity-building and health care worker empowerment. However, the medical education communities in LMICs have faced unique challenges when introducing these new, virtual education models—which were originally developed in high-resource settings where implementation was often faster and more facile.

Reflecting on COVID-19 and medical education in Brazil, Carvalho and colleagues noted that “online education and the wide use of high-technology is not a reality in our educational environment.” A systematic review of eLearning in LMICs, noting that only 31% of an already limited subset of interventions moved beyond the pilot stage, supports Carvalho et al’s observation. Moreover, technological challenges such as bandwidth limitations, electricity shortages, and device accessibility have been important barriers in adapting virtual education in LMICs, especially during the pandemic. Despite these obstacles, eLearning in LMICs was implemented successfully before the pandemic through programs such as The People’s Open Access Education Initiative (2008) and OxPal MedLink (2011).
In this report, we describe the formation of the Global Medical Education Collaborative (GMEC; www.gmecollab.org) to address the disruption to medical education in Low- and Middle-Income Countries (LMICs) during the COVID-19 pandemic. GMEC provides free, online, case-based tutorials to medical students in LMICs using low-bandwidth technology and volunteer tutors from around the world. GMEC provides a model for collaborative eLearning in LMICs that will help promote equity in medical education globally.

Approach

Needs assessment

GMEC began with a 1-month pilot (April 26 through May 26, 2020). Leveraging prior connections of one of GMEC’s founders (A.A.), we partnered with a Nigeria medical school (The College of Health Sciences at the University of Ilorin). First, we created a general needs assessment, following Kern and colleagues’ theory from *Curriculum Development for Medical Education,* to objectively characterize student needs (see Supplemental Digital Appendix 1 at http://links.lww.com/ACADMED/B144). We piloted the needs assessment with this cohort of Nigerian medical students, querying their confidence in various clinical domains, their interest in learning topics, their preferred modes of learning, and their motivations for participating in virtual education (see Supplemental Digital Appendix 2 at http://links.lww.com/ACADMED/B145). To be comprehensive yet succinct, we included basic clinical skill sets and topics by organ system. We invited students completing the pilot needs assessment to enroll in several tutorial sessions during this time period.

Next, given the results of the needs assessment, which demonstrated need and increasing student interest, we started our “postpilot phase” (May 27, 2020 onward). During this phase, we used social media to enroll larger networks of students from other LMICs and began to offer more tutorials. We integrated a revised needs assessment on our student registration web page, including new questions on barriers to participation and the pandemic’s effect on education (see Supplemental Digital Appendix 3 at http://links.lww.com/ACADMED/B145). Surveying each newly enrolled student was imperative to gaining more insight into our expanding partnerships with students from different schools and countries. Throughout the remainder of 2020, we recruited more students and tutors from across the globe and eventually began to deliver approximately 10 to 15 tutorials per week (August 2020 onward). As the pandemic progressed, some students returned to regular instruction; however, the majority of participating students continued to be without formal classes or clinical experiences when we revised this report (January 2021).

Goals and objectives

Needs assessment data and stakeholder conversations informed GMEC’s 2 primary goals: (1) to provide free, accessible, and interactive tutorials online for all interested students in LMICs and (2) to bridge the physical distance between educators and learners. Through our online platform, students engage with medical tutors during interactive, small–group tutorials, eliminating physical distance as a barrier. Specific learning objectives are developed for each tutorial by the tutor; should the tutor require assistance or guidance in creating objectives for their tutorial, the collaborative provides the tutor with further information regarding the self-identified learning needs of participating students, resources on objective development from the medical education literature, and further one-on-one skills training to ensure consistent, high-yield learning across GMEC-sponsored tutorials. Students from all nations were welcome to participate, but we recruited, specifically, students from LMICs. Students from countries with more resources did not express need for the collaborative’s tutorials as much as peers from LMICs given their preexisting virtual learning resources. As such, some who were interested in GMEC served as tutors.

Educational strategy and implementation

Our educational strategy requires collaborative, case-based learning. Each tutorial allows students the opportunity to share how medical practices at their home institutions may differ from those presented, and each concludes with time for students to ask questions and give feedback. Preliminary needs assessment data and informal discussions with students have revealed that medical students in LMICs have limited exposure to case-based discussions; therefore, we felt a case-based approach would both complement local medical curricula and facilitate collaborative learning.

In addition to providing resources for tutors and tutorials for learners, we identified key stakeholders to form a sustainable collaborative: leadership committee/advisory board members, learners, partnering schools, and volunteer tutors. Resources required to implement the collaborative included a website (as listed above, www.gmecollab.org) and a learning platform (Zoom, San Jose, California).

GMEC’s successful implementation depended on our network of stakeholders, innovative educational strategy, and technology. We primarily recruited learners through the following:

- our professional networks,
- advertising, specifically ads on Facebook (Menlo Park, California),
- email distributions across medical student organization listservs (e.g., the one associated with the Federation of African Medical Students’ Associations), and
- social media outreach to various medical student organizations and schools (e.g., direct messages or tweets sent to medical student associations and medical schools in LMICs).

We identified student representatives from medical schools in LMICs who could disseminate information about GMEC to their classmates and who could facilitate conversations between faculty at their home institutions and GMEC’s leaders. Conversations with faculty yielded insight into GMEC’s potential role in supplementing existing medical school curricula. Applying this insight, we crafted a scaffolded GMEC curriculum, which has provided tutors with suggested material to cover during future tutorials while also considering learners’ needs from the perspective of their primary educators and the students themselves. Speaking with faculty has enabled stronger external support of our work and promoted additional collaboration.

Tutors were initially recruited through medical education networks at Harvard...
Medical School and Oxford University Hospitals. As the collaborative has grown, word of mouth, social media posts, and advertisements among various physician groups have further facilitated the recruitment of tutors. Once tutors express interest in working with the collaborative by filling out an interest form on the collaborative’s website, they are contacted by the collaborative’s leaders to assess their prior teaching experiences, to understand what topics they may be able to cover in their tutorials, and to answer any questions they may have about the process. To complete their onboarding process, the tutors then receive instructional materials and videos on how to prepare for and host a GMEC-sponsored tutorial. Onboarded tutors teach to their strengths while considering data from the needs assessments, suggested tutorial topics, and the scaffolded curriculum developed by the GMEC leaders. Tutors self-select the number of and frequency with which they will deliver tutorials. Tutors may opt to host a single-session “class” (10–20 students), a multisession “course” with the same group of 10 to 20 students over multiple tutorials, or, for select tutors, a large group single-session “lecture” (50–100 students). When a tutor decides when they want to teach and what they plan to teach about, they complete a form distributed during their onboarding. The form allows the collaborative to post the time, topic, and ideal audience of each tutorial onto the website. Additionally, this form asks tutors if they would like the collaborative’s leadership team, more specifically the medical education intervention-focused team members, to create a 1-page primer on the topic of the tutorial. This primer is then added to the GMEC collaboration space on a shared Google Drive (Mountain View, California) so that future tutors may also benefit from this supporting material. Students are notified of new tutorials via the website and weekly email. According to responses to the collaborative (April 26, 2020 through June 26, 2020), 95 providers signed up to tutor with GMEC. Of these, 82 (86%) were residents, 3 (3%) were attendees, 9 (9%) were senior medical students, and 1 was a physician assistant (1%). Of the 95 tutors, 66 (69%) worked in the United Kingdom, 16 (17%) worked in the United States, and 13 (14%) worked in other geographic locations including Nigeria, Indonesia, Ethiopia, and Sri Lanka. Tutors represented diverse clinical specialties, and needs assessment data have allowed us to recruit specialists with specific expertise to fill gaps. By June 2020, 16 tutors delivered 52 tutorials, and future tutorials by other tutors were already scheduled. According to the responses on surveys (see Supplemental Digital Appendix 4 at http://links.lww.com/ACADMED/B145), tutors have cited the flexibility of our scheduling, the excitement of students to learn, and the opportunity to practice virtual teaching as main motivators for remaining with the collaborative.

Outcomes

At the time of writing (late June 2020), 324 students, representing 12 countries and over 20 medical schools, primarily in Africa and Asia, had enrolled and completed the needs assessment. The weakest skill set identified was “interpreting imaging studies”; 204 students (63%) responded they were “not confident at all” or only “slightly confident” in their ability to interpret images (see Figure 1). Students hoped to cover a wide range of topics. The 3 most highly ranked topics were diseases of the cardiovascular, nervous, and respiratory systems. Medical students cited the following as barriers to learning and participating in GMEC tutorials:

- Internet access (identified by 136 students [42%]) of students,
- (Lack of) personal availability or time (identified by 97 students [30%]),
- (Lack of) familiarity with online learning platforms (identified by 26 students [8%]), and
- Inconsistently available electricity (identified by 23 students [7%]).

Despite barriers, many students used the free-response option to indicate interest in engaging with GMEC. See also Table 1

As mentioned above, most of the tutorials last approximately 1 hour and no more than 20 students attend. Both preclinical and clinical students are invited to participate. Notices on the website sign-up page indicate if a tutorial suits more senior students. During the tutorial, the tutor shares their screen to display teaching material while students interact using only audio. Currently, the tutorials are solely conducted in English. We extensively tested different presentation formats and identified this format as effective while minimizing wireless data usage. During each session, students engage in case-based learning with their tutor and one another. Together, students practice skills pertaining to history acquisition, physical exam technique, diagnostic interpretation, and case management. Afterward, tutors email all students who signed up for the session, in case students unexpectedly could not attend. This email connects the tutors and students, creating a venue through which the tutor can share annotated slides from the tutorial, forward the 1-page educational primer GMEC developed for the topic, answer remaining questions, and/or offer future mentorship.

Evaluation

At the end of each tutorial, tutors elicit verbal and anonymous feedback from the learners, creating a space for learners to suggest future improvements. The anonymous survey (see Supplemental Digital Appendix 5 at http://links.lww.com/ACADMED/B145), which has both qualitative and quantitative elements, invites students to comment on the tutor’s performance and the utility of the tutorial. Data acquired from the feedback survey allow us to track and improve upon the effectiveness of individual tutors and tutorials. While we eventually implemented pre- and posttutorial multiple-choice knowledge assessments, we initially measured only changes in student confidence as it pertained to the tutorial topic. Tutor-specific feedback was provided in aggregate to each tutor on a monthly basis. All students and tutors responding to surveys (see Supplemental Digital Appendixes 2–5 at http://links.lww.com/ACADMED/B145) provided electronic consent for including their deidentified response data in aggregate reporting (Terms and Conditions, www.gmeccollab.org), and the reporting of these data was deemed exempt from institutional review board approval in consultation with the Harvard Longwood Institutional Review Board Office (email correspondence with corresponding author, May 21, 2020).
Of the 198 students who responded to COVID-19-specific questions in the revised (June 2020 onward) needs assessment, 176 (89%) indicated having “little” or “no” class time and 190 (96%) indicated having “little” or “no” clinical time. Students still in classes indicated that most learning was done through virtual meetings and prerecorded lectures or readings. Many students felt the new learning environment was stressful and costly (primarily because of the need to buy internet access while at home). Three-quarters of the students (n = 149; 75%) were “very” or “extremely” worried about the pandemic’s effect on their learning. One student noted,

many [students] are deprived of their rights to learn…. It becomes difficult for some students to access the lectures and even if they get the material, time becomes a problem because of the house chores we’re expected to help with [see Table 1].

According to 78 students who answered the relevant question/s after participating in a tutorial, 71 students (91%) felt more confident with the presented material than they did before the lesson, 44 (56%) reported that they found the material “appropriate” for their skill level, and 73 students (94%) felt the tutor presented the material “well” or “very well.” To access the tutorials, students used the following devices:

- Mobile phones (60 students [77%]),
- Tablets (9 [12%]), and
- Computers (9 [12%]).

Our surveys have several limitations, including limited generalizability, limited ability to assess local context, and respondent self-selection. In our analyses, we have not accounted for students’ local context, which may affect how tutorials are delivered (e.g., although imaging studies are a low-confidence area, we lack data on the modalities used for imaging and for learning/practicing how to interpret images at the students’ institutions). Additionally, students responding to our surveys can access the internet and may not experience the same barriers as students unable to respond. Therefore, our findings may not apply to all medical students at partner schools—an issue we will consider as we continue to develop GMEC.

**Next Steps**

GMEC possesses vast potential to grow as an educational platform, and its ongoing success depends on student and tutor engagement. We continue to expand our student and tutor base and to engage with more medical schools in LMICs. With help from our growing community, we are developing a social presence on platforms such as Twitter (@GMECollab), WhatsApp, and

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**Figure 1** Data from a needs assessment asking medical students (n = 324) from low- and middle-income countries to rate their level of confidence in 6 basic clinical skills, April 26–June 26, 2020. Students completed the needs assessment before enrolling in a Global Medical Education Collaborative tutorial, and the authors, in turn, have used the response data to guide the development of subsequent tutorials.
Table 1

Themes and Illustrative Quotations From a Needs Assessment Asking Medical Students (n = 324) From LMICs to Share Their Experiences, Concerns, and Questions About Learning During the COVID-19 Pandemic, April 26–June 26, 2020

| Theme                                           | Quotations                                                                 |
|------------------------------------------------|---------------------------------------------------------------------------|
| Medical education during the COVID-19 pandemic | We don’t have any clinical time which I feel has hampered our hands-on learning and experience. - Student from India |
| Student motivations                            | As a young medical professional, I see this as an opportunity to be exposed to a new realm of knowledge, meeting professionals, and learning new ideas about what I love: medicine. - Student from Nigeria |
| Barriers to participation                      | Time [would be a barrier] because I’ve been given a lot of work to do in the house, so personal studies are sometimes a problem. [A second barrier] would be money to buy internet bundle for online lectures. - Student from Tanzania |
| Clinical reasoning skills                      | When given a clinical case, I can reason my way through the history and physical examination findings. I have a limited understanding of laboratory tests and their results and I have an even more limited grasp on interpreting different imaging modalities. - Student from Uganda |

Abbreviation: LMIC, low- and middle-income country.

GoogleGroups, through which students and tutors can interact to foster greater collaboration and learning. 10

We aim both to continue delivering highly interactive tutorials that cover gaps in students’ knowledge and to leverage the experience of tutors from a variety of specialties. Applying Kern’s iterative process, 9 we continue to incorporate feedback from students and tutors to improve GMEC (see Supplemental Digital Appendix 1 at http://links.lww.com/ACADMED/B144). Our approach will be increasingly “bottom-up”; that is, we hope to use approaches such as focus groups to garner further feedback and to increase the representation of LMIC students and tutors in leadership (e.g., by developing a GMEC Student Liaison Committee). Moreover, LMIC representation in leadership roles will aid GMEC’s expansion and sustainability as we adapt to education during and after the pandemic. We will expand our effectiveness by exploring novel asynchronous interventions and technological innovations in medical education, such as tutorials held over WhatsApp threads. Moving forward, we will continue to investigate how to make our resources more accessible to even lower-resourced areas using LMIC student input. One option we are considering is hard-copy dissemination of annotated tutorial presentations. Finally, sponsorship by a larger educational institution will provide additional human resources and mentorship, both of which are vital to the future administration and sustainability of the collaborative.

Strengthening student, tutor, and sponsor engagement will be essential in achieving GMEC’s vision of greater equity in global medical education.

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Teaching and Learning Moments
When We Needed His Wisdom More Than Ever

Sir William Osler once told his students, "Listen to your patients—they're telling you the diagnosis." He emphasized that good doctors should focus on their patients. The patient is not only an individual who needs to be healed but also part of a complex world that a good listener needs to understand.

Mr. Ramirez was in tears after seeing his brother, Alejandro, having a seizure. Alejandro, just 39 years old, had been diagnosed with AIDS a few days prior. He had a nonresectable cerebral tumor that was causing him to hallucinate and he could barely recognize his family members.

As he was crying, Mr. Ramirez held our hands and spoke from his heart. He was tired after enduring a 20-hour bus trip to get to the hospital and then seeing his brother in such a poor condition. He is a resident of Tabasco, Mexico—one of the poorest regions of an incredible country that has recently been struggling in a deep ocean of poverty, crime, and inequality. Having less than $2 in his pocket, he was also struggling with inequality. Having less than $2 in his pocket, he was also struggling with inequality.

Poverty is a simple word that can be hard to understand if one has had the privilege of being far from it. It can be smelled and felt, like a sword embedded in the heart or ashes brushing one's face. These ashes caught fire as the tearful doctor explained that Alejandro’s prognosis is bad; the rural hospital does not have the resources to offer better treatment options; and the other possibilities for treatment he could have are now limited, as the major hospitals in the area have collapsed because of one of the worst pandemics the world has ever faced: COVID-19.

What can a good doctor say to a patient when his hands are tied by the poverty of his country, an inadequate health system, and a global pandemic?

A good doctor must then approach medicine as an art—an imperfect art full of beauty but also mysterious and sometimes faulty. Medicine is a beautiful skill used to correct an imperfect body, or in this case, an imperfect world and society. A good doctor should always teach others how to love this art and how to use it the best way possible. Sometimes that means choosing the least bad option.

If I could share my experience with Mr. Ramirez with someone, I would choose Sir William Osler. I wish he could explain to my interns and me the best way to deal with illness, poverty, and a pandemic at the same time—a reality that has not been covered in even the best medical books. Students should understand the society they are living in before approaching an individual patient. Patients are just individual examples of different shades of gray in society. Good doctors should always see their patients as a whole world but treat them as a unique piece of art. They should use their creativity and think outside the box to help their patients using limited material resources.

Just as Osler transmitted his wisdom to his students, I will strive to teach my interns the best way to deal with difficult situations, to approach them with critical thinking and an open mind, and to always offer their patients the best option.

We need to listen to our patients. They might not tell us the diagnosis this time, but they will give us courage to continue trying to help them the best way we can, and we might create new answers along the way.

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Author’s Note: The names and identifying information in this essay have been changed to protect the identities of the individuals described.

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