

Implementing adaptable approaches to medical students' qualification exam in the era of the COVID-19 pandemic: A cross-sectional descriptive study in a resource-limited Ethiopian medical school

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Publication information

Received: 27-Jul-2022

Accepted: 12-Dec-2022

Published: 30-Jan-2023

Citation: Esubalew T. et al. Implementing adaptable approaches to conduct medical students' qualification exam in the era of COVID-19 pandemic: Cross-sectional descriptive study at resource limited Ethiopian medical school. MJH, 2023, Volume 2 (1): eISSN: 2790-1378.

Abstract

Background: COVID-19 threatened the global healthcare system not just because of the lives it threatened but also severely disrupted medical training and dried up the continued supply of qualified healthcare professionals. The impacts have been particularly severe in resource-limited countries like Ethiopia, where trained manpower is a serious concern even under non-pandemic situations.

Objectives: This descriptive report with qualitative data aims to assess the challenges encountered and opportunities tapped when one major medical school in Ethiopia tried to implement adaptive methods to help graduating class students take the surgery exit qualification exams in the middle of the COVID-19 pandemic.

Methods: The study was conducted from October 10 to December 4, 2020. An institution-based multidisciplinary task force was formed to develop a platform to deliver final-year medical students' exit examinations. The adaptive module was composed of long-case clinical scenarios, short-case bedside clinical videos, imaging, and viva topics.

Results: In total, 112 graduating class students were screened for COVID-19 and admitted to the examination center at SPHMMC. Routine surveillance and testing were implemented throughout the examination period. During this time, six students acquired COVID-19, albeit asymptomatic except for one student for the entire duration, and were forced to complete their written qualification exam while quarantined in the treatment center. Students passing rate was higher than the pre-pandemic year result.

Conclusion: Overall, the study revealed that an effective and adaptive method could be implemented in resource limited setup to facilitate the training and evaluation of healthcare professionals including students who complete their qualification exam and join the fight against the pandemic despite challenges. This paper summarizes some of the challenges and opportunities.

Keywords: Adaptable training, Coronavirus, COVID-19, Healthcare professional, Pandemic

Background

COVID-19 is an ongoing pandemic caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). It has already taken the lives of millions making it one of the deadliest diseases in history. One of the multifactorial impacts of the COVID-19 pandemic was the threat to the supply of trained medical professionals because training has been halted especially during the peak of the pandemic (1–3). Maintaining an uninterrupted supply of trained professionals is key to achieving a strong healthcare system (4,5). Medical schools in resource-limited countries in particular suffered the most from COVID-19 because they are not equipped with the capacity to shift their teaching methods and resources to innovative approaches such as e-learning, just the same way as what could be possible elsewhere in well-resourced medical schools(3). For example, medical schools in the United Kingdom employed online tests, oral tests using teleconference, and virtual simulation tests using video recording (6–8). Implementing such methods in resource-limited schools such as in Ethiopia is a daunting task as it needs not just technologically savvy faculty, infrastructure, or financial resource, but also needs political will and commitment (3,4,6,9). Besides, resource-limited nations have already weak healthcare systems and limited healthcare workers. In Ethiopia, for example, the doctors-to-population ratio is 1: 21,000, which is one of the lowest in density doctors in sub-Saharan Africa (10,11). Therefore, maintaining an uninterrupted supply of trained professionals is paramount to fighting the pandemic as well as to preventing the healthcare system from collapsing. Worth mentioning, training healthcare professionals, especially medical doctors is expensive and takes a long time.

Countries used various approaches to mitigate the high demand for the healthcare system to battle the pandemic. One such example is Italy where medical students were deployed before graduation to help battle the pandemic (12). During the early phase of the pandemic, there was a nationwide lockdown in Ethiopia that extended to the closure of all teaching facilities including all medical schools threatening a steady supply of doctors and healthcare professionals.

St. Paul's Hospital Millennium Medical College (SPHMMC) is the second-largest multi-specialty tertiary care teaching hospital in Ethiopia. As COVID-19 was detected in Ethiopia around March 2020, SPHMMC was identified as the main clinical management center in the capital in the fight

against the pandemic (13). That designation means that all elective clinical sessions and surgical procedures should be postponed, which made continuing surgical clinical rotation for undergraduate students unavailable. At the time, the graduating class medical students have already completed their clinical rotations and were about to take the final exit examination. However, per the guidance from the Ministry of Education and Ministry of Health, SPHMMC had to cease activities and wait for further notice before resuming any teaching or conducting a final exit examination for the graduating class. Students were directed to stay at home and continue their preparation for the qualification exam. Unfortunately, about 8 months passed before final year students were called back to take the exit exams and the number of infected patients and mortalities were increasing alarmingly from time to time in Ethiopia, which might have caused a lot of frustration in students (13). SPHMMC came up with adaptable methods to conduct exit or qualification exams for final-year students in resource-constrained facilities maintaining appropriate safety and hygiene protocols. This paper briefly describes the decision-making process and conduct of undergraduate surgical qualification exams and highlights the challenges faced during the development and implementation of adaptable assessment methods in SPHMMC for undergraduate medical students in the middle of covid-19 pandemic crisis. Since SPHMMC was the first medical school in Ethiopia to deliver undergraduate medical students' qualification exams in the middle of the COVID-19 crisis, the lessons learned throughout the process offer some recommendations for other institutions that plan to conduct similar adaptable programs under challenging circumstances.

Methods and Materials

Study site and design

The cross-sectional descriptive study was conducted from October 10 to December 4, 2020, at SPHMMC, which is the second-largest multi-specialty tertiary care teaching hospital in the capital of Ethiopia. The hospital has been serving for more than seventy years with an emphasis on an underserved population. There are about 800 postgraduate and undergraduate medical students and more than 3031 staff including clinical, academic, and administrative (14). A structured observation of the planning process, setting up of the examination facility (students'

dormitory, cafeteria, library, and practical exam stations), and disclosure of exam results were made by the author. Qualification exam task force members of SPHMMC, department of surgery undergraduate program directors, candidate students, and their examiners in the calendar year of 2019 at SPHMMC, registrars, and librarians were major stakeholders in the exam process. The steps followed from planning to implementation were described in detail along with the challenges encountered and solutions suggested. Regarding practical exam questions long case scenarios including clinical pictures and short case video shots from the surgical ward were developed, radiologic imaging soft copies were collected and the examiner's checking lists were set for each practice question which was thoroughly evaluated and approved by the exam committee before implementation.

Results

The challenges of planning and executing the qualifying exam, and mitigation strategies

The pandemic deprived students of access to various academic resources, focus, motivation, and interaction with peers. Preparation at home without any end in sight brought a lot of exhaustion because 8 months have already passed before students were called to take the exam. Some students live in remote parts of the nation and access to reading materials such as standard textbooks was also very limited. Besides, the internet is not widespread and the service has been highly intermittent making matters worse. In addition, the information about the status of students in the middle of the pandemic was very limited which made planning very difficult. Lastly, as SPHMMC was dedicated to a national covid-19 treatment center and since the community transmission at the time was higher, students and their families had great concern about acquiring COVID-19 infection. Even to plan what to do, with the limitation of access to video conferencing, it was a very difficult task to bring various stakeholders to the table and come up with a feasible recommendation in the middle of covid-19 crisis. Above all 2 physicians, 1 pharmacist, 2 senior anesthetists, and 1 operation theater nurse of our hospital succumbed due to covid-19 during this time which was shocking to the medical faculty with great concern of acquiring covid-19.

Considering all these challenges, SPHMMC established a task force consisting of undergraduate directors from various departments (surgery, internal medicine, gynecology and obstetrics, pediatrics and child health, public health and psychiatry), medical education experts, and college

deans which are the major stakeholders in the undergraduate medical education. The task force was assigned to look for experiences with similar setups, conduct a feasibility assessment and develop a proposal to deliver the qualification exam by maintaining desirable standards in the middle of the COVID-19 pandemic while ensuring all the safety measures to keep all involved safe during the course. The task force was led by the academic dean of the college and the experiences of other medical faculties to deliver such high stake exams in the middle pandemic were searched but there was no documented or verbally accessible experience found in Ethiopian medical faculties. Published experiences from the United Kingdom, where technology-assisted exam platforms took the lion's share, and simulation lab-based experiences from Rwanda were presented and discussed among task force members at their regular meetings. The task force members also assessed our existing hospital and academic facility, the willingness and readiness of students to sit for the exam, readiness of academics to handle the exam. Upon this assessment, facility limitation was raised as the main concerning issue as more than half of the hospital building is already dedicated to Covid-19 patients and the available simulation lab was also small compared to the number of candidates. Incorporating all the feedback, the task force came up with recommendations as summarized in Table 1.

Table 1: Recommendations to ensure safe and effective conduct of qualification exam at SPHMMC

	Recommendation
1	Dormitories are to be evacuated and disinfected properly before the admission of students
2	Preparing a cafeteria dedicated only to the students
3	All students are to undergo a COVID-19 test before their admission to their residence
4	The number of students per room is to be limited to only 2
5	Dedicating the library only for the medical students to finalize their preparation for the exam. The necessary safety precautions in the library were laid out, for example encouraging students to avoid sharing hard copies as much as possible
6	Prohibiting students from visiting their relatives or family members in person during their preparation and exam time. Those who broke the recommendation to undergo COVID-19 test and quarantine before joining the remaining students.
7	Arrange counseling sessions for the students on how to pass such a challenging time
8	At the time, access to oxygen therapies and mechanical ventilators was very limited and students acquiring an infection during their stay on the campus may be given priority.
9	For those who got sick but decided to continue their preparation, possible arrangements like access to computers and personal materials should be made in the treatment centers.

After careful deliberation on the recommended packages, 112 (100%) candidates were admitted to the prepared dormitories after undergoing COVID-19 screening. Admission was based on negative test results. The sociodemographics of students are summarized in Table 2. The students were given 3 weeks to finalize their preparation for the final written exams

which were given every 6 days.

Table 2: Sociodemographic of graduating class students who took the qualification examination (total 112 students)

Attributes	Group	Percentage
Age	20-24	66.1
	25-30	33.9
Gender	Female	37.5
	Male	62.5
High school completion address	Addis Ababa	39.3
	Amhara	23.2
	Oromia	15.2
	Somali	6.3
	SNNPR	3.6
	Gambella	2.7
	Afar	2.7
	Benishangul	2.7
	Tigray	4.5

SNNPR: Southern Nations, Nationalities, and People's Region

Planning and delivery of the qualification exam

In the pre-COVID-19 pandemic era, the surgery department in SPHMMC conducts qualification exams through written exams and patient-based practical clinical assessments. The practical exam consists of long case presentations, short case clinical assessments, and viva stations. However, some of these practical aspects created safety concerns because of the COVID-19 pandemic crisis. Per the recommendation from the task force, the qualification exam was designed to include long case scenarios, clinical images, short video shots like colostomy and tracheostomy from surgical ward bedsides, and radiologic images from each unit of a surgical department where students were attached during their clinical rotations. Each of the exam cases was submitted to the respective units of the surgical department (General Surgery, Urology, Gastrointestinal Surgery, Chest, Plastic and Reconstructive Surgery, Orthopedics, and Neurosurgery) and carefully evaluated and standardized by the college exam committee. There was a facility limitation to conducting exams by videoconferencing. The exam contents and examiner's checkpoints are included in the supplement. The examiner's team consists of faculties from within SPHMMC (internal examiners) and external examiners invited from outside of SPHMMC. The modifications made to the examination format were briefed to the examiners and students were extensively oriented by telegram channel through their representatives. The written examination was a computer-based multiple-choice question (MCQ) conducted in the Digital Library Center of SPHMMC. The qualification exam avoided the traditional pen-and-paper format, candidates were seated at an appropriate distance from each other, masked, and were not allowed to bring any material into the examination room. The examination rooms were adequately

ventilated, and hand sanitizer was routinely used when there is interaction including with examiners. Faculty members with known comorbidities were exempted from being an examiner.

The practical examination took place in the hospital's main building. Five external and 18 internal examiners were involved in the practical examination. Space was a major challenge to conduct the examination and after repetitive negotiation with other departments offices of anesthesia, anesthesiology, nursing directorate, and pharmacy were also dedicated to conducting the examination. Ten examination stations with two examiners per station were prepared and each station handled up to 5 students per day. The clinical exam took 50 min per student (long case discussion, short case analysis, and viva session). All examination materials were uploaded on computers. The surgical department undergraduate committee, which comprised 2 consultants and 1 general practitioner, took the overall responsibility of preparing and arranging the examination formats and venues. The practical exam took 5 days and students were surveyed for possible COVID-19 symptoms every day. The routine survey identified 6 students who acquired COVID-19 infection during their preparation for the written exam and they had mild symptoms except one. The infected students continued their preparation and took the qualification exam in the treatment center. Their circumstances appeared to have no significant bearing on their performance because all of them passed the qualification exam successfully. Their marks on both written and practical exams were comparable to the remaining uninfected students. Based on a brief interview with the infected students, they seem to be happy with the result but expressed their fear, exhaustion, and loneliness while in the treatment center. Their families were also concerned when they hear they were admitted to the treatment center. Of note, one student was from a remote area, and it was difficult to inform his family members of his status. It appeared this student was the only son of the family, and he was concerned about not putting his mother under extreme stress. Nevertheless, the daily surveillance confirmed all infected students remained asymptomatic through the practical qualification examination.

Performance of students compared to results in the pre-pandemic era

There was no modification made to the way students were graded. The progressive assessment, final written exam, and external practical examination accounted for 40%, 30%, and 30% respectively. The progressive assessment includes seminar presentation, mentorship

evaluation, long case, short case presentation, and viva exam. The results were graded per the department system and the profile is summarized in Fig 1. Out of the 112 candidates, above 85% scored B+ and better while only 3 students scored C. It was notable that students performed comparably between practical progressive assessment and external practical exam. Further, when compared with the results of qualifying students from previous years the pass rate in the current assessment year was significantly higher and this may be attributable to the flexibility of examiners considering students' overall condition during the exam.

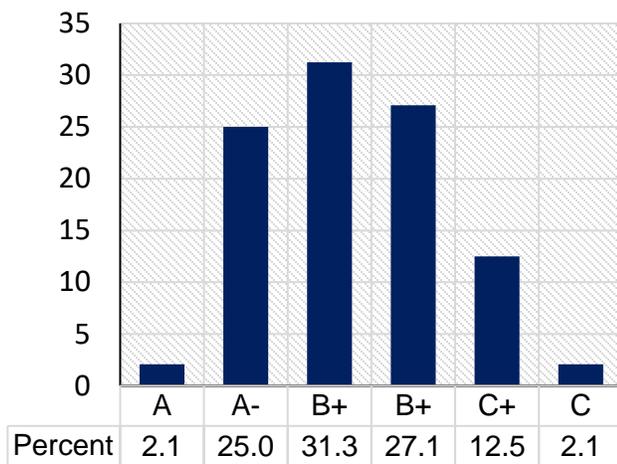


Figure 1: Distribution of the overall qualification examination results graded according to the standard scale at SPHMMC

Discussions

The impact of extending the academic year and delaying exit exams for graduating students is multiple including social, economic, and psychological stress, and delay in career progression on graduates (3,4). Since the qualifying exit exam is the gateway to practicing medicine, the Medical Faculty also consider it very critical and make appropriate preparation to handle all likely circumstances. In the middle of covid-19 crisis, some students may not report back due to the perceived risk of acquiring infection from the hospital (15). In this regard, no candidate failed to report back during the readmission which may be due to the intense orientation given about the exam platform through students' telegram channel. The qualification exam, even under normal circumstances, is stressful for candidates because it needs intense preparation (11,15) and the department of psychiatry was giving continuous support to the candidates throughout the exam process.

The COVID-19 pandemic has impacted humanity and the brunt of its impact is felt in the global healthcare system. Not just the high burden of

the disease that challenges the healthcare system, but it also disrupts the training programs that are the lifeline of the healthcare system, particularly in developing nations where trained manpower is a serious problem even under the non-pandemic situation. Even under the best of circumstances in more industrialized countries, handling COVID-19 has been an immense challenge and the system was on the precipice of collapse. The example of Italy where many succumb to the disease in a short period forcing the country to international help where Cuban doctors responded admirably (16,17). One more lesson of the COVID-19 saga was that global crisis requires a well-orchestrated global response and having well-trained physicians across the globe is an absolute necessity. It was remarkable that even in the best of circumstances, a well-resourced nation alone may not necessarily be effective in battling out such a ferocious opponent. Medical schools have also some lessons to take from this event and incorporate some helpful topics in their curriculum, particularly on how to adapt to fast-moving situations or fast-spreading global pandemics. Globally focused medical education with specialized training on how to respond to emergencies and leadership skill is increasingly necessary to address international healthcare emergencies (1).

On the flip side, COVID-19 has shown us it is in the long-term best interest of the global community to produce qualified healthcare professionals to conduct effective global surveillance and implement early management and mitigation system to prevent deadly diseases from spreading worldwide. In this regard, collaborative efforts between healthcare systems in resource-limited countries and well-resourced ones go a long distance to help establish infrastructure in developing countries to help this purpose. For example, digitalizing medical education and care is in its infancy in countries like Ethiopia, and with the growing number of medical students and patient privacy factors clinical education in a real patient is also becoming a challenge over time. Moreover, the majority of clinical teaching videos are from textbook countries, and having teaching clinical pictures and videos in the community where the students are practicing medicine is easily understandable. Overall, our little experience also showed that it is time to plan for a possible hybrid approach in medical education and student assessment in facilities like ours. Global non-government organizations have also a major role to play in filling gaps in healthcare systems globally. Furthermore, governments of developing nations should pay attention to the healthcare needs of their society and actively engage global alliances, identify opportunities, and

provide the necessary platform to improve health and strengthen the infrastructure of their medical schools.

In conclusion, COVID-19 is a huge wake-up call that brought the healthcare system in developing nations close to collapse. There is a huge lesson for everybody including those in the decision-making sets of the healthcare system and training institutions. Our experience in delivering this exam has shown the real impact of panic and lack of skilled leadership during such international emergencies in the early phase of the COVID-19 pandemic. If there was a pre-planned action plan specifically designed for such circumstances, we could have conducted this qualifying examination in the early phase of the pandemic when the community transmission rate was still very low under the circumstances in Ethiopia (13). The lesson appears to have been learned but it is up to the medical schools and policymakers now to put together a forum for more consultation and prepare a better-structured and adaptable plan that could be deployed when deemed necessary.

Recommendations: this limited experience at SPHMMC showed medical schools in resource-limited countries like Ethiopia should assess their existing circumstances and plan for adaptability and when circumstances allow, implement hybrid methods of medical education (combination of in-person and virtual means of delivery).

Abbreviations

COVID 19: Coronavirus disease 2019

FMOH: Federal Ministry of Health

SPHMMC: Saint Paul's Hospital Millennium Medical College

WHO: World Health Organization

Declarations

Ethics approval and consent to participate

Clearance was obtained from the Institutional Research and Ethics Review Committee (IRB) of the SPHMMC. Participation in the study was voluntary and all data were kept confidential.

Acknowledgments

The author acknowledges the department of surgery faculty members, SPHMMC administration, and final-year medical students for active participation in the current survey.

Authors' contributions

ET- conceived the idea, study design, reviewed the article, analysis, report writing, and drafted and write up the manuscript.

Funding

There is no source of funding for the current manuscript.

Competing interest

The author declares no competing interests.

Availability of Data and Materials

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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