

A Review of Challenges of Medical Education in the COVID-19 Crisis

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Abstract

Before the outbreak of COVID-19 pandemic and due to the clinical nature of education in medical sciences, online and virtual educations were not implemented as the dominant methods in medical education; however, they were adopted as immediate solutions to help students pursue their education during the pandemic period. The change from the traditional education method to the electronic and virtual ones represented many challenges for the educational systems. The main challenges can be categorized into four groups: mental health consequences resulting from the quarantine and catching COVID-19, challenges of virtual education, challenges of clinical education, and challenges concerning medical students and COVID-19 frontline. In sum, the COVID-19 crisis was found to pose a number of challenges to faculty and students of medical science as well as to their families. In order to increase the preparedness of the medical education system to cope with similar crises, it was suggested that combined education programs should be implemented in the post-crisis period.

Keywords: Medical Education, COVID-19, Virtual Education, Clinical Education

1. Context

With the emergence of information and communication technology in the 21st century, training learners faced with the complexity of information explosion age and changing society as well as preparing them for the new world have become serious challenges (1). Today, electronic learning and virtual education are proposed as new paradigms in teaching and learning. In recent decades, developing electronic learning and virtual education has been adopted as one of the main official policies aimed at developing the higher education. Today, these policies are also designed to develop educational justice, remove geographical restrictions, and facilitate lifelong learning. Therefore, it is essential that universities pay special attention to the implementation of e-learning and development of online programs (2). The world has confronted the huge challenge of Corona Virus (COVID-19) since the late December 2019, which has resulted in the shutdown of economic, industrial, health, and education systems (3). Coronavirus, as a global disease, has caused some problems for the education sector of countries, especially medical education in the field of health-care; it has also caused serious human and economic losses (e.g., educational center closures, disinfection of crowded places, measures to stop the transmission of the COVID-19 disease or reduce its spread, etc.). Due to the

first, second, and third waves of COVID-19 occurring successively, the medical science classes were almost closed, and restriction plans – the reduction of the commute to both academic and clinical environment, in particular – were implemented (4); this forced closure of face-to-face education in both theoretical or clinical fields in universities and caused considerable concern for professors.

Due to the clinical nature of education in medical sciences, online and virtual educations were not adopted as the dominant methods for implementing medical education before the outbreak of COVID-19. However, they were adopted as workable solutions to help students pursue their education during the pandemic. The change from the traditional education method to the electronic and virtual ones represented many challenges for the educational systems. Due to the ongoing pandemic of COVID-19 and the challenges facing education, therefore, it is expected that both virtual education and face-to-face education should be adopted by universities. Taking into account this expectation, it is necessary to identify the challenges facing virtual education, as well as to make necessary plans and develop effective solutions to deal with the given challenges. Therefore, the present study aimed to review the article in order to investigate the challenges of virtual education in medical sciences and



identify the methods to improve it. Challenges facing medical education during COVID-19 crisis are summa-

rized in Table 1 and presented in details in the following sections.

Table 1. Summary of Challenges of Medical Education During COVID-19 Crisis

	Mental Health
Mental Health and Catching Infection	Catching Infection
Challenges of virtual education	Inadequacy of infrastructure
	Lack of proficiency of professors and students in using virtual technologies and content production
	Inadequacy of infrastructure in houses
	The attitude of professors, students, and families towards the effectiveness of virtual education
	Proper interaction between professor and student and student with student
Challenges of clinical education	Time management for training
	Evaluation and measurement systems
	Allocation of teaching hospitals for referral patients with Corona
	Reducing the activity and referral of other non-emergency patients to medical centers
Medical students and the COVID-19 frontline	Impossibility of group presence of students in educational centers

2. Mental Health and Catching Infection

Depression, anxiety, and distress were among the most important psychological consequences of COVID-19 on medical students, so that 38.17%, 38.77%, and 36.83% of French medical students experienced symptoms of depression, anxiety, and distress, respectively, which were higher than those of the students of other groups. Furthermore, the rate of depression symptoms in medical students diagnosed with COVID-19 was reported to be 2.5 times higher than that of non-infected students (5). The results of a meta-analysis study showed that the prevalence of depression among medical students during the Corona period was 37.9% (95% CI: 30.7 - 45.4%), and the prevalence of anxiety was 33.7% (95% confidence interval: 26.8 - 41.1%), which were higher than those among the general population. Different rates have been reported for gender, country, and continent (6). Medical science students, due to the presence in health and treatment centers, have been reported to be more infected with COVID-19 than students of other non-clinical fields. In Jordan, for instance, the incidence of positive tests for COVID-19 has been reported to be higher among clinical students compared to pre-clinical students (7). Taking preventive measures such as providing sufficient and standard personal protective equipment and proper application, setting up proper ventilation systems, reducing the duration of attendance at health and treatment centers, as well as providing adequate vaccination coverage for students could, to some extent, reduce the psychological burden of students when dealing with infectious COVID-19 (8). Stress management and rumor management courses can be also useful when dealing with the pandemic (9, 10).

3. Challenges of Virtual Education

The widespread implementation of virtual training as the main alternative to face-to-face training methods requires preparation and infrastructure, the lack of any

of which can impede education. These infrastructures include the existence of physical infrastructure such as equipment (e.g., computers, smartphones, internet, software) as well as professors and students capable of using this technology and producing suitable content for presentation. Successful implementation of virtual training also requires offering adequate software support services, designing effective evaluation and measurement systems to reduce the cases of cheating, providing training in the specified time, establishing the proper interaction between professor and student and among students, changing the beliefs and attitudes of professors, students, and families towards the effectiveness of virtual education, and providing suitable physical space in the house for students in order facilitate using virtual education simultaneously.

3.1. Inadequacy of Infrastructure

Limited access to the internet due to the geographical diversity of students' residences, the speed, and bandwidth of the internet, as well as the additional costs associated with it are among limitations imposed on families and are the most significant infrastructural obstacles facing students in the way of their participation in online classes (11, 12). This issue is observed more in low- and middle-income countries (13). Some students cannot afford internet packages due to their families' financial problems - which were exacerbated during the COVID-19 crisis - or, in some cases, do not have access to communication facilities and sufficient equipment such as smartphones, laptops, or computers (12, 14). In Pakistan, for example, 76% of students use mobile phones for their electronic education (15). Also, the shortage of IT experts for providing technical support and preventing cyber-attacks on online operating systems is another infrastructural weakness of online education (12). Offering low-cost internet for students by government organi-

zations seems to be an effective solution to address the given problems (14).

3.2. Lack of Proficiency of Professors and Students in Using Virtual Technologies and Content Production

The inabilities of professors and students to use new educational technologies when teaching and producing content is another challenge facing education authorities. The lack of technical skills is the first challenge that has been identified in online education. The inadequacy of computer and writing skills has aggravated the general negative attitude of professors towards the new e-learning system, and this, in turn, has negatively affected the online education. Furthermore, students have generally failed to develop their necessary clinical skills through using online education systems. Since it may negatively affect their mental health (11), it is essential to develop introductory training courses and prepare virtual teaching materials for professors and students (14). Considering the variety of the courses offered in the field of medicine, the amount of virtual content of a given course should be determined prior to the virtualization of the content (16). Another essential factor was determining the teaching standard before presenting it. Determining the minimum standards not only increases the quality of teaching but does also prevent unscientific and poor teaching (16).

3.3. Lack of Physical Space in Houses

The physical environment, which includes infrastructure, physical spaces, and environmental characteristics along with its social environment, can support or hinder the learners' learning activities performed by different computers and mobile devices (17). It was reported that there were significant differences in terms of technical equipment, ergonomic furniture, and the availability of dedicated learning space based on gender and household structure in Australia, such that the more students were satisfied with their physical learning environment, the more they were motivated and healthy and the less they were anxious. Their learning experience was further enhanced by the extent to which they had a separate, fixed learning space that did not need to be coordinated or shared with others (18). There are other situations that may be associated with the problems, such as when there are two or more students in the same house, or one of the family members is a teacher or professor, and they all have to use virtual space simultaneously in a limited space. Also, the presence of students in the family leads to acceptance of different responsibilities. In addition, the noise created by other family members at home makes it difficult for students to record and send assignments when they have no separate rooms for their own (12).

3.4. Attitude of Professors, Students, and Families Regarding the Effectiveness of Virtual Education

One of the most important factors negatively contributing to the inefficiency of virtual education is quantity, quality, and order of the presented content (12). A total of 77% of Pakistani students have been reported to have a negative attitude towards e-learning due to the poor access and stability of the Internet and, therefore, to prefer face-to-face learning over virtual learning (15).

3.5. Proper Interaction Between Professor and Student and Student with Student

In online education, effective teacher-student interaction is necessary for deep learning, so teacher-student interaction promotes students' learning participation by creating a good psychological atmosphere (19). At the interactive content level of the professor and student, there are several indicators such as knowledge acquisition, ability training, emotional cultivation, and value creation from an interactive content system. Interaction in online learning is closely related to learners' learning experience, learning participation, learning satisfaction, and learning effects (19). During COVID-19 period, students stated that one of the reasons for unwillingness to use the virtual education space was lesser face-to-face interaction established in virtual classes (12). In a study by Rajab et al, 59% of students mentioned the factors related to the teacher-student relationship as one of the challenges of virtual education (20). The absence of the teacher in the classroom and his/her weak rapport with the students is one of the challenges that reduces the teacher-student interaction (21). Holding live virtual classes and creating the necessary platform for teacher-student and student-student interactions can be effective in addressing this challenge.

3.6. Time Management for Training

Before the pandemic, professors struggled with effective time management to deliver all the information needed in the curriculum. The unprecedented online teaching classes require even more time and effort from faculty and staff. Professors must dedicate time to improve their technical skills, rewrite educational content to fit online teaching methods, overcome technical difficulties, and find ways to keep students engaged in online lectures (11). In general, the faculty members believed that the educational complex should have given them enough opportunities and facilities for better adaptation (12). To overcome this problem, students should be provided with a detailed schedule for each session with a faculty contact number, and be informed of course materials and timings in advance, so that they can manage their study time in a more efficient manner (11).

3.7. Evaluation and Measurement Systems

The high volume of assignments, assignments without feedback, unrealistic evaluation, and unanswered questions are the most significant causes of dissatisfaction among students and professors in the field of student evaluation during the COVID-19 period (12). Student evaluation of the online learning process should be carried mainly out in the form of “formative learning” instead of “summary learning” (11). There are specific assessment tools that can be used to evaluate students’ knowledge through open book exams, essay questions, and assignments. Virtual objective structured clinical examinations and a virtual patient can be used for clinical evaluation (11).

4. Challenges of Clinical Education

Many universities canceled clinical internships so as to minimize personal interactions, prevent the spread of COVID-19, and reduce the risk of contracting COVID-19 in medical students (22). Also, the COVID-19 pandemic disrupted dental services –dental education, in particular – in more than three-quarters of the world’s countries. Despite the attempt made to use electronic tools and show flexibility in the face of this pandemic, as well as due to the practical nature of medical education, most of the challenges regarding education in this field could not be overcome (23). On the other hand, some medical courses – especially clinical courses along with medical education, cannot be presented via virtual classes (16). In general, the most important challenges facing clinical education in medical sciences during COVID-19 period can be categorized into three groups: allocation of teaching hospitals for referral patients with corona, reduction in the activity and referral of other non-emergency patients to medical centers, impossibility of group attendance of students in educational and evaluation centers.

4.1. Allocation of Teaching Hospitals to Corona Referral Centers

Due to the increase in the number of patients with COVID-19 requiring hospitalization and the limited capacity of hospitals, the majority of the capacity of medical centers was allocated to corona patients all over the world in order to respond to crisis adequately. Therefore, the allocation of several teaching hospitals for the referral patients with COVID-19 and the direct involvement of some faculty members in the management of the disease disrupted the pre-clinical and clinical education of medical students during the period of COVID-19 (9, 24, 25).

4.2. Reducing the Activity and Referral of Other Non-emergency Patients to Medical Centers

During the COVID-19 crisis, especially during the restriction period due to the disease, the activity of non-emergency medical centers was reduced or stopped. Also, non-emergency patients’ visits to educational medical

centers showed a significant decrease due to the fear of contracting the coronavirus. Therefore, fewer patients attended the training centers for practical and clinical training, and students were deprived of observing some training items (24-27).

4.3. Impossibility of Group Presence of Students in Educational Centers

In order to reduce the risk of contracting COVID-19 among medical students, some students were not allowed to attend the patient’s bedside. Therefore, the opportunity for students to interact with their classmates and get to know more clinical cases was limited (28, 29).

5. Students of Medical Sciences and the Frontier

Employing medical students in the frontline to fight against Corona is the other challenge of clinical, medical education. The presence of students in other educational sites results in many problems. In addition, the rate of infection of students with COVID-19 and, consequently, absence in educational classes increase with the increase in their exposure to corona patients (30).

6. Conclusions

In sum, the COVID-19 crisis was found to pose considerable challenges to faculty and students of medical education and their families. In order to increase the preparedness of the medical education system to cope with similar crises, therefore, it was suggested that combined education programs should be implemented in the post-crisis period. Moreover, it was recommended that valid and comparative studies should be conducted in order to propose the most effective combined educational method based on the geographical conditions of countries.

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