



Medical Education in Epidemic and Disaster Situations

Salgın ve Afet Durumlarında Tıp Eğitimi

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ABSTRACT

There is no standard practice for the sustainability of medical education in epidemics such as Covid-19 and disasters affecting society. Synchronous or asynchronous trainings have been carried out in some of universities and colleges that have distance education technical infrastructure, during the Covid-19 pandemic. If every student has access to information technologies and the skills of the instructors who will prepare and deliver the training increase their ability to use information technologies, there is no problem in the implementation and maintenance of theoretical lessons. During the Covid-19 pandemic, we had to go to distance education, which we had not yet implemented at Bezmialem Vakıf University Faculty of Medicine. During this period, we applied asynchronous and synchronous education models (mixed model) for theoretical lessons. However, the fact that practical and internship applications were carried out by distance education - although videos about skills and practices were shot and uploaded to the system - it was not possible to replace the formal education. Distance education is inevitable for the continuity of education in epidemic and disaster situations. However, after the epidemic and disaster situations have passed, practical and internship practices should be carried out as much as possible in addition to distance education in medical education. In normal times, distance education can only be used to support formal education in medical education. As a result of all these evaluations and experiences we gained in the Covid 19 pandemic, we think that synchronous/synchronous distance education applications will improve over time and contribute to medical education.

Keywords: Distance education, epidemic, pandemic, disaster

ÖZ

Covid-19 gibi salgın hastalık durumlarında ve toplumu etkileyen afetlerde tıp eğitiminin sürdürülebilirliğine yönelik standart bir uygulama bulunmamaktadır. Yaşadığımız Covid-19 salgınında uzaktan eğitim alt yapıları bulunan bazı yüksek öğretim kurumlarında senkron/eş zamanlı ya da asenkron/eş zamanlı olmayan eğitimler yapılabilmektedir. Her öğrencinin bilgi teknolojilere erişimi sağlandığı ve eğitimi hazırlayacak ve sunacak öğretmenlerin bilgi teknolojilerini kullanma becerileri arttığı takdirde özellikle teorik dersler için uygulanması ve sürdürülmesinde bir sorun bulunmamaktadır. Covid-19 salgını döneminde Bezmialem Vakıf Üniversitesi Tıp Fakültesi'nde henüz o zamana kadar uygulamadığımız uzaktan eğitime geçmek zorunda kaldık. Bu sürede teorik dersler için asenkron ve senkron eğitim modellerini birlikte (karma model) uyguladık. Ancak pratik ve staj uygulamalarının uzaktan eğitimle yapılmasının her ne kadar beceri ve pratiklere yönelik videolar çekilip sisteme yüklenmiş olsa da -örgün eğitimin yerine geçmesi mümkün değildi. Uzaktan eğitim salgın, afet durumlarında eğitimin devamlılığı için kaçınılmazdır. Ancak salgın, afet durumları geçtikten sonra tıp eğitiminde uzaktan eğitime ek olarak pratik ve staj uygulamalarının mümkün olduğunca gerçekleştirilmesi gerekmektedir. Normal zamanlarda da, tıp eğitiminde uzaktan eğitim ancak örgün eğitime destek olarak kullanılabilir. Bütün bu değerlendirmelerimiz ve Covid-19 salgınında kazandığımız deneyimler sonucu senkron/senkron uzaktan eğitim uygulamalarının zaman içinde daha gelişeceği ve tıp eğitimine katkı sağlayacağını düşünüyoruz.

Anahtar Sözcükler: Uzaktan eğitimi, salgın, pandemi, afet

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Introduction

Although there are preliminary preparations, laws and regulations for health services and disaster management in epidemic diseases such as Covid-19 and in disasters affecting the society, there is no standard practice for the sustainability of medical education in such cases. Due to the intensity of applied courses in both pre-clinical and clinical periods in medical education, the option of conducting medical education completely with distance/web-based education is quite limited. However, with technological developments, there are many options in which particularly theoretical courses can be given by distance education. In the Covid-19 epidemic we experience, some higher education institutions with distance education infrastructures can benefit from this system, as well as synchronous/simultaneous or asynchronous/non-simultaneous education using communication technologies on the internet. In this epidemic, the importance of information technologies has increased even more.

Flexible learning environments offered in distance education/web-based education/online education that can be maintained regardless of time and place are considered as a promising innovation (1). If every student has access to these technologies and the skills of the instructors who will prepare and present the course increase, there will be no problem in applying and maintaining them, especially for theoretical courses. This situation is seen in the reports published by the Turkish Council of Higher Education (CoHE) in the epidemic that we experienced (2).

With the studies, the advantages and limitations of distance/web-based education have been investigated. These include lack of face-to-face interaction, not understanding the developments in the learning process, not being motivated to study on their own by individuals without self-discipline, not being able to communicate when the number of students is high, and naturally, the limitations in laboratory and internship practices as in medical education. In fact, the main process of success in education is good communication between learner and teacher, communication and cooperation among students, giving appropriate feedback and guidance. Distance education has important limitations in these respects. On the other hand, it is thought that the learning methods and environments used today are insufficient to meet the expectations of the generation z, which has grown up in a digital age. Therefore, it has already become compulsory for educational institutions to renew their curricula and support them with advanced technologies (3-7).

History of Distance Education

The first efforts regarding distance education started with education with letter in the 1800s and was supported by means such as radio and tape recorders in the first half of the 1900s (8). Later, with the rapid developments in the technologies of television, video and computer communication systems, the dimensions of the application varied considerably and reached today. Distance education in our country was first initiated in 1950 by Ankara University Faculty of Law as a learning

practice with letter. The most rooted practice was started to be implemented by Anadolu University Open Education Faculty. In 1996, Bilkent University established distance education center and started distance education applications via video conference. In 1997, the Middle East Technical University founded Informatics Institute and started to coordinate distance education activities from there (9).

Distance Education at Present

Today, instead of the term “distance education”, the concepts of online education/web-based education or simply e-learning are also used. Therefore, if the definition of e-learning is to be made, it is “a general name given to synchronous or asynchronous education and training activities published on the internet as audio, visual and interactive”. E-learning is a learning type realized by the individual’s self-learning over the internet or local network, having no boundaries for time and place in accessing information, being simultaneous (synchronous) or asynchronous (non-simultaneous), establishing communication between teachers and learners, providing interaction with visual and audio applications offered by computer technology, providing individuals with the opportunity to benefit from lifelong education and training activities. There are three types of models applied in e-learning. These are synchronous (simultaneous), asynchronous (non-simultaneous) and mixed models (9).

Synchronous, in other words simultaneous or live electronic learning, means that the communication between individuals takes place at the same time and the information entry is instant. Simultaneous interactions are only possible when instructors and students work together at the same time. In order for students to hear, see and share applications made over the internet, facilities such as at least a computer and an uninterrupted internet connection are required. Asynchronous, in other words non-simultaneous learning and learning at different times, is a form of instruction that allows the student to complete his/her study within a certain time period according to his/her program and study order without establishing a live connection with any instructor. The biggest disadvantage of synchronous education is that it conflicts with distance education philosophy in terms of time. As it is known, continuity of education regardless of time and place is included in the definition of distance education. However, there is a time limitation in synchronous education. In the asynchronous method, the lessons are prepared in advance by the instructor and the student can access this information at any time. Communication between the instructor and the student and between the students themselves does not occur at the same time and in the same time period. In this way, students can access this information from wherever and whenever they want and complete their education. In the process, they ask the educators or other students about the subjects they do not understand, by means of e-mail, discussion forums, with predetermined addresses and they share information in this way (9). In the mixed model, all the materials related to the same subject are uploaded to the system (asynchronous method) and also live lessons are carried out on the same topic (synchronous method).

In some cases, while a part of the lesson runs asynchronously, certain parts of the lesson continue synchronously (9).

Distance Education in Our Country in Covid-19 Pandemic

In our country, many educational institutions continued synchronously or asynchronously to higher education, which was interrupted in the Covid-19 pandemic (2). In synchronous/simultaneous web-based education, education has been carried out by using the features of information technologies and appropriate web-based programs in accordance with the current course schedule and course hours, ensuring that the instructors and students participate in the training activity live simultaneously. In order for the training to be effective, it is possible to convey the image and/or voice of the instructor to other users, and to provide whiteboard, chat, presentation view, and document sharing. Questions asked by students during the lectures can be answered, and questions can be asked by the instructor. Although limited, communication has been provided. In addition, it is possible to re-watch the records made while lectures are given by the students later. In asynchronous distance education, it has also been possible to upload and share educational slides over similar programs, create and upload audio and video recordings of the lessons, and enable students to watch them whenever they want. In this way, it has been possible for the students to watch the records and documents that were uploaded to the program without a live lesson when they are available. According to the report prepared by CoHE, 121 of 189 universities (64%) started distance education due to Covid-19 pandemic on March 23, 2020 (one week after YÖK suspended education at universities), 41 (21.6%) on March 30, 2020, and 25 (13.2%) on April 6, 2020. Almost all of the universities (99.2%) started to conduct their theoretical courses through distance education and approximately 89% of them started to conduct the theoretical parts of the applied courses through distance education. Live classroom practice was carried out in 22% of the courses opened with the distance education method. While 53.2% of Foundation Universities kept the live course practices as “compulsory in all courses”, this rate was 29.1% in state universities (2).

Evaluation of Distance Education

Until today, some concrete data have been obtained from studies in which the opinions of educators and students on distance education were taken in order to use distance education more effectively in our universities and the problems experienced during the implementation process were tried to be determined (10-16). Various questionnaires and scales have been created to be used in these studies. The participants of the questionnaire created by Barış and Çankaya regarding distance education stated that theoretical courses could generally be given through distance education, but applied courses and courses requiring interaction could not be given in this way (17). Similarly, in the study of Özköse et al. (15), it was concluded that distance education was not suitable for applied and interactive lessons. As the positive aspects of distance education, being independent of time and place, offering the opportunity to repeat and presenting

rich content have come to the fore, while the negative aspects have been the lack of interaction, less participation in the course and the decrease in the importance of the course in the eyes of students (15).

Distance Education in Medical Education

In medical education, e-learning applications were started to be used, especially after the 1960s, in computer aided postgraduate education (8). When the e-learning applications carried out in medical faculties are examined, it is seen that it is mostly used in basic sciences and relatively less in clinical sciences. However, it is noteworthy that the applications in clinical sciences have increased over the years. There are examples of applications made especially in clinical sciences such as Radiology, First and Emergency Aid, and Surgery (18,19). It is seen that these practices carried out in medical faculties are mostly for trial purposes and generally, students' exam success and satisfaction with the application are examined as a result of the application. It is noteworthy that especially Surgery, Urology, First Aid and Emergency disciplines lead such studies in medical education before graduation (19). Studies show that the level of knowledge of the students is the same or is high in the e-learning group, students are satisfied with the e-learning application supported by rich resources and they want to increase its prevalence. Studies conducted on Medical Faculty students have also found that e-learning is a better method for learning, gaining skills and attitudes than classical courses, students keep information in mind longer and use information better with e-learning (19). It has been stated that e-learning has a more positive effect on learning motivation compared to classical education due to the fact that it enables them to master the learning process, enables them to access information resources more and more easily via the internet, and makes learning more enjoyable (20). Currently, it is generally used as an application to support medical education and is mostly preferred as an asynchronous method. E-learning application is more widely used in postgraduate medical education as well as in graduate medical education. In our country, the practices of the Turkish Medical Association (TMA) in this area are particularly striking (8,9). The potential of existing e-learning applications to be included in the applied parts of medical education seems very high. Many applications that will be prepared especially considering epidemic and disaster situations can be brought together with students thanks to information technologies.

“Augmented reality” applications, which have an important potential to increase the functionality of educational environments in medical education and to provide learning activities by practising, have started to be used in educational environments. Augmented reality technology, which stands out in terms of having the potential to attract the attention of the generation z on the one hand, and responding to the search for effective methods/environments to support and enrich education on the other hand, is a new technology that can be used in web-based education. It is recommended to reveal the potential of this technology in terms of education and to be more recognized and used by educational technology experts and educators (21).

On the other hand, many augmented reality applications related to medical education have been developed today. Augmented reality is considered as an effective solution to create a virtual three-dimensional patient model. The integration of data that can be useful for the patient during the operation with the real patient data by calculating with a computer helps the surgeon. Moreover, with the augmented reality simulators that use information obtained from real patient data such as heartbeat and pulse, the trainees who receive medical education are given theoretical and psychomotor skills. In addition to these, simulators (22) for childbirth and various surgeries and applications showing x-ray images on the patient have also started to be used in medical education. Augmented reality technique is an alternative application in distance medical education especially for practices in epidemic and disaster situations. On the other hand, as a new technology, augmented reality applications such as *Google Glass* are already used in the practices of medicine and health education and they are a technological approach that can be adapted to distance education models (23).

Distance Education at Bezmi Alem Foundation University Faculty of Medicine during the Covid-19 Outbreak Process

The new coronavirus (Covid-19) disease resistant to treatments, also called SARS-CoV-2, which was first seen in Wuhan, China in December 2019 and caused pneumonia, affected the whole world in a short time. On March 11, 2020, it was declared as a global epidemic (pandemic) by the World Health Organization. The index case was detected in our country on March 11, 2020, and after this date, measures were taken across the country to gradually reduce and prevent the spread of the virus in the society. Within the scope of these measures, education and training were suspended at all schools, including universities, across the country until the end of the month as of March 16, 2020. In the writing of the Council of Higher Education dated 19.03.2020 and numbered 758550160-199-E.22344, upon the decision about universities to provide courses through distance education method for the Spring term of 2019-2020 Academic Year due to the Covid-19 pandemic, distance education started at the Bezmi Alem Foundation University (BFU) Faculty of Medicine on 23.03.2020 in accordance with the decisions of BFU Education Commission on 19.03.2020.

First of all, in order to compensate for the educational activities to cover the week of March 16-23, 2020, the course contents were immediately uploaded to the *learn.bezmialem.edu.tr* distance education portal as presentation files, lecture notes, etc. materials in the form of a slide (PowerPoint) presentation or pdf, and presented to our students asynchronously. In this system, it can be seen whether the students have opened the slides of the lessons and how long they have completed the lesson. As of March 23, 2020, education and training activities have been continued with presentation file of course contents, lecture note, audio-video recording (to enable students to learn more effectively and increase their motivation) or by uploading all to *learn.bezmialem.edu.tr* system to cover all of these methods asynchronously. At the same time, at the BFU Education Commission meeting dated 19.03.2020, it was decided that the Departments and the

Faculty Secretariat, Student Affairs and Information Technology Directorates should work in cooperation in order to carry out the process effectively. Technical support was provided to teach the lessons with audio and / or video recording (asynchronous distance education model) and lecturers were encouraged in this regard. In accordance with the decisions of the BFU Education Commission on 26.03.2020, it was concluded that the *i-spring suite system*, which was previously available at our university, could be used while recording audio and / or video with the support of the information technologies directorate within our university. Later, *i-spring suite* link was shared with faculty instructors via e-mail. On-line training was provided by information technologies department on how to make course presentations via this link. For those who could not attend the training, training videos were recorded and shared with the faculty members. For our faculty instructors who could not record audio and / or video from their own computers in the environment they were in, cameras and microphones were installed in the objectively structured clinical exam (OSCE) laboratory rooms in the Faculty of Medicine and the computers in these rooms were made ready. With the necessary technical infrastructure and support, audio and / or video recordings of the course subjects were taken by the relevant faculty members and uploaded to the *learn.bezmialem.edu.tr* system by the faculty secretaries. The *i-spring system* is one of the asynchronous education materials such as *camtasia* and *snagit*. This system allows you to record screenshots on presentations, record presentations with audio or video, and also gives detailed information about when and how long educational materials, such as presentations, videos, pictures etc. in e-learning structures similar to moodle, are followed by the students.

Upon the extension of the interruption of education and training due to the epidemic, synchronous education was started after March 30, 2020 in addition to asynchronous education in order to increase interaction with students and to create an environment for questions and answers by ensuring their active participation in the course. The faculty members were provided with the necessary technical equipment and support to provide synchronous education in our Faculty of Medicine (OSCE laboratory rooms), as well as in the realization of asynchronous education. It is similar to other online training programs such as adobe connect, google meeting, webex, zoom and teams. There are some differences among these systems such as licensing models, device compatibility, and number of participants. While most of the courses went parallel to the academic calendar, some of them were carried out retrospectively. After the distance education process started in the BFU Faculty of Medicine, it was observed that 30% of the course subjects were taught with both asynchronous and synchronous distance education methods in all classes (1st, 2nd, 3rd, 4th and 5th). It was found that it was more beneficial for the students to learn the lesson subject first asynchronously and then as synchronously. During this period, videos of the skill lessons were also shot and uploaded to the system. During the Covid-19 epidemic, it was determined that the most synchronous lessons were given to the 2nd and 4th grades, and it was noted that the faculty members of the department of

infection, chest diseases and emergency departments could not do synchronous lessons at all due to their duties in the pandemic. The departments offering the most synchronous lectures were pediatrics from internal medical sciences, microbiology and pathology from basic sciences.

We applied a learner-centered feedback questionnaire, which evaluated the effectiveness of the models we used regarding the distance education system on learning the course and exam success, and also included an additional question about what they thought about using the distance education system when the normal process was started. We also applied a similar teacher-centered feedback questionnaire to lecturers, evaluating the difficulties they encountered during distance education and the effectiveness of education models. We asked the faculty members additional questions regarding their suggestions on distance education. 349 students took part in this survey. 97.7% of the participants were between the ages of 20 and 24 years, and 65.5% were female students. Semester 3 (27.5%) and 2 (26.9%) students had the highest participation in the survey. When our students' survey results were evaluated, it was seen that 8.9% of the students stated that loading the course subjects in the form of a slide alone might be sufficient for both learning the course and exam success; adding videos or audio recordings to the slides and loading them into the system might be sufficient for 31.2% of students to learn the course, and for 20.6% of students for the success in the exam. 43.8% of the students stated that live courses might be sufficient in learning the lesson and 31.2% stated that live courses might be sufficient in the exam success. 63.9% of the students found it more beneficial both to have video-audio narration of the lesson previously and then to make the same lecture live later in accordance with the academic calendar. Only 26.1% of students stated that when the normal process was passed, distance education might be sufficient for theoretical courses and formal education would not be required. On the other hand, 121 instructors participated in this survey. 45.5% of these participants were between the ages of 40 and 49 years, 24% were between the ages of 50 and 59 years, and 68.8% were male (this is related to the higher number of male faculty members). Of them, 47.9% were from internal medical sciences, 38.8% were from surgical departments, and 13.2% were from basic medical sciences (This result is also related to the number of faculty members in those departments). 91.7% of the faculty members had not had any previous experience as an educator in distance education. 53.7% of the faculty members thought that the distance education process contributed to them academically. When the survey results were evaluated, 45.5% of them stated that they had problems in achieving classroom dominance during the live lessons, and 33.7% of them had problems with technical equipment and infrastructure. 51.2% of the lecturers stated that lecturing with video/audio recording (asynchronous model) was more beneficial for students and 41.3% stated that live lectures (synchronous model) were more beneficial for students. Again, 50% of the faculty members stated that they could use distance education models in theoretical lessons when the normal process was started. They made suggestions that it would be necessary to develop technical infrastructure and to give training about it

to them, and that it would be more beneficial for students to determine new strategies to keep students active in live lessons. On the other hand, they emphasized that distance education should not be applied except for compulsory cases for practical lessons and case studies.

We hope that wider feedback surveys, which will be applied for distance medicine education focusing on learner and education, will contribute to the shaping of more effective and efficient education in the future, both in the normal process and in extraordinary situations.

Conclusion

During the Covid-19 outbreak, we had to switch to distance education at the Bezmialem Bakır University Faculty of Medicine, which we did not apply until then. During this period, we applied asynchronous and synchronous education models together (mixed model) for theoretical lessons. We found that the mixed model applied for the same course subjects was more beneficial for students. However, it was not possible distance education in practical and internship practices- although videos on skills and practices were recorded and uploaded to the system- to replace formal education.

In addition, for theoretical courses, distance education has limitations such as the inability to provide face-to-face interaction and opportunities, the inability to immediately solve the difficulties encountered in the learning process, planning difficulties for students who cannot work individually, and limitations in communication due to the excess number of students. As a matter of fact, only a quarter of the students have stated that distance education may be sufficient even for theoretical courses when the normal process is passed. Limitations in conducting theoretical and especially practical exams are also an important disadvantage. Distance education is inevitable for the continuity of education in epidemic and disaster situations. However, after the epidemic and disaster situations have passed, practical and internship applications should be carried out as much as possible in addition to distance education in medical education.

In normal times, distance education in medical education can only be used as a support to formal education. As a result of all these evaluations and the experiences we have gained in the Covid-19 pandemic, we think that synchronous/asynchronous distance education applications will develop further over time and contribute to medical education.

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