Research Doi:

Experiences of Educators in Undergraduate and Postgraduate Medical Education in Covid-19 Pandemic: A Qualitative Study

Covıd-19 Pandemisinde Tıp Eğiticilerinin Mezuniyet Öncesi ve Sonrası Tıp Eğitimindeki Deneyimleri: Nitel Çalışma

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Abstract

Aim: Since the beginning of the COVID-19 pandemic, medical faculties have been trying to adapt their program, their students and educators, which are the main components of education, to new and rapidly changing conditions. For this reason, this study aims to investigate medical educators' point of view about the effects of pandemic on undergraduate and graduate medical education, and their experiences during the pandemic.

Method: It is a basic qualitative study. The study was carried out with the participation of a total of 13 medical educators, 4 from basic sciences, 6 from internal sciences and 3 from surgical sciences, at Hacettepe and Akdeniz University Faculty of Medicine, between October and November 2020. In-depth individual interviews were conducted with the participants and the findings were evaluated with thematic analysis.

Results: Participants most commonly shared negative opinions about the effect of the pandemic. Medical educators commonly think that the inability to continue face-to-face clinical education (Terms 4-5) in undergraduate education due to the pandemic negatively affects the acquisition of clinical competencies and professional attitudes and values. During the pandemic process, the negative effects of insufficient number and variety of patients and interventional practices, especially in clinical specialties, are reported in postgraduate education. Clinical teaching activities (visit, bedside discussion, etc.) were applied considering the risk of infection. Medical educators' online teaching experiences have included difficulties in planning/adapting teaching, preparing materials, providing online student participation, teacher-student interaction, motivation, and conducting reliable and methodically rich exams. Developing and increasing the accessibility of educational materials for distance education were evaluated as positive developments. While medical educators see the adaptation process to distance education as a challenge in terms of using technology and rapidly adapting teaching during the pandemic process, they also perceive it as an important gain. The negative effects of the lack of face-to-face interaction with the student in the social and psychological context were widely shared.

Conclusions: The distance education experiences of medical educators in the COVID-19 pandemic draw

Keywords: Undergraduate Medical Education, Postgraduate Medical Education, Medical Educators, COVID-19 Pandemic

Anahtar Sözcükler: Mezuniyet Öncesi Tıp Eğitimi, Mezuniyet Sonrası Tıp Eğitimi, Tıp Eğiticileri, COVID-19 Pandemisi

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attention to the importance of improving the technological infrastructure of medical faculties and supporting educators (use of technology, distance education-assessment methods). In addition, arrangements (social networks, feedback, etc.) that support medical educators socially and motivationally are recommended. In the context of carrying on face-to-face education in pandemic conditions, it is important to provide and maintain safe clinical and learning environments for educators, learners and patients. It is recommended to carry out studies to ensure equal opportunity at the national level, and to increase cooperation and sharing (educational materials and infrastructure) among medical faculties.

Özet

Amaç: *COVID-19 pandemisinde tıp eğitimi, eğitimin temel bileşenleri olan program, öğrenci ve eğiticilerin yeni ve hızla değişen koşullara adaptasyonunu sağlayarak yanıt vermeye çalışmıştır. Bu çalışmada, tıp eğiticilerinin COVID-19 pandemisinin mezuniyet öncesi (MÖE) ve sonrası (MSE) tıp eğitimine etkilerine yönelik görüşlerinin ve eğiticilik deneyimlerinin incelenmesi amaçlanmıştır.*

Yöntem: *Temel nitel araştırma desenli çalışma, Hacettepe ve Akdeniz Üniversitesi Tıp Fakülteleri'nde, Ekim- Kasım 2020 döneminde temel bilimlerden 4, dahili bilimlerden 6 ve cerrahi bilimlerden 3 olmak üzere toplam 13 tıp eğiticisinin katılımı ile gerçekleştirilmiştir. Katılımcılarla derinlemesine bireysel görüşmeler yapılmış ve tematik analiz ile bulgular değerlendirilmiştir.*

Bulgular: *Katılımcıların COVID-19 pandemisinin MÖE ve MSE'e etkilerine yönelik görüşlerinde olumsuz etkiler daha sıklıkla paylaşılmıştır. Tıp eğiticileri yaygın olarak MÖE'de pandemi nedeniyle klinik eğitimin (Dönem 4-5) yüz yüze sürdürülememesinin klinik yeterliklerin ve profesyonel tutum ve değerlerin kazanımını olumsuz etkilediğini düşünmektedir. MSE'de pandemi sürecinde özellikle klinik uzmanlık alanlarında yeterli sayı ve çeşitlilikte hasta görememe ve girişimsel uygulamalar yapamama olumsuz etkiler olarak öne çıkmıştır. Klinik öğretim etkinlikleri (vizit, hasta başı tartışma vb.) enfeksiyon riski gözetilerek uygulanmıştır. Tıp eğiticilerinin çevirim içi öğretim deneyimleri, öğretimi planlama/adapte etme, materyal hazırlama, çevirimiçi öğrenci katılımını, eğitici-öğrenci etkileşimini ve motivasyonunu sağlama, güvenilir ve yöntemsel olarak zengin sınavlar yapabilme açısından zorluklar içermiştir. Uzaktan eğitim için eğitim materyallerinin geliştirilmesi ve ulaşılabilirliğinin arttırılması olumlu gelişmeler olarak değerlendirilmiştir. Tıp eğiticileri pandemi sürecinde uzaktan eğitime uyum sürecini teknoloji kullanımı ve öğretimi hızla adapte etmek açısından bir zorlanma olarak görürken, aynı zamanda önemli bir kazanım olarak da algılamaktadır. Öğrenci ile yüz yüze etkileşimin olamamasının sosyal ve psikolojik olumsuz etkileri yaygın olarak paylaşılmıştır.*

Sonuç: *Tıp eğiticilerinin COVID-19 pandemisindeki uzaktan eğitim deneyimleri tıp fakültelerinin teknolojik altyapılarını geliştirmeleri ve eğiticilerin desteklenmesinin (teknoloji kullanımı, uzaktan öğretim-ölçme yöntemleri) önemine dikkat çekmektedir. İlaveten, tıp eğiticilerini sosyal ve motivasyonel olarak destekleyici düzenlemeler (sosyal ağlar, geribildirimler vb.) yapılabilir. Pandemi koşullarında eğitimin yüz yüze sürdürülmesi açısından eğiticiler, öğrenenler ve hastalar açısından güvenli klinik ve öğrenme ortamlarının sağlanması ve sürdürülebilirliği önemlidir. Ulusal düzeyde fırsat eşitliğini sağlamaya yönelik çalışmalar yapılması, tıp fakülteleri arasında iş birliğinin ve paylaşımın (eğitim materyalleri ve altyapısı) arttırılması önerilir.*

INTRODUCTION

The new Coronavirus (COVID-19) pandemic forced people to change their social, educational, and physical lives more clearly and rapidly than other factors did in the last century. This situation has brought forward the debates on the responsiveness of undergraduate and postgraduate medical education to extraordinary situations, as in every field. Medical schools have been trying to respond to new conditions during the pandemic process by adapting the program, students, and educators, which are the basic components of education. To date, there have been criticisms that medical education has remained slow to adapt to the

rapidly changing educational environment and the changing needs of the medical workforce (1,2). Therefore, in some respects, the COVID-19 pandemic is seen as a facilitator of innovation in medical education (3).

Building a sustainable information technology infrastructure that will support the growing capacity needed to sustain education during the pandemic will help educators create, produce and deliver educational materials online. In the light of this technological infrastructure, suggestions were made such as supporting trainers to help adapt face-to-face teaching skills to the distance learning environment by providing training and support (4). However, planning and continuing education in online environments in a very short time during preclinical and clinical training periods is a fairly new and multidimensional experience for medical educators. Medical educators have quickly become skilled in using platforms that allow lectures to be recorded and delivered synchronously or asynchronously during the pandemic period (5). They have learned how to use platforms such as Blackboard, Zoom, or Teams for the continuity of teaching. This approach has allowed medical education to overcome barriers by using some advanced learning platforms that are fit for purpose (6).

During the pandemic period, the literature on students and education programs, which are the two main components of medical education in undergraduate and postgraduate education is developing rapidly (7–11). However, there is a limited number of publications reflecting the perspectives and experiences of the trainers who are other significant stakeholders of medical education.

The aim of this study was to examine the views and educational experiences of medical educators (faculty members) on the effects of the COVID-19 pandemic on undergraduate (UGME) and postgraduate medical education (PGME). Within the scope of the research, answers to the following questions were sought:

-What are the views of medical educators on the effects of the COVID-19 pandemic on undergraduate and postgraduate medical education?

-What are the experiences of medical educators in undergraduate and postgraduate medical education in the COVID-19 pandemic?

-What are the recommendations of medical educators to improve the responsiveness of medical education to the pandemic and similar extraordinary situations in which the education might be interrupted?

METHOD

Research Pattern

It is a basic qualitative study. An in-depth interview method was used to investigate the experiences and opinions of medical educators.

Study Location

This study was conducted in Hacettepe University Faculty of Medicine (HUFM) and Akdeniz University Faculty of Medicine (AUFM). Both schools are among the largest medical schools in Turkey in terms of infrastructure and have similar characteristics regarding students, trainers, and educational programs. HUFM carries out two UGME programs in Turkish and English and offers doctorate, specialty, and subspecialty training in 10 departments in basic sciences, 20 departments and 29 disciplines in internal sciences, and 13 departments and 2 disciplines in surgical sciences. AUFM carries out the UGME program in Turkish and provides doctorate, specialty, and subspecialty training in 9 departments and 4 disciplines in basic sciences, 20 departments and 30 disciplines in internal sciences, and 13 departments and 3 disciplines in surgical sciences. The duration of UGME in both schools is 6 years (the first 3 years of preclinical training, 2 years of clinical training, and 1 year of internship). The

postgraduate residency training period varies from 3 to 5 years.

Study Group

Since it was planned to obtain qualitative data through in-depth interviews in the study, convenient case sampling method was used. Faculty members with distance medical education experience were included in the study on a voluntary basis. Six participants were from Hacettepe University and seven from Akdeniz University. The distribution of the study group by disciplines, gender, and academic title is presented in Table 1.

Table 1. Qualifications of the Study Group

Gender	Female	9
	Male	4
Internal Sciences	Internal diseases	1
	Pediatrics	1
	Pulmonology	1
	Community health	1
	Radiology	1
	Emergency	1
Surgical Sciences	Urology	1
	Ear nose throat	1
	Anesthesia	1
Basic Sciences	Anatomy	1
	Physiology	1
	Microbiology	1
	Biochemistry	1
Academic Title	Assistant Professor	1
	Associate professor	4
	Professor	8
TOTAL		13

Implementation of the Study

The study was conducted in the fall term of the 2020/21 academic year. Educators were asked to share their views about their academic experiences during the first phase of the pandemic, which was in the spring term of the 2019/20 academic year, and the second phase of the pandemic, which was in the fall term of the 2020/21 academic year.

Interviews were carried out individually with each participant via MS Teams®. The questions about the effects of the pandemic on UGME and PGME, educators' experiences during the pandemic, and their views on what can be done in medical education to be more prepared for pandemics and similar situations in the future were included in the semi-structured questionnaire prepared for interviews by the researchers. Interviews were conducted by the authors. In the individual interviews, voice recordings were taken with the consent of the participants.

Analysis of Individual Interviews

The information obtained from the individual interviews was analyzed with the thematic content analysis method. Thematic content analysis was carried out by two researchers following the process described below (12).

-Quickly reading raw data and identifying possible codes. Compromising on possible codes,

-Identifying and clustering statements (analysis units) in response to research questions,
-Detailed reading and determining which theme each statement may correspond to,
-Evaluating themes in terms of frequency, specificity, emotional content, and extensibility,
-Discussing and reaching a consensus on the contexts and possible themes of the study,
-Reviewing analyses (individual),
-Finalizing the thematic tables by consensus and choosing example expressions, and
-Interpreting the findings based on the literature and current programs and practices.

Validity and Reliability Information

Opinions were received from 3 field experts (from the departments of clinical sciences, basic sciences, and medical education) regarding the questions in the individual interview questionnaire. Two faculty members who would not take part in the study group were asked to evaluate the clarity of the questions. According to the opinions received, the individual interview questionnaire was given its final form. The analysis of the data obtained after individual interviews were carried out by two researchers in two rounds. It was determined that there was 70% consistency between the independent codings of the researchers in the first round, and a consensus was reached in the codings at the end of the second round.

Ethical Consideration

The study was approved by Akdeniz University Faculty of Medicine Clinical Research Ethics Committee on 26.08.2020 with the number KAEK-644. Participation in the study was based on volunteerism, and the participants were included in the study after their written and verbal consent had been obtained.

RESULTS

Research findings are presented under the headings of the effects of the pandemic on UGME and PGME, the experiences and achievements of medical educators in the pandemic, and the necessity to increase the responsiveness of medical education to extraordinary situations such as pandemics. While sharing the findings, participant (P) numbers were used.

Effects of the COVID-19 Pandemic on Undergraduate Medical Education

As a result of the analysis of participant views on the effects of the COVID-19 Pandemic on UGME, considering the "negative" and "positive" context, a total of 66 codes and 206 analysis units were determined in 6 themes and 18 subthemes. In the negative context, a total of 44 codes and 141 analysis units were obtained under the themes of "Curriculum and Instruction" (68.70%), "Students" (24.82%), and "Educational administration" (6.38%). In the positive context, a total of 22 codes and 65 analysis units were obtained in the themes of "Curriculum and Instruction" (75.38%), "Educational administration" (16.93%), and "awareness of medical education" (7.69%). Quotations about effects of the COVID-19 Pandemic on undergraduate medical education are shown in Appendix 1.

Effects of the COVID-19 Pandemic on Postgraduate Medical Education

In this study, as a result of the analysis of the opinions of medical educators on the effects of the COVID-19 Pandemic on postgraduate medical education, in the "negative" and "positive" context, a total of 27 codes and 87 analysis units were determined in 5 themes and 8 sub-themes. In the negative context, a total of 16 codes and 56 analysis units were obtained in the themes of "specialty training" (82.14%), "academic studies" (12.50%), and "doctoral education" (5.36%). In the positive context, a total of 11 codes and 31 analysis units were

determined in the themes of "teaching-learning processes" (51.61%) and "program adaptation" (48.39%). Quotations about effects of theCOVID-19 Pandemic on Postgraduate Medical Education are shown in Appendix 2.

Experiences of Medical Educators of the COVID-19 Pandemic

A total of 39 codes and 98 analysis units were determined in five (5) themes and 14 sub-themes in the contexts of UGME and PGME from the views of participants' experiences in the COVID-19 pandemic. In the context of UGME, a total of 26 codes and 77 analysis units were obtained under the themes of "effects of distance education" (46.75%), "teaching in distance education" (38.96%), and "adaptation" (14.29%). In the context of PGME, a total of 13 codes and 21 analysis units were determined in the themes of "safe working and educational environment" (66.67%) and "being an educator" (33.33%). Quotations about experiences of Medical Educators of the COVID-19 Pandemic are shown in Appendix 3.

Responsiveness of Medical Education to Extraordinary Situations such as Pandemics

The following codes and analysis units were obtained as a result of the questions asked about increasing the responsiveness of medical education to extraordinary situations such as pandemics: A total of 28 codes and 75 analysis units were determined under 4 themes and 10 sub-themes; 10 codes and 27 analysis units in the theme of "Curriculum and instruction" (36.00%), 7 codes and 22 analysis units in the theme of "Medical educators" (29.33%), 5 codes and 15 analysis units in the theme of "Infrastructure" (20.00%) and 6 codes and 11 analysis units in the theme of "Educational administration" (14.67%). Opinions of medical educators on increasing the responsiveness of medical education to extraordinary situations such as pandemics are shown in Appendix 4.

DISCUSSION

Effects of the COVID-19 Pandemic on Undergraduate Medical Education

Medical educators more frequently expressed their views on the negative impact of the COVID-19 pandemic on the UGME. The prominent disadvantages are that 4th and 5th-year programs are not implemented with real patients in the clinical setting, the number and duration of clinical education activities are reduced during the internship, and the practical sessions cannot be made during the preclinical period. This situation was caused by the application of distance education in both medical schools during the period of the research, except for the internship period (sixth year). The disruptions experienced in clinical education due to the transition to distance education have been reported in the literatüre (13,14). Conducting clinical training online has also had negative effects on the acquisition of professional values and attitudes. The lack of role models, the inability to interact with real patients, healthcare team, and peers may have been influential. To achieve attitudinal goals in distance education, suggestions are made such as reorganizing the education program, upgrading the technological infrastructure and simulation laboratories, educating faculty members and students in technology, and synergizing faculty development with internal quality assurance (15).

Negative situations such as inadequate interactions in the online lessons (asking questions, discussion, etc.), low level of participation and engagement of students, and unwillingness are pointed out as a result of online education. Despite these disadvantages, it is possible to note a number of positive impacts such as being able to access the online education materials anytime/anywhere, not having a negative experience in terms of knowledge acquisition of students, and having interactive training activities (case-based,

problem-based learning, etc.), with the help of online education. Despite the positive opinions given by the participants of this study, a successful online program cannot be developed just by providing online materials and interactive training activities. In the literature, it is suggested to question all of the components of the program in depth in order to maintain an online competency-based education (16). The perceived effectiveness of online applications in terms of knowledge gain may be dependent on the limited knowledge about online teaching methods that the faculty members have. The authors think that this situation is an indication of the importance of training for trainers. With a well-trained faculty, online education can be turned into an opportunity by using appropriate educational tools that develop problem-solving skills and creativity, as well as knowledge transfer through applications such as the flipped classroom (17).

One of the most important disadvantages stated in this period is the problems experienced in the field of assessment and evaluation. These problems include the difficulty of adapting to the infrastructure and application process, the low reliability of the online exams, the inability to measure clinical skills and not using different assessment methods. In the literature, opinions in this direction have been expressed, and it has been suggested to provide formative evaluation through homework and projects as well as decision-making exams (14,18). However, the ease of preparation and implementation of online exams is seen positively by some participants in the study. Experiencing some difficulties and spending more time in preparing and administering the face-to-face exams for a large number of students may be the reason for these positive opinions.

When the findings are evaluated in terms of education management, it is seen as a disadvantage that the education is interrupted even for a short time and the uncertainty continues and the education program is constantly revised. In addition to these, the development and accessibility of educational materials for distance education and the development of the technological infrastructure were welcomed by the faculty members. In both medical schools from which the participants were included in this study, training videos were quickly prepared for synchronous or asynchronous lectures. The developments in the technological infrastructure generally include the installation of camera systems, the dissemination of video conferencing applications, and learning management systems to the entire faculty. Training for trainers was also applied especially for the use of technology. There are many elements to consider in developing an effective distance education program during the pandemic period (4,19–21). It was observed that the faculty members positively defined the elements that they were supported and well informed about. However, it is thought that their possible lack of information about the remaining elements of the program may have made the deficiencies related to these elements undetectable. There is a need for comprehensive program evaluation studies on the adequacy of training for trainers during the pandemic, educational materials, and technological infrastructure.

The COVID-19 pandemic has caused medical students to experience inequalities in accessing distance education (22,23). Similarly, inequalities among medical educators were emphasized in this study. In addition, important topics in distance education such as reluctance, social isolation, anxiety, and clinical inadequacies draw attention in the study findings similar to literatüre (24–27). The prolongation of the pandemic period, uncertainties, and the burnout of faculty members and students may have affected this situation.

Effects of the COVID-19 Pandemic on Postgraduate Medical Education

Medical educators also stated the negative effects more frequently for PGME. Among such drawbacks were the assignment of all residents (except those at risk) to COVID duties (intensive care, filiation, etc.) due to the conversion of faculty hospitals into pandemic hospitals; decrease in the number and diversity of patients; decrease in interventional procedures and disruption of rotations draw attention. Although instructor-resident interaction continues in clinical settings, face-to-face contact has decreased due to the risk of infection and flexible working practices. As a natural consequence of these, the view that resident training is interrupted is common. In the studies conducted, findings such as the decrease in the number and diversity of patients in postgraduate education, limitation of clinical education, interruption of surgical education, delays in thesis processes, and burnout in residents were found (3,28–30). However, in our study, no disadvantage was stated in terms of resident training in some specialties (Emergency, Microbiology), but the increased workload due to COVID was clearly stressed.

After the first few months, routine educational activities such as case presentations and article discussion hours were applied online. Although the one-to-one faculty-resident interaction decreased, they stated that residents saw enough patients and they could discuss patients face-to-face and/or online. In addition, the experiences they gained in the fight against the pandemic are perceived as additional gains.

The drawbacks experienced in Ph.D. education were expressed as the remote execution of teaching and assessment, the disruption of thesis studies due to the pandemic (decrease in on-patient applications, lab conditions, etc.), and the COVID ward assignments of the Ph.D. students with MD title.

Experiences of medical educators of the COVID-19 Pandemic

The results of the study indicated that the participating medical educators were of the opinion that conducting distance education in the UGME was worrying in terms of loneliness, dissatisfaction, monotony, and student learning. Some participants considered it as “behaving against the nature of medical education”. Kulikowski et al. determined that the compulsory transition to distance education negatively affects the motivation of educators in higher education, and emphasized the importance of developing preventive strategies for the success of the programs (31).

Participants perceived this process as a challenging but important experience since they had no previous experience in distance education and had to adapt in a short time period. In this process, they had to prepare intensive training materials (preparing videos of theoretical and practical lessons, developing written materials), adapt to the use of technology, and review and rearrange the contents and presentation styles of the courses they were responsible for in distance education. In this process, the trainers experienced online interactive small group training session planning, remote consultation, and preparing questions for online exams. In all these processes, it became important to provide institutional technological infrastructure, support, and communication mechanisms, but some differences were observed between institutions in this respect. Medical educators have had to acquire some technological skills they did not need before, with the COVID-19 pandemic (32). The training of trainers on educational technology makes important contributions to support this challenging process (20).

Among clinical educators, creating and maintaining a safe clinical learning environment

is a privileged issue. Taking safety precautions for patients and the healthcare team, providing adaptation training for residents and interns, monitoring and supporting them, working in an environment where the risks and stress are intense are stated as new and challenging experiences for clinical educators.

Responsiveness of Medical Education to Extraordinary Situations such as Pandemics

In the study, different approaches were reported to increase the responsiveness of medical education to extraordinary situations by the participants. Clinical training can be maintained by providing safe environments for patients, healthcare staff, and learners. In addition, the effectiveness of online education can be increased by increasing students' motivation, participation, and engagement in online teaching activities, creating interactive online activities, and using materials (online learning resources, virtual patients, skill training kits, etc.) suitable for distance education. In this context, the development of medical educators is deemed necessary. In particular, it is recommended that training programs be organized for educators to enhance knowledge and skills for online education methods and the use of technology in education. In addition, activities that will keep their motivation high are also suggested. Participants also think that efforts should be done for continuous development and renewal of the infrastructure at institutional levels.

Based on their experiences during the pandemic process, the participants suggested maintaining communication with students during the management of education in extraordinary situations. Getting feedback from them, and maintaining interaction among students, faculty members, and administrators by creating social platforms are also considered crucial. While it is recommended that a national action plan be created as well as increasing cooperation and sharing (educational materials and infrastructure) by networking between medical schools, one participant suggested adding an accreditation standard for the continuation of medical education in extraordinary situations. In 2021, the national accreditation agency for medical education in Turkey added a basic standard to the list of standards for medical schools to develop a strategy for continuity of medical education under unexpected conditions having a risk of interruption of the educational program.

CONCLUSIONS

The study findings revealed the effects of the COVID-19 pandemic on medical education from the perspective of medical educators. Findings drew attention to the different effects of the pandemic on the UGME and the PGME and the importance of institutional context.

In the UGME, the inability to continue face-to-face clinical education negatively affected the acquisition of clinical competencies and professional attitudes and values. Online teaching included difficulties in terms of planning instruction, preparing materials, providing student participation in online processes, instructor-student interaction, and motivation, and conducting valid and reliable exams. Developing and increasing the accessibility of educational materials for distance education were evaluated as positive developments. In this context, it is recommended that medical faculties develop their technological infrastructure and support educators to use technology effectively (technology use, distance education methods training).

During the pandemic process, the inability to see enough number and variety of patients and to perform interventional practices, especially in clinical specialties, adversely affected the PGME. The assignment of residents in COVID wards and the restriction of non-COVID patient admissions were effective in this condition. Clinical teaching activities (visits, bedside

discussion, etc.) were limited considering the risk of infection. Sustainable institutional support is important to ensure safe clinical and learning environments for educators, learners, and patients.

While medical educators perceived the adaptation process to distance education as a challenge, they also appreciated the gains of the process to become experienced teachers in using technology and distance education facilities. The lack of face-to-face interaction with the students affected both the educators and the students socially and psychologically. This draws attention to the support of medical educators not only in terms of educational skills but also in social and motivational aspects. In extraordinary situations such as pandemics, it is considered important to create social platforms to maintain the interaction between students, educators, and administrators, to receive their feedback, and to provide social support. We recommend that further studies be conducted to have more information about implementations during the pandemic at the national level. Such information may help to ensure equal opportunities by increasing cooperation and sharing of resources such as educational materials and infrastructure among medical schools.

The main limitation of this study is about sampling and generalizability of the results. Since our results were obtained from a limited number of faculty members from only two medical schools, they cannot be generalized. Further studies with wider participation in different regions and cultures are needed to have more reliable results. Additionally, studies can be designed to obtain the opinions of other stakeholders such as managers, staff and health professionals as well and combine all data to make multidimensional inferences.

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Contributors

First author contributed to study design, analysis and interpretation of data, drafting and editing of the manuscript. Co-author contributed to study concept and design, analysis and interpretation of data, drafting of the manuscript.

Competing Interests

None declared.

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Ethical Approval

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Data Availability Statement

Data is available upon request.

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Appendix 1. Opinions of Medical Educators on the Effects of the COVID-19 Pandemic on Undergraduate Medical Education

Context	Theme	Subtheme	Quotations
Negative	Educational administration	Adaptation	*"It was a field we were new to, a field we didn't know. We noticed and corrected the setbacks while implementing certain things." (P1)*
		Process management	*"As the coordinators of the second semester, we had to rearrange the syllabus about seven or eight times." (P3)*
	Curriculum and instruction	Internship education	*"We had to reduce the number of shifts in the emergency room for our sixth-year students. Because the groups are crowded. Having more students inside means a higher risk of transmission." (P1)*
		Clinical education (Semester 4-5)	*"We used to spend a lot of time with students. We used to examine patients together and ask questions for differential diagnosis. We can't do any of them now." (P4)*
		Preclinical education	*"For hands-on skills, learning from videos is insufficient, so probably watching it live, to touch and feel is something different." (P12)*
		Learning outcomes	*"The most efficient way to transfer attitudes and skills occurs in environments where the communication is more face-to-face. Therefore, any environment where this is prevented negatively affects this process." (P9)*
		Learning approaches	*"I care too much about the master-apprentice relationship. Here, students stay away from their teachers, who should set an example for them." (P11)* *"Frankly, we cared about their learning together via peer education. Now they are far from this point. I think the discussions and interactions between students contribute a lot to their education." (P8)*
		Online education	*"Why don't they attend the 8:30 morning class (interactive online lesson)? Students think they will somehow pass the practical and theoretical exams by watching the videos, looking at the slides, reviewing the revisited questions that were asked in the past years' exams." (P4)*
		Assessment and evaluation	*"We do not measure and evaluate hands-on skills." (P7)* *"I don't think that online exams are very fair. As we see from the results, the exam scores are higher than those of the last year. There is a deceptive success. (P12)*
	Students	Participation in distance education	*"They have great concerns, such as what will happen if my internet connection goes down during the exam or if the webcam doesn't work." (P3)*
		Psychological effects	*"Students see themselves in a huge unknown. They feel alone. Although they are in very close contact with the dean and us, they are far from each other and away from their universities." (P3)*
		Social effects	*"As much as we were affected, they were also affected in their homes. They need more socialization. I think the pandemic affects them more. I think they need to get together with their friends more." (P6)*

Context	Theme	Subtheme	Quotations
Positive	Educational administration	Crisis management	*"Seeing that the infrastructure of our university was developed in a very short time on this subject and that people who were engaged in this work in an energized way, motivated ordinary faculty members like us." (P7)*
		Adaptation of the program	*"At every stage, a lot of meetings were held, mutual decisions were made, everyone's opinion was given importance, and decisions were immediately put into practice." (P13)*
	Curriculum and instruction	Online education	*"We revised our lessons and simplified them. We changed our perspective on life." (P6)* *"The number of small groups has been increased a little more, the number of students in the groups has been reduced... because doing this does not require any other online infrastructure." (P4)*
		Face to face education	*"Opportunity to work in a once-in-a-lifetime pandemic environment" (P2)*
		Assessment and evaluation	*"Our advantage is that the system immediately gives us the analysis of the questions and we can actually get the feedback instantly which we used to receive in a longer process." (P1)*
		Education materials	*"The fact that the lessons are recorded, and the students can access these records and even we can access our own recorded lessons. This will provide convenience when we want to review the lessons in the following years." (P5)*
	Awareness of medical education		*"Now they are willing to work at the emergency service in their elective internships. They are in the need to see more patients so that they can improve their practical skills. I think they started to realize that what they thought is good, could be bad, and what they thought was bad might be good for them." (P1)* *"We realized how important the social responsibility in medical education is. Because every physician has something to do for the society… the only basis for achieving good medical education." (P10)*

Appendix 2. Opinions of Medical Educators on the Effects of the COVID-19 Pandemic on Postgraduate Medical Education

Context	Theme	Subtheme	Quotations
Negative	Specialty training	Teaching-learning processes	*"The routine patient cycle and the hospitalizations have changed. Maybe there were competencies which were missing" (P2)* *"Stopping elective cases makes it difficult for surgical residents to complete a certain number of elective cases that they must do during their training process to achieve competency." (P1)*
		Work-learning environments	*"As ENT (Ear-Nose-Throat) specialists, we look directly at the patient's face and mouth, and the risk of contamination is very high. Residents have a lot of anxiety, which is normal." (P5)*
		Assessment and evaluation	*"They used to attend the exams held by the XXX Thoracic Society once or twice a year. Because of intense clinical work, they couldn't take the exams since there was no one else to replace them if they leave for the exams" (P4)*
	Doctoral education	Teaching-learning processes	*"Lessons are going online. Although we come together for a limited time, we never do one-on-one lessons." (P8)*
		Assessment and evaluation	*"How the evaluation will be done is left to the teachers." (P8)*
	Academic studies	Research	*"It became very difficult for them to carry out the studies they had planned. Because the patient intake was low. Patients do not want to submit to the hospital much." (P13)*
		Dissertation studies	*"Counseling is online but thesis studies are progressing very slowly. In my communication with my Ph.D. students, the concept of convenient time disappeared, we entered a period of continuous extension." (P8)*
Positive	Program adaptation	Educational events	*"We had (routine) training on Tuesdays for residents. They still continue via MS Teams." (P1)*
		Rotations	*"By June (2019), all residents returned to their rotations to complete their rotation period." (P9)*
	Teaching-learning processes	Online education	*"Contact (face-to-face) is less, but because we see each other on Zoom every day, they have the opportunity to hear the opinions of all of us about a patient." (P13)*
		Face to face education	*"They may not have much one-to-one contact with the professors due to flexible working schedule, but ... considering our polyclinic, they saw most of the patients they needed to see and learned a lot." (P13)*
		Working experience in the pandemic	*"They had the opportunity to work in many different fields that they had never known before. They learned how to fight and prevent any infection in the operating room or hospital environment, not just COVID." (P2)*

Appendix 3. Experiences of Medical Educators in the COVID-19 Pandemic

Context	Theme	Subtheme	Quotations
UGME	Adaptation	Distance education	*"Will I be able to teach online classes? It was something I have never done. I was nervous. How many students would listen? Are the students really going to listen to me? The students coming to the online class and saying that it is too boring causes an incredible demotivation." (P13)*
		Use of technology in education	*"Frankly, we old people had no experience other than Skype or Messenger." (P5)*
	Effects of distance education	Psychological effects	*"It feels like you are alone there (online class). You don't get a lot of reaction, like before. They could normally ask more questions in face-to-face training." (P6)*
		Social effects	*"I am missing face-to-face education and being with students in the same environment. Because you don't just talk about the subject and leave the class. You communicate with them, listen to their concerns, look into their eyes and understand what they are trying to say." (P5)*
	Teaching in distance education	Planning and executing instruction	*"(Online course) I organized it like bedside training. For example, I present them a case and I ask them to take the history. We talk about what they did while taking the history, one by one." (P13)* *"Frankly, I prefer to be together with the students in real-time rather than a lecture video because it (video record) makes the whole thing artificial. Speak once, broadcast the same thing again and again. Instead, I prefer to teach (the same lesson for different groups) online eight times." (P7)*
		Developing educational materials	*"It takes a lot of time to make video recordings of lectures. Because at a slight mistake when your tongue slips, it is necessary to record it again." (P12)*
		Online teaching	*"(in the online course) Do you have any questions? I ask. I can't even get an answer to my question most of the time that is why I don't expect them to ask questions. ... this unconcernment of the students affects me very negatively." (P3)*
		Assessment and evaluation	*"It was difficult to evaluate open-ended questions while reading the written exams. And when we saw the copy-paste cheating, we had to read all the answers for a week by comparing them with each other." (P9)*
PGME	Safe working and educational environment	Security	*"Wearing and removing this personal protective equipment that has just entered our lives, entering the patient's room, what we will do in emergency interventions, all of these have been changed as a whole." (P9)*
		Support	*"In the service where I was a consultant, I had to go there twice a day and stay after my visit and tell residents; protect yourself, wear this and that, disinfect your hands like this. We had to be there to protect them and increase their adaptation." (P9)*
		Working order	*"Since our ward was also transformed to be a COVID service, the medical teams working in our ward automatically started to look after COVID patients." (P9)*
	Being an educator	Online teaching	*"We started teaching online (for residents) this year." (P3)*
		Face to face teaching	*"We have never lost touch with residents. ... even though we are allowed to work more flexibly, I actively keep coming to the hospital. We still keep in touch with them because I always come to the hospital on certain days every week and continue the visits." (P5)*
		Academic studies	*"I used to participate in the wrap it up the process of the retrospective research and I do this work with a few residents every year. Now we do them mostly online, rarely by meeting face to face. (P11)*

Appendix 4. Opinions of Medical Educators on Increasing the Responsiveness of Medical Education to Extraordinary Situations such as Pandemics

Theme	Subtheme	Quotations
Medical educators	Distance education knowledge and skills	*"Not all of us were very prepared for online education. All faculty members need to improve themselves in this regard. Maybe with some specific training by the Department of Medical Education… we need to improve ourselves on this issue." (P2)*
	Individual improvement	*"Every medical educator should be ready for this in his own way, use the available resources related to their course, whatever is necessary, and educate themselves." (P2)*
Infrastructure	Corporate	*"We benefited a lot from HUZEM (distance learning center of the university), maybe the medical school can also develop such a platform." (P8)*
	Students	*"For example, in regions where the internet connection is not very good, infrastructure services can be provided a little more by revealing the deficiencies. "(P7)*
	Instructors	*"We should act a little more responsibly and develop our own infrastructure. I don't know, we shouldn't expect everything from the medical school. I think we should have a plan B (alternative)." (P5)*
Curriculum and instruction	Program development	*"I think that there will be no preparation for the next pandemics unless we bring medical education closer to the society, create responsible physicians for the society all over the country." (P10)* *"I think it is necessary to open a title called proactive approach in education and it is necessary to develop this title with all its necessities. Maybe scenario-based studies. Pandemic today, something else tomorrow after all" (P10)*
	Teaching processes	*"Maybe we can create virtual patients. (P4)* *"It is absolutely necessary to create time and safe environment for the students in the fifth or sixth year so that we can do the practical part of clinical training truly face to face" (P9)*
	Learning materials	*"I think we need to increase our materials for practice. Let's record the practices in laboratories so that students can access it." (P5)* *"Medical school can purchase online learning resources. We can only recommend books to them. Maybe we can canalize them to online resources." (P8)*
Educational administration	Emergency management (corporate basis)	*"Our relationship with students is not only consisted of lectures, I think social platforms can be established rapidly at the university." (P13)* *"We should not be late to be in touch with students. I think we shouldn't be late to get feedback from students, this may give us a little more relief." (P3)*
	Protecting the quality of education (national basis)	*"I think that much more national organization should contribute to this issue, ministries and all government departments should open up their infrastructural opportunities for medical students. Only then we can equalize the resources/conditions between the students. .... I think it would be much better if there was a more inclusive action plan from above." (P5)* *"Training materials need to be prepared and there should be systems to facilitate the access to them. .... A more collective network should be formed among medical faculties" (P5)*