Alternative Approaches to Clinical Practice in Medical Education During the Covid-19 Pandemic

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Abstract

The aim of this study was to propose alternative approaches to clinical practice that would be effective substitutes for traditional clinical practice at the bedside of patients during a pandemic. For this purpose, an alternative approach and a method of determining the effectiveness of its use in medical educational institutions were developed through the method of synthesis. The level of medical competencies acquired during clinical practice was also assessed. The effectiveness of the proposed alternative approach is determined through the Pearson's chi-squared test and Cohen's coefficient. This study showed that the distance learning can be introduced through the methods that will allow medical students to acquire the clinical skills needed to perform their professional duties. In particular, video discussions of specific clinical cases, viewing videos of clinical procedures, interviews with a virtual patient, video conferencing, electronic testing, etc. are effective. They allow students to acquire the skills and abilities to conduct a survey of patients, their physical examination, prescription of additional examinations, interpretation of the results, performing clinical procedures, making medical records and more. The results of this study suggest that clinical practice can be realized remotely, if necessary. And the proposed alternative approach to clinical practice allows students to develop the necessary clinical competencies for future professional activities. This study revealed the need for further research to develop methods for assessing the clinical competencies of medical students.

Keywords: distance learning, case method, virtual patient, physical examination, educational platform

1. Introduction

The COVID-19 pandemic, which began in March 2020, has become a challenge not only for healthcare workers but also for other professions, including teachers in medical education (Rose, 2020; Alkhowailed et al., 2020). All educational institutions in the world were forced to switch to distance learning, which led to a number of problems (Chiel et al., 2020; Zayapragassarazan, 2020). Many teachers did not have sufficient online skills for the use of information and communication technologies at the time of the introduction of quarantine restrictions (Tuma, Nassar et al., 2021). Students and teachers also did not have the necessary equipment, and not all educational platforms could meet the educational needs (Tuma, Nassar et al., 2021). Besides, quarantine has had a negative impact on medical experience for medical students due to the prohibition of their contact with patients (Taha et al., 2020; Papapanou et al., 2021), although it is believed that this has no far-reaching implications for medicine in general (Tolsgaard et al., 2020).

Teachers of medical institutions faced the problem of finding such teaching methods that can be used online and that would contribute at the same time to the development of practical clinical skills and abilities of medical students (Shehata et al., 2020; Anjankar et al., 2020). In particular, it was necessary to solve the problem of finding new methods that help students develop the skills of conducting a medical interview with a patient and conducting his/her examination and treatment if it is impossible to contact the latter (Kasai et al., 2021).

A number of studies dealt with the problem of finding alternatives to traditional methods of education. Tips for online classes with medical students were developed (Jiang et al., 2021). The effectiveness of the use of e-problem-based learning in the acquisition of clinical skills by students of medical institutions was evaluated (Kasai et al., 2021). An online model of clinical practice involving virtual medical interviews was developed, where a teacher is the patient and a student is the doctor, the so-called virtual patient (Ayoub et al., 2020). Electronic medical records for inpatients were introduced. Students also discussed specific clinical cases and jointly sought ways to address them through online conferences under the supervision of a teaching physician (Kasai et al., 2021). Different educational platforms were used for that purpose, for example: Moodle (Kasai et al., 2021, Taha et al., 2020), Zoom (Kasai et al., 2021), Blackboard (Taha et al., 2020), Microsoft Teams (Taha et al., 2020), Telegram or YouTube (Taha et al., 2020), CiscoWebEx (Tuma, Kamel et al., 2021, Chatziralli et al., 2021), Skype, Business (Chatziralli et al., 2021), Padlet and Facebook (Cleland et al., 2020), Blackboard Collaborate combining with Visible Body (Flynn et al., 2021), 3D anatomical modelling programmes (Flynn et al., 2021). Cloud technologies allow online learning both synchronously and asynchronously (Al-Balas et al., 2020). However, experts (Taha et al., 2020) advise to start distance learning with asynchronous one.

In addition to educating medical students, there was a need during the pandemic to train medical practitioners on ways to overcome the little-known virus (Collins et al, 2021). For example, in the United States, work to ensure an adequate level of medical training was divided into the following components to improve medical education during a pandemic (Fong et al., 2020): 1) preparation, accumulation and exchange of necessary materials, including documented medical experience; 2) development of alternative methods of training and evaluation of acquired clinical skills and abilities, including the creation of new technologies and tools developed by modelling and technology companies; 3) conducting surveys to assess the effectiveness of new teaching methods.

The work of Collins et al. (2021) also deals with alternatives to traditional teaching methods. The authors developed innovative methods that can be used in the education of healthcare workers, both those who are directly involved in the fight against the pandemic, and doctors who work in other areas during the period of distancing. At the same time, virtual learning platforms were used. In particular, a number of materials were developed that could be exchanged between doctors and medical students through the WhatsApp platform (Collins et al., 2021). Webinars in the Zoom environment were also used, which included synchronous work of all participants, pre-recorded videos and practical classes (Collins et al., 2021). Researchers also propose to use not only electronic lectures, but also electronic practical laboratories, considering clinical cases in electronic format in order to acquire practical skills (Taha et al., 2020), applying the virtual patient method, gamifying the learning process, which promotes strategic thinking, adaptation to rapidly changing processes, the ability to plan and follow a plan.

Further development of clinical skills in medical students can be achieved through telemedicine, which involves a virtual visit to a real patient (Alsoufi et al., 2020). It, along with electronic libraries and simulation laboratories, virtual meetings on educational platforms, independent home research and surgical simulations, is used as an alternative to traditional teaching methods in the education of future surgeons (Tuma, Kamel et al., 2021, Chatziralli et al., 2021).

The studies had some limitations. For example, (Kasai et al., 2021) limited the development of students' clinical skills needed to interview a patient, maintain proper medical records, and analyse medical history to diagnose, prescribe the necessary tests, interpret their results, and prescribe appropriate treatment. Three specific cases of respiratory medicine are considered: pneumonia, thromboembolism and lung cancer (Kasai et al., 2021). Other studies focused on developing the practical skills needed for clinical medicine in a particular field, including surgery (Fong et al., 2020, Tuma, Kamel et al., 2021), ophthalmology (Chatziralli et al., 2021; Tsekhmister et al., 2019), otolaryngology (Hall et al., 2020), orthopaedics (Richardson et al., 2020), chiropractic (MacDonald et al., 2020), cardiovascular surgery (DeFilippis et al., 2020), dentistry (Salgado & Castro-Vale, 2020) and those that require work with cadaveric material (Flynn et al., 2021, Papapanou et al., 2021).

Despite the large number of works dealing with the development and diagnostics of new methods that can be used in the teaching of medical students during distance education, alternative approaches that allow students to acquire clinical skills under the conditions of forced distancing are not sufficiently developed.

The aim of this study was to develop and test the effectiveness of alternative approaches to clinical practice in medical education during the COVID-19 pandemic. The aim involved the following objectives:

1) study the positive experience of introducing alternative methods of clinical practice in medical educational institutions in the context of distance learning;

2) develop alternatives to traditional approaches to clinical practice and introduce them in medical educational institutions included in the sample;

3) evaluate the effectiveness of the developed approaches to clinical practice in medical education, which allow for distance learning.

2. Methods

The study consisted of three stages. The first stage involved studying of the international experience of using alternative methods and approaches in clinical practice, in particular, electronic, distance, online synchronous and asynchronous learning through the method of analysis of the scientific literature. The experience of using the method of case studies and problem-based learning in medical education (Servant-Miklos, 2019), flopped classroom (Tolks et al., 2020), virtual patient (Ellaway et al., 2008), virtual laboratories and 3D simulation (Abdalla, 2019) were also studied in detail.

The second stage provided for the creation of an alternative approach to clinical practice used during the COVID-19 pandemic and its introduction into the educational process in the sampled medical education institutions. The proposed approach involves the acquisition of clinical experience by medical students remotely, avoiding contact with patients, while developing the skills needed in the professional activities of doctors. It involves the use in clinical practice: texts of lectures and practical assignments, video lectures, videos demonstrating clinical procedures posted on Google Drive, synchronous discussion of clinical cases during video conferences, interviews with virtual patients, work in virtual laboratories, 3D simulation, electronic testing, etc. Educational platforms such as Moodle and Zoom can be used for that purpose.

In the third stage, a questionnaire was created and medical students were surveyed to investigate whether the proposed approach to clinical practice is as effective as traditional methods of gaining clinical experience by medical students, which included student visits to clinics and hospitals, participation in real interviews with patients, in examinations of patients, appointment of additional examinations, interpretation of the results obtained, statement of diagnoses, planning and carrying out treatment, etc.

Besides, students were surveyed before the introduction of an alternative approach to clinical practice in both experimental and control groups, and after the experiment, which lasted for one academic year. To do this, a questionnaire was developed that met the ethical standards of the study. Data encoding was also performed. Participation in the survey was anonymous, voluntary. At the same time, no rewards were provided for answering the questions. The questionnaire was closed, consisting of 20 questions: 3 of them were of gender-demographic type, the other 17 were aimed at clarifying the advantages and disadvantages of distance education in clinical practice and determining students' opinions on the effectiveness of their approaches to gaining clinical experience under distancing conditions.

The sample included 158 medical students structured as follows: 36 students from Bogomolets National Medical University majoring in Paediatrics, Dentistry, Medicine, 42 students from Odessa National Medical University majoring in Medicine and Dentistry, 37 students from Ivano-Frankivsk National Medical University majoring in Paediatrics, Dentistry, Medicine, and 43 from Dnipropetrovsk Medical Academy of the Ministry of Health of Ukraine majoring in Paediatrics, Dentistry, Medicine, Physical Therapy/Ergotherapy. Students who participated in the study aged 18 to 35, studied in the 3rd-5th years of relevant educational institutions.

Besides, the sample included 3 teachers from each of the above medical education institutions, a total of 12 people. Prior to the study, they were explained the specifics of the alternative approach considered in this study and the methods of diagnosing its effectiveness, as well as the features of assessing the clinical competencies acquired by students during the experiment. The experts assessed the impact of an alternative approach to clinical practice on students' acquisition of professional practical skills in experimental and control groups before the introduction of an alternative approach and every six months during the experiment on a ten-point scale, where 1 is the lowest level of clinical skills and abilities, while 10 is the highest level of skills and abilities. The following competencies were assessed:

1) ability to keep medical records;

2) the ability to interview the patient;

3) the ability to conduct a physical examination of patients;

4) the ability to prescribe additional examinations;

5) the ability to analyse the results of examinations;

6) the ability to diagnose;

7) the ability to prescribe treatment according to the diagnosis;

8) the ability to carry out treatment at any of its stages.

The students were surveyed before the introduction of an alternative approach to clinical practice in both experimental and control groups, and after the experiment, which lasted for one academic year.

The results obtained during the study were processed in Statistica. The effectiveness of the introduced alternative approach to clinical practice was assessed using the Cohen's coefficient and Pearson's test.

3. Results

The developed alternative approach to clinical practice in medical institutions during the pandemic was to replace traditional methods of clinical practice at patients' beds with such methods that can be used remotely without contact with patients, with the supervisor and classmates. The theoretical preparation for clinical practice in the form of traditional lectures in the classroom, where the teacher dictates theoretical material to students, and students take notes, was replaced by students' independent study of theoretical material placed in the form of text files on Google Drive. Seminars, which were traditionally held in the classroom, were replaced by video conferences with the help of educational platforms Moodle and Zoom. Moreover, the traditional reproduction of theoretical material in seminars and linking it with clinical cases under the teacher's guidance was completely replaced by the case method and flipped classroom, that is the use of pre-developed theoretical material to solve specific clinical situations. The cases created by the European Case Clearing House (The Case Centre) were considered under the control of correctness of thought, but with no intervention of the teacher, active discussion of all possible solutions to the problem and the collective search for the right solution by students. The traditional direct participation of students in the work of medical institutions was replaced by:

1) maintenance of digital medical documentation, based on the examples of medical documents and instructions for their completion developed in Excel;

2) viewing videos of physical examination of patients;

3) conducting a conversation with the patient, which is a teaching physician who simulates a particular disease;

4) viewing videos of clinical procedures;

5) analysis of the results of real medical research placed in open access cloud storage, in particular, CanadiEM (https://canadiem.org/), their discussion by students during video conferences under the supervision of a teaching physician and diagnosing, making treatment plan, and walking through all stages and procedures of the prescribed treatment;

6) replacement of practical work with cadaveric material by 3D simulation and work in virtual laboratories.

In order to improve the effectiveness of teaching with the described methods, it was necessary to conduct preliminary training of students in order to include them in the educational process, in particular, preliminary discussions were held about the content of the videos, their purpose and the material to be learned. The video material corresponded to the learning objectives. It was mandatory to discuss the content of the reviewed materials and to involve various forms of quality control of the acquired knowledge, in particular, electronic testing, quizzes, etc.

Students were also asked to formulate questions when considering a specific clinical situation, for example. This has contributed to a deeper understanding of clinical cases and, as a result, to the right decisions to address them. There were also videos with clinical procedures, accompanied by comments from a teaching physician.

The questionnaire revealed the difficulties that arise in medical students in the remote acquisition of clinical experience, as well as the methods and forms of learning which are most conducive to the development of clinical skills and abilities. The results of the survey are presented in Table 1.

Table 1. Conceptual Scheme of Development and Further Evaluation of Projects of Personal and Professional Development and Leadership of Students

Item No.	Questions of the questionnaire	Number of "Yes" answers of students, %			
		In the experimental group		In the control group	
		Before the experiment	After the experiment	Before the experiment	After the experiment
1.	What alternative methods have been used in clinical practice?				
a)	Lecture texts posted on Google Drive	29 %	83 %	31 %	87 %
b)	Video fragments of lectures	24 %	67 %	23 %	72 %
c)	Virtual laboratories	17 %	42 %	18 %	28 %
d)	Virtual cases	33 %	81 %	32 %	36 %
e)	3D simulation	19 %	36 %	21 %	25 %
f)	Virtual patient	59 %	79 %	58 %	66 %
g)	Video conferencing	22 %	88 %	24 %	70 %
h)	Electronic testing	45 %	81 % %	48 %	82 %
2.	Are ICT skills sufficient to use digital educational resources?	85 %	96 %	86 %	93 %
3	Is online training organized properly enough to gain clinical experience remotely?	32 %	83 %	35 %	46 %
4. In your opinion, what contributes most to the development of clinical skills?					
a)	Texts of lectures	81 %	31 %	82 %	56 %
b)	Video records of lectures	76 %	42 %	79 %	63 %
c)	Discussion of specific clinical cases (through videoconferencing during a pandemic)	30 %	78 %	32 %	36 %
d)	Independent processing of materials on the topic under study (posted on Google Drive)	21 %	31 %	24 %	75 %
e)	Videos of clinical procedures	42 %	77 %	41 %	43 %
f)	Work in outpatient clinics, polyclinics and hospitals at the patient's bed	97 %	51 %	96 %	99 %
g)	Interview of virtual patients	48 %	75 %	49 %	56 %
h)	Maintenance of digital medical records	54 %	83 %	54 %	59 %
i)	Virtual physical examination of the patient	12 %	71 %	13 %	14 %
5.	What technical barriers existed in developing clinical skills?				
a)	Lack of quality Internet	10 %	19 %	11 %	18 %
b)	Insufficient resources of technical information and communication tools used in distance learning	14 %	36 %	13 %	27 %
c)	Insufficient quality of video materials	2 %	21 %	2 %	19 %
d)	Untimely feedback	5 %	46 %	4 %	12 %
e)	No feedback	1 %	27 %	1 %	15 %
6.	What form of distance learning is most acceptable to you?				
a)	Synchronous	28 %	43 %	28 %	48 %
b)	Asynchronous	72 %	57 %	72 %	52 %
7.	Did you have difficulty understanding the material while observing the clinical procedures on video?	-	34 %	-	-
8.	Did you feel the atmosphere of the clinical conditions on the videos?	-	53 %	-	-
9.	Were you able to gain experience in conducting a physical	47 %	76 %	47 %	78 %

	examination of patients during clinical practice?				
10.	Were you able to gain experience communicating with patients during clinical practice?	46 %	85 %	46 %	80 %
11.	Do you lack clinical experience in acquiring the competencies necessary for professional activity?	78 %	37 %	77 %	40 %
12.	Do you lack the experience of medical surveys of patients to feel more confident in the future when performing professional duties?	80 %	30 %	78 %	32 %
13.	Has clinical practice helped you to develop medical record keeping skills?	45 %	86 %	46 %	83 %
14.	Do you have enough experience to diagnose a patient's disease?	28 %	74 %	28 %	71 %
15.	Do you have enough experience to prescribe the necessary tests and analyse their results in order to diagnose the disease?	24 %	82 %	23 %	76 %
16.	Will you be able to plan the treatment that is adequate to the diagnosis?	23 %	84 %	24 %	79 %
17.	Will you be able to provide medical treatment?	24 %	76 %	25 %	81 %

According to the survey, the introduction of an alternative approach in the experimental group affected the tools and resources used in teaching. The use of cloud data repositories increased by 54%, in particular for the distribution of lecture texts among students, and the number of video records of lectures on professional subjects in the medical education institutions included in the sample increased by 43% (Figure 1). Virtual laboratories have gained considerable popularity (25%). But the case method was most often used in the experimental group as part of an alternative approach to clinical practice (48% more often than before the experiment). The introduction of an alternative approach to clinical practice involved the interaction of participants in the learning process, but in compliance with the conditions of distancing. That is why video conferencing has been used 4 times more often. The popularity of electronic quality control of acquired knowledge has also almost doubled.

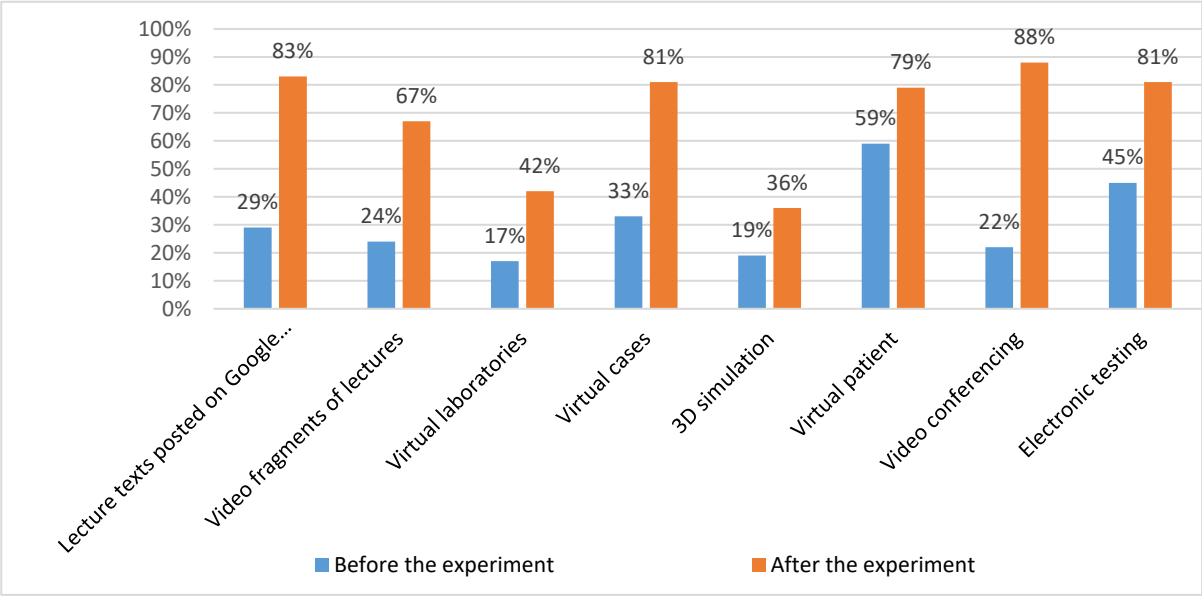

Figure 1. Teaching Methods Used in the Experimental Group before and after the Introduction of an Alternative Approach

Since the experiment began during the Covid-19 pandemic, and educational institutions had just switched to distance learning, the control group underwent changes in teaching methods (Figure 2). Cloud storage was almost three times more often used to distribute educational content among students, both in text format (students began to use the texts of lectures posted on Google Drive 56% more often), and in video format (49% more often). Virtual cases, laboratories and patients did not gain popularity as control methods in the control group during the study. However, electronic testing and video conferencing began to be used in the control group, as well as in the experimental one during distance learning more than twice more often and almost three times more often, respectively (Table 1).

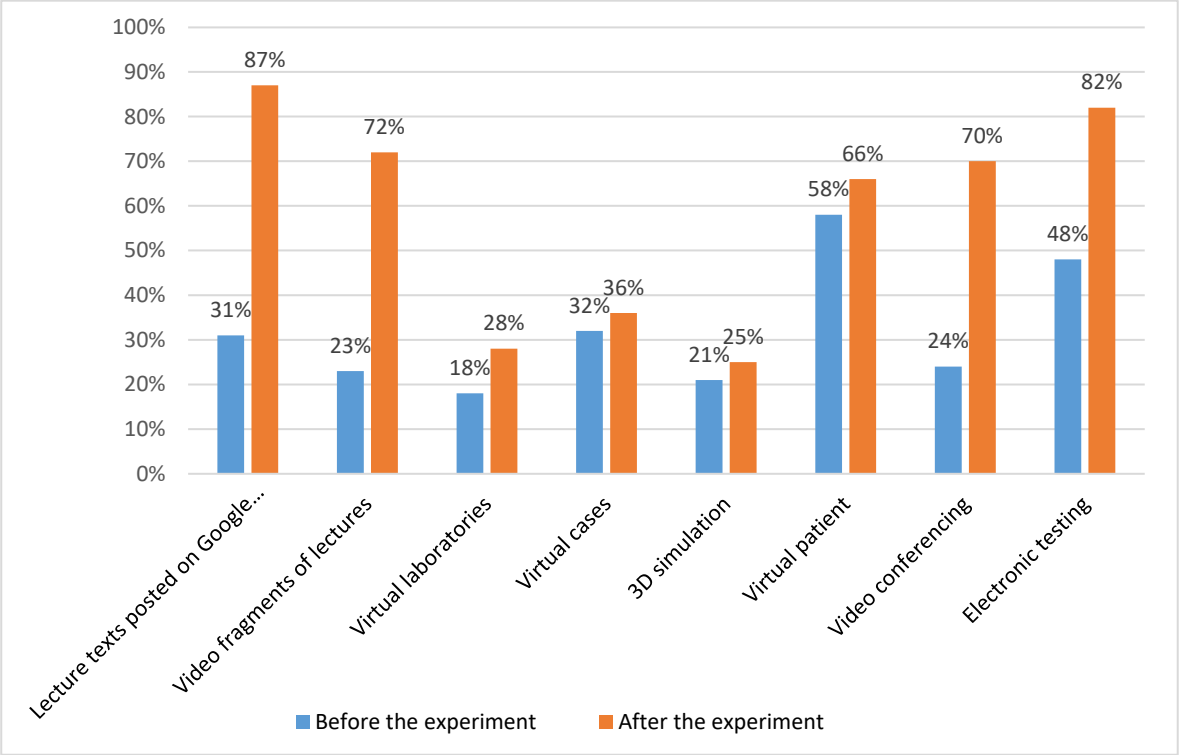

Figure 2. Teaching Methods Used in the Control Group before and after the Introduction of the Alternative Approach

The difference in the methods used during the study in the experimental and control groups is shown in Figure 3. As Figure 3 shows, the biggest difference between the approaches to learning in the control and experimental groups is the emphasis on the case method, virtual patient, virtual laboratories in the experimental group. Besides, the pandemic has forced all participants in the process to increase their digital literacy, thus increasing their ability to work with ICT and use digital educational resources by 10%.

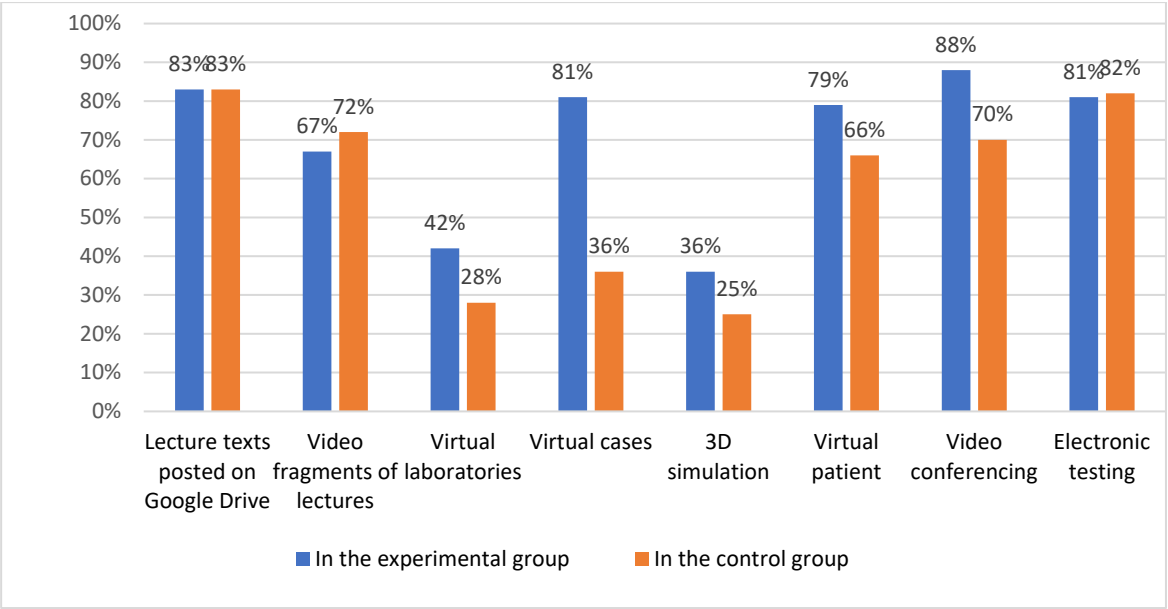

Figure 3. Comparison of Methods and Approaches Used in the Experimental and Control Groups

The opinion of students about the methods that contribute to the development of clinical skills and abilities during the experiment has changed. Before the introduction of an alternative approach to clinical practice, students believed that the main thing in developing the necessary skills for professional activities is to visit hospitals, polyclinics and clinics, as well as attend interviews, examinations of real patients, clinical procedures (Figure 4). This opinion was shared by 97% of surveyed students. However, when introducing an alternative approach to clinical practice, students began to give preference to case method (78%), videos of clinical procedures (77%), surveys of virtual patients (75%), digital medical records (83%), virtual physical examination of the patient (71%).

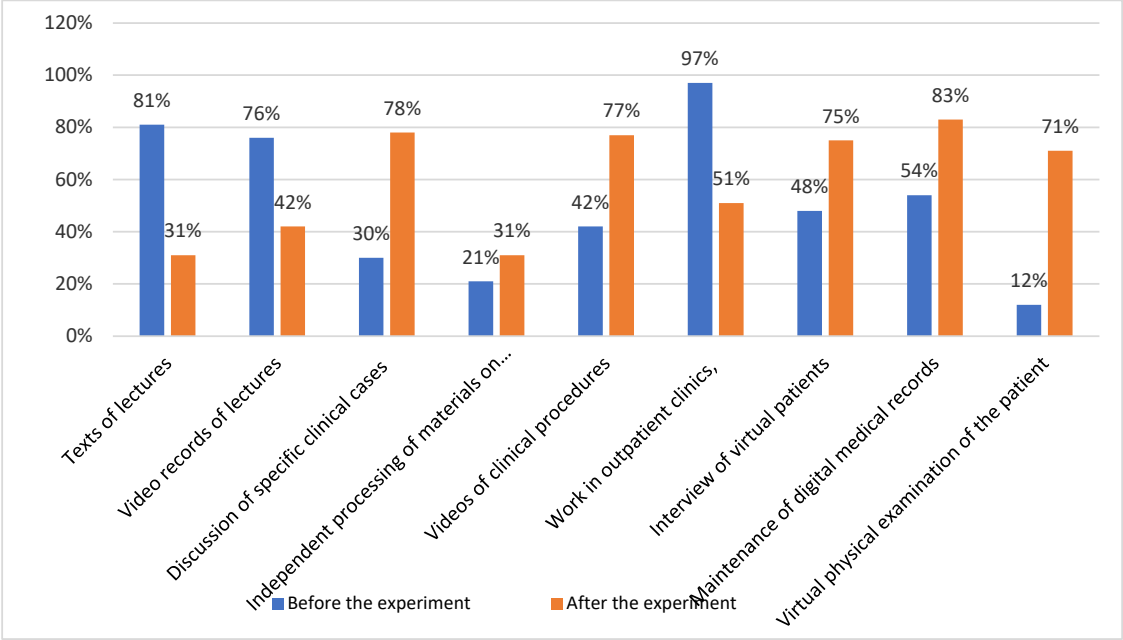

Figure 4. Distribution of Answers to the Question "What contributes most to the development of clinical skills?" in the Experimental Group

As for the control group, the students gained more independence during the study (Figure 5).

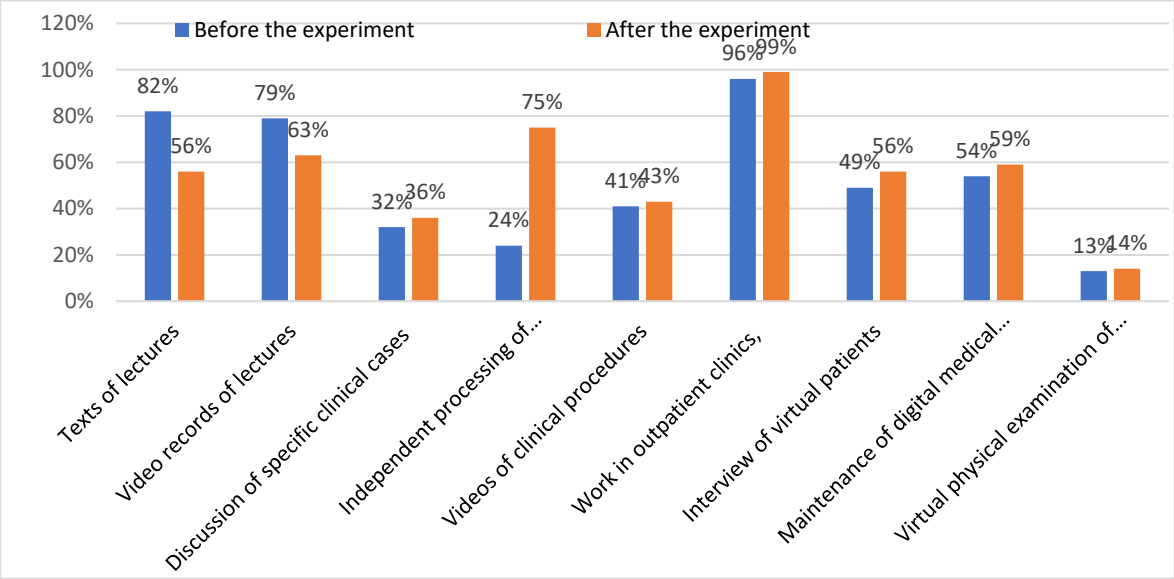

Figure 5. Distribution of Answers to the Question "What contributes most to the development of clinical skills?" in the Control Group

The opinion of the students of the experimental and control groups regarding the effectiveness of the methods and approaches used during the last survey differed significantly. In the control group, 99% of students continued to consider visiting real outpatient clinics, polyclinics and hospitals the most effective form of clinical practice, which best develops the practical skills needed to perform the professional duties of physicians (Figure 6). In the experimental group, this opinion was supported by only 51% of respondents. However, the surveyed students of the experimental group believe that virtual physical examination of patients (71%), survey of virtual patients (75%), videos of clinical procedures (77%) and discussion of case studies (78%) allow to gain the clinical experience needed for performance of professional duties.

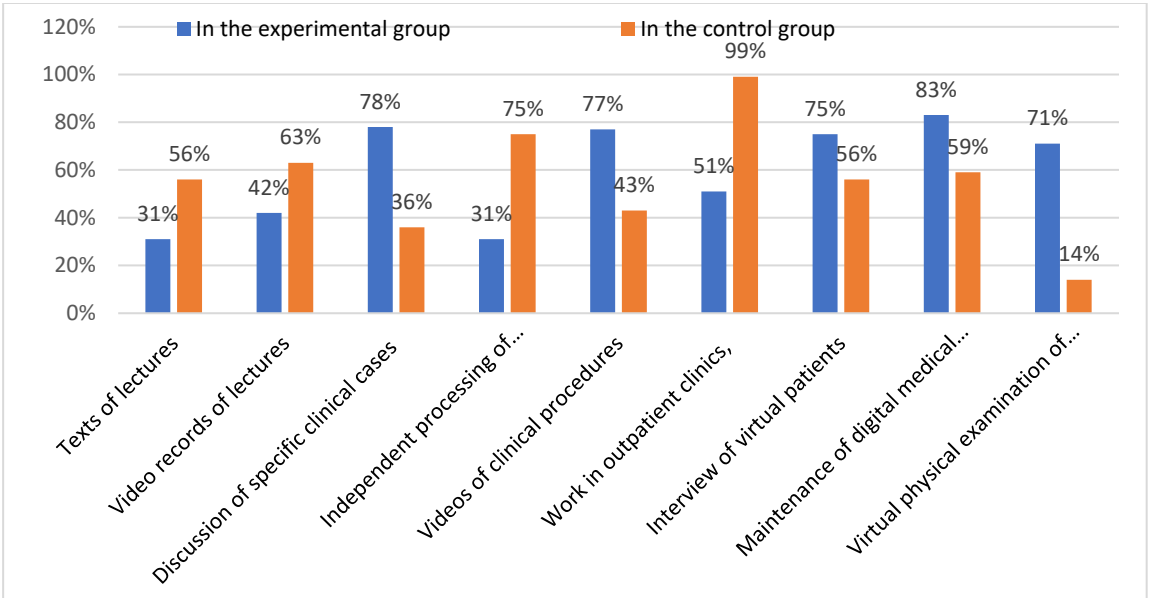

Figure 6. Comparison of the Results Obtained in the Experimental and Control Groups for the Question: "What is most conducive to the development of clinical skills and abilities?"

The lack of quality Internet communication by students was not perceived as an obstacle to the acquisition of clinical skills (only 10% of respondents), and with the pandemic and the need to distance and introduce alternative approaches, including clinical practice, it became an obstacle for 19% of medical students. Similarly, with the resources of technical information and communication tools used by students during their studies (14% vs. 36%), the lack of ICT resources was called an obstacle to gaining clinical experience). There were 46% of respondents who expressed a need for timely feedback; 27% complained about the low quality of video materials.

Students also evaluated which form of distance education was most acceptable to them, and 72% indicated asynchronous one.

The distribution of answers to other questions of the questionnaire in the experimental and control groups is given in Figures 7 and 8. A comparison of the results obtained in the last survey in both groups is provided in Figure 9.

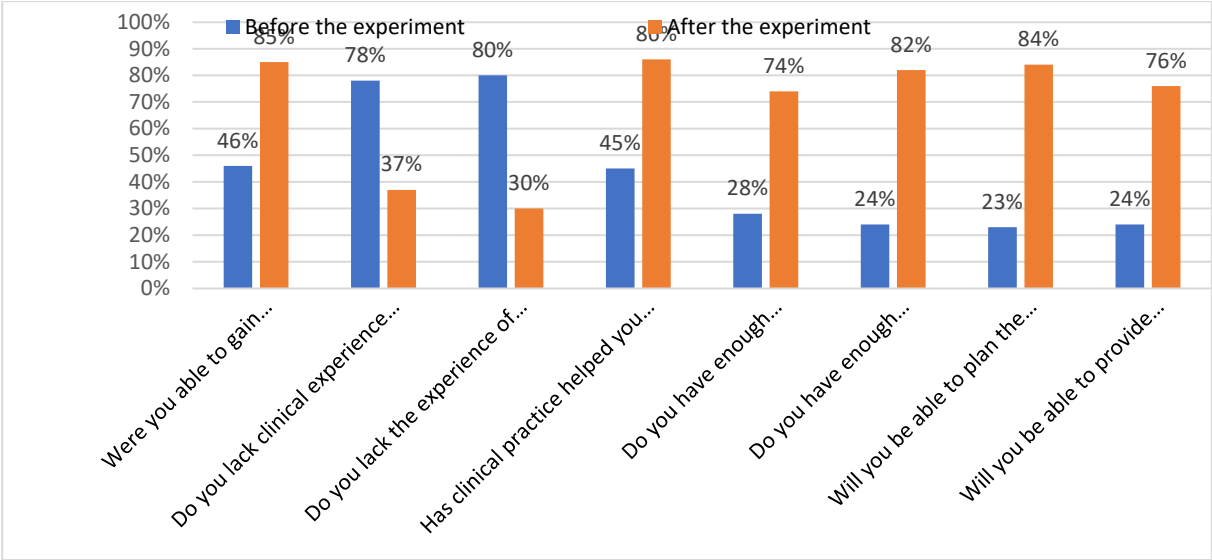

Figure 7. Distribution of Answers to the Questionnaire in the Experimental Group

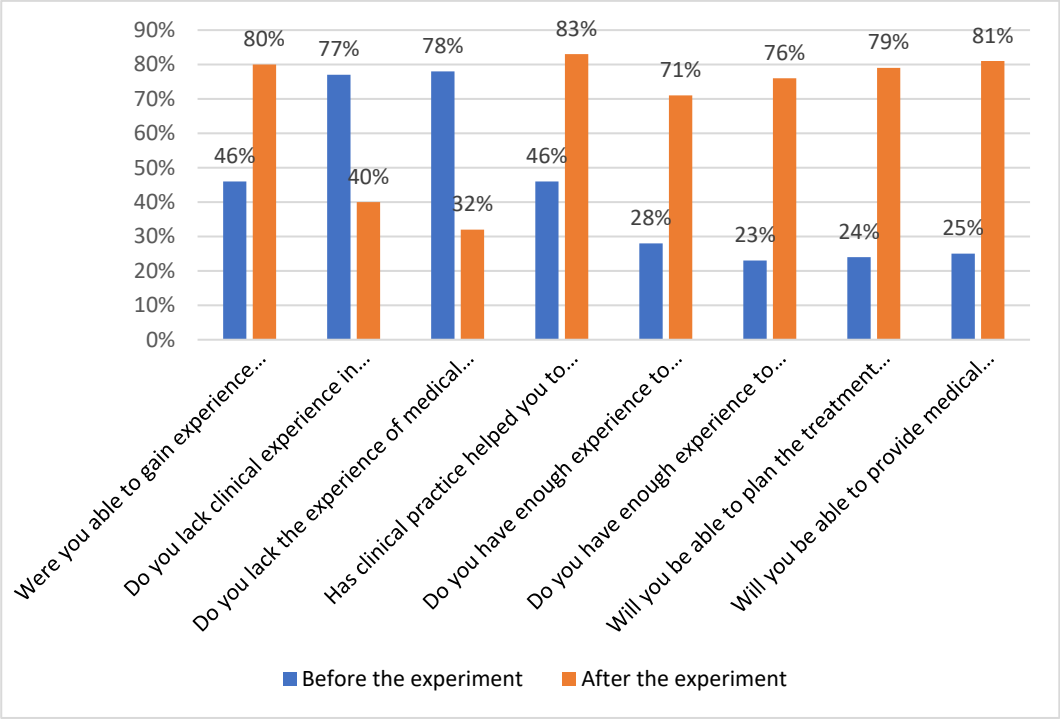

Figure 8. Distribution of Answers to the Questionnaire in the Control Group

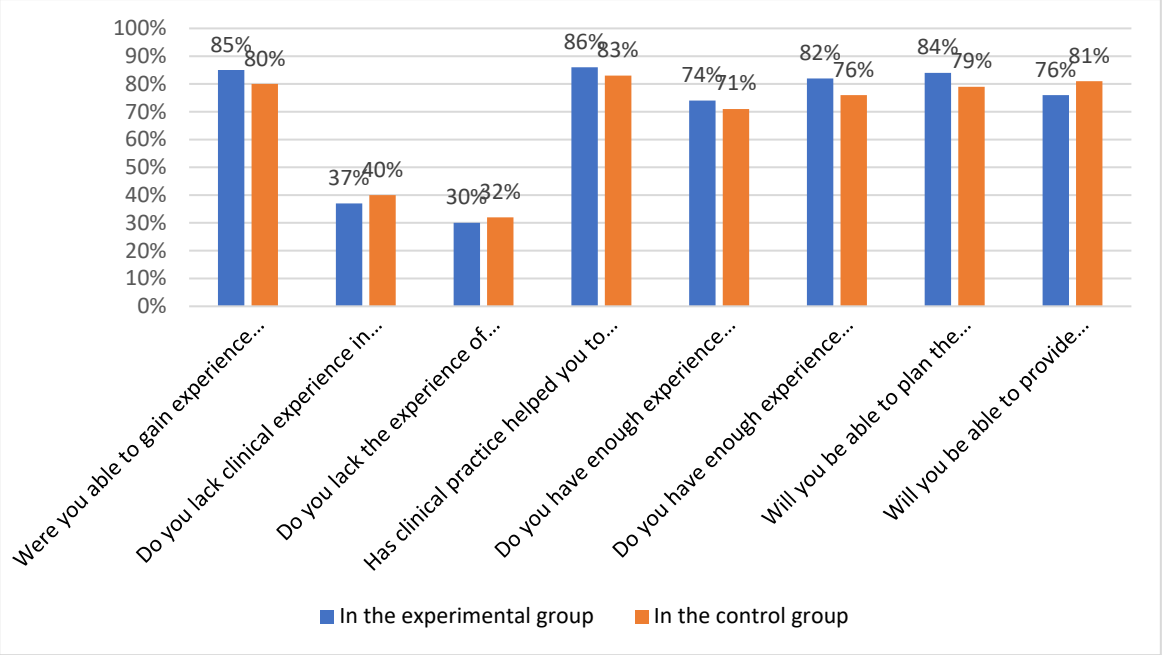

Figure 9. Distribution of Answers to the Questionnaire in the Experimental and Control Groups after the Experiment

The results of the experts' assessment of the impact of the introduced alternative approach to clinical practice are presented in Table 2.

As the study showed (Table 2) in general, clinical practice increases the confidence of medical students in diagnosing patients' diseases, prescribing the necessary examinations, interpreting their results, diagnosing and prescribing appropriate treatment and carrying out the latter. At the same time, alternative approaches to clinical practice are quite effective along with traditional methods of its implementation.

Table 2. The Results of the Experts' Assessment of the Impact of the Introduced Alternative Approach to Clinical Practice

Competence	Average score			
	Experimental group		Control group	
	Before the experiment	After the experiment	Before the experiment	After the experiment
Ability to keep medical records	4	8	4	7
Ability to interview the patient	3	7	3	6
Ability to conduct a physical examination of patients	3	7	3	7
Ability to prescribe additional examinations	3	7	3	7
Ability to analyse the obtained examination results	2	8	2	7
Ability to diagnose	2	8	2	8
Ability to prescribe treatment according to the diagnosis	3	8	3	8
Ability to carry out treatment at any of its stages	2	7	2	8

It was found in the course of the study that the standard deviations from the mean percentage of positive responses to the same questionnaire questions differed in different universities. The intergroup variance, which is a characteristic of the fluctuation of the considered groups, and the intragroup variance, which is a characteristic of the fluctuations caused by random factors not taken into account, are not equal values. This is proof that the null hypothesis is not true.

Besides, using Pearson's criterion, having calculated the value of the answers to the following questions of the questionnaire: "Did clinical practice help you develop skills and abilities of keeping medical records?", "Do you have enough experience to diagnose a patient's disease?", "Do you have enough experience to prescribe the necessary tests and analyse their results in order to diagnose the disease?", "Can you plan the treatment that is adequate to the diagnosis?" given by the students of the experimental group ( ), and comparing with obtained for answers to the questions given by students of the control group, we found that. This may indicate a reason to believe that there is some relationship between the approach to clinical practice and the level of relevant skills acquired during clinical practice.

Intergroup variance is the weighted sum of squares of deviations of group means from the general mean, due to the heterogeneity of the sample, namely the different conditions for the introduction of an alternative approach to clinical practice in different medical institutions ranged from 340 to 1200.

Also in the studies, Cohen's d was about 1.0 in the experimental group, which indicates the high efficiency of the used alternative approaches to clinical practice. This gives grounds to state that the proposed alternative approach to clinical practice is effective in the process of gaining clinical experience by students of medical educational institutions.

4. Discussion

The results of the study presented in this paper showed that the proposed alternative approach is effective, for example, to gain experience in communicating with patients. It also contributes to the development of skills in maintaining medical records, conducting examinations, treatment, etc.

It was found (Kasai et al., 2021) through questionnaires and semi-structured focus group interviews of 43 students that online learning had a positive effect on respondents' clinical self-assessment through the successful use of alternative methods used in clinical practice despite the shortcomings identified. It also had a positive effect on the acquisition of medical record keeping skills, skills of conducting interviews and consultations with patients, conducting physical examinations of patients. They pointed out that online learning is an alternative to clinical practice in outpatient clinics and hospitals, at the patient's bed (Kasai et al., 2021).

Clinical practice skills acquired online can also be useful in terms of conducting medical consultations and examinations of patients remotely — video consultations, which is an innovation in modern medicine due to the high risk to which physicians are exposed and in order to preserve them (Trethewey et al., 2020).

A survey (Shehata et al., 2020) also showed that more than 60% of respondents consider alternative teaching methods acceptable in a pandemic. And almost 85% of respondents confirmed that alternative teaching methods were used during clinical practice in educational institutions where they study in the pandemic. Of the 636 students, about 51% believe that traditional methods can be contrasted with online education. This opinion is shared by 33% of the 81 teachers surveyed (Tuma, Nassar et al., 2021).

However, there is another opinion. Out of 3,348 respondents (Alsoufi et al., 2020), only 21.1% believe that e-learning can be used as an alternative approach to clinical practice, and almost 55% are strongly against e-learning in the development of clinical skills.

According to the study (Chatziralli et al., 2021), before the pandemic 92.8% of respondents preferred traditional lectures, 72% — case studies, 43% drew educational information from video. About 43% of respondents attended video conferences (Chatziralli et al., 2021), and about 11% used e-class platforms. This study showed that the pandemic affected education, which led to a change in approaches and forms of learning. Online education has become a good alternative during the pandemic (Dost et al., 2020). The attitude to online learning of both students and teachers has also changed.

A study (Ayoub e al., 2020) showed that the use of the method of considering specific clinical cases is more effective in gaining clinical experience than traditional attendance of lectures.

There were 60% of respondents (Chatziralli, 2021) who believed that the experience of online learning will be used

after the pandemic.

The research conducted in this paper, as well as a number of others presented in the scientific literature, as the authors (Kasai et al., 2021) noted, are subjective due to the lack of generally accepted criteria for assessing clinical competence.

5. Conclusion

Due to the pandemic that began in 2020, the whole world was forced to change the traditional form of learning into distance one. This has forced teachers in various fields to look for new approaches to learning, in particular, teachers of medical education institutions to introduce alternative approaches to clinical practice. This study proposed one of them and evaluated its effectiveness. It has been established that conducting clinical practice remotely in a pandemic is an effective alternative to traditional forms of clinical practice. In particular, the use of virtual patients and laboratories, watching videos of medical procedures, discussing specific video cases during video conferences, etc., allow students to develop medical skills necessary for physical examination of patients, prescribing additional examinations, interpretation of results, diagnosing, prescribing and conducting treatment, and feeling more confident in the performance of their professional duties.

This study has practical value for researchers and teachers of medical education institutions who are looking for alternative approaches to clinical practice.

In the future, it is necessary to develop common criteria for assessing the clinical competence of both medical students and practicing physicians, which will allow a more accurate assessment of the effectiveness of the approaches introduced, in particular to clinical practice in medical education institutions.

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