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Distance learning opportunities during the COVID-19 epidemic

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Abstract

Aim. To compare the results of using traditional and distance education technologies in the training of obstetricians and gynecologists in the continuing medical education cycles.

Methods. The effectiveness of the use of traditional and distance learning technologies in the training of obstetrician-gynecologists on the continuing medical education cycles was assessed based on Bashkir State Medical University. The study included an assessment of the knowledge of obstetricians and gynaecologists trained in the 36-hour program. Two study groups were selected. The group I included 28 doctors, whose training and knowledge assessment was carried out mainly using traditional education technologies. The group II consisted of 30 doctors, whose training and knowledge assessment was carried out using distance education technologies. The final effectiveness of the use of the studied technologies was evaluated based on the analysis of the final test results and the solution of situational clinical tasks as a General interview. The research results processing was performed by IBM SPSS Statistics Version 25.0.

Results. The study revealed that the use of distance learning technologies does not lead to a decrease in the physician's level of training: 70.0% in group I, 60.7% in group II (χ^2=0.11, df=1, p=0.74). Meanwhile, the distance learning format causes difficulties for doctors of the older age group: in group I, there is a direct moderate correlation between age and performance (r=0.497, p=0.007), in group II — a noticeable inverse correlation (r=–0.689, p <0.001).

Conclusion. Based on the results of the study, it is necessary to take a differentiated approach to the formation of groups for distance learning in the future.

Keywords: obstetrics, gynecology, training, doctor, distance learning, competencies, coronavirus, COVID-19.

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Background. In Russia, the introduction of a new model of advanced training for doctors, namely the Continuing Medical Education (CME) is ongoing. In 2019, large-scale transition to distance learning by all educational institutions of the country seemed impossible, but due to the coronavirus pandemic (COVID-19) in 2020, on-campus classes became infeasible from the perspective of the health and safety of teachers and students alike, and therefore this transition had to be implemented within the shortest possible time duration. The educational system faced the enormous challenge of the need to urgently adapt existing educational programs to distance education.

The smooth transition to new educational programs was facilitated by the Decree of the President of the country V.V. Putin "On measures to ensure the sanitary and epidemiological well-being of the population on the territory of the Russian Federation due to the spread of a new coronavirus infection (COVID-19)" [1]. However, given that during the period of self-isolation, medical institutions did not stop their activities, distance education played a very positive role, since it allowed learning sessions to be conducted when it was most convenient for students. Existing software in educational institutions was adapted to aid distance learning, which enabled the continuation of high-quality postgraduate education [2]. In the shortest possible time, electronic educational resources (cases) were developed and updated, which included software, technical,

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and organizational support for conducting classes.

During the period of self-isolation, teachers had to overcome various issues related to the conduct of educational activities. After analyzing the activities of teachers, European scientists came to the conclusion that the teacher has to be [3]:

– An information provider;

– A mentor who becomes a role model for doctors;

– An intermediary between other participants in the educational process;

– An evaluator of the quality of knowledge gained;

– Developer of quality educational materials and the manager of the educational process.

The fulfillment of the performance targets for teachers was complicated by the fact that literally every month a new update to existing guidelines and recommendations, "Prevention, diagnosis and treatment of new coronavirus infection (COVID-19)," was issued. This led to the need for new programs for coronavirus infection (COVID-19) to be developed, and altering the existing systems. Knowledge of the various aspects of clinical presentation of COVID-19 in pregnant women would help the obstetrician-gynecologist to establish a timely diagnosis, as well as provide the necessary amount of medical care, and prevent possible complications for both the mother and the fetus. Clinical guidelines will therefore enable choosing optimal management of pregnancy, the scope of the examination, as well as the method of delivery of pregnant women [4].

Distance education is a relatively new phenomenon in the Russian Federation. It began only in 1992, when the "Concept for the creation and development of a unified distance education system to increase the availability and quality of educational programs throughout the country" was adopted. In 2002, the "Methodology for the application of distance learning technologies in educational institutions of higher, secondary, and extended professional education of the Russian Federation" was approved, and in September 2013, the Federal Law "On education in the Russian Federation" came into force. It has simplified greatly the possibilities of introducing online technology into educational programs of universities in the Russian Federation [5].

Online learning has its own unique characteristics. They are related primarily to the fact that the doctor determines independently the amount, time, and sequence of studying the material provided to him; therefore it is extremely important for the teacher to properly organize the educational process. This is achieved by providing each doctor with well-structured and instructive educational course materials. Having studied them, each doctor must understand and master the theoretical foundations of each topic, methods of solving typical problems, performing surgical interventions studied during the cycle, and finally perform self-management and correction of the educational work, as well as self-assessment of the results. This requires the dedicated involvement with the study material by each doctor who undergoes intensive training and acquires the ability to carry out independent work. Moreover, online educational systems could also provide the possibility of doctors being able to consult with a teacher on emerging issues related to the problem being studied and the clinical situation [6–10].

The very possibility of using online learning by medical universities for training personnel remains controversial. On the one hand, the introduction of this form of training enabled the safety of the health of teachers and the doctors trained, which in future would enable increasing the number of students and reducing the shortage of trained personnel in the health care system. Since a significant part of the information would become digitized, the student will have more time for self-study. On the other hand, this form of training does not help the doctor to properly master new practical skills, methods of performing surgical interventions, since simulation methods cannot replace "hands-on" training for performing surgical interventions, which then throws into question the quality of the education received. Here Scotland's Education Minister Ian Lang can be quoted, who, in the face of pressure from parents arguing against testing in primary schools, said: "I think that teaching without testing is like cooking without tasting" [11].

One of the main functions of contemporary education is to create conditions that enable persons to successfully adapt to changes that are taking place in society [10]. Therefore, given this current situation, based on their own technical capabilities, teachers chose independently the form of distance teaching. Some teachers preferred distance training of doctors "in the absence of a teacher" and limited themselves to sending theoretical material in the form of documents and video files, as well as a package of tasks by e-mail. Other teachers chose a method of "partial presence of the teacher" and, in addition to sending theoretical material, also organized videoconferencing, during which further analysis and discussion of the current topic and knowledge acquired were undertaken.

Currently, distance learning technologies are widespread in the field of extended professional education, including medical education [5]. In future, the experience gained through distance learning in pursuing extended medical education will

be useful for creating newer and better technology to enable full distance learning by doctors in educational medical institutions during a pandemic.

The work aimed to compare the results of using traditional and distance educational technologies while training obstetricians-gynecologists on CME cycles.

Materials and methods. An assessment of the effectiveness of contact and distance educational technologies was conducted in the Department of Obstetrics and Gynecology with a course of extended education institution, Bashkir State Medical University, within the framework of training using the cycle "Emergency care and resuscitation in obstetrics and gynecology."

Two study groups were enrolled. Group 1 included 28 doctors, whose training was conducted in 2019 mainly using traditional educational technologies, whereas group 2 included 30 doctors, whose training and knowledge assessment was performed in 2020 mainly using distance learning technologies. The groups were comparable in terms of age, gender, certification category, and employment term.

The effective application of the technologies under study was assessed based on the comparative analysis of the results of the final testing and solutions offered for situational tasks in the traditional and distance forms.

The traditional (contact) form of education in medical universities consists mainly of explaining the material in the classroom. The training of doctors in medical educational institutions is based on lectures, practical exercises, and performing surgeries on simulators in a simulation center and then going on to assist a senior doctor and finally undertaking independent performance of procedures, manipulations, or surgical interventions in a hospital setting.

Doctors are trained in groups, each of which includes 5 to 10 people. The teacher demonstrates models and dummies as visual aids, which represent the anatomical and topographic aspects of the female reproductive system, including during pregnancy. Demonstration of such educational videos enables doctors to study the course and technique of performing gynecological and obstetric surgeries, and some types of surgeries, due to their rarity, are recorded (a video file is created) and demonstrated during classes. Assessment of current knowledge is based on a daily survey by the teacher, as well as on the results of solving situational problems, analyses of clinical cases, and tests.

In addition, the educational process at the department traditionally includes at least 10% of active and interactive forms of classes ("Mini-conferences with multimedia presentation," "Role-playing games on the subject of the lesson," and "Solving case problems"). During the CME cycle, doctors are provided with access to the stock and library funds of the university library; furthermore, the department has developed guidelines and textbooks for each section of the academic subject.

The independent work of a doctor includes not only preparation for practical exercises (studying basic and additional literature, clinical guidelines, printed and electronic manuals of the department), but also the preparation of thematic abstracts, presentations, and reports. An important role in the structure of a doctor's independent work involves the preparation of medical documentation, which enables consolidation of the knowledge gained and contributes to consolidation of professional skills and abilities.

Due to the threat of the spread of coronavirus infection COVID-19, from April 2020, the Bashkir State Medical University started to implement training programs for doctors, students, and clinical residents using distance learning technologies to impart education as well as conduct assessments electronically. The distance learning format included not only tasks for the entrance and final academic performance assessment, but also access to video lectures, educational films and presentations on the various topics of the cycle classes after receiving a key for the case with all the current information, which was accessible round-the-clock. To consider problematic issues, the classes used free proprietary closed-source software (Skype), which supports text, voice and video communication through the Internet, including in the videoconference format, and the lecture material was saved for 30 days.

Considering that doctors undergoing training in the CME cycle did not have daily assessment of their current performance, the results of the final certification in both groups were assessed on a 100-point scale, where 69 points or less corresponded to an "unsatisfactory" result, 70–79 points corresponded to a "satisfactory" result, 80–89 points corresponded to a "good" result, and 90 points or more corresponded to an "excellent" result. Additional consultations before the test were conducted in person in group 1, and in the format of a video conference in group 2. The final lesson also included the solving of situational problems on emergency conditions in obstetric and gynecological practice, followed by an interview. In 2020, the certification took place in a remote manner, in the form of a video conference (Zoom). The examination boards consisted of at least three teachers (the head of the department, the main teacher-curator

of the group, and the assistant professor/professor of the department).

In statistical analysis, the authors were guided by the principles of the International Committee of Medical Journal Editors and the recommendations of Statistical Analysis and Methods in Published Literature (SAMPL) [11]. The research results were processed using the statistical software package IBM SPSS Statistics Version 25.0 (International Business Machines Corporation, USA). The normality of characteristics distribution, taking into account the size of the studied groups (less than 50 people), was assessed using the Shapiro–Wilk test. Considering the distribution of characteristics close to normal, the data were presented as the mean value (M) and standard deviation (SD) and were represented as M (SD). Comparison of two independent groups for one quantitative trait was performed using the student's t-test, while the hypothesis of equality of variances was tested using the F-test. Nominal data were presented as absolute values and percentages. To compare the nominal data, we used the Pearson χ^2 test with the number of degrees of freedom equal to df. In all cases, when the *p*-value (level of significance) met the ratio $p < 0.05$, the corresponding statistical hypothesis was considered statistically significant [11, 12]. To determine the degree of strength of relationship between the studied quantitative indicators, the linear Pearson correlation coefficient (*r*) was used. The pronouncement of the degree of strength of relationship between the studied indicators was determined based on the Chaddock scale.

Results and discussion. The average age of doctors was 36.3 (8.0) years in group 1, and 37.1 (9.9) years in group 2 (t = 0.06, df = 56, $p = 0.95$). The insignificance of differences in the variances of the mean age for these groups was tested by the F-criterion, which was $F_{calculated} = 9.9^2 / 8.0^2 = 1.53$. While its critical value was $F_{critical}$ (0.05; 29, 27) = 1.90 that is, $F_{calculated} < F_{critical}$, that is, the age variances differed insignificantly in these groups, therefore, the student's test was justified.

The distribution of doctors by gender in group 1 showed 14.3% (4/28) males and 85.7% (24/28) were females; while in the study group 2; these indices were 20.0% (6/30) and 80.0% (24/30), respectively ($\chi^2 = 0.33$, df = 1, $p = 0.56$). In group 1, 42.8% (12/28) of participants had a superior medical category, 25.0% (7/28) had category I, 21.4% (6/28) had category II, and 10.8% (3/28) of participants did not fall under any category. In group 2, 35.7% (10/30) of participants had a superior category, 20% (6/30) had category I, 26.7% (8/30) had category II, and 20% (6/30) of doctors did not fall under any category ($\chi^2 = 1.48$, df = 3, $p = 0.69$).

Thus, there are no statistically significant differences between these indicators in the two groups under study, and therefore it would be possible to compare the effectiveness of traditional and distance educational technologies within the framework of the CME. It is remarkable that there were no unsatisfactory results during this study.

In the study group 1, 39.3% (11/28) of the trained doctors received "satisfactory" marks, 53.6% (15/28) of the doctors received "good" marks, 7.1% (2/28) of the doctors received "excellent" marks; while in group 2, these indices were 53.3% (16/30), 46.7% (14/30), and 0.0% (0/30) doctors, respectively ($\chi^2 = 2.89$, df = 2, $p = 0, 24$). The final certification of students also did not reveal unsatisfactory results. Furthermore, some progress was also noted in both the groups under study, as in group 1, 10.7% (3/28) of the doctors received "satisfactory" marks, 64.3% (18/28) of the doctors received "good" marks, and 25.0% of the doctors received "excellent" marks (7/28); in group 2, 33.3% (10/30) of the doctors received "satisfactory" marks, 50.0% (15/30) of the doctors received "good" marks, and 16.7% (5/30) doctors received "excellent" marks ($\chi^2 = 4$), 31, df = 2, $p = 0.12$). These results are clearly illustrated in Fig. 1.

The absolute academic performance in the course of the CME cycles in both group 1 and group 2 was 100.0% (58/58). Qualitative performance was 89.3% (25/28) in group 1 and 66.7% (20/30) in group 2 ($\chi^2 = 4.26$, df = 1, $p = 0.04$) (Fig. 2). In general, it also appears that the distance learning format is not sufficient to receive "excellent" marks for the hardworking group of students ($\chi^2 = 0.61$, df = 1, $p = 0.41$). However, this statement was not statistically confirmed, since the degree of training of doctors was approximately the same in both study groups and amounted to 70.0% in group 1 and 60.7% in group 2 ($\chi^2 = 0.11$, df = 1, $p = 0.74$).

The average final academic assessment score was 4.14 (0.59) points in group 1, and 3.83 (0.70) points in group 2 (t = 0.34, df = 56, $p = 0.74$). Analysis of the critical and calculated values of the F-criterion showed that the use of t-statistics in this case is reasonable.

Despite the absence of statistically significant differences, a slightly larger number of "satisfactory" marks in study group 2 are noticeable. While analyzing the age structure of students who received "satisfactory" marks, it was observed that doctors under 45 years (3/3) are more in group 1, and those over 45 years (7/10) are more in group 2 ($\chi^2 = 4.55$, df = 1, $p = 0.03$). Consequently, the use of distance learning technologies leads to a decrease in the educational level of doctors in the older age group (over 45 years old). This fact is probably due to their lack

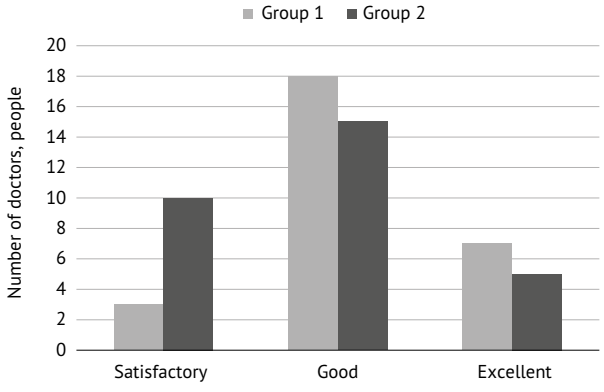

Fig. 1. Distribution of doctors in the groups 1 and 2 based on the results of academic performance assessment

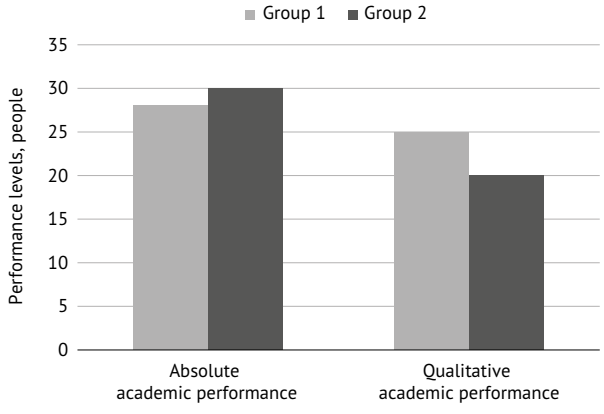

Fig. 2. The absolute and qualitative performance of the groups under study

of experience in the Internet system, which in turn results in a stressful situation and an increase in the number of unintentional mistakes, which are reflected in the results of the final academic assessment.

Given this fact, it is of certain interest not only to assess the effectiveness of training in the studied groups, but also to determine the actual degree of parallelism between the results of the final test and the student's age, as in the group 1, there is a direct moderate correlation between the student's age and the performance ($r = 0.497$, $p = 0.007$); while in the group 2, there was a noticeable inverse correlation ($r = -0.689$, $p < 0.001$). Thus, the traditional form of education is most acceptable for obstetricians-gynecologists of the older age group (over 45 years old), and the distance form is most acceptable for doctors under 45 years of age.

The study revealed that the distance learning format within CME is comparable to the traditional form of education. The level of training in the studied groups does not show any statistically significant differences. However, the distance learning format leads to a decrease in the educational level of obstetricians-gynecologists of the older age group. Considering the imperfections in the technologies developed, more attention should be paid to the technical knowledge and online experience of both Russian and international colleagues, which will enable improvements in the level of distance medical education in the future [13–16]. Furthermore, after the complete elimination of the COVID-19 epidemic, the option of a differential approach to in creating distance learning groups should be considered.

CONCLUSIONS

Taking into account the results of the study, and to optimize in the future the structure of the educational process, the following points should be considered:

1) Converting all lecture material into video format in order to enable online and distance learning, thus preventing the spread of socially significant infections;

2) Providing round-the-clock access to the materials in the library stock for the entire period of study;

3) Implementation of a differential approach in the creation of groups for distance learning, including taking into account the age of the students;

4) Provision with material and technical equipment, and programs to teachers for conducting training sessions on the provision of emergency medical care;

5) Development of software and technological support of the educational process, including virtual reality simulators, which allow mastering basic practical skills and techniques for performing surgical interventions in a distance format (for example, simulation of practical actions during surgical interventions using 3D gloves and virtual reality glasses).

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