

COVID-19: EFFECTIVENESS EVALUATION NEW CONCEPT OF COMBINED LEARNING FOR OB/GYN RESIDENTS UNDER QUARANTINE RESTRICTIONS

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Abstract

Introduction. The COVID-19 pandemic has been going on in Ukraine and around the world for more than a year. This process wasn't unnoticed by Odessa National Medical University (ONMedU), where a new concept of combined postgraduate education for OB/GYN residents was introduced at the Obstetrics and Gynecology department.

Goal. To analyze the new combined concept effectiveness of postgraduate education for OB/GYN residents in quarantine through COVID-19, which includes innovative approaches to the educational process connected with traditional teaching methods at the Department of Obstetrics and Gynecology ONMedU.

Materials and methods. The research involved 139 residents who studied at the Department of Obstetrics and Gynecology ONMedU in 2020-2021 under the new concept of combined learning due to quarantine restrictions (Group I), and 132 OB / GYN residents who studied in 2018 - 2019 for traditional full-time educational program (group II). The learning outcomes and assessment of 139 residents of OB / GYN (I group) have been analyzed with the help of imitational virtual platforms for obstetricians-gynecologists, birth simulators, virtual operation room and virtual labor room. The new concept of combined learning included:

- 1 Interactive online lectures, classes via video using pre-loaded information: presentations, videos, photos, cardiotocograms, partograms, etc., current and final (monthly) test controls, preparation for the STEP-3 licensing exam using Microsoft Teams and Office 365 cloud services, which are accessible to all teachers and residents under personal accounts.
- 2 Practice in the Simulation Center of medical care for obstetric pathologies (hypotonic bleeding, eclampsia, resuscitation of the newborn, CPR of pregnant women, dystocia of the shoulders, assistance with pelvic presentation of the fetus) both individually and in groups (teamwork). They underwent seminar (10%) and practical (90%) classes for normal and pathological labor, obstetrical operations, urgent cases and emergencies in obstetrics with several different assessment protocols, including initial and final testing. Practical skills mastery assessment was conducted in the OSCE format. Team work with changing roles using video-monitoring and debriefing by case-study check-lists (29 positions; from 2 to 5 points for each).
- 3 Personalized work in clinics with curators (1 curator for 5 residents) according to an individual schedule with observance of all anti-epidemic measures.

Results. The average group I age was 23.1 ±0.78 years, and the second group age was 23.7 ±0.65 years ($p > 0.05$). The average diploma score on a 5-point scale in group I was 3.9 ±0.11 and in group II - 4.1 ±0.15 ($p > 0.05$). Both groups were homogeneous in age and baseline in the diploma. Group I interns showed significantly better results of the STEP-3 licensing exam compared to group II: average score 77.4%, obstetrics and gynecology subtest - 80.9% (group I); 70, 8% and 72, 7% respectively (group II). Attendance at lectures and online classes in group I was 99, 5%, in group II - 84, 3%. When assessing practical skills individually significantly better results were also obtained in group I - 84.5% compared to group II (72, 3%); when assessing teamwork in group I, the best results were obtained at CPR stations of pregnant women, hypotonic bleeding and eclampsia. When assessing the theoretical knowledge on a 5-point scale, no significant differences were found between the groups: 4.2 ± and 4.4 ±, respectively.

Conclusions. The new model of mixed learning has demonstrated its effectiveness in training resident obstetricians and gynecologists, making the most of the advantages and minimizing the disadvantages inherent in distance education.

Keywords. medical education, obstetrics-gynecology residents, postgraduate education, combined educational concept, quarantine restrictions, COVID-19.

1 INTRODUCTION

The COVID-19 pandemic has been going on in Ukraine and around the world for more than a year. The educational community is in dire need of new approaches to learning with a limited number of classes, higher education institutions teachers and higher education students due to quarantine restrictions switched to learning using distance technology[1, 2].

Distance learning technologies are not a new phenomenon today. In the world in recent decades, the rapid modern web technologies development, global information networks, the Internet dominance has contributed to the transformation of classical learning and the rapid emergence of new approaches to teaching in higher education. Distance learning is a promising education area in the modern world realities, which, if necessary, can ensure the educational process continuity in emergencies, when classroom studies are impossible[1, 3]. In addition, without the widespread introduction of online technologies and fundamental changes in approaches to the studies organization in educational institutions, it is almost impossible to ensure compliance with basic requirements for higher education, namely its accessibility and inclusiveness, flexibility for certain applicants categories who work, have children, etc. to introduce dual education and individual learning trajectory of each individual applicant[4, 14].

Distant technologies undoubted advantages use includes the ability to build a lifelong learning and information exchange systems variety for a wide participants range in the educational process, time, location, age, social status regardless. Distance education is more cost-effective for both higher education and universities, as students do not spend money on accommodation and travel to primary school, and educational institutions no longer need to provide educational facilities, it becomes more flexible to schedule classes, with a constant and educational and methodical fast updating base possibility. The latest technologies can provide an individual approach and the opportunity to learn at their own pace for each student, choose to study several courses simultaneously and in parallel, provide access to educational materials (video lectures, abstracts, correspondence with teachers, etc.), which can be returned and revised if necessary), communication mobility with teachers not only in person but also online. The educational process takes place for students in a comfortable, calm environment, which reduces stress, because there are no certain psychological barriers that can be felt by some students in a traditional audience[1, 4, 6, 7, 10].

Well, one of the main advantages - distant education makes it impossible to get infected in modern conditions with the SARS_CoV_2 virus during training.

At the same time, the active online segment spread in education is accompanied by controversial assessments. In addition to the fact that universities are gradually losing their "social function", online learning using digital technologies has a number of disadvantages and limiting factors[4, 7].

Dependence on technical means of teaching, high-quality and fast Internet, lack of group work in online lectures, sometimes weak students motivation to study and master the material, low technology mastery level by teachers and students, which makes it necessary to create "technical support" groups. Compilation of videos, multimedia training courses, etc. (certain costs), lack of reliable criteria for evaluating students, the integrity and identification problem, which sometimes arises during testing and answers - this is a non-exhaustive list of problems facing universities around the world process using remote technologies[4, 5, 7].

Speaking specifically about medical education, one of the main future doctors online training disadvantages is the inability to practice hands-on and communicative skills and abilities, teamwork and communication with real patients. Distance learning cannot fully ensure the clinical disciplines practical aspects mastery, because no modern computer simulator can replace the physical skills development on the phantom under the teacher's supervision and then at the patients' bed[1, 2, 4, 8, 9, 15, 16].

What are the solutions to these problems today and is there a significant difference in knowledge between traditional learning and distance learning? These issues were particularly acute for medical institutions around the world during the COVID-19 pandemic and did not go unnoticed at Odessa National Medical University, where a new mixed postgraduate training model for resident obstetricians-gynecologists was introduced at the Department of Obstetrics and Gynecology. In such conditions, one of the main tasks was to organize a high-quality and safe educational process with the online

technologies help, reduce the number of classes, conduct trainings among teachers, organize and motivate residents to study. After all, the world's leading universities experience shows that quality medical education is possible with a significantly smaller classrooms number with the rational online technologies use, appropriate methodological support and effective direct and indirect forms interaction combination between students and teachers in the form of mixed learning[11, 12 , 14, 16].

Objective. Make a new mixed model comparative effectiveness analysis of postgraduate obstetricians-gynecologists training in quarantine through COVID-19, which includes digital technologies, resources and innovative approaches to the educational process, and traditional teaching methods at the Department of Obstetrics and Gynecology Odessa National Medical University.

2 METHODOLOGY

The study involved 139 residents who studied at the Department of Obstetrics and Gynecology Odessa National Medical University in 2020-2021 under the new model of mixed learning due to quarantine restrictions (Group I), and 132 resident obstetricians-gynecologists who studied in 2018 - 2019 for traditional full-time educational program (group II). The learning outcomes and assessment of 139 residents of OB / GYN (I group) and 132 resident obstetricians-gynecologists (group II) have been studied with the help of imitational virtual platforms for obstetricians-gynecologists, birth simulators, virtual operation room and virtual labor room.

The new mixed learning model for resident obstetricians and gynecologists included:

- 1 Interactive online lectures, classes via video link using pre-downloaded information: presentations, videos, photos, cardiotocograms, partograms, etc., current and final (monthly) test controls, preparation for the licensing exam STEP-3 with using Microsoft Teams. Microsoft Teams is a program for teamwork in Office 365, which allows team members to interact, share information in a common workspace, conduct online lectures, set tasks, communicate in a social network, etc. Odessa National Medical University uses cloud services Office 365, to which all teachers and students have access under personal work accounts.

Theoretical classes at the Department of Obstetrics and Gynecology (lectures, seminars, practical classes) with residents were conducted in an online learning environment created using the tool Microsoft Teams. Previously, Class-type teams were created for each academic group of residents, as well as events in the Calendar according to the interns schedule.

Lectures, theoretical seminars were organized via video using pre-loaded information: presentations, videos, photos, cardiotocograms, partograms, etc. During the online lesson, the teacher explains the topic, interviews residents, corrects their answers. Also in practical classes in obstetrics and gynecology, interns solve situational problems, study algorithms for care in various pathological conditions in obstetrics and gynecology, work in groups on a specific task in the space for joint work (13) (partogram in pathological childbirth, for example, when clinically narrow pelvis, labor weakness, if necessary, labor, distress, etc.).

Sectional control classes for interns were conducted in the testing form with automatic results evaluation (using Office 365 Forms, creating forms with questions on topics according to the calendar-thematic plan) and by solving clinical problems and written answers to questions in the Tasks tab. Test results were converted into scores according to evaluation criteria. After checking the completed tasks, the teacher sends individually to each resident feedback on the work done, their comments and assessments.

Thus, the interaction of the teacher and the resident obstetrician-gynecologist in the distance learning system was through a message in the chat Microsoft Teams, which encourages the teacher to search for new dialogic communications, allows each teacher to develop an individual method of presenting material on obstetrics and gynecology, constantly improving their pedagogical skills.

Microsoft Teams allows students to learn both synchronously and asynchronously, which is a significant benefit of this tool. Videos of lectures, classes are stored and available for viewing / download at any convenient time to each team member. The Stream application is actively used to exchange videos of classes and lectures between groups.

Preparation for the STEP-3 licensing exam in Group I was also carried out using the Microsoft Teams application. During the video-communication classes with the residents, the obstetrics and gynecology issues were analyzed from the STEP-3 test database of the past years, which is

publicly available on the website of the Ministry of Health. More than 1,200 questions from the STEP-3 open test database in the past years have been transformed into forms of 200 questions each, which were used for monthly interns obstetricians and gynecologists preparation level monitoring for the licensing exam. The order of questions in the form for each individual respondent was set in advance. Answers to the form questions could be sent only from your own university account, and a time limit for answers was set, as close as possible to the real exam. A total of 6 controls were conducted during the preparation.

- 2 Practice in the Simulation Center of practical skills and medical care standards for obstetric pathologies (hypotonic bleeding, postpartum hemorrhage, preeclampsia, eclampsia, resuscitation of the newborn, pregnant women CPR, shoulders dystocia, amniotic fluid embolism, pulmonary artery thrombosis, assistance in breech fetal presentation).

A safe and reliable educational environment for practicing skills by interns at the Department of Obstetrics and Gynecology of Odessa National Medical University was provided by an interactive birth simulator, interactive mannequins for newborns and children 6 months to master cardiopulmonary resuscitation, mannequins for breast cancer examination, 3-D haptic virtual simulator for endoscopic surgery and hysteroscopy, simulators for suturing the skin, simulators for mastering basic laparoscopic interventions.

Classes at the Simulation Center were conducted both individually and in groups (team work) in compliance with all anti-epidemic requirements. They underwent seminar (10%) and practical (90%) classes for normal and pathological labor, obstetrical operations, urgent cases and emergencies in obstetrics with several different assessment protocols, including initial and final testing. Practical skills mastery assessment was conducted in the OSCE format. In total, 7 OSCE stations were established to assess the resident obstetricians and gynecologists practical competencies: normal delivery, objective research methods in obstetrics and gynecology, eclampsia, pregnant women CPR, hypotonic bleeding, operative vaginal delivery, oncology prevention in gynecology. Team work with changing roles using video-monitoring and debriefing by case-study check-lists (29 positions; from 2 to 5 points for each, max rating for the station - 100%).

The training takes place regardless of the clinic's work schedule and quarantine restrictions, part of the teacher's functions was taken over by a virtual simulator.

- 3 Personalized work in clinics with curators (1 curator for 5 residents) according to an individual schedule with all anti-epidemic measures observance (13).

3 RESULTS

The average first group residents age was 23.1 ± 0.78 years, at the second group age was 23.7 ± 0.65 years ($p > 0.05$). The average diploma score on a 5-point scale in group I was 3.9 ± 0.11 and in group II - 4.1 ± 0.15 ($p > 0.05$). Both groups were homogeneous in age and baseline graduation grade point average. The relatively low average grade point average residents obstetricians and gynecologists of is objectively explained by outdated approaches to the postgraduate education organization in medical schools of Ukraine, medical university's lack of rating distribution graduates and should be corrected in the near future by introducing a new residency model for 2022.

Group I interns showed significantly better results of the STEP-3 licensing exam compared to group II: average score 77.4%, obstetrics and gynecology subtest - 80.9% (group I); 70.8% and 72.7%, respectively (group II) ($p < 0.05$) (Fig. 1). Thus, the advantage of using remote technologies in preparation for the licensing exam over traditional methods (analysis of problematic questions from the open database of tests in practical classes, self-training of residents on test questions on the website of the Ministry of Health) is obvious.

When assessing the theoretical knowledge on a 5-point scale, no significant differences between the groups were found: 4.2 ± 0.15 and 4.4 ± 0.09 , respectively. Good I group theoretical knowledge obstetricians and gynecologists residents results can be explained by the distant learning flexibility: residents work at a convenient time at a convenient pace. Each resident can study as much as he personally needs to master the material. Asynchrony, mobile communication with the teacher, the availability of the training course at any time certainly contribute to better mastering of theoretical material.

Attendance at lectures and online classes in group I was 99, 5%, in group II - 84, 3%. The results obtained are directly related to such distance learning features as parallelism and remoteness. Parallelism implies that training can take place in the process of combination with additional professional activities (part-time work, duty in clinics), as well as under certain personal circumstances (during child care, temporary incapacity for work, etc.), which is especially relevant at the postgraduate level stage of education. In addition, the distance from the resident's location to the educational institution is not an obstacle to an effective educational process.

When assessing practical skills individually significantly better results were obtained in group I - 84.5% compared with group II (72, 3%).

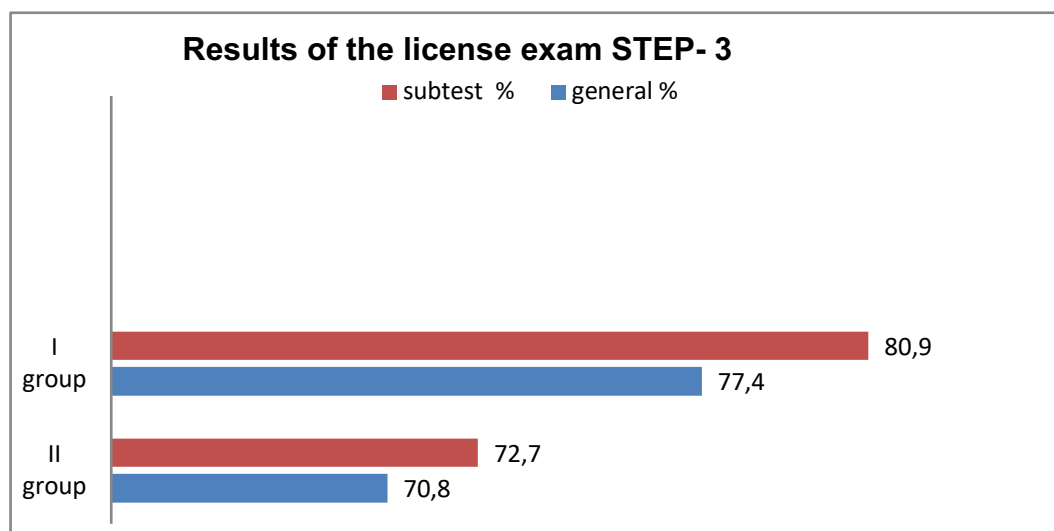


Fig. 1. The results of the licensing exam STEP-3 in the studied groups.

When evaluating teamwork in group I, the best results were obtained at pregnant women CPR stations, hypotonic bleeding and eclampsia stations (table 1).

Table 1. Results of OSCE (team work) in the studied groups

OSCE station	I group, N=139, %	II group, N=132, %	p
Normal childbirth	88,4	87,8	>0,05
Objective research methods in obstetrics and gynecology	89,1	89,8	>0,05
Eclampsia	85,7	72,3	<0,05
Pregnant women CPR	80,2	69,4	<0,05
Hypotonic bleeding	87,6	70	<0,05
Operative vaginal delivery	75,5	77,6	>0,05
Cancer prevention in gynecology	79,4	80,2	>0,05

And this is certainly related to the key stimulating interns training aspects: training individualization, providing feedback to residents on the results of training, a variety of clinical situations, the repeated practical skills possibility, integration with the training program, choice difficulty level for interns.

Significant practicing skills advantages by residents obstetricians-gynecologists in the Simulation Center include an objective achieved skill level assessment, reduced stress during the first self-manipulations, unlimited repetitions for skills development, care practice standards for rare and those life-threatening pathologies (hypotonic bleeding, eclampsia, resuscitation of the newborn, etc.).[13, 15, 16].

4 CONCLUSIONS

Qualitatively organized mixed learning allows each teacher to develop their own individual presentation of material, constantly develop and improve pedagogical skills.

In turn, residents have the opportunity to study regardless of quarantine restrictions, provided with wide access to educational resources and non-traditional informational sources, which increases the independent work efficiency, motivates and allows to find new opportunities to master the specialty "obstetrics and gynecology".

Based on the work during quarantine restrictions analysis, the main strategic mixed learning introduction directions for interns by the Department of Obstetrics and Gynecology of ONMedU are determined: appropriate information and methodological support development of the learning process in mixed learning, reflection of distance learning technologies in curriculum and program training internships in the specialty "Obstetrics and Gynecology", advanced training of teachers in the field of digital technology, preservation of remote technologies in preparation for the licensing exam STEP-3.

Qualitatively organized mixed learning at the postgraduate stage, despite a number of shortcomings allows to ensure harmonization of educational programs, constant monitoring of education quality, demonstration of individual courses to potential entrants - graduate students, who want to choose specialization in obstetrics and gynecology, possible commercialization.

The new mixed learning model, introduced at the Department of Obstetrics and Gynecology of Odessa National Medical University during quarantine restrictions through COVID-19, has demonstrated its effectiveness in training residents obstetricians-gynecologists, maximizing the benefits and minimizing the disadvantages of distance education.

Mixed learning makes it possible to bring the provision of educational services at Odessa National Medical University to the level of world standards at an accelerated pace.

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