

INNOVATIVE METHODS EFFICIENCY IN OBSTETRICIANS-GYNECOLOGISTS' POSTGRADUATE EDUCATION

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Abstract

Introduction: Important for the Ukraine was the creation of the new reformative governmental undergraduate and postgraduate medical education program. In Odessa State Medical University today it's the main innovative guideline for the physician modern practical training especially in obstetrics and gynecology.

Objective: To determine the efficiency of the innovative methods in the obstetricians-gynecologists postgraduate education.

Materials and methods: The learning outcomes and assessment of 320 postgraduates of OB/GYN have been studied with the help of imitational virtual platforms for the obstetricians-gynecologists, birth simulators, virtual operation room and virtual labor room. Physicians' average age was $39,4 \pm 0,7$ years; their average work experience - $12,6 \pm 0,9$ years. They underwent seminar (10%) and practical (90%) classes for the normal and pathological labor, obstetrical operations, urgent cases and emergencies in obstetrics with several different assessment protocols, including initial and final testing, anonymous self-assessment for their practical skills, structured check-lists with intermediate and final steps for each practical skill (from 12 to 18 points), team work with changing roles using video-monitoring and debriefing by case-study check-lists (29 positions; from 2 to 5 points for each).

Results: According to the results of the final tests it was found that low initial assessment of complicated childbirth and obstetric surgery themes significantly increased one and a half times ($p < 0,001$). After completion of the course the theoretical training was improved by one and a half times ($p < 0,05$). Indicators of the output of the theoretical test of postgraduates with work experience of at least five years, compared with the postgraduates, the experience of more than fifteen years, were 1.3 times lower ($p < 0,001$). On the course completion the theoretical performance testing has increased one and a half times, and skills have increased twice. Initial assessment of the vacuum extraction newborn operation significantly increased almost twice ($p < 0,001$). Teamwork evaluation at the end of the course has increased more than twice ($p < 0,001$).

Conclusions: The obtained results showed the significant correlation in ob/gyn specialists theoretical knowledge and practical skills scores with average work experience and hospital level. Modern and innovative psychological and simulation technologies use significantly increase the teaching effectiveness of theoretical and practical skills for obstetricians-gynecologists.

Keywords: postgraduate education, obstetrician-gynecologist, theoretical test, practical skills, teamwork, simulation methods, debriefing.

1 INTRODUCTION

Nowadays, one of the main approaches in medical education of obstetrician-gynecologists is the need for significant upgrade of practical skills while maintaining a sufficient level of theoretical knowledge. This is a problem both for students and for practitioners, especially young professionals [1]. Modern medical education is a process when students and medical workers constantly update their knowledge and practical skills.

Its prior goal is improving the quality of medical care and patient's safety [2]. The main feature of modern education is the focus not on content only but also on the result of education, expressed in terms of improving the competence of experts [3]. The introduction of simulation education opportunities for obstetrician-gynecologists is a promising and necessary trend in current environment [1].

History of medical simulation for obstetrician-gynecologists dates back hundreds of years and is inextricably linked with the development of medical knowledge and the progress of science and technology. Simulation training is an effective and efficient tool to solve many problems. The

advantage of simulation technology is training which causes no harm to the patient as well as the opportunity to evaluate the professional level, which was gained by each specialist. What is more important, it provides a chance to evaluate their team work, which is a really complicated task in clinical setting [4].

One of the strongest motivational factors and driving force for educational process is the assessment of educational outcomes, the use of which using simulation techniques is the implementation of the qualified specialists training [5].

At the end of the previous century, there was a dramatic rise of simulation technology, involving a wide range of medical specialties. An important development in medical education in Ukraine was the foundation of Educational-Innovative Center for the Physicians' Practical Training and Department of simulation medicine in 2014 at Odessa National Medical University [6].

2 METHODOLOGY

The objective of the research: evaluation of the quality of mastering theoretical and practical skills introduced by the cycle of issue-related professional development of obstetricians using simulation technology.

The study involved 210 obstetrician-gynecologists from different regions of Ukraine who underwent cycles of pre-attestation or thematic improvement in Educational-Innovative Center for the Physicians' Practical Training using virtual simulation platforms for obstetricians, childbirth simulators, virtual operation rooms and labor rooms. The average age of students was $38,9 \pm 0,6$ years. The average work experience of obstetricians was $12,1 \pm 0,9$ years, moreover, specialists whose work experience was less than 5 years, compiled significant part of the group (149 people) compared to physicians with more extensive experience ($p < 0.05$).

The distribution of students for the qualification of the hospital in which they work was as follows: 18.5% were working in perinatal centers, 60.9% — worked in maternity clinics of level II and 20.3% — in level I. Thus 31.1% of all obstetricians do not have a qualification category ($p < 0.05$) and only 4.9% of them all had a scientific degree. Medical doctors who constantly worked in maternity units took part in studies significantly more often — 47.2% ($p < 0.05$).

The curriculum of thematic improvement cycle included seminars and workshops on the following modules: basic principles of labor, managing delivery complications, obstetric surgery, emergency and urgent situations in obstetrics [6]. During the cycle, various evaluation approaches were used to assess learning outcomes. At the beginning of the cycle the test to monitor baseline knowledge of the main subjects of the research was conducted, final testing was held at the end of the course. The tests included 160 questions (40 in each topic).

One way to assess the effectiveness of the conducted cycles was self-evaluation of the medical doctors. Students were offered a test card, where they anonymously evaluated their level of implementation of the following practical skills: the use of outlet and cavity forceps, vacuum-extraction of the fetus, providing medical assistance in case of breech birth, as well as shoulder dystocia, perform complex resuscitation in acute heart-circulatory failure, primary resuscitation of a newborn, reading CTG during pregnancy and delivery (each skill was evaluated from 1 to 10 points).

Almost 90% of educational process was devoted to practical training. Students in training halls, supervised by experienced teachers, using simulators related to various topics of the studies, worked on particular practical skills until they were entirely automatic. Assessment of correctness of skills fulfillment was conducted using a structured evaluation sheet. Manipulations were divided into intermediate and control phases. The instructor, who observed the actions of the student, recorded their performance in the assessment check-list displaying scores — from 0 to 2, depending on the correctness of a separate phase. Each manipulation included from 9 to 29 such checkpoints, and thus for each practical skill or stage of operation uniquely structured check-list was developed.

Particular attention was paid to the implementation of significant and complex skills. Thus, for example, we evaluated the assimilation by students of one of complex obstetric operations, namely performing vacuum extraction of the fetus. A student received first assessment for performing a particular skill before the beginning of the learning process, the second — at the end of the cycle. The total number of points for conducting this operation was relevant to specific grade: less than 12 points — "unsatisfactory", points 12-13 — "satisfactory", 14-15 — "good", points 16-18 — "excellent." To

determine the quality of conducting operation experienced professionals were involved, who are highly skilled in vacuum extraction technique.

We consider it appropriate and necessary to evaluate teamwork in order to ensure clinical work in maternity hospital. For this purpose situational tasks solving was implemented using mannequins, last generation robots and medical equipment. Possessing theoretical knowledge and some practical skills, students had classes in the simulation rooms, in virtual operating rooms, which had the environment as close as possible to the settings in maternity unit and intensive care (real situation, medical equipment, high-tech mannequins-simulators, robot simulator of a pregnant woman and a woman in labor).

Studies were conducted in accordance with the major protocols of Ukraine Ministry of Health. In these halls medical doctors improved their practical skills, skills of working with patients, equipment, worked on the algorithms of actions and behaviors of each trainee and the team as a whole. Multiple repetition of the same situation allowed to bring practical skills to automaticity, made it possible to return to the starting point in case of error. Each room was equipped with a video monitoring system that allows you to record and analyze the actions of individual professionals as well as the entire medical team to conduct debriefing. This greatly increases the efficiency of the educational process.

For each clinical module evaluation checklists were also developed, which were based on up-to-date algorithms of actions, which can always be changed with the advent of scientifically proven data. Teacher filled the appropriate check-list when a specific task was fulfilled (method of "case study" in education). Training began with the task to implement the basic protocol of delivery. 29 positions were assessed while fulfilling this task (each — from 1 to 5).

The result of the medical team (each student took turns to role play obstetrician-gynecologist, anesthetist, neonatologists, midwives) was counted and outcome evaluation was graded from 2 to 5 (0-24,5 points — "unsatisfactory"; 25-34,5 points — "satisfactory," 35-42,5 points — «good», points 43-50 - "excellent"). In any case, not only correct action and performed skills were assessed, but also communication skills within the group (teamwork index). We believe, a crucial part of the work, was a well diversified use of psychological techniques to identify signs of emotional burnout syndrome in students during medical simulation training [7].

Mathematical processing of results was carried out by conventional methods of variation statistics. Accuracy of differences between the indices of independent samples was evaluated by Student T-test ($M \pm m$). Statistical analysis was performed with the help of Microsoft Office 2010.

3 RESULTS

We paid significant importance to theoretical knowledge testing of obstetrician-gynecologist students. If the span of correct answers was less than 70%, it was graded as "unsatisfactory," 71-80% — «satisfactory», 81-90% — "good" 91-100% — "excellent." The results of the initial tests revealed that the best theoretical knowledge students demonstrated on the topic "Basic Principles of prenatal care and childbirth" (average score of $4,4 \pm 0,04$ points), low scores — on the topics "Conducting complicated deliveries" and «Obstetric surgery» ($3,2 \pm 0,02$ and $3,9 \pm 0,03$ points, respectively).

Due to the results of the final test of theoretical knowledge, it was defined that the average score for all the topics proposed for study significantly increased to $4,8 \pm 0,02$ points (output $3,3 \pm 0,02$ points; $p < 0,001$).

We also discovered the dependence of the theoretical preparedness of students on the medical institution they work for. Thus, medical doctors working in the day hospitals of level I, had lower initial theoretical preparedness ($3,1 \pm 0,04$ points) compared with their counterparts who worked in perinatal centers ($3,9 \pm 0,04$ points; $p < 0,05$). After undergoing the cycle of thematic improvement, theoretical knowledge of the groups compared greatly improved up to $4,7 \pm 0,02$ and $4,9 \pm 0,04$ points, respectively ($p < 0,05$ in both cases).

The dependence of the level of theoretical preparedness of the medical doctors on their work experience was also revealed. Thus, physicians with experience less than 5 years had lower rates in their initial testing compared with their colleagues, who had the experience of more than 15 years - $3,1 \pm 0,05$ and $4,2 \pm 0,03$ points, respectively ($p < 0,001$). After the cycle in these groups the average score dramatically increased to $4,6 \pm 0,03$ and $4,9 \pm 0,05$ points, respectively ($p < 0,05$ in both cases), moreover, it should be noted that more significant increase was observed in the group of physicians with experience less than 5 years.

The analysis of test cards (self-evaluation forms) showed that the initial level of self-evaluation as for practical skills was $30,0 \pm 1,2$ points, while after the course there was a significant increase in this index to $60,8 \pm 0,7$ points (with maximum 80 possible points; $p < 0.001$). It should be noted that at first obstetricians with less than 5 year experience had really lower self-esteem rate compared with their colleagues, whose experience was over 15 years - $23,1 \pm 2,0$ and $42,2 \pm 4,2$ points respectively ($p < 0.001$). After a series TI (Thematic Improvement), self-esteem in the two groups had a dramatic increase — in comparison with the initial self-esteem rate went up to $60,3 \pm 2,7$ and 69.

In addition, the dependence of the students' self-evaluation rate on the medical institution where they work was identified. Thus, self-esteem of medical doctors working in day hospitals of level I at the beginning was significantly lower than their colleagues' working in perinatal centers - $21,1 \pm 2,1$ and $30,0 \pm 2,1$ points respectively ($p < 0,05$). At the end of the cycle self-esteem in the compared groups increased dramatically in comparison with the initial rate - to $52,2 \pm 2,1$ and $63,9 \pm 3,6$ points respectively ($p < 0.01$ in both cases) and had no significant differences in the groups working in obstetric hospitals of levels I and II.

The assessment of practical skills had great importance. The initial average grade for the operation of vacuum extraction of a fetus in the group under observation was $2,2 \pm 0,02$ points. After the cycle it significantly increased up to $4,2 \pm 0,03$ points ($p < 0.001$). It should be noted that medical doctors working in day hospitals of level I, for the operation of vacuum extraction of a fetus had much lower initial score than that of colleagues working in perinatal centers - $2,0 \pm 0,11$ and $3,0 \pm 0,17$ respectively ($p < 0.01$). The final score for performing the operations mentioned above increased in all groups of students regardless of the hospital in which they work ($p < 0.001$ in all cases). The dependence of quality of performing this operation on the work experience was not detected.

Evaluation of students' teamwork appeared to be of a great importance. According to the test results, at the beginning of the studies the average score on the implementation of the basic protocol of delivery was - $2,3 \pm 0,05$, and after the cycle - $4,8 \pm 0,03$ ($p < 0.001$).

The course showed great interest from the audience side. When the cycles were done, an anonymous survey of obstetrician-gynecologists was conducted to evaluate the course they completed. According to the results, all the students mentioned a distinct advantage of the cycle using simulation technology in comparison with other forms of learning.

Conventional approaches in postgraduate studies of obstetricians currently not fully meet the high demands of clinical practice. The use of simulation training contributes, first of all, to the patient safety, training specialist for urgent situations and in today's world it is a compulsory component of the professional education [8].

The emergence of new ways of learning requires development of evaluation tools to sort out acquired knowledge and skills. Assessment of comprehending the cycle of thematic improvement involves the demonstration or proof that students have mastered the necessary skills that are formulated for each specific module and can perform all necessary actions within a given competence.

Testing is a common way to assess theoretical knowledge. According to our data, the results show a rather low level of basic knowledge of the main topics of study, indicating that insufficient self-education of medical doctors and the need to explore constantly new trends, standards, clinical protocols and instructions. After the cycle the theoretical knowledge greatly increases.

One way to assess the effectiveness of the course is self-evaluation of the medical doctors. Self-evaluation is a conception of the person as for the importance of their individual activities in society and evaluation of themselves and their skills and capabilities. Self-evaluation presupposes critical attitude. True self-appraisal supports human dignity and gives them moral satisfaction. Our results indicate that the students after the simulation cycle feel much more confident, if all the practical skills that are practiced during the training are acquired.

Young professionals often cannot first in their lives master complex manipulations that in everyday practice are usually performed by experienced doctors. Obstetrician-gynecologists with wide experience improve their skills, master their work performance in complex emergency situations. In addition, the analysis of the quality of performing certain practical skills on the example of the assessment of the operation of vacuum extraction of a fetus showed the effectiveness of this technique.

To evaluate the formation of professional competence in the simulation training is also offered as a work process. For this purpose, the monitoring of progress of the actions in real time is conducted,

such as, watching the records, formalized observation (structured observation). Experience shows that students have a limited understanding of what happens to them when they are involved in the process of simulation.

Different researchers proved that the presence of visual, audio and tactile stimuli during simulation training, using video repetitions and constructive discussion after completing the task, helps to learn new information and contributes to a better memorization [8]. Being in the center of the action, students can see only what can be seen from the perspective of an active participant, and it is through constructive discussion after accomplishing the task, the simulation experience becomes conscious practice, which ultimately helps because it prepares students for a particular situation with a particular patient.

To assess the actions of the team, we believe it is effective to use structured checklists of expertise with modern algorithms of actions developed by leading experts. The system of comprehensive assessment of competence includes assessment of practical preparedness for different situations as well as effective communication in the group, reducing of the "human factor" influence. Thus, in our study we evaluated with this method students' knowledge of 'basic principles of prenatal care and childbirth "and found a significant improvement as for knowledge and skills in the subject.

4 CONCLUSIONS

- 1 Based on the initial testing, it was revealed, that students obstetricians had poor theoretical preparedness on topics, concerning complicated labors and obstetric surgery. According to the results of the final tests, it was found out, that these scores were significantly increased by more than one and a half times at the end of the cycle.
- 2 Obstetricians working in the maternity hospital of level I had 1.2 times lower initial theoretical knowledge compared with their counterparts who work in perinatal centers. After completing the cycle, they demonstrated results one and a half times as much.
- 3 Obstetrician-gynecologists, who had work experience less than 5 years, had 1.3 times lower rates in initial tests than their colleagues, whose work experience was over 15 years long. At the end of the cycle this index increased by one and a half times.
- 4 Output level of self-esteem as for performing practical skills after the cycle increased almost in twice.
- 5 The initial grade for the operation of vacuum extraction of a fetus after the cycle was significantly increased almost two times, moreover, regardless of the medical institution they work for and work experience they have.
- 6 Evaluation of students' teamwork for conducting basic protocol of delivery at the end of the cycle had twice higher results.
- 7 The results showed that the use of simulation technology helps to increase the effectiveness of obstetricians training.

REFERENCES

- [1] A.I. Malyshkina, I.A.Panova, S.S Manis, «The Simulation Method Role in Training of Obstetrician-Gynecologists», Tavrisheskiy Medico-Biologicheskiy Vestnik, no. 2 (62), Issue 1. pp.137-138. 2013.
- [2] J.T. James, «A New, Evidence-based Estimate of Patient Harms Associated with Hospital Care», Journal of Patient Safety, no. 9, Issue 3, pp. 122–128, 2013.
- [3] V.V. Artyomenko, V.M. Nosenko, L.I. Berlinskaya, «Problem-Oriented Approach in the System of Simulation Training of Medical Personnel», Humanitarnyi visnyk DVNZ of Pereiaslav-Khmelnytskyi State Pedagogical University by H. Skovoroda, vol. 5 (65), Suppl. 1, Issue. 36, pp. 16-23, 2015.
- [4] F.R. Banga, S.E.M. Truijens, A.F. Fransen, J.P. Dieleman, P.J. van R. Heimel, G.S. Oei, «The Impact of Transmural Multiprofessional Simulation-Based Obstetric Team Training on Perinatal Outcome and Quality of Care in the Netherlands», B.M.C. Medical Education, no. 14, pp. 175-184, 2014.

- [5] V.V. Artyomenko, V.M. Nosenko, «Anaesthesiologists' simulation training during emergencies in obstetrics», Romanian Journal of Anaesthesia and Intensive Care, vol. 24, no. 1, pp. 37-40, 2017.
- [6] V.V. Artyomenko, V.M. Nosenko, R.S. Vastyanov, L.I. Berlinskaya, D.A. Novikov, S.S. Semchenko, O.S. Egorenko, «Simulation Learning During Medical Emergencies Treatment», Achievements of Biology and Medicine, no. 2, pp. 58-64, 2015.
- [7] V.V. Artyomenko, S.I. Yelchaninova, V.M. Nosenko, R.S. Vastyanov, «The Emotional Burnout Syndrome Signs Identification During Medical Training Simulation», Visnyk of Vinnytsya National Pirogov Memorial Medical University, no. 1, part. 1, pp.125-127, 2016.
- [8] H. Ksouri, O. Hamzaoui, J. Georger, X. Monnet, «Impact of Morbidity and Mortality Conferences on Analysis of Mortality and Critical Events in Intensive Care Practice», Am. J. Crit. Care, no. 19 (2), pp. 135-145, 2010.