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FEATURES OF MASTERING PRACTICAL SKILLS BY STUDENTS DURING THE COVID-19 PANDEMIC USING SIMULATION TRAINING METHODS

ABSTRACT:

Observed the mastery of practical skills, as competencies for compiling OSCE (Objective structured clinical examination), by 6th year students and interns of various specialties in Odessa national medical university (Ukraine). Practical skills were performed on realistic simulation mannequins. The difference in outcomes was based on different learning conditions during the period of changing quarantine restrictions due to the COVID-19 pandemic in The Whole World. The results of observations were evaluated by the following parameters: time spent performing practical skills (in seconds) and the score (in marks) obtained by checklist. The final results testified a crucial part of the offline mode in mastering practical skills as competencies for compiling an Objective structured clinical examination, and the possibility of organizing theoretical learning processes in the online-form with obtaining certain positive results.

INTRODUCTION.

Because of the development and widespread of the COVID-19 pandemic around the world, and the need to continue the educational process at both undergraduate and postgraduate levels, many universities and other educational institutions have undergone changes in the educational process [1, 2]. Thus, according to the Resolution of the Cabinet of Ministers of Ukraine "On prevention of the spread of coronavirus COVID-19 on the territory of Ukraine" № 211 from March 11 year 2020. Letter from the Ministry of Education and Science of Ukraine № 1/9-154 from March 11 year 2020. Letter from the Ministry of Healthcare of Ukraine № 22-04/7148/2-20 from March 12 year 2020, Order of the Ministry of Education and Science of Ukraine № 703/23235 from April 12 year 2020 "On approval of the Regulations on

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distance learning" and "Regulations on the organization of the distance form of the educational process at the Odessa National Medical University from march 13 year 2020", During the Simulation Medicine cycle, a distance learning form for 6th year students (medical, pediatric and international faculties) and interns of all specialties was developed and implemented using the Microsoft Teams platform [3]. It should be noted that one of the main missions of the cycle is training aimed at identifying and assessing the acquisition of clinical skills by students and interns [4] and their acquisition of professional competencies - for the successful completion of OSCE (Objective Structured Clinical Examination).

OSCE can provide a more accurate assessment of clinical competence compared to the traditional approach to evaluation in clinical trials, and the outcome of the assessment depends less on the specific examiner and the standardized patient.

The use of checklists in compiling OSCE provides a more objective assessment of the practical skills as competencies [5, 6, 7]. In recent decades, there has been a steady exponential increase in the use of OSCE for undergraduate and postgraduate examinations worldwide [5].

Despite this, there are both advantages and disadvantages in OSCE [5].

Advantages are:

1. Validity, which is the degree where the content of the test allows you to assess the skills that students have mastered and/or are subjects to assessment.

2. Reliability. Usually, the more stations with different practical skills within the OSCE, the higher the degree of reliability of its results and the validity of the assessment.

3. Practicality and feasibility. Feasibility can be defined as the degree of practicality of the evaluation method.

4. Flexibility. The flexibility of OSCE as a method of assessment allows it to be widely used in different disciplines and at different stages of medical education.

5. Fairness of assessment. This is a characteristic of the assessment method, which demonstrates the lack of impact on the result and discrimination of students to be assessed.

6. Impact on learning. OSCE can have a positive impact on the educational process because it stimulates studying.

Disadvantages are:

1. During OSCE, the student's ability to examine the patient holistically is not tested. Students' knowledge and skills are assessed as separate competencies.

2. Costs and the need to involve a significant number of organizers and examiners, specially prepared for this exam.

Stress for students who were not familiar with the method, so there is a need to use this method not only for the final but also for the current assessment.

MATERIALS AND METHODS.

During the COVID-19 pandemic and official quarantine restrictions, classes with different groups of students (students and interns) were conducted under different conditions. Depending on the period of quarantine restrictions, students' classes were divided into either completely online or hybrid. During the hybrid type of classes, students had the opportunity to practice some practical skills on their own, as well as they had an opportunity to pass a differential test offline, in compliance with all official quarantine requirements during a pandemic.

To assess the effectiveness of different types of training, a practical skill that was chosen - cricothyrotomy [8, 9], and the results of 99 students and interns were processed. Cricothyrotomy is a rarely used procedure in real life yet a lifesaving manipulation and it is being done during very emergency conditions, therefore it is a very difficult practical skill to master.

That is why it was implemented in the curriculum of all senior students and interns of all specialties in Odessa National Medical University [10, 11, 12].

SimuLab's Surgical Trauma Training Manikin (SKU: TM-5138) was used for mastering and assessing practical skills. It is a high quality simulation mannequin that could be used in Simulation-Based Medical Education for all students, interns, residents, and medical doctors [13, 14].

The following emergency medical procedures could be performed with the help of this mannequin:

1. Chest Tube Insertion (Otherwise known as Pleural Drain, Thoracic Catheter, Chest Drain, Intercostal Drain or Tube Thoracostomy);
2. Cricothyroidotomy (or Cricothyrotomy), Tracheostomy;
3. Needle Decompression, Pneumothorax;
4. Pericardiocentesis;

5. Diagnostic Peritoneal Lavage (DPL) or Diagnostic Peritoneal Aspiration (DPA);

6. IV Cutdown and more.

Groups of students and interns were divided according to the above criteria into 4 groups:

1. A group of 6th year students - 22 people, whose practical skills classes were conducted online, but the differential test was taken offline with help of the mannequin.

2. A group of 6th year students - 25 people who were present in class only on the day of practical skills (and on all other days' classes were held online), and passed a differential test offline.

3. A group of interns in specialty - "Orthopedics and Traumatology" - 23 people who came to classes, and according to the Educational Program have a credit form of the cycle, i.e. performed practical skills immediately in class and do not have a differential test.

4. A group of interns in specialty - "General Dentistry" - 29 people who underwent a cycle under the same conditions as the 3rd group.

The results were evaluated according to the following parameters:

1. The score was obtained on a traditional 5-point scale using checklists.

2. Time spent performing a practical skill in seconds.

Statistical criteria used included parametric and nonparametric analysis methods: One-way ANOVA + test Newman-Keuls and Kruskal-Wallis ANOVA + Median test.

THE EVALUATION OF MASTERING THE PRACTICAL SKILL ACCORDING TO TRADITIONAL 5-POINT SCALE.

Applicants of the 1st group (6th year students - 22 people) received an assessment result of 21.4 % lower in the differential test than students of the 2nd group (6th year students - 25 people), in which both classes and differential test were conducted offline ($P<0.05$).

Also, 1 group received an assessment result of 23.2 % lower compared to 3 groups (interns in the specialty "Orthopedics and Traumatology" - 23 people), who received an assessment immediately in class, without prior training ($P<0.05$).

At the same time, there was no significant difference between groups 2 and 3 in obtaining a practical skill score - 2.35 % ($P>0.05$).

The result of group № 4 (interns in "General Dentistry" - 29 people) was interesting, it was 10.4% higher than group № 1, and lower than groups № 2 and № 3 by 12.3% and 14.3%, respectively (P<0.05) (Table 1).

Table 1

Indicators of results of observation groups according to the received estimations. (results are presented as mean ± standard deviation)

№	Observation groups	Number of students and interns	Observation parameter: 5-point scale
1.	6th year students	22	3.27 ± 0.45*
2.	6th year students	25	4.16 ± 0.62#
3.	Interns in the specialty "Orthopedics and Traumatology"	23	4.26 ± 0.62#
4.	Interns in the specialty "General Dentistry"	29	3.65 ± 0.48*

Note: *-P<0.05 for all other groups; #-P<0.05 related to groups № 1 and № 4, and P>0.05 related to groups with #. (ANOVA method + Newman-Keuls test).

Based on the results, it can be seen that interns in the specialty "Orthopedics and Traumatology" (group № 3) received the highest score as well as 6th year students (group № 2), who had the opportunity to practice practical skills before assessment.

At the same time, the lowest score was received by the group № 1 - 6th year students, who did not have the opportunity to master the practical skills during classes, as their classes were conducted online at that time, because of quarantine restrictions.

THE EVALUATION OF MASTERING THE PRACTICAL SKILL ACCORDING TO TIME SPENT PERFORMING A PRACTICAL SKILL.

The average value of the speed of practical skills in groups № 2 (6th year students - 25 people) was the lowest, and differed from the highest value in group № 4 (interns in the specialty "General Dentistry" - 29 people) by 30.73% (P<0.05).

The results of groups № 1 and № 3 (6th year students - 22 people and interns in the specialty "Orthopedics and Traumatology - 23 people) also differ significantly from other groups and were 26.56% and 16.08% more than in group № 2, and also differ from each other by 12.49% (P<0.05) (Table 2).

Table 2

Indicators of results of observation groups according to time spent. (results are presented as mean ± standard deviation)

№	Observation groups	Number of students and interns	Observation parameter: time spent (in seconds)
1.	6th year students	22	170.86 ± 10.60
2.	6th year students	25	125.48 ± 9.79
3.	Interns in the specialty "Orthopedics and Traumatology"	23	149.52 ± 16.41
4.	Interns in the specialty "General Dentistry"	29	181.13 ± 13.25

Note: P<0.05 in all groups related to each other. (method Kruskal-Wallis ANOVA + Median test).

Thus, the obtained positive results in the speed of practical skills of group № 4 (interns in the specialty "General Dentistry" - 29 people), can be explained by the presence of existing experience in the clinic during the internship, as well as previous classes in this practical skills in the 2nd year of study in the cycle "Topographic Anatomy and Operative Surgery".

The biggest difference was observed between the groups of 6th year students who had the opportunity to practice the skill on a mannequin during classes and attending the cycle and those who had online classes on this topic without practical skills.

CONCLUSIONS.

The presence or absence of a relationship between the assessments obtained and the time of the practical skill is subject to more detailed consideration, and in this case it is impossible to draw unambiguous conclusions.

The results show that, in addition to theoretical discussion and demonstration of practical skills during online classes, the ability to practice the skill of each student separately under the guidance and supervision of a teacher is critical.

At the same time, online learning is very convenient and effective for mastering the theoretical knowledge base, it can be implemented both during quarantine restrictions, and in general to move partially to this type of training,

namely: lectures - can be given in the form of videos (gives more free time for lecturers for other scientific or medical activities) and online through online platforms (Microsoft Teams, Zoom and many others); testing - conducting any testing of students in online forms, the use of Google forms allows you to do it for free.

In addition to reducing the risk of infectious diseases for both students and teachers, another advantage is the reduction of travel time, i.e. increasing the time for other types of studying for students and interns. Also for educational institutions, an obvious advantage is the increase in the area of educational premises for other types of educational and scientific activities.

Thus, we can analyze some specific conclusions based on the obtained research data:

1. During obtaining the competence to master the practical skill in training, especially for the compilation of OSCE, more important is the practical (offline) training of this practical skill.

2. The more repetitions of a practical skill made by a student, the better the assessment result of that student.

3. Online learning provides a significant theoretical basis for students, but is not able to replace practical training and mastery of practical skills as competencies for OSCE.

It is possible to restructure curricula in educational institutions, optimizing all theoretical processes in the online form of education on a permanent basis, and get a positive result in the form of reorganization of free space, saving time and, especially, minimizing contact and reducing the likelihood of infection.

REFERENCES:

[1] Aryaev M.L., Kaplina L.Y., Senkivska L.I., Pavlova V.V. (2020) Pershyi dosvid dystantsiinoho navchannia v medychnykh vuzakh Ukrainy v umovakh COVID-19-karantynu [First experience of online education in medical Universities of Ukraine during COVID-19-quarantine conditions]. *Zdorov`e Rebenka.* 2020;15(3):195-199. doi: 10.22141/2224-0551.15.3.2020.204555 [in Ukrainian].

[2] Zagorodnya L.I., Yamilova T.M., Chernecka H.V. (2020) Orhanizatsiia dystantsiinoho navchannia likariv-interniv za fakhom "Vnutrishni khvoroby" v Odeskomu natsionalnomu medychnomu universyteti [Organization of online education for interns by speciality "Internal Medicine" in Odessa National Medical University]. *Ukrainian research institute of transport medicine,* July 7, 2020: 3-6. DOI http://dx.doi.org/10.5281/zenodo.3967694 [in Ukrainian].

[3] Louis Martin, Dave Tapp (2019) Teaching with Teams: An introduction to teaching an undergraduate law module using Microsoft Teams // *Innovative Practice in Higher Education*, Vol 3 (3) April 2019 ISSN: 2044-3315

[4] Artyomenko V.V., Nosenko V.M., Vastyanov R.S. et al. (2015) Simuljacionnoe obuchenie pri lechenii neotlozhnyh sostojanij v medicine [Simulation education during acute conditions in medicine]. *New medical-biological technologies,* 2015 № 2(26):58-64 [in Russian].

[5] Marichereda V.G., Mogylevkyna I.O., Konkov D.G. et al. by com. red. DMs, prof. V.G. Maricheredy (2020) Orhanizatsiia ta provedennia obiektyvnoho strukturovanoho klinichnoho ispytu: metodychni rekomendatsii [Organization and conduction of objective structured clinical exam: methodical recommendations]. *Odesa: Odesa national medical. university,* 2020.84p [in Ukrainian].
[6] Balkizov Z.Z., Semenova T.V. (2016) Obektivnyj strukturirovannyj klinicheskij jekzamen [Objective structured clinical exam. Guide.] *Medical education and professional development,* 2016. № 3 (25):27-62. [in Russian].
[7] Marichereda V.G., Rogachevsky O.P., Borsh V.I., Kryvtsova N.V. (2018) Modern technologies of advancing the qualities of medical education. *Integrative anthropology,* 2018. № 2 (32):70-74.
[8] Artyomenko V.V., Nosenko V.M. (2017) Anesthesiologists` simulation training during emergencies in obstetrics. *Romanian Journal of Anaesthesia and Intensive Care,* 2017 Vol 24 No 1, 37-40. doi: http://dx.doi.org/10.21454/rjaic.7518.241.dym
[9] Dan Sebastian Dirzu (2017) Medical simulation - a costly but essential teaching tool // *Romanian Journal of Anaesthesia and Intensive Care,* 2017 Vol 24 № 1, 5-6 DOI: http://dx.doi.org/10.21454/rjaic.7518.241.drz
[10] Kate E Hughes, David Biffar, Eze O Ahanonu, Thomas M Cahir, Allan Hamilton, John C Sakles (2018) Evaluation of an Innovative Bleeding Cricothyrotomy Model. *Cureus. 2018 Sep; 10(9): e3327.* Published online 2018 Sep 18. doi: 10.7759/cureus.3327 PMCID: PMC6248871
[11] Issa N, Liddy WE, Samant S, et al (2020) Emergency cricothyrotomy during the COVID-19 pandemic: how to suppress aerosolization *Trauma Surgery & Acute Care Open* 2020;5:e000542. doi: 10.1136/tsaco-2020-000542
[12] Šifrer, R., Urbančič, J., Piazza, C. et al. Emergent tracheostomy during the pandemic of COVID-19: Slovenian National Recommendations. *Eur Arch Otorhinolaryngol* (2020). https://doi.org/10.1007/s00405-020-06318-8
[13] Sattler L A, Schuety C, Nau M, et al. (December 09, 2020) Simulation-Based Medical Education Improves Procedural Confidence in Core Invasive Procedures for Military Internal Medicine Residents. *Cureus* 12(12): e11998. doi:10.7759/cureus.11998
[14] Gustafson ML, Hensley B, Dotson M, Broce M, Tager A. Comparison of Manikin Versus Porcine Trachea Models When Teaching Emergent Cricothyroidotomy Among Emergency Medicine Residents. *AEM Educ Train. 2019 Apr* 7;3(3):280-285. doi: 10.1002/aet2.10333. PMID: 31360821; PMCID: PMC6637022.
[15] Zasso, F.B., You-Ten, K.E., Ryu, M. et al. Complications of cricothyroidotomy versus tracheostomy in emergency surgical airway management: a systematic review. *BMC Anesthesiol* 20, 216 (2020). https://doi.org/10.1186/s12871-020-01135-2