Experiences of a Virtual Objective Structured Clinical Examination during the COVID-19 Pandemic

Marcelo Bedoya-Sommerkamp (marcelo.bedoya.s@upch.pe)
Universidad Peruana Cayetano Heredia

Bárbara Málaga-Espinoza
Universidad Peruana Cayetano Heredia

Deborah Gurfinchel-Zevallos
Universidad Peruana Cayetano Heredia

Joselyn Ye-Tay
Universidad Peruana Cayetano Heredia

Rose Vallejo-Vigo
Universidad Peruana Cayetano Heredia

Guiliana Mas
Universidad Peruana Cayetano Heredia

Jorge Huerta-Mercado
Universidad Peruana Cayetano Heredia

Research Article

Keywords: Medical Education, Patients Simulation, Educational Measurement, Clinical Competence, Audiovisual Aids, Pandemics, COVID-19.

Posted Date: July 19th, 2022

DOI: https://doi.org/10.21203/rs.3.rs-1867608/v1

Abstract

Objective: To describe the process and development of a Virtual Objective Structured Clinical Examination (V-OSCE), and the perception of this virtual evaluation through a survey aimed at fifth-year students from a Peruvian medical school.

Materials and Methods: Cross-sectional study. The V-OSCE was held between August and September 2020 using the Zoom® platform (Zoom Video Communications, Inc., San José, California, USA). The students completed five stations, which included clinical scenarios of endocrine, rheumatic, gastrointestinal, and hematologic pathologies. Standardized simulated patients were used. An anonymous Likert scale survey was conducted among students with Google Forms (Google LLC, Mountain View, California, USA), and the data were analyzed with STATA® 16 (StataCorp LLC, College Station, Texas, USA).

Results: Of the 145 students who participated in the V-OSCE, 85% perceived that the evaluation met their expectations as a learning tool, 81.7% stated that it allowed them to put the acquired knowledge into practice, and 89.2% rated the quality of the organization and development of the V-OSCE as "excellent" or "good". However, 13.3% perceived that the greatest limitation was not being able to perform the physical examination in person.

Conclusions: The V-OSCE constitutes a good evaluation tool for medical students. Although it does not replace face-to-face evaluation, it is a very useful instrument for evaluating scenarios that emphasize on anamnesis. It is a safe and efficient evaluation alternative in the context of the pandemic.

Introduction

The COVID-19 pandemic has imposed the need to restructure medical education to avoid delay in medical students' curriculum. Health systems around the world are overwhelmed; therefore, there is an urgent need to have trained doctors ready for patient care. This implies having a virtual approach to learning; however, it is not simple for health sciences careers, since part of the acquisition of knowledge is carried out in a practical environment in health establishments. In addition, it is a greater challenge to acquire empathy and communication skills within medical students [1].

The evaluation of medical students has been constantly changing. Initially, it was based on oral and written examinations, whose results could be biased by the examiner [2,3]. A non-standardized grading scheme was not capable of measuring the student's real performance and only allowed the evaluation of limited competencies. This is how the Objective Structured Clinical Examination (OSCE) emerges as a tool that has gained greater importance in university education, especially in health sciences careers. This type of evaluation places the student in a series of standardized clinical scenarios, allowing a comprehensive learning, including clinical, communicative, and professional skills [4–7]. For the

development of this evaluation, it is necessary to carry out additional training with examiners, simulated patients, and the logistics team [5,8–11].

Since 2014, the School of Medicine of the Universidad Peruana Cayetano Heredia (UPCH) has implemented the OSCE as an evaluation tool for medical students, starting in the fourth year of their studies. Specifically, the OSCE for fifth-year students seeks to evaluate the clinical competencies learned for the development of a general medical care encounter. Additionally, the principles of good verbal and nonverbal communication are emphasized throughout the evaluation [2, 4–6,8].

Due to the COVID-19 pandemic, the OSCE was adapted to be used in a virtual platform to ensure that students have the necessary skills to start their preprofessional practices [1,10,12]. Therefore, the present study aims to describe the process of developing a V-OSCE and the students' perspective on it.

Methods

Design and study population

A descriptive and cross-sectional study was conducted in conjunction with fifth grade students of UPCH medical school, who participated in a V-OSCE that took place during August and September 2020.

V-OSCE platform

The V-OSCE was a formative assessment that consisted of 3 parallel circuits, each one including 5 stations that resembled a medical encounter. Examinees were given 18 minutes to complete each encounter and 2 minutes of feedback were provided (Fig. 1).

Content and clinical competencies evaluated

The clinical scenarios were previously standardized and structured by teaching physicians with experience in the development of OSCE. The content of the stations was based on the curriculum of fifth grade medical students: endocrine, rheumatic, gastrointestinal, and hematologic pathologies. The clinical competencies evaluated are summarized in Table 1. Finally, the student performances were rated using a checklist and a global rating scale.

Table 1
Classification of scenarios and definition of evaluated clinical competencies.

Clinical Scenarios	Clinical Competencies
Scenario 1: Diarrhea (Gastroenterology)	Task 1: To stablish an effective communication.
Scenario 2: Diabetes (Endocrinology)	Task 2: To perform an adequate anamnesis.
Scenario 3: Anemia (Hematology)	2.1 Determine the principal signs and symptoms.
Scenario 4: Hypothyroidism (Endocrinology)	2.2 Explore additional data regarding the mentioned signs
Scenario 5: Painful shoulder syndrome (Rheumatology)	and symptoms.
	2.3 Systematic exploration of the past medical history.
	Task 3: To perform a complete physical examination (verbally).
	3.1 General examination.
	3.2 Directed examination.
	Task 4: To correctly inform the diagnosis.
	Task 5: To elaborate a coherent diagnostic plan.
	5.1 Order appropriate complementary exams.
	5.2 Inform the patient the ordered exams.
	Task 6: To generate and adequate treatment management plan.
	6.1 Pharmacological management
	6.2 Non-pharmacological management
	Task 7: To adequately register the findings in the medical history.

Development of the V-OSCE

V-OSCE pilot

A pilot test was carried out with the designers, examiners, simulated patients, and volunteer students to assess the structure of this examination. After the pilot, the feasibility of this evaluation was verified and the following changes were implemented:

- Verbal prompts to indicate the times of the clinical encounters: "You may begin", "You have 5 minutes left", "Start of feedback" and "Change of station".

- To add an additional minute for examiners and actors to join the next station.

Steps for the V-OSCE

In Fig. 2, the process of the V-OSCE is described, from log in to the virtual platform, to the end of the examination. All participants were asked to use their own electronic devices with enabled audio and video.

Statistical analysis

The information collected was imported into the STATA® 16 statistical program. For the quantitative variables, measures of central tendency were calculated (mean and standard deviation); for the qualitative variables, percentages and frequencies were used. The numbers were rounded to a single decimal.

Results

In this V-OSCE, 145 students participated, of which the response rate to the survey was 120 (82.3%). The mean age was 22.4 (SD 1.35) years and 65 (54.2%) were women.

For 118 (98.3%) of the students, the introduction prior to the OSCE was clear. Table 2 shows that 98 (81.7%) of the students perceived the evaluation to meet their expectations as a learning tool (“agreed” and “strongly agreed”) and 102 (85%) stated that it allowed them to put into practice the skills described in Table 1.

Table 2
Perception of students regarding the V-OSCE.

V-OSCE attributes	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
The previous knowledge is put into practice (taking medical history, physical examination, communication).	2 (1.7%)	2 (1.7%)	14 (11.6%)	41 (34.2%)	61 (50.8%)
Meets their expectations as a new learning tool.	2 (1.7%)	3 (2.5%)	17 (14.2%)	44 (36.6%)	54 (45%)
Less difficulty in filling out the virtual medical record in contrast to the written one	9 (7.5%)	9 (7.5%)	10 (8.3%)	30 (25%)	62 (51.7%)
V-OSCE organization	**Very bad**	**Bad**	**Neutral**	**Good**	**Excellent**
V-OSCE global rating (coordination, actors, evaluators, feedback)	1 (0.8%)	1 (0.8%)	11 (9.3%)	58 (48.3%)	49 (40.8%)

Most of the respondents rated the quality of the V-OSCE organization and development as "excellent" or "good", with an average score of 4.28 out of 5. However, 65 (54.1%) of the students considered that clinical encounters should be longer, and 69 (57.5%) considered it important to have additional practices similar to the V-OSCE prior to the evaluation day. More than a third of the students stated that it was necessary to add a resting time between stations. The filling out of the virtual medical record was considered ‘intermediate’ or ‘very difficult’ for 29 (24.1%) of the students.

In general, 107 (89.2%) of the students were satisfied with the organization of the V-OSCE, and various strategies to improve future V-OSCE were suggested. Positive aspects highlighted by students included: well-structured evaluation, 118 (98.3%); cooperation of examiners and simulated patients with examinees, 107 (89.2%); the practicality of filling out the virtual medical record, 14 (11.7%); and the formative aspect of the evaluation, 10 (8.3%).

On the other hand, 16 (13.3%) of the students emphasized the difficulty of performing the physical examination without having direct contact with the patient as one of the main limitations in a virtual encounter. Another very commented aspect was the Internet connection problems, 10 (8.3%) reported not being able to hear or be heard during clinical encounters, along with poor video quality. Additionally, 5 (4.2%) of the respondents felt that the V-OSCE was a stressful and intimidating experience, because they “worked against the clock” and felt observed by the examiners when writing the medical history. It should be noted that 10 (8.3%) of the students would have preferred a face-to-face examination.

Among the improvement suggestions provided by the respondents, more simulated evaluations similar to the V-OSCE, 69 (57.5%); additional time per station, 65 (54.2%) and between them, 46 (38.3%); longer feedback time from the examiners, 36 (30%) and from the simulated patients, 3 (2.5%) were mentioned. Furthermore, 4 (3.3%) students commented that the implementation of a predesigned virtual medical record would be useful to reduce typing time.

The best rated scenarios were endocrine and hematologic pathologies, 26 (21.7%). According to 59 (49.2%) students, these cases allowed them to apply what they had learned, and 29 (24.2%) said that they received better feedback. On the other hand, 46 (38.3%) considered that the rheumatic pathology station could improve the most due to insufficient training during previous classes and practical sessions before the examination, 74 (61.7%).

Discussion

Given the current circumstances resulting from the pandemic, the implementation of a V-OSCE was proposed as an alternative to the evaluation of clinical skills that were carried out in person in faculty facilities. Understanding the students' perspective on this new methodology is particularly important to ensure a quality examination that allows them to measure their abilities while meeting their expectations.

The perspective of the students on the V-OSCE was encouraging, receiving an average rating of 4.28/5 on the Likert scale, well above the results presented by Novack, where the virtual exam received an average

rating of 3.88/5, and the study carried out at the Autonomous University of Madrid, where the student satisfaction survey offered an average value of 3.9/5 [5,10].

A high proportion of students (85%) recognized that the V-OSCE allowed them to put their knowledge into practice, which is consistent with previous studies. In a study conducted at the University of Arizona, Prettyman reported that 81% of the students strongly agreed that the V-OSCE allowed them to demonstrate their clinical skills [8]. In the study by Majumder, it was observed that more than half of the students considered that the evaluated scenarios reflected '*in some way*' the knowledge acquired during their clinical rotations [13]. Similarly, other studies conducted in Nigeria and Ireland found that a large percentage of their medical students believed that OSCE measured their knowledge accurately [14,15]. It is positive and motivating to find that, although the organization of this exam modality was more tedious (requiring more hours of rehearsals and training to ensure a good adaptation to the virtual platform), 82.5% of the students considered that the V-OSCE fulfilled their learning expectations.

Regarding the negative aspects of this virtual modality, the vast majority of students agreed that the greatest limitation was not being able to perform the physical examination, with comments such as: *'being unable to perform the physical exam […] disadvantaged us'*, *'the main problem is that we cannot develop our skills in taking vital signs and performing a physical examination'*. It was algo suggested that the V-OSCE is only feasible in scenarios where the physical examination is not essential, but that *"nothing beats being able to do the physical exam by ourselves"*. This opinion was shared by the medical students from Weill Cornell Medicine-Qatar surveyed in the Stella Major and Novack studies, where it was stated that the physical examination proficiency score did not reflect previously acquired skills [4,10]. In our study, the scenario with the lowest rating was rheumatology, which required a more detailed and exhaustive physical examination, difficult to perform verbally; while the best-rated scenarios were those of diabetes and anemia, where anamnesis played a more important role.

Virtual medical consultation constitutes an artificial barrier to effective communication, the possibility of performing an adequate physical examination is limited and, thus, weakens the relationship with the patient (rapport). This limitation was detailed in the studies by Novack and Danforth, where the student-patient relationship was diminished by a difficulty in responding to nonverbal language in a virtual interface [10,16]. Similarly, our students commented: *'I felt that I had less interaction with the patient, which makes it difficult for me to see how he really feels or to clearly see his expressions'* and '*I am concerned about eye contact with the patient […] many times I had to look at the screen and not at him, I felt disconnected'.*

In addition, there were technological limitations during the evaluation. Students emphasized the need to *'improve the training of the actors with the virtual environment'.* This contrasts with what was stated in the Stella Major study, where simulated patients were surveyed to assess their technological skills on the virtual platform and, subsequently, staff members ensured that they were eligible to participate [4]. On the other hand, some students did not have a suitable device to access the exam; therefore, it is

recommended that the organizing institution ensures equitable access to adequate technology and offers suitable devices to those who do not have one.

Furthermore, 54.2% of the students considered that the time allocated to complete the stations was insufficient, generating stress and anxiety. For decades, the duration of medical consultation has been a highly debated and disparate issue depending on the health systems of the different countries. Although the World Health Organization (WHO) states that for an effective medical consultation, an average of 20 to 30 minutes must be granted for each patient, a systematic review published by Irvin in the British Medical Journal found that 18 countries, representing 50% of the global population, spend on average 15 minutes in the consultation with their primary care doctor [17,18]. In Peru, the general practitioner spends 12 minutes on average in an outpatient consultation [19].

It is essential to have the appropriate digital resources to achieve an immersive experience with students. To improve the V-OSCE, it would be recommended to incorporate the use of virtual simulators, such as PCS Spark® (PCS North America LLC, Florida, USA) or the Oxford Medical Simulation® (Oxford University, London, UK) to make virtual consultations more dynamic and similar to a real physical exam. One of the students suggested *'improving the physical examination by recording the patient's heart sounds or the vesicular murmur'.* In the V-OSCE proposed by Novack, students could access heart and lung sounds, and images related to the pathology of the simulated patient were projected [10].

When comparing the V-OSCE and face-to-face OSCE, the students reported feeling more comfortable being at home, without having to physically move from station to station, and with the V-OSCE being a formative evaluation without real impact on their final grades. On the other hand, the inability to perform the physical examination, connectivity issues and the diminished patient relationship caused by the digital interface turned out to be considerable limitations. It is worth noting that the vast majority of Peruvian medical students are used to the traditional paper-based health record system [11]; thus, students agree that they must also be trained to properly fill the virtual medical records. Nevertheless, the virtual modality does not replace, much less exceeds, the face-to-face examination. However, it is important to emphasize that this new modality allows us to continue with the training of medical students, especially in a health emergency situation, where face-to-face lessons and evaluations have been limited by social distancing during the COVID-19 pandemic. Additionally, the V-OSCE is suitable for evaluating scenarios that do not involve performing a physical examination or procedure, which can be useful for simulating teleconsultations for the control and monitoring of patients [20].

Among the limitations of the study is the use of indirect data collected from a database of the UPCH. Likewise, the data is from a single group of fifth-year-grade students, without including V-OSCEs from other years. Finally, comments and perceptions of the examiners, designers, and simulated patients were not included in our analysis, which could enrich the experience of future V-OSCEs.

We consider that, when returning to face-to-face activities, the V-OSCE can be useful as a formative evaluation of interview-like scenarios. This way, the optimization of resources from the Simulation Center

for other activities is guaranteed, allowing for a more flexible schedule. Lastly, the V-OSCE constitutes an important individualized feedback tool for the learner.

In conclusion, the OSCE in its virtual form constitutes a good evaluation and learning tool for medical students, providing a safe and efficient alternative in the context of the COVID-19 pandemic and an option that can be extrapolated to other medical schools.

Declarations

Acknowledgements

The authors wish to thank the Alberto Hurtado Faculty of Medicine of the Universidad Peruana Cayetano Heredia for providing the data used in this study.

Funding

None.

Disclaimers

None.

Ethical Approval

The information used for this study was obtained from a UPCH database, which was recollected with an anonymous survey. There was no access to the identities of the students. Likewise, the project was approved by the UPCH Institutional Ethics Committee (ID 202731).

References

1. Buckley, M. (2020). COVID-19 pandemic spurs creation of new, remote teaching methods at HMS. *The Harvard Gazette*. Published online May 8, Accessed September 23, 2021. https://hms.harvard.edu/news/mother-invention
2. Behrens, C., Morales, V., Parra, P., et al. (2018). A standardized objective structured clinical examination to assess clinical competencies in medical students. *Revista médica de Chile*, *146*(10), 1197–1204. doi:10.4067/S0034-98872018001001197
3. Dávila-Cervantes, A. (2014). Simulación en Educación Médica. *Investigación en Educación Médica*, *3*(10), 100–105. doi:10.1016/S2007-5057(14)72733-4
4. Major, S., Sawan, L., Vognsen, J., & Jabre, M. (2020). COVID-19 pandemic prompts the development of a Web-OSCE using Zoom teleconferencing to resume medical students' clinical skills training at Weill Cornell Medicine-Qatar. *BMJ Simul Technol Enhanc Learn*, *6*(6), 376–377. doi:10.1136/bmjstel-2020-000629

5. García-Puig, J., Vara-Pinedo, F., & Vargas-Núñez, J. A. (2018). Implantación del Examen Clínico Objetivo y Estructurado en la Facultad de Medicina de la Universidad Autónoma de Madrid. *Educación Médica*, *19*(3), 178–187. doi:10.1016/j.edumed.2017.01.003
6. Domínguez-González, A., & Guzmán-Valdivia, G. (2018). Cómo afrontar con éxito el examen clínico objetivo estructurado (ECOE). *Educación Médica*. ;19(6):369–374. Accessed September 23, 2021. https://medes.com/publication/148972
7. Roberts, V., Malone, K., Moore, P., Russell-Webster, T., & Caulfield, R. (2020). Peer teaching medical students during a pandemic. *Medical Education Online*, *25*(1), 1772014. doi:10.1080/10872981.2020.1772014
8. Prettyman, A. V., Knight, E. P., & Allison, T. E. (2018). Objective Structured Clinical Examination From Virtually Anywhere!. *The Journal for Nurse Practitioners*, *14*(8), e157–e163. doi:10.1016/j.nurpra.2018.05.007
9. Boursicot, K., Kemp, S., Ong, T. H., et al. (2020). Conducting a high-stakes OSCE in a COVID-19 environment. *MedEdPublish*, *9*, doi:10.15694/mep.2020.000054.1
10. Novack, D. H., Cohen, D., Peitzman, S. J., Beadenkopf, S., Gracely, E., & Morris, J. (2002). A pilot test of WebOSCE: a system for assessing trainees' clinical skills via teleconference. *Medical Teacher*. ;24(5):483–487. doi:10.1080/0142159021000012504
11. Ticse, R. (2017). El Examen Clínico Objetivo Estructurado (ECOE) en la evaluación de competencias de comunicación y profesionalismo en los programas de especialización en Medicina. *Rev Med Hered*, *28*(3), 192. doi:10.20453/rmh.v28i3.3188
12. Zayyan, M.. Objective Structured Clinical Examination: The Assessment of Choice. *OMJ*.Published online July25, 2011:219–222. doi:10.5001/omj.2011.55
13. Majumder, M. A. A., Kumar, A., Krishnamurthy, K., Ojeh, N., Adams, O. P., & Sa, B. (2019). An evaluative study of objective structured clinical examination (OSCE): students and examiners perspectives. *AMEP*, *10*, 387–397. doi:10.2147/AMEP.S197275
14. Nasir, A. A., Yusuf, A. S., Abdur-Rahman, L. O., et al. (2014). Medical Students' Perception of Objective Structured Clinical Examination: A Feedback for Process Improvement. *Journal of Surgical Education*, *71*(5), 701–706. doi:10.1016/j.jsurg.2014.02.010
15. Muldoon, K., Biesty, L., & Smith, V. (2014). 'I found the OSCE very stressful': Student midwives' attitudes towards an objective structured clinical examination (OSCE). *Nurse Education Today*, *34*(3), 468–473. doi:10.1016/j.nedt.2013.04.022
16. Danfoth, D., & Suchak, N. (2021). OSCE-Style Telemedicine Patient Encounter with Instructor Observation. Integrating simulation into healthcare training. Training presented at the: COVID-19 Preparedness Training of the Week; April 2, 2020. Accessed September 23, https://www2.simulationiq.com/l/26002/2020-04-03/717xz6
17. Oxtoby, K. (2010). Consultation times. *Bmj*, *340*, c2554. doi:10.1136/bmj.c2554
18. Irving, G., Neves, A. L., Dambha-Miller, H., et al. (2017). International variations in primary care physician consultation time: a systematic review of 67 countries. *British Medical Journal Open*,

7(10), e017902. doi:10.1136/bmjopen-2017-017902

19. Outomuro, D., & Actis, A. M. (2013). Analysis of ambulatory consultation length in medical clinics. *Revista médica de Chile*, *141*(3), 361–366. doi:10.4067/S0034-98872013000300012
20. Trejo-Mejía, J. A., Blee-Sánchez, G., & Peña-Balderas, J. (2013). Elaboración de estaciones para el examen clínico objetivo estructurado (ECOE). *Investigación en educación médica*. ;3(9):56–59. Accessed September 23, 2021. http://www.scielo.org.mx/scielo.php?script=sci_abstract&pid=S2007-50572014000100008&lng=es&nrm=iso&tlng=es

Figures

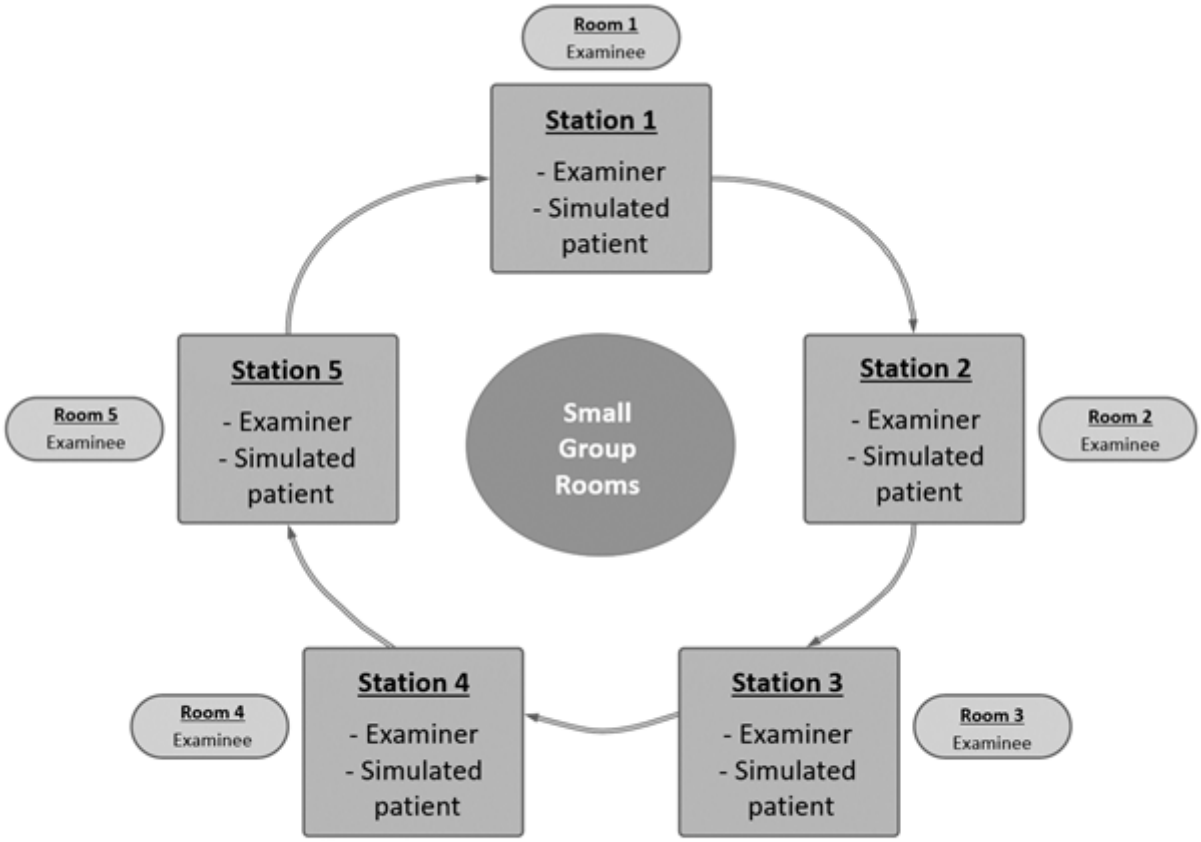

Figure 1. Flow chart of the V-OSCE.

Figure 1

See image above for figure legend.

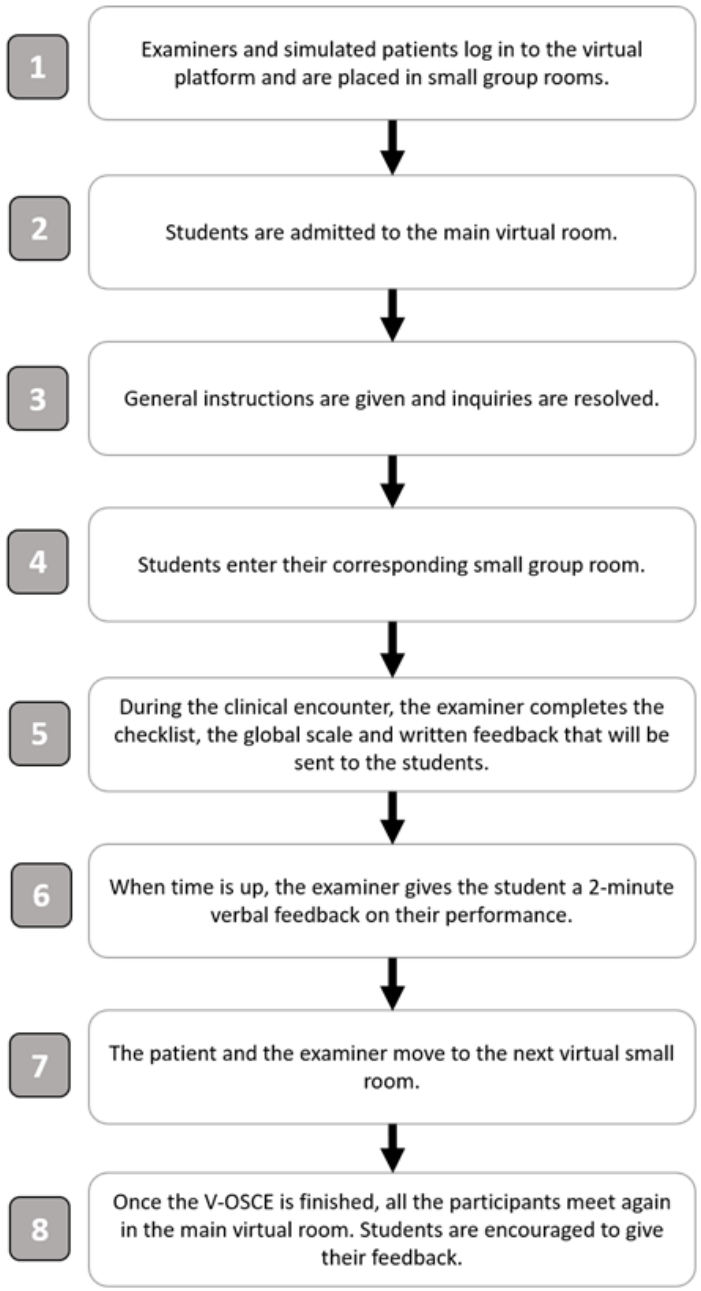

Figure 2. Process of the V-OSCE.

Figure 2

See image above for figure legend.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- SurveyVOSCE.pdf