Revista ARACÊ
ISSN: 2358-2472

CHALLENGES AND OPPORTUNITIES IN THE ONLINE ASSESSMENT OF CLINICAL SKILLS: A SYSTEMATIC REVIEW OF THE LITERATURE

https://doi.org/10.56238/arev7n2-284

Submitted on: 26/01/2025 **Publication date:** 26/02/2025

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ABSTRACT

Objective: to consolidate current knowledge about online competency assessment, with a focus on medical education, and to compare its effectiveness with traditional methods. Materials and methods: a systematic review of the literature was carried out according to the Best Evidence Medical Education Collaboration protocol and analyzed experimental and observational studies in the PubMed and Embase databases. Results: An increase in the use of online Objective Structured Clinical Examinations (OSCE) was observed during and after the COVID-19 pandemic. Most studies reported effective implementation, with 66% indicating few technical issues, although challenges related to connectivity and the assessment of non-verbal aspects were observed. Comparisons between online and in-person assessments revealed mixed results: some studies showed higher scores on remote assessments due to greater concentration and better feedback. Others did not identify significant differences or favored the traditional format. Issues of academic integrity were raised, but they did not prove to be determinant in the results. Students found remote

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ISSN: 2358-2472

assessments to be less stressful, more accessible, and efficient, while educators valued flexibility and reduced logistical effort. Despite the advantages, limitations in the assessment of complex skills were evidenced. Bottom line: Online assessments are a promising tool, but they require technological refinement to overcome current challenges.

Keywords: Medical Education. Clinical Competence. Education Evaluation. Online Systems. Systematic Review.

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ISSN: 2358-2472

INTRODUCTION

Evaluation is an element present in all activities of human life. It can be understood as the analysis of the value of something for a specific purpose. In the context of education, assessment involves obtaining information through specific methods, which should guide decision-making related to the learning process (NORCINI *et al*., 2011; TRONCON, 1996). For a long time, medical schools have given primacy to assessment methods centered on cognitive knowledge. The assessment of clinical skills was generally restricted to clinical case discussions, with little emphasis on practical demonstrations by students and with an exclusive focus on inpatients. Although the importance of the physical examination in the clinical evaluation was recognized, it was often conducted by means of images, being inefficient to fully assess the students' skills and competencies. The evaluation of higher education is in constant progress and has received more and more prominence in the search for excellence in professional training (MATOS; TOLEDO JR, 2020).

Assessment in medical education should be multidimensional, including written, oral, practical, and behavioral tests, each with distinct objectives in measuring student learning and development (AMORIM *et al*., 2023). The process of assessing skills and competencies in medicine is particularly complex and requires an approach that considers biopsychosocial and behavioral aspects, as well as cognitive and procedural knowledge. Ideally, a variety of resources and methods should be used, in different environments and contexts, in order to cover different aspects of performance. They should include direct observation of behaviour, providing feedback and continuous monitoring (NUNES *et al*., 2013).

Since its creation in the 1970s, the Objective Structured Clinical Examination (OSCE) has become a reference for assessing clinical competencies, knowledge, behavior, communication, and professionalism (HARDEN; GLEESON, 1979; MATOS; TOLEDO JR, 2020). The OSCE format has undergone several adaptations and adjustments in response to challenges faced since its first implementations. However, all OSCEs share common characteristics, such as rotation between stations, the use of standardized assessment instruments in the form of checklists, and the prior specification of clinical competencies to be assessed (SCHLEICHER *et al*., 2017; WHITE, 2023).

The implementation of the OSCE faces several challenges, from operational issues to high costs. The limited time at each station requires students to demonstrate skills in

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isolation rather than competencies, which can compromise the establishment of an authentic doctor-patient relationship. In addition, the reliance on a checklist of tasks can reduce the doctor-patient interaction to a series of actions to be fulfilled, neglecting the complexity of the human relationships involved (SCHLEICHER *et al*., 2017; WHITE, 2023). Although it is widely used as an assessment tool, it is important to recognize that it sometimes tends to emphasize theoretical knowledge rather than its application in clinical practice. The greatest challenge for medical educators lies in the evaluation of the real performance of students, which is influenced by several unpredictable factors, of a practical and emotional nature (AMARAL; DOMINGUES; BICUDO-ZEFERINO, 2007).

In an attempt to circumvent these limitations, alternative approaches have emerged, such as the use of computing and virtual environments to simulate clinical situations, the virtual OSCE (COOK; TRIOLA, 2009; ISSENBERG *et al*., 2005), which allows remote evaluations. Other alternatives are work-based assessment, which evaluates students in real work environments, and long case clinical examination, which focuses on detailed assessments of real patients, allowing for an in-depth analysis of clinical skills. However, this last alternative may have important limitations, due to its low validity, since it depends on the patients available at the time of evaluation (MATOS; TOLEDO JR, 2020; NORCINI; BURCH, 2007).

In 2020, the covid-19 pandemic caused an interruption in conventional teaching-learning models. It has become mandatory and urgent to implement remote teaching, based on information and communication technologies, which became known as emergency remote teaching. During the period of social distancing, several teaching and assessment methodologies, including OSCE-type practical assessments, had to be adapted to the virtual environment, accelerating the adoption of new technologies, until then considered emerging (SANDHU; DE WOLF, 2020). This scenario has led to a significant increase in publications referring to remote assessments.

Thus, the objective of this article was to consolidate the current knowledge on online competency assessment through a systematic review of the literature. The research hypothesis was that online assessment is as effective as face-to-face assessment.

METHODOLOGY

A systematic review of the literature was carried out based on the recommended protocol Best Evidence Medical Education Collaboration for this type of study (HAMMICK;

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DORNAN; STEINERT, 2010). The review question, elaborated following the PICOT, was: "Is the online assessment of competencies effective in medical education?", with the population (P) being students of medicine and other courses in the health area, the exposure (I) the online assessment of competencies compared (C) with the traditional assessments (if available), the outcome (D) the reliability of the grade and without time limit (T).

Experimental and quasi-experimental studies, experience reports, case reports, observational studies, systematic reviews and/or meta-analysis that were related to the proposed theme (the effectiveness of online competency assessments), selected through title, abstract or methodology, and that dealt with the subject in English, Portuguese, and Spanish, with no date limit, were included. Articles that did not have any type of relationship with the proposed theme, articles selected in the screening that were not located in full, opinion articles and abstracts of conference proceedings and the like were excluded.

The search for primary studies was carried out in PubMed and Embase, with no language limitation. The following initial descriptors were used: Medical Education, Medical Students, Educational Measurements, Clinical Competency and Clinical Skills. These descriptors and their subdescriptors were combined with Boolean operators "AND" and "OR". To increase the accuracy of the search, two terms, ONLINE and REMOTE, were included in the search strategy as items in the title and not as descriptors. Chart 1 presents the final search strategy of PubMed with the Boolean operators AND, NOT, and OR.

The PubMed search strategy was adapted to Embase by searching for the same descriptors on Emtree. As there was no correspondence between several descriptors, especially those related to the outcomes, the final search strategy of Embase (Chart 2) was smaller. To avoid duplication of articles, articles that were available in Embase and PubMed were eliminated.

Chart 1 - Final PubMed search strategy

Variable	Descriptors
Population	((Education, Medical OR Medical Education) OR (Education, Medical, Undergraduate OR Medical Education, Undergraduate OR Undergraduate Medical Education OR Education, Undergraduate Medical OR Students, Medical OR Medical Students OR Student, Medical OR Medical Student)) OR (Education, Medical, Graduate OR Graduate Medical Education OR Medical Education Graduate OR Education, Graduate Medical)) OR (Students, Medical OR Medical, Students OR Student Medical OR Medical Student))
Operator	AND
Denouement	Measurement, Educational OR Educational Measurements OR Measurements, Educational OR Graduate Records Examination OR Examination, Graduate

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	Records OR Examinations, Graduate Records OR Graduate Records Examinations OR Educational Assessment OR Assessments, Educational OR Educational Assessments OR Assessment, Educational) AND (Competency, Clinical OR Competence, Clinical OR Clinical Competency OR Clinical Competencies OR Competencies, Clinical OR Clinical Skill OR Skill, Clinical OR Skills, Clinical OR Clinical Skills.C))
Operator	AND
Words in the title	(ONLINE [Title] OR REMOTE[Title])

Source: prepared by the authors

Chart 2 - Final search strategy used in Embase

(('area health education centers'/exp OR 'area health education centers' OR 'education, medical'/exp OR 'education, medical' OR 'education, medical, continuing'/exp OR 'education, medical, continuing' OR 'education, medical, graduate'/exp OR 'education, medical, graduate' OR 'education, medical, undergraduate'/exp OR 'education, medical, undergraduate' OR 'education, premedical'/exp OR 'education, premedical' OR 'education, public health professional'/exp OR 'education, premedical' OR 'education, public health professional' OR 'fellowships and scholarships'/exp OR 'fellowships and scholarships' OR 'internship and residency'/exp OR 'internship and residency' OR 'medical instruction'/exp OR 'medical instruction' OR 'medical program'/exp OR 'medical program' OR 'medical programme'/exp OR 'medical programme' OR 'medical teaching'/exp OR 'medical teaching' OR 'medical training'/exp OR 'medical training'/exp OR 'medical training' OR 'training, medical'/exp OR 'training, medical' OR 'medical education'/exp OR 'medical education') AND ('online' AND 'assessment' AND 'competency')) AND [embase]/lim NOT ([embase]/lim AND [medline]/lim)

Source: prepared by the authors

The results of the two searches were exported to independent files and later imported into a single file in the Rayyan QCRI application for the next steps of the study.

The selection of studies involved three researchers, one physician and two medical students in the final years of the course. The selection of articles was made in three stages: (1) exclusion of duplicate articles, (2) screening and (3) eligibility analysis. The import of the files into Rayyan QCRI was done by a single researcher, who shared the final file with two other researchers, using blind mode. The deletion of duplicate articles was done automatically by the application

In the screening phase, three researchers independently analyzed the titles and abstracts of all articles and identified those that should be included in the next phase of the study. After the initial analysis, blinding was removed and the three researchers reviewed the articles in which there was no consensus.

In the eligibility analysis, articles whose full version was not located or were unavailable were eliminated. Each article was analyzed independently by two researchers, according to the inclusion and exclusion criteria, in addition to considering the relevance and quality of the study. Disagreements regarding inclusion were made in a consensual manner.

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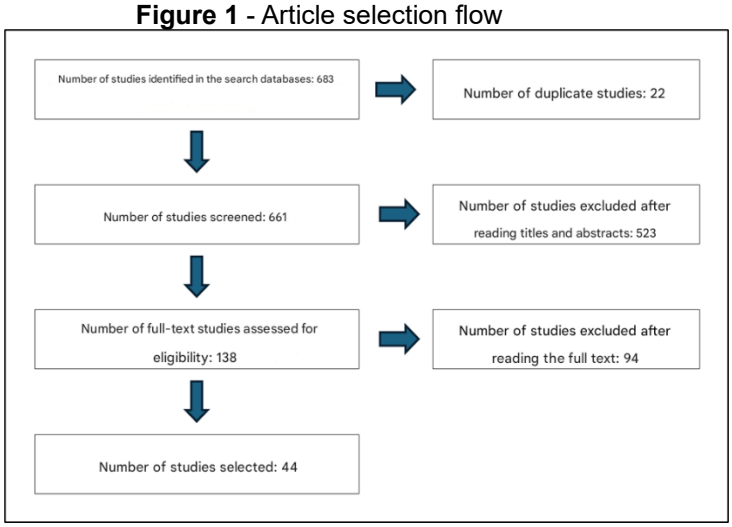
In the extraction and synthesis phase, an Excel® spreadsheet (Microsoft, USA) was developed to extract the following variables: article identifier, researcher responsible for extraction, title of the article, study authors, journal name, year of publication, place of publication (country), objective, population, sample size, study design, comparative study (yes or no), type of intervention, primary outcomes, secondary outcomes, whether there was a measure of reliability or internal consistency, Cronbach's alpha value (or other measure of reliability), measure of validity, statistical difference between groups (if comparative), p-value (if comparative), and conclusion. The data were extracted by one researcher and reviewed by a second researcher to ensure the completeness of the information. In addition to data extraction, the contents of each article were synthesized, highlighting relevant excerpts for the synthesis process. Based on the results of the extraction, the most relevant themes addressed in the studies were identified.

The protocol of this systematic review was registered on The Open Science Framework platform, maintaining the entire methodological process explicit to avoid duplication of studies (https://doi.org/10.17605/OSF.IO/85PYN).

RESULTS AND DISCUSSION

In the search in the PubMed and Embase bibliographic databases, with no time period limit, 683 articles were identified. Of these, 22 articles were duplicated and 523 were excluded after analysis of titles and abstracts. After the remaining 138 articles were read in full by two researchers, 94 were excluded and 52 studies were submitted to content extraction for qualitative synthesis (Fig. 1).

Figure 1 - Article selection flow



Source: prepared by the authors.

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Most of the studies were conducted in the United States (11), followed by Australia (6) and England (6). The following countries carried out two studies each: Saudi Arabia, Canada, China and Egypt. And finally, South Africa, Germany, the United Arab Emirates, India, Indonesia and Switzerland contributed one article each. No studies were conducted in South America, and three studies were multicenter or did not have a specific site. As expected, due to the covid-19 pandemic, there was a large increase in publications on the subject from 2020 onwards. The year with the highest number of publications was 2021 (11), followed by 2022 (9), 2023 (7) and 2020 (3). Between 2016 and 2019, one or two articles were published per year. Regarding the study design, 23 (52.3%) were experimental, 7 (15.9%) descriptive, 4 (9.1%) were cross-sectional studies, and 3 (6.9%) were systematic reviews. Four central themes were identified: online OSCE, comparison of grades between remote and face-to-face assessment, students' perception, and teachers' perception.

OSCE ONLINE

Conducting OSCE online required significant adaptation of traditional methods. Students participated in the evaluations from their homes or from places with internet access and an adequate environment for the exams. It was necessary to use simulation platforms and simulation infrastructure, which would allow the creation of realistic environments for the training and evaluation of clinical skills. In addition, OSCE stations have often been combined with video conferencing platforms such as Zoom® (HANNAN *et al*., 2021), Skype® (LANGENAU; KACHUR; HORBER, 2014), WebEx® (MESKELL *et al*., 2015) and Microsoft Teams® (AREKAT *et al*., 2022), to facilitate interaction between participants. Learning management systems, such as Moodle and Blackboard, were also used to organize and monitor student performance in online contexts (SHEHATA *et al*., 2021). Teachers and health professionals evaluated student performance in real time, recording observations and providing feedback through evaluation platforms (AREKAT *et al*., 2022; HANNAN *et al*., 2021; LANGENAU; KACHUR; HORBER, 2014).

Although there is no detailed description of the platforms used, 66% of the studies reported that there were no significant problems (AMIN *et al*., 2021; BENJAMIN; ROBBINS; KUNG, 2006; ENOCH; ABRAHAM; SINGARAM, 2022; MOTKUR; BHARADWAJ; YOGARAJAH, 2022; PLACKETT *et al*., 2020; WILSON; WEATHERS; FORNERIS, 2018). In 18% of the articles, there were difficulties related to the platform,

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which presented logistical limitations, especially in the evaluation of students' body language. The complexity of platforms such as Skype®, Zoom® and Google® Classroom was also a challenge, as some students did not master these tools. Langenau, Kachur and Horber (LANGENAU; KACHUR; HORBER, 2014) mentioned that 57.0% of users experienced technical difficulties, claiming that Skype® is not an easy-to-use platform.

Another difficulty reported was the quality of the internet connection, which led to interruptions during the presentation of videos, changes in sound quality, and freezing of screens, affecting both students and teachers (NUSANTI *et al*., 2021; SAAD *et al*., 2022; SHEHATA *et al*., 2021). In 7.5% of the articles, difficulties with equipment (computers, cameras, and sound) and poor image and recording quality were reported (NUSANTI *et al*., 2021; PRASAD *et al*., 2022).

Only 3.7% of the articles mentioned financial problems for the implementation of remote assessment. Benjamin, Robbins and Kung (BENJAMIN; ROBBINS; KUNG, 2006) and Wilson, Weathers and Forneris (WILSON; WEATHERS; FORNERIS, 2018) argued that the selection of program providers and aspects of platform implementation should not be based solely on cost, but also on flexibility, responsiveness, history of innovation, knowledge of the training environment, and the quality of available technical support.

While there are some technical and logistical challenges, online learning platforms have proven effective in evaluating performance, offering considerable benefits in optimizing resources.

COMPARISON BETWEEN REMOTE AND FACE-TO-FACE ASSESSMENT SCORES

Eleven articles analyzed the grades obtained by the students. Among them, six indicated that the evaluation scores were higher when carried out in the online format (ATTENBOROUGH *et al*., 2021; LEBENSOHN *et al*., 2012; WOLBRINK *et al*., 2020; XU *et al*., 2023).

Attenborough *et al*. add that the remote format eliminated the requirement to monitor the time of each station, allowing examiners to focus on student observation, resulting in more balanced grades and more meaningful feedback. According to them, the scores were higher in the online assessments, as the students were able to improve, in some way, concentration, confidence and content retention (ATTENBOROUGH *et al*., 2021).

Four articles found no significant differences between online and face-to-face scores (BOUZID *et al*., 2022; KANIA *et al*., 2011; MEYER *et al*., 2023). And four other articles

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indicated that students achieved higher grades in the face-to-face assessment (KUMARAVEL; STEWART; ILIC, 2022; LEBENSOHN *et al*., 2012; THEPWONGSA *et al*., 2014).

The comparison between face-to-face tests and those carried out online, with webcam supervision, showed that there was no significant difference in student performance, suggesting that online assessment can be as effective as traditional assessment (HOPE *et al*., 2021).

A relevant topic in relation to remote assessment is academic integrity (KANIA *et al*., 2011). Amin *et al*. propose the use of video case presentations as a solution to reduce "cheating" (AMIN *et al*., 2021). Attenborough *et al*. discuss the difficulties in preventing cheating during remote assessment and suggest hybrid models as a way to improve supervision. In addition, they mention the importance of academic integrity in assessments, but do not attribute a relationship with grades (ATTENBOROUGH *et al*., 2021).

The results of online versus traditional assessments can vary depending on the specific context and the conditions in which they are applied, so few articles bring a definitive consensus on the superiority of the grades obtained in each assessment format. Therefore, more research is needed to establish more robust and comprehensive conclusions.

STUDENT PERCEPTION

Sixteen articles reported that students considered the online OSCE to be more efficient and accessible than the traditional one. These studies highlighted that the material of the evaluations, the logistics and the standardization of the test were adequate. In addition, three articles mentioned that remote assessment decreased students' stress and anxiety, attributing this improvement to the quality of the videos, the absence of the evaluator in the room, and the realization of the different stations without the need to change environment (ATTENBOROUGH *et al*., 2021; HANNAN *et al*., 2021; PHELPS *et al*., 2011; PRASAD *et al*., 2022).

Fourteen articles described the positive perception of students in relation to the use of other online assessment tools. These articles indicated that the quality of the tools used provided time reduction, greater retention of content and clinical skills, in addition to improving feedback and communication with evaluators. The students stated that the online tools facilitated communication and the feedback was carried out in a shorter time

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and with personal and objective language. The satisfaction survey conducted after the completion of three OSCEs, which included 236 students and 52 examiners, showed that most of the open comments were positive (SHABAN *et al*., 2021). Another study indicated that 93% of students were satisfied with the overall organization and implementation of the exam (SHEHATA *et al*., 2021).

However, conducting online assessments can also have negative points. The problems most reported by students were nervousness caused by technological failures, short test time, forgetfulness of clinical skills, and the impossibility of properly performing the physical examination (NUSANTI *et al*., 2021; SAAD *et al*., 2022; SHEHATA *et al*., 2021).

Most students found remote assessment to be more efficient, accessible, and less stressful than the traditional method (GULATI *et al*., 2021). In addition, in the study by Langenau Kachur and Horber (LANGENAU; KACHUR; HORBER, 2014), participants felt that the virtual OSCE improved their confidence in carrying out key clinical competencies. They also reported that utilizing online tools provided better content retention, more effective feedback, and more fluid communication with faculty. Despite some technical challenges and feelings of anxiety reported, students' overall experience with the online OSCE was positive, suggesting that this methodology may be a viable and beneficial alternative for clinical assessment.

PERCEPTION OF TEACHERS

Regarding the perception of teachers, 14 articles emphasized the general satisfaction with the use of these platforms. The examiners reported positive experiences, believing that students are capable of developing their potential and presenting results similar to the face-to-face assessment (SHABAN *et al*., 2021; YOUSEF *et al*., 2022).

Roy, Ray and Bhakta noted that almost all examiners (97.0%) were satisfied with the online application of the OSCE, with 72.0% indicating that the electronic system facilitated the assessment of students' competencies and 84.0% considering that using a tablet was easier than the paper form. In addition, more than 95.0% were satisfied with the implementation of the OSCE online, to evaluate fifth-year medical students (ROY; RAY; BHAKTA, 2020).

Amin *et al*. reported that the evaluators were impressed by the unique, well-structured, problem-based case scenarios prepared by some of the students, noting that

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they could be added to the problem-based learning bench. However, it was observed that some students were not fully proficient in obtaining the patient's history, which drew attention to future corrective measures (AMIN *et al*., 2021).

LeRoy Heinrichs *et al*. highlighted the replayability of the Second Life® platform, which allowed instructors to assess individual performance and teamwork in each of the work areas. It provided an adequate and practical environment for the assessment of clinical skills, faithfully imitating the traditional OSCE (LEROY HEINRICHS *et al*., 2008).

Simulations based on virtual platforms had a positive impact on the evaluators' working hours, allowing breaks and reducing fatigue (BUSSENIUS; HARENDZA, 2023). Another positive point was the improvement in feedback to students, with more detailed information and more accurate records (HO *et al*., 2019). Kania *et al*. highlight other positive points, such as the automated and objective assessment, allowing for greater reliability, immediate availability of grades, and effective feedback (KANIA *et al*., 2011).

However, six articles pointed out some obstacles emphasized by teachers, such as the need for more training and dissatisfaction with student results (ATTENBOROUGH *et al*., 2021; MEYER *et al*., 2023). It should also be noted the concern about academic integrity, discussed in the topic about the comparison of grades. This is a point always remembered in all discussions about online assessments, whether theoretical or practical.

This scenario suggests that while online platforms offer many benefits, they still face obstacles that need to be overcome in order for them to fully meet educators' expectations.

PERSPECTIVES

It was observed that the combination of different online tools, most of them not specific to online assessment of clinical skills, maintained good levels of teaching and skills assessment. However, it should be noted that many articles indicate the importance of using appropriate platforms and equipment, such as software, cameras and adapted programs, and the need to train teachers and students in the use of tools to achieve truly valid and reliable results. It is expected that, based on the experience accumulated during the covid-19 pandemic, platforms more suitable for remote skills assessment will be developed. Another relevant point is the need for access to equipment and infrastructure, especially quality internet connection, so that the evaluation is carried out properly.

In general, the remote assessment was well accepted by teachers and students. Most students reported a reduction in stress associated with the assessment and, when it

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occurred, it was more associated with infrastructure problems, such as the quality of the internet, or equipment. One of the advantages to be highlighted for teachers is the possibility of more rational work schedules and the reduction of fatigue associated with the application of the test.

Although academic integrity and cheating are constant concerns of professors, of the 14 articles that compared scores between the online and face-to-face assessment, eight reported that the score was the same or lower in the case of the online OSCE. These results suggest that the problem may be less than the teachers' expectations in relation to it.

Despite the good results indicated by the studies, it should be noted that the online assessment may have important limitations, such as difficulty in assessing non-verbal language and performing procedures. The results indicate that it is better suited to the assessment of communication skills and less complex procedural skills.

In summary, the online competency assessment presents itself as a promising tool, offering significant advantages, such as operational and logistical practicality, reduction of stress associated with the test, possibility of automation of correction and immediate feedback, which can represent a cost reduction in relation to the traditional test. However, there are limitations regarding the possibility of cheating and difficulty in evaluating medium and high complexity procedures. Today's adoption of these platforms requires a careful balance between technological innovation and maintaining educational requirements, to ensure that all aspects of teaching and learning are adequately met. It is expected that the experience accumulated so far will be the basis for the development and improvement of current technologies, so that online assessment becomes more of an educational resource and does not necessarily replace face-to-face assessment.

ACKNOWLEDGMENTS

The researchers thank UNIFENAS and FAPEMIG for the financial support to carry out the project.

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REFERENCES

1. AMARAL, E.; DOMINGUES, R. C. L.; BICUDO-ZEFERINO, A. M. Avaliando Competência Clínica: O Método De Avaliação Estruturada Observacional. Revista Brasileira de Educação Médica, v. 31, n. 3, p. 287-290, 2007.

2. AMIN, H. A. A. *et al*. Case Item Creation and Video Case Presentation as Summative Assessment Tools for Distance Learning in the Pandemic Era. Med J Armed Forces India, v. 77, n. Suppl 2, p. S466-S474, Jul 2021.

3. AMORIM, G. C. D. *et al*. Cenários Simulados Em Enfermagem: Revisão Integrativa De Literatura. Revista Brasileira de Enfermagem, v. 76, n. 1, p. e20220123, 2023.

4. AREKAT, M. *et al*. Evaluation of the Utility of Online Objective Structured Clinical Examination Conducted During the Covid-19 Pandemic. Adv Med Educ Pract, v. 13, p. 407-418, 2022.

5. ATTENBOROUGH, P. *et al*. Clinical Assessment During a Global Pandemic - Transitioning to a Covid Safe Hybrid Osce. Int J Osteopath Med, v. 42, p. 1-4, Dec 2021.

6. BENJAMIN, S.; ROBBINS, L. I.; KUNG, S. Online Resources for Assessment and Evaluation. Acad Psychiatry, v. 30, n. 6, p. 498-504, Nov-Dec 2006.

7. BOUZID, D. *et al*. Eosce Stations Live Versus Remote Evaluation and Scores Variability. BMC Med Educ, v. 22, n. 1, p. 861, Dec 13 2022.

8. BUSSENIUS, L.; HARENDZA, S. A Simulation-Based Osce with Case Presentation and Remote Rating - Development of a Prototype. GMS J Med Educ, v. 40, n. 1, p. Doc12, 2023.

9. COOK, D. A.; TRIOLA, M. M. Virtual Patients: A Critical Literature Review and Proposed Next Steps. Med Educ, v. 43, n. 4, p. 303-311, Apr 2009.

10. ENOCH, L. C.; ABRAHAM, R. M.; SINGARAM, V. S. A Comparative Analysis of the Impact of Online, Blended, and Face-to-Face Learning on Medical Students' Clinical Competency in the Affective, Cognitive, and Psychomotor Domains. BMC Med Educ, v. 22, n. 1, p. 753, Nov 1 2022.

11. GULATI, R. R. *et al*. Virtually Prepared! Student-Led Online Clinical Assessment. Educ Prim Care, v. 32, n. 4, p. 245-246, Jul 2021.

12. HAMMICK, M.; DORNAN, T.; STEINERT, Y. Conducting a Best Evidence Systematic Review. Part 1: From Idea to Data Coding. Beme Guide No. 13. Med Teach, v. 32, n. 1, p. 3-15, Jan 2010.

13. HANNAN, T. A. *et al*. Designing and Running an Online Objective Structured Clinical Examination (Osce) on Zoom: A Peer-Led Example. Med Teach, v. 43, n. 6, p. 651-655, Jun 2021.

Revista ARACÊ
ISSN: 2358-2472

14. HARDEN, R. M.; GLEESON, F. A. Assessment of Clinical Competence Using an Objective Structured Clinical Examination (Osce). Med Educ, v. 13, n. 1, p. 41-54, Jan 1979.

15. HO, K. *et al*. Remote Assessment Via Video Evaluation (Ravve): A Pilot Study to Trial Video-Enabled Peer Feedback on Clinical Performance. BMC Med Educ, v. 19, n. 1, p. 466, Dec 18 2019.

16. HOPE, D. *et al*. Candidates Undertaking (Invigilated) Assessment Online Show No Differences in Performance Compared to Those Undertaking Assessment Offline. Med Teach, v. 43, n. 6, p. 646-650, Jun 2021.

17. ISSENBERG, S. B. *et al*. Features and Uses of High-Fidelity Medical Simulations That Lead to Effective Learning: A Beme Systematic Review. Med Teach, v. 27, n. 1, p. 10-28, Jan 2005.

18. KANIA, R. E. *et al*. Online Script Concordance Test for Clinical Reasoning Assessment in Otorhinolaryngology: The Association between Performance and Clinical Experience. Arch Otolaryngol Head Neck Surg, v. 137, n. 8, p. 751-755, Aug 2011.

19. KUMARAVEL, B.; STEWART, C.; ILIC, D. Face-to-Face Versus Online Clinically Integrated Ebm Teaching in an Undergraduate Medical School: A Pilot Study. BMJ Evid Based Med, v. 27, n. 3, p. 162-168, Jun 2022.

20. LANGENAU, E.; KACHUR, E.; HORBER, D. Web-Based Objective Structured Clinical Examination with Remote Standardized Patients and Skype: Resident Experience. Patient Educ Couns, v. 96, n. 1, p. 55-62, Jul 2014.

21. LEBENSOHN, P. *et al*. Integrative Medicine in Residency Education: Developing Competency through Online Curriculum Training. J Grad Med Educ, v. 4, n. 1, p. 76-82, Mar 2012.

22. LEROY HEINRICHS, W. *et al*. Simulation for Team Training and Assessment: Case Studies of Online Training with Virtual Worlds. World J Surg, v. 32, n. 2, p. 191-170, 2008.

23. MATOS, F. S.; TOLEDO JR, A. A Prova Prática-Oral Estruturada É Comparável Ao Exame Clínico Objetivo Estruturado Na Avaliação De Micro-Habilidades Clínicas? Revista Docência do Ensino Superior, v. 10, p. 1-21, 2020.

24. MESKELL, P. *et al*. Back to the Future: An Online Osce Management Information System for Nursing Osces. Nurse Educ Today, v. 35, n. 11, p. 1091-1096, Nov 2015.

25. MEYER, E. G. *et al*. The Effectiveness of Online Experiential Learning in a Psychiatry Clerkship. Acad Psychiatry, v. 47, n. 2, p. 181-186, Apr 2023.

26. MOTKUR, V.; BHARADWAJ, A.; YOGARAJAH, N. Is Online Objective Structured Clinical Examination Teaching an Acceptable Replacement in Post-Covid-19 Medical

Revista ARACÊ
ISSN: 2358-2472

Education in the United Kingdom?: A Descriptive Study. J Educ Eval Health Prof, v. 19, p. 30, 2022.

27. NORCINI, J. *et al*. Criteria for Good Assessment: Consensus Statement and Recommendations from the Ottawa 2010 Conference. Med Teach, v. 33, n. 3, p. 206-214, 2011.

28. NORCINI, J.; BURCH, V. Workplace-Based Assessment as an Educational Tool: Amee Guide No. 31. Med Teach, v. 29, n. 9, p. 855-871, Nov 2007.

29. NUNES, S. O. V. *et al*. O Ensino De Habilidades E Atitudes: Um Relato De Experiências. Revista Brasileira de Educação Médica, v. 37, n. 1, p. 126-131, 2013.

30. NUSANTI, S. *et al*. Delivering a Modified Continuous Objective Structured Clinical Examination for Ophthalmology Residents through a Hybrid Online Method. Korean J Med Educ, v. 33, n. 4, p. 419-430, Dec 2021.

31. PHELPS, A. *et al*. Educating Radiology Residents in the New Era: Implementation and Evaluation of Online End-of-Rotation Examinations. Acad Radiol, v. 18, n. 11, p. 1442-1446, Nov 2011.

32. PLACKETT, R. *et al*. Online Patient Simulation Training to Improve Clinical Reasoning: A Feasibility Randomised Controlled Trial. BMC Med Educ, v. 20, n. 1, p. 245, Jul 31 2020.

33. PRASAD, N. *et al*. Evaluation of Online Interprofessional Simulation Workshops for Obstetric and Neonatal Emergencies. Int J Med Educ, v. 13, p. 287-304, Oct 31 2022.

34. ROY, H.; RAY, K.; BHAKTA, A. Faculties Perception on Anatomy Teaching and Assessment in Lockdown and Post-Lockdown New Normal Phase. Journal of Clinical and Diagnostic Research, v. 14, n. 11, p. AC05-AC09, 2020.

35. SAAD, S. L. *et al*. Virtual Osce Delivery and Quality Assurance During a Pandemic: Implications for the Future. Front Med (Lausanne), v. 9, p. 844884, 2022.

36. SANDHU, P.; DE WOLF, M. The Impact of Covid-19 on the Undergraduate Medical Curriculum. Med Educ Online, v. 25, n. 1, p. 1764740, Dec 2020.

37. SCHLEICHER, I. *et al*. Examiner Effect on the Objective Structured Clinical Exam - a Study at Five Medical Schools. BMC Med Educ, v. 17, n. 1, p. 71, Apr 24 2017.

38. SHABAN, S. *et al*. Conducting Online Osces Aided by a Novel Time Management Web-Based System. BMC Med Educ, v. 21, n. 1, p. 508, Sep 26 2021.

39. SHEHATA, M. H. *et al*. A Toolbox for Conducting an Online Osce. Clin Teach, v. 18, n. 3, p. 236-242, Jun 2021.

40. THEPWONGSA, I. *et al*. Online Continuing Medical Education (Cme) for Gps: Does It Work? A Systematic Review. Aust Fam Physician, v. 43, n. 10, p. 717-721, Oct 2014.

Revista ARACÊ
ISSN: 2358-2472

41. TRONCON, L. E. D. A. Métodos De Avaliação No Ensino Médico. Medicina (Ribeirão Preto), v. 29, n. 4, p. 429-439, 1996.

42. WHITE, K. To Osce or Not to Osce? BMJ, v. 381, p. 1081, May 11 2023.

43. WILSON, T.; WEATHERS, N.; FORNERIS, L. Evaluation of Outcomes from an Online Nurse Residency Program. J Nurs Adm, v. 48, n. 10, p. 495-501, Oct 2018.

44. WOLBRINK, T. A. *et al*. Online Learning and Residents' Acquisition of Mechanical Ventilation Knowledge: Sequencing Matters. Crit Care Med, v. 48, n. 1, p. e1-e8, Jan 2020.

45. XU, Y. *et al*. Exploring the Impact of Online and Offline Teaching Methods on the Cognitive Abilities of Medical Students: A Comparative Study. BMC Med Educ, v. 23, n. 1, p. 557, Aug 8 2023.

46. YOUSEF, A. A. *et al*. Innovative Method to Digitize a Web-Based Osce Evaluation System for Medical Students: A Cross-Sectional Study in University Hospital in Saudi Arabia. Int J Gen Med, v. 15, p. 1085-1095, 2022.