

Raising the Standard in Clinical Assessment Through the Objective Structured Clinical Examination

Sean Richardson, EdD, R.T.(R)(CT), MTR

The objective structured clinical examination (OSCE) is a versatile multipurpose examination tool capable of testing health care professionals' knowledge, competence, clinical skills, and safety in the clinical setting.¹⁻⁴ Its objectivity is based on direct observation scored against determined assessment criteria during a specified period. Each candidate is assessed using identical or similar scenarios or tasks. It is designed to assess all domains of learning (ie, cognitive, psychomotor, affective) concurrently and objectively.⁵ According to Harding, a psychiatrist, the OSCE is "the fairest standardized assessment of clinical skills and competencies."²

Harden and Gleeson introduced the OSCE in medical school assessment in 1975.⁶ Later, Harding aimed to standardize the assessment of clinical competencies by minimizing examiner subjectivity and the variables affecting examinees' examination performance while adding objectivity to the assessment of clinical skills.^{1,2} The original format of the OSCE has been modified to include sequential OSCE,⁷ group OSCE, computer-assisted OSCE, objective structured long examination record, and objective structured video examination.⁵

The OSCE is a well-established tool in undergraduate and postgraduate programs in medicine, pharmacy, nursing, dentistry, and other allied health professions because its validity and reliability in evaluating clinical skills have been proven in numerous studies among various subjects.⁸⁻¹² The OSCE has become a staple in medical and allied health assessments in reputable

health care educational institutions in Australia, Canada, South Africa, the United Kingdom, and the United States. OSCEs are employed in all medical programs in Australia to assess students' exit-level clinical performance.¹³ In the United States and Canada, it forms part of the entry-to-practice licensing and certification exams for medicine and pharmacy.¹⁴ In Korea, the OSCE is called the *clinical performance examination*.¹⁵

OSCE Format

The standardized OSCE is a short, practical examination consisting of simulated clinical scenarios arranged and completed in a circular pattern of stations. The OSCE presents real-life clinical scenarios for students to demonstrate¹⁻³:

- communication
- interpersonal skills
- patient care
- problem-solving
- procedural skills
- professional judgment
- professionalism

Clinical examination scenarios are arranged and presented to examine students' knowledge and clinical skills under timed conditions.² Students move from 1 station to another to interact with the simulated patient and perform the required task on a timed basis.

OSCEs usually are mapped against the program curriculum, outcome statements, or competency requirements, such as those provided by the American

Short Report

Raising the Standard in Clinical Assessment

Society of Radiologic Technologists. The number of stations varies according to the variety of skills to be assessed and the level of assessment. The objective level of the OSCE (ie, to evaluate course learning outcomes, program learning outcomes, or exit-level competency) usually determines the number of stations.

In 1975, Harden originally suggested 16 stations²; however, medicine and pharmacy programs in the United States tend to use 12 to 16 stations for licensing exams. Therefore, 12 to 16 stations might be adequate for a radiography programs' evaluation of end-of-program competencies, but 5 to 6 stations might be needed for an end-of-course competency evaluation.

A hypothetical example, created by the author for an exam, of a 6-station end-of-course or semester OSCE for first-year radiography students is:

- station 1 – Obtain informed consent for a pregnant patient who has been scheduled for a chest radiograph. Students demonstrate patient communication skills and knowledge of radiation protection, radiobiology, and chest positioning.
- station 2 – Position a hypersthenic patient with pleural effusion for a posteroanterior radiograph of the chest and set the technical factor for this projection. Skills demonstrated include patient communication, chest positioning, appropriate image receptor placement, and central ray centering, as well as students' radiation protection and technical knowledge.
- station 3 – Position a patient suspected of having a perforated bowel who cannot stand or sit upright and set the technical factors for the patient position or projection.
- station 4 – Position a patient with a history of rheumatoid arthritis for an anteroposterior oblique projection of both hands using the Norgaard method and select the appropriate technical factors for this projection.
- station 5 – Position a patient for an elbow examination using the Coyle method and select the required technical factors.
- station 6 – Pattern recognition and radiographic pathology station for chest, abdomen, and upper extremities.

The following is a typical process for conducting an OSCE¹³:

- Students draw a station number at which they will start.
- A bell is rung to signal for students to go to their stations.
- The examiner meets the student at the door of the clinical station and presents the student with a written description of the clinical scenario and instructions.
- A second bell signals for students to read their instructions. Students are given 1 minute to read the instructions and gather their thoughts.
- A third bell then is rung to indicate the students should perform the instructed task. Students are given a reasonable, established duration to complete the required task. The examiner observes the student and scores their performance using previously agreed criteria. The student can ask the examiner for help, but this is marked against the student.
- The station assessment ends when the student indicates they have completed the task, or the sound of a fourth bell indicates the end of the allotted time.
- The student steps outside the clinical station and awaits the subsequent bell to indicate for them to move to the next station. Students are usually given 1 minute of rest between stations.
- Students move to their next station at the sound of the bell, and the cycle is repeated. The time at each station varies between 5 to 8 minutes. However, students receive the same time per station, and movement from their current station to the next are in sync.
- The circuit might also include a rest station.
- Student sequestration is usually employed to avoid students communicating the OSCE content with each other.
- Feedback usually is provided to students at the end of the day or a few days after the examination. The feedback might be oral or written, depending on the timeline. However, the educational effect of OSCEs is improved with immediate feedback.

Simulated Patients

Simulated patients might be junior-year students who are unfamiliar with the exam content or students from other disciplines at the college such as nursing or theater students. Simulated patients' participation might be voluntary, paid, or rewarded with an honorarium. Programs might use real patients, hire individuals or actors, or use mannequins as simulated patients.² In all instances, training is required to preserve authenticity and consistency in presenting the clinical problem.

Score Sheet

The score sheets might be competency-based mark sheets, checklist mark sheets, or a combination of both. Construct validity and reliability should be assured. Construct validity and reliability are essential as they improve the objectivity of the method.¹³

Advantages and Disadvantages of the OSCE

Like most methods, the OSCE has associated advantages and disadvantages. Some advantages of the OSCE include^{6,16}:

- allowing for easy advanced planning of questions for the competencies that need to be assessed, which align with the learning objectives of the course or program
- being a more functional, objective, comprehensive, and reliable tool than traditional assessment methods
- being used widely in the clinical education of medical and health care professionals
- being valid and reliable tools for assessing clinical performance
- facilitating immediate feedback to improve students' learning progress
- generating formative feedback for students and the education program
- having more reproducible results compared with results obtained from conventional examinations
- helping students identify gaps in their clinical knowledge and practice
- helping to reduce biases in clinical assessment
- improving assessment uniformity for all students

- improving reliability and construct validity of clinical assessment
- improving the ability to observe skills being performed
- presenting real-life scenarios designed to assess students' ability to demonstrate specific competencies under real-life conditions

Possible disadvantages of OSCEs are costs, requiring comprehensive organization and implementation, being stressful for students and faculty, and being time-consuming.

Graduate Expectations

Graduates of radiography programs must possess knowledge, skills, and appropriate judgment to practice effectively and safely in an ever-changing clinical environment. The American Registry of Radiologic Technologists requires radiography education programs to assess and affirm that their graduates have satisfied the didactic and clinical competencies required for certification and entry into practice. Programs are free to exercise preference in developing and implementing tools to prepare and assess students when programmatic standards meet the profession's standards.¹⁷

Assessment systems might include written exams (eg, multiple-choice or structured questions), clinic-based assessment methods (eg, miniature clinical evaluation exercises with real patients), performance-based assessments, and viva voce (oral) exams. However, these traditional assessment methods have received widespread criticism for being deficient in structure, standardization, interrater reliability, and minimizing examiner bias.^{16,18-21} Traditional methods of clinical examination can lack objectivity, as students are assessed with patients by clinical preceptors who assess the students subjectively. Harden's proposed OSCE in 1975 was designed to overcome these and other issues related to assessing clinical competencies to improve the quality of clinical performance in students.

The OSCE is an ideal competency-based skill tool for the summative assessment of end-of-course or end-of-program clinical abilities because clinical tasks or skills of learning outcomes are represented at several stations, and all examinees are assessed using established standardized scoring rubrics in a simulated realistic

clinical environment.¹ OSCEs provide a realistic practice environment to evaluate competencies such as^{1,2,4}:

- communication
- critical thinking skills
- higher-order reasoning
- patient-centered care
- professionalism
- radiographic positioning

OSCE Implementation

The optometry program at the University of Waterloo developed an OSCE to improve the effectiveness of its assessment of students' exit-level competencies, to prepare them for the board examination, and to increase their assessment system's validity and reliability.⁴ Similarly, radiography programs can use the OSCE to evaluate end-of-course clinical abilities for all radiographic procedures and clinical courses. Students must use the knowledge and skills they accumulated on patient care, radiation protection, radiography procedures, and techniques to demonstrate proficiency through the clinical simulations. The OSCE is not an assessment tool that is easy to establish. The initial development, implementation, and execution of the OSCE can be challenging if the required ingredients, preparation, and supporting learning infrastructure are unavailable. Getu et al attributed poor organization, inadequate student preparation (exposure to simulation-based learning), and time at stations as the factors that negatively affected the implementation of their pilot OSCE.²² However, they reported their students' assessment of the difficulty level of the OSCE as medium and assessed the OSCE as a good assessment tool.

In a survey of its students who participated in a pilot OSCE, the University of Waterloo reported high favorability due to its realistic clinical scenarios.⁴ Students also reported high satisfaction from their interaction with standardized patients and the general organization of the OSCE. Further, Majumder et al surveyed 52 students and 22 examiners on their OSCE to determine the final year Bachelor of Medicine, Bachelor of Surgery (MBBS) students' and examiners' perceptions of the attributes, quality, validity, reliability, and organization of the medicine and therapeutics exit OSCE at the University of the West Indies at Cave Hill,

Barbados.¹⁸ Most of their students found the OSCE to be positive in its attributes, quality, validity, reliability, and organization. Examiners also were satisfied with the organization, administration, and execution of the OSCE. However, students found the OSCE environment to be stressful and the level to be complicated. Their OSCE circuit was composed of 17 testing stations and 4 to 6 rest stations with a total transit time of approximately 4 hours.

Although the OSCE can be stressful, students endorsed the benefits of the assessment of their learning experience.^{19,23} Students also reported a traditional clinical examination as being more challenging than an OSCE. They indicated their preference for the OSCE because it is a fairer assessment, the tasks reflect taught scenarios, and the setting and context feel authentic, provide opportunities to learn, and are more valid and reliable.²¹ Moreover, Kromann et al reported that OSCEs improved learning outcomes in some clinical skills categories compared with other methods.²⁴ Kromann et al also found that the acquired skills associated with the OSCE last longer. This might be consistent with the widely held belief that assessment is a catalyst for learning in clinical education.²⁵ Other issues the OSCE overcomes are examiner or clinical instructor bias and correlation among examiners. Similarly, the faculty agreed that the OSCE reduces subjective biases in clinical assessment by improving the validity and reliability of the assessment of clinical performances.²³

However, feasibility can hinder the OSCE because of costs associated with staff, standardized patients, and venues. Considering this, using the sequential OSCE might yield cost-saving dividends. Hejri and Jalili employed the sequential OSCE as a cost-reduction measure.⁷ In the sequential OSCE, all students take an initial shortened version of the OSCE for screening. Those who were successful were excused from further testing. However, the remaining students were administered an additional OSCE.⁷ They realized 33.9% and 40.4% savings with the screening OSCE compared with the main OSCE.

Conclusion

The radiography curricula, like other health care professional curricula, is based on competency. The

educational objective of radiography programs is to provide the community with competent entry-level graduates and practitioners. Radiography curricula should prepare students to not only pass licensure examinations but also to provide excellent patient-centered care. The literature has shown that traditional examination formats have failed to measure critical entry-to-practice competencies accurately. Therefore, many professions, such as pharmacy, have developed the OSCE to replace the conventional oral examination, multiple-choice test, and other assessment methods for the entry-to-practice licensure or certification examination. If radiography programs are to prepare entry-level radiographers to meet the current challenges of the ever-evolving multidisciplinary clinical environment, valid and reliable methods of assessing students' clinical competencies must be established; the OSCE is a method that can assist in this endeavor.

Sean Richardson, EdD, R.T.(R)(CT), MTR, is program director and professor of radiography at JFK Muhlenberg School of Radiography at Union College of Union County, New Jersey.

References

- Harding D. The objective structured clinical examination (OSCE) explained. *BMJ*. 2017;358:j3618. doi:10.1136/sbmj.j3618
- Harding D. *Deconstructing the OSCE*. Oxford, UK: Oxford University Press; 2014.
- Zayyan M. Objective structured clinical examination: the assessment of choice. *Oman Med J*. 2011;26(4):219-222. doi:10.5001/omj.2011.55
- Hrynchak, P, Bright J, MacIver S, Woo S. Students satisfaction with an objective structured clinical examination in optometry. *Optometric Education*. 2021;46(2):
- Chaudhary R, Grover C, Bhattacharya SN, Sharma A. Computer assisted objective structured clinical examination versus objective structured clinical examination in assessment of Dermatology undergraduate students. *Indian J Dermatol Venereol Leprol*. 2017;83(4):448-452. doi:10.4103/ijdv.IJDVL_587_16
- Harden RM, Gleeson FA. Assessment of clinical competence using an objective structured clinical examination (OSCE). *Med Educ*. 1979;13(1):41-54. doi:10.1111/j.1365-2923.1979.tb00918.x
- Hejri SM, Jalili M. Sequential objective structured clinical examination based on item response theory in Iran. *J Educ Eval Health Prof*. 2017;14:19. doi:10.3352/jeehp.2017.14.19
- Cohen R, Rothman AI, Poldre P, Ross J. Validity and generalizability of global ratings in an objective structured clinical examination. *Acad Med*. 1991;66(9):545-548.
- Hodges B, Hanson M, McNaughton N, Regehr G; University of Toronto Psychiatric Skills Assessment Project. Creating, monitoring, and improving a psychiatry OSCE: a guide for faculty. *Acad Psychiatry*. 2002;26(3):134-161. doi:10.1176/appi.ap.26.3.134
- Vaidya NA. Psychiatry clerkship objective structured clinical examination is here to stay. *Acad Psychiatry*. 2008;32(3):177-179. doi:10.1176/appi.ap.32.3.177
- Amr M, Raddad D, Afifi Z. Objective structured clinical examination (OSCE) during psychiatry clerkship in a Saudi university. *Arab J Psychiatry*. 2012;23:69-73.
- Almoallim H. (OSCE) in internal medicine for undergraduate students newly encountered with clinical training. *MedEd PORTAL*. 2006;2:429. doi:10.15766/mep_2374-8265.429
- Heal C, D'Souza K, Banks J, et al; ACCLAIM collaboration. A snapshot of current objective structured clinical examination (OSCE) practice at Australian medical schools. *Med Teach*. 2019;41(4):441-447. doi:10.1080/0142159X.2018.1487547
- Shirwaikar A. Objective structured clinical examination (OSCE) in pharmacy education - a trend. *Pharm Pract (Granada)*. 2015;13(4):627. doi:10.18549/PharmPract.2015.04.627
- Yu J, Lee S, Kim M, Lee J. Comparison of students' performance of objective structured clinical examination during clinical practice. *Korean J Med Educ*. 2020;32(3):231-235. doi:10.3946/kjme.2020.168
- Joshi MK, Srivastava AK, Ranjan P, et al. OSCE as a summative assessment tool for undergraduate students of surgery—our experience. *Indian J Surg*. 2017;79(6):534-538. doi:10.1007/s12262-016-1521-y
- Radiography curriculum. American Society of Radiologic Technologists. Published 2022. Accessed June 29, 2023. <https://www.asrt.org/educators/asrt-curricula/radiography/radiography-curriculum>
- Majumder MAA, Kumar A, Krishnamurthy K, Ojeh N, Adams OP, Sa B. An evaluative study of objective structured clinical examination (OSCE): students and examiners perspectives. *Adv Med Educ Pract*. 2019;10:387-397. doi:10.2147/AMEP.S197275
- Urteaga EM, Attridge RL, Tovar JM, Witte AP. Instructional design and assessment: evaluation of clinical and communication skills of pharmacy students and pharmacists with an objective structured clinical examination. *Am J Pharm Educ*. 2015;79(8):122. doi:10.5688/ajpe798122
- Johnson G, Reynard K. Assessment of an objective structured clinical examination (OSCE) for undergraduate students in accident and emergency medicine. *J Accid Emerg Med*. 1994;11(4):223-226. doi:10.1136/emj.11.4.223
- Ameh N, Abdul MA, Adesiyun GA, Avidime S. Objective structured clinical examination vs traditional clinical examination: an evaluation of students' perception and preference in a Nigerian medical school. *Niger Med J*. 2014;55(4):310-313. doi:10.4103/0300-1652.137191

22. Ataro G, Worku S, Asaminew T. Experience and challenges of objective structured clinical examination (OSCE): perspective of students and examiners in a clinical department of Ethiopian University. *Ethiop J Health Sci.* 2020;30(3):417-426.
23. Fouad S, Gouda E, Abdel Nasser A, Kamal D. Perception of students, staff and simulated patients towards objective structured clinical education (OSCE). *Educ Med.* 2019;11(2):27-42. doi:10.21315/eimj2019.11.2.4
24. Kromann CB, Jensen ML, Ringsted C. The effect of testing on skills learning. *Med Educ.* 2009;43(1):21-27. doi:10.1111/j.1365-2923.2008.03245.x
25. Kromann CB, Bohnstedt C, Jensen ML, Ringsted C. The testing effect on skills learning might last 6 months. *Adv Health Sci Educ Theory Pract.* 2010;15(3):395-401. doi:10.1007/s10459-009-9207-x