

Developing skills in managing Objective Structured Clinical Examinations (OSCE)

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Abstract: The objective structured clinical examination (OSCE) was originally developed in 1975 by Harden to avoid the many disadvantages of the traditional clinical examination and to improve feedback between staff and students; in making the examination more objective, a marking strategy was decided in advance. Furthermore, clinical competence assessment is an important issue in clinical health education: assessing clinical practice is long-standing and receives substantial attention in health care education. The OSCE mode is very useful to monitor the abilities students, and stations can be designed to address different skills and knowledge. OSCEs are a valuable way of assessing proficiency in range of clinically- focused skills and knowledge, so they are widely used as fundamental assessment strategy in across the world. The greatest advantage of using OSCE is that it can be set up to integrate theory and practice in forms of small scenarios, simulations, case studies, standardized patient (SP) and the students can improve their own learning and reflection in a safe environment. In the OSCE evaluation of clinical skills is essential feedback and it plays an important motivating role between students and teachers to ensure the quality and appropriateness of a learning process. It may be used for exploration of the relationship between competence and knowledge as an assessment method through meeting specific objectives of the teaching process and integrating technical and theory “stations” to advanced clinical practice. However, OSCE can also be used in a formative way, as problem-based exercises to enhance skill acquisition and integrate other key skills (e.g. critical thinking, communication, and reflective practice). There are a number of methods to evaluate the knowledge, skill and attitudes of students in academic program such as written examinations, projects / papers / presentations, and clinical examinations. The Objective Structured Clinical Evaluation (OSCE) is a clinical examination, utilizing a standardized patient (SP) setting in order to test the student’s understanding and performance knowledge, skills and attitudes. Additionally, OSCEs involve the Year Coordinators, Instructors, Examiners, Standardized Patients Students. Each of these stakeholders has a particular role and set of responsibilities towards an OSCE. During an OSCE, the students are evaluated on their skill sets of communication, assessment and treatment, safety, and patient feedback and education. Examiners and Standardized patients receive additional training to ensure continual quality of the OSCE. However, the potential of OSCE as a flexible teaching and evaluation method to avoid examiner variation has been recognized in health education. The greatest advantages of using OSCE are that it can be set up to integrate theory and practice in the form of small scenarios, simulations, case studies and standardized patient (SP), and the students can improve their own learning and reflection in a safe environment, as has been identified. Although there are a few drawbacks in using OSCE, such as time, cost, number of clinical instructors requested with the high number of students, we should not neglect it. Several studies were found in the literature review that are on assessment of clinical competence and objective structured clinical examination (OSCE). Studies were reviewed from the Cumulative Index of Nursing and Allied Health Literature (CINAHL); MEDLINE and ASSIA were searched using Ovid and CSA.

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1. Introduction

Clinical competence assessment is an important issue in clinical health education: assessing clinical practice is long-standing and receives substantial attention in health care education, as shown in Watson et al’s (2002) study of clinical competence assessment. This reports that the assessment of clinical competence is centre stage in health education and it is problematic due to difficulties in deciding what to assess, whether competence should

be assessed globally or through multiple competencies, and issues behind the lack of objectivity of assessment methods with little evidence to support the use of clinical competence and a wide variety of methods for its use in health care team. Alinier (2003) proposes that OSCE can be a useful method of teaching because it is a safe practice to help students gain more confidence when confronted by technical instruments present in the hospital environment. Latif (1992) pointed out that OSCE and

clinical examination both scored high for their ability to assess clinical competence. Bondy (1983) comments that evaluation of clinical competence of students is usually considered subjective and inconsistent. He proposed the criteria for a five-point rating scale for evaluation of student clinical performance to be a fair assessment of performance.

Another study in clinical competence assessment tools for reliability and validity (Norman et al, 2002) found that no single method is appropriate for assessing clinical competence among health care students and points out that health care education needs a multi-method strategy for clinical competence assessment. Mahara (1998) comments that the evaluation of student learning in the clinical area has been concentrating on how much educators are familiar with issues arising from the subjective nature of clinical evaluation and the role of clinical instructors as both teachers and evaluators.

The clinical competence evaluation it considers as a teaching assessment method is not the only evaluation method. Bradley and Postlethwaite (2003) analyzed that it is essential for evaluation of clinical skills to give feedback and play an important role in motivation between students and teachers to ensure the quality and appropriateness of a learning programme. They suggest use of the objective structured clinical examination (OSCE) at both undergraduate and postgraduate level. The objective structured clinical examination (OSCE) was originally developed in 1975 by Harden to avoid the many disadvantages of the traditional clinical examination and to improve feedback between staff and students; in making the examination more objective, a marking strategy was decided in advance (Harden et al, 1975). The OSCE stations can be designed in the form of small scenarios where students have to set up or interact with technical instruments or communicate with 'patients': a layperson is called a standardized patient (SP).

Whether OSCEs assess clinical safety or role competence is an area of debate. If we strictly adhere to inflexible parameters for safe practice, a student could potentially, in the name of safety, refer every patient they see to either a medical practitioner or a specialist nurse for a second opinion. While this may be a safe practice, it does not conform to the everyday level of independent practice realistically required from an advanced nurse practitioner to assess, plan, deliver and evaluate patient care. Therefore, there is a baseline at which we expect an advanced nurse to operate. Students need to demonstrate their ability to work bounded by the limits of their advanced role competence within an overall safe approach. Accordingly, students need to be able to identify potentially serious clinical signs and symptoms in

their OSCE stations, and conversely OSCE stations need to be designed to give students an opportunity to identify serious clinical signs and symptoms.

2. Literature review

Several studies were found in the literature review that are on assessment of clinical competence and objective structured clinical examination (OSCE). Studies were reviewed from the Cumulative Index of Nursing and Allied Health Literature (CINAHL); MEDLINE and ASSIA were searched using Ovid and CSA. The database Keywords for searching included: OSCE, assessment clinical competence, change, evaluation and performance. The problem of assessing clinical practice is long-standing and receives substantial attention in the literature research. Norman et al (2000) suggest a need for a multi-method strategy for clinical competence assessment for health care students. Their study collected assessment data from a sample of 257 nursing and 43 midwifery students in four educational institutions and administered additional assessment measures. They assert that the different methods address different abilities. A clear finding from this study is that no single method is appropriate for assessing clinical competence. Similarly, Mahara (1998) claims, in a perspective on clinical evaluation in health care education, that clinical learning is the heart of the educational experience for students. He reviewed and discussed the objectivity-subjectivity debate and the limits of evaluation practices based solely in positivism and teacher-evaluator and formative-summative distinction. He reported that clinical evaluation processes are more than one aspect of clinical learning and he suggested that curricula judging of a student's clinical practice as a teaching-learning strategy must be based on the concepts of meaning-making, reflection and teacher-student feedback, providing a basis for evaluation approaches.

In similar vein, Waston et al (2002) propose that the assessment of clinical competence remains almost universally accepted in health education. Their study was designed to investigate the evidence for the use of clinical competence assessment through a review using systematic methods of literature of different assessments of clinical competence, like use of objective structured clinical examination (OSCE) as a clinical competence tool for assessment. This points out that some students may perform less well than they would in clinical practice due to the examination nature of the OSCE.

There is still considerable confusion about the definition of clinical competence and most of the methods in use to define or measure competence have not been developed systematically. There has been a change in theoretical frameworks of assessment, as a

lack of consistency in the training of student assessors in the clinical areas was identified. In Calman's (2002) study, data were collected by postal questionnaire.

The directors of the 13 programmes (seven nursing and six midwifery programmes) were surveyed and also 12 group interviews were conducted with students (six nursing and six midwifery student groups) from seven institutions. Students from all four branches were represented and 72 students (36 nurses and 36 midwives). Students' views suggested that they had little confidence in methods of clinical competence assessment and there was no formal validity and reliability of testing. Some of these issues may be resolved with the development of an instrument for competence assessment. In another study, Bukinghams (2000) asserts that effective assessment of competency of student in clinical practice is a vital issue. Another study by Howley (2004) criticizes the traditional method of assessment in clinical competence, saying that the assessment tool is becoming increasingly complex. Reviewing the performance assessment with standardized patients based on various literatures, Howley proposed several areas for the future direction of performance assessment, including (a) toward evidence-based locally-developed assessments, (b) toward an understanding of educational outcomes and non-cognitive assessment factors, and (c) toward more student-driven assessments.

When we review the framework for assessing clinical competence for health care students to help me understand the process of psychomotor acquisition in my Advanced Practice in order to gain some confidence in how to assess students' competence, I turn to Miller (1990) Psychologist George Miller 1990 proposed a framework for assessing clinical competence. At the lowest level of the pyramid is knowledge (knows), followed by competence (knows how), performance (shows how), and action (does). In this framework, Miller distinguished between "action" and the lower levels.

"Action" focuses on what occurs in practice rather than what happens in an artificial testing situation. Other common methods of assessment of clinical competence in health care students, such as multiple choice questions, simulation tests, and objective structured clinical examinations (OSCEs) target the lower levels of the pyramid (Norcini, 2003). A review by Miller (1990), on the assessment of clinical skill, competence and performance, raises an interesting point concerning the performance and action component of future graduates.

Examinations should be designed to test students in performance closely related to their future professional function, such as objective structured

clinical examination (OSCE). Ananthakrishnan (1993) defines OSCE as an "assessment tool in which the components of clinical competence such as history taking, physical examination, simple procedures, interpretation of lab results, patient management problems, communication, attitude etc. are tested using agreed check lists and rotating the student round a number of stations some of which have observers with check lists." OSCE is considered a powerful tool in evaluation and an effective facilitator in learning in health education.

Ross et al (1988) point this out in their study of objective structured clinical examination (OSCE) to measure the psychomotor learning outcome and the programme designed to assist students to learn to conduct a nursing neurological examination. They report that OSCE has a tradition in medicine, having been developed by Ronald Harden in Scotland and first reported in the British Medical Journal in 1975, and educators have a challenge in the measurement of clinical skills performance. An examination of the literature on OSCE clarifies the advantages and limitations of the method as follows.

A. Advantages of objective structured clinical examination (OSCE)

In Objective Structured Clinical Examination (OSCE) the students practise the clinical skill in a safe area, such as with standardized patients (SP); simulated, artificial models or manikins are utilized with an examiner present. This is one of the advantages of OSCE: according to Alinier (2003) study, when assessing students and lecturers in use of this hybrid formative OSCE, two questionnaires have been designed.

The first questionnaire was aimed at collecting information from students (n=86); the second questionnaire was distributed to lecturers (n=39) who have assessed students during OSCE. The study received positive feedback regardless of teaching method and shows that OSCE is favourably perceived because the aim of OSCE is to teach safely to help students gain more confidence when confronted by technical instruments present in the hospital environment.

Following this line, Langford et al (2004) report that OSCE can help the students to gain some confidence; practising in a safe environment will reduce stressful feelings and fear from high numbers of errors if real patients were to be present in the exam, which may lead to a lack of competence in the required skill among the students. In a similar vein, Lee et al (2003) propose that OSCE competency assessment may reduce the incidence of errors in information reported and an OSCE is a reliable, valid, and practical method for assessing continued skill

competency. Following along these lines, skills and competences need to be acquired because they are used in a formative way to enhance skill acquisition through simulation.

Preparation and implementation of the OSCE is explored in students and tutors, and the strengths and problems are examined in the study by Anderson (2002) on the implementation of an objective structured clinical examination (OSCE) in the assessment of mental health nursing students with discussion of the development of OSCE. The study concludes advocating the use of the OSCE assessment tool as a formative exercise. Similarly, Coovadia and Moosa (1985) suggested that OSCE can measure both clinical competence and theoretical knowledge. Advanced nursing practice is concerned about decision-making based on a theoretical background, as in objective structured clinical examination (OSCE) that will be considered as an import issue in nursing education. As Bartfay (2004) suggested, objective structured clinical examinations (OSCE) promote the mastery of clinical skills and decision-making for nursing students in controlled and safe learning environments, which lead to advanced nursing education and practice.

B. Disadvantages of objective structured clinical examination (OSCE)

Objective structured clinical examination (OSCE) consists of different stations. All stations should be capable of being completed in the limited time. The students are rotated through all stations and have to move to the next station at the call from the examiner. Since the stations are generally independent, students can start at any of the procedure stations and complete the cycle. These stations are independent of each other, broken down into components and tested separately. This condition of OSCE's different stations is considered to be a limitation: Chabeli (2001) criticizes the objective structured clinical examination (OSCE) and suggests use of varied alternative methods for clinical assessment and evaluation for nursing students because OSCE does not measure the learners' clinical competence holistically; the data were collected from perceptions of 20 nurse educators, regarding the use of OSCE as a clinical evaluation method within a qualitative and descriptive research strategy. Three focus group interviews were conducted in different sessions.

A descriptive content analysis was formulated and he found positive and negative aspects toward OSCE from nurse educators. This suggestion is also supported by Senanayake (2001), who found that OSCE tests skills, attitudes and knowledge in separate compartments, and ability to look at patients as a

whole is not assessed; however, clinical decision making can be incorporated in an OSCE. Another reason for limitation of OSCE in clinical teaching is that it is time consuming: OSCE exams need extra time than traditional assessment tools in clinical teaching to cover all stations in clinical assessment, preparation, displaying and time management needed in the exam. As shown in Anisur (2005), objective structured clinical examination (OSCE) can lead to increase in teaching time.

On the other hand, Cusimano et al (1994) found that OSCE is more expensive and time-consuming than traditional exams because of the need for more human resources and materials in, for example, the need for enough examiners, standardized patients (SPs), support staff and equipment for the procedure. Brazeau et al (2002) found OSCE did not meet higher standards of reliability and would need more time of testing per student to meet those standards. When comparing OSCE with other methods, Alnasir (2004) created a similar method to OSCE called Watched Structured Clinical Examination (WSCE), which can test student competence in clinical skill and knowledge communication skill in a short time. The method of study is illustrated by a total of 62 students for the WSCE, seated in two halls, which were equipped with video projectors. Five stations were presented in the session, which lasted for 60 minutes. Complete instructions on how to interpret each station and how to answer the questions related to each station were clearly written in the WSCE booklet. Alnasir discovered WSCE to be more useful than OSCE because it is possible to examine a large number of students in certain clinical skills in a short period, with an advantage over the OSCE in that it is less time-consuming, more cost-effective, requires less supervising staff to conduct the examination and it is less stressful to the students.

The image of health care has improved over the past 130 years, since Nightingale initiated a transition to professional status by introduction of advanced clinical practices. It is evident that health care staff have been involved in change across the decades (Joellen & Janice, 1996). Other writers also suggested that clinical education needs to change and introduce students to Objective Structured Clinical Evaluation (OSCE) as an effective method (McCourt & Thomas, 2001; O'neill, 1996).

Similarly Nicol (1998) proposed that 'Bart's OSCE' is an innovative approach to the assessment of clinical skills, through the medium of simulated professional practice. This has prompted changes in teaching-learning and assessment of clinical skills because of the change in nature of clinical placements due to shortage of staff in clinical areas or in-patient episodes to increasing workloads.

Objective structured clinical examination (OSCE) needs to be implemented in a proper way by creating some changes. Using the theory of Lewin, K (1958) as a source of classical change theory, this viewed changes as occurring in three steps: unfreezing, moving, and refreezing. He also emphasized the need to identify those forces that support change (driving forces) and those that mediate against it (restraining forces). The first step of a change process is unfreezing, meaning getting people to think differently about a problem or way of doing something. For example, for assessment of clinical competence by OSCE, we would need to meet with my colleagues at. This would be to discuss: students problems in evaluation and help students to gain more confidence in practising in a safe environment; and how the nursing curriculum lacks a professional assessment tool, with emphasis on the need to change from traditional evaluation and use OSCE as a teaching and evaluation method. The provision of evidence in previous research, and a compilation of literature to support this change should satisfy the practice outcome for educators and students.

The second step in the change process is moving: meaning trying something new, given the idea of a trial. In our college the objective structured clinical examination is considered to be a new idea, needing assessment with an arranged check list: the practical objectives and feedback from students and staff is a requirement to measure reliability and validity of the exam. As Cohen et al (1990) defined, "OSCE reliability refers to precision of the examination and construct validity to the degree to which the examination can discriminate between different levels of training". This reliability and validity of the exam is an important issue before implementation as a clinical assessment tool because the examination is more objective, and a marking strategy can be decided in advance.

Then we should recognize the stakeholders in change and power of organization to acceptance intervention and teambuilding sessions can helpful too. The third step of the change process is refreezing, which means solidifying the change so that it becomes universal practice. By adapting the objective structured clinical competence (OSCE) as an effective assessment tool, this may be used for evaluation of students as a routine part of care.

Data on students' perception about OSCE examination yield important information that was helpful for the driving forces supporting a change because nursing students possibly may become qualified in practice due to feeling more confident, having reduced stress, and obtaining satisfaction from the OSCE evaluation tool. Students are able to reflect on their performance and solve any problems they

might have with some of the stations in a safe and comfortable environment. Support and positive attitude of organization members as feedback information also acknowledges the high education value of the OSCE, which may also have potential as a driving force.

There are a few restrictions, such as the number of students involved, the rigidity of the time so that the session runs in a coordinated way, the large number of qualified people required to assess the students, and adequate funding maintenance. Confrontation can be useful in effecting change when an advanced practice role is introduced and, in appropriate situations, such as when faced with previous resistance, the power of the organization has a positive effect in facilitating and supporting the change in advanced practice.

In conclusion, the OSCE mode is very useful to monitor the abilities students, and stations can be designed to address different skills and knowledge. The greatest advantage of using OSCE is that it can be set up to integrate theory and practice in forms of small scenarios, simulations, case studies, standardized patient (SP) and the students can improve their own learning and reflection in a safe environment. In the OSCE evaluation of clinical skills is essential feedback and it plays an important motivating role between students and teachers to ensure the quality and appropriateness of a learning process. Although there are a few drawbacks in using OSCE, such as time, cost, number of clinical instructors requested with a high number of students, it should not be neglected.

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References

1. Alinier, G. (2003) Nursing students' and lecturers' perspectives of objective structured clinical examination incorporating simulation. *Nurse Education Today*; 23 (6), pp.419-426.

2. Alnasir, F.A. (2004) The Watched Structured Clinical Examination (WSCE) as a tool of assessment. **Saudi Medical Journal**; 25(1):71-4.
3. Ananthkrishnan, N. (1993) Objective structured clinical/practical examination (OSCE/OSPE). **Journal of Postgraduate Medicine**; 39:82-4.
4. Anisur, R. (2005) Teaching students—whose job is it anyway? **British Medical Journal**; 330:153.
5. Anderson, M. (2002) Finding reality: the use of objective structured clinical examination (OSCE) in the assessment of mental health nursing students' interpersonal skills. **Nursing Education in Practice**. 2(3):160-8.
6. Bartfay, W.J. (2004) The OSCE approach in nursing education. Objective structured clinical examination. **Canadian Nurse**. 100(3):18-23.
7. Bondy, K.N. (1983) Criterion-referenced definitions for rating scales in clinical evaluation. **Journal Nursing Education**; 22(9):376-82.
8. Bradley & Postlethwaite (2003) Setting up a clinical skills learning facility. **Medical Education**. Volume 37, Issue 1, Page.
9. Brazeau C., Boyd L. and Crosson J. (2002) Changing an existing OSCE to a teaching tool: the making of a teaching OSCE. **Academic. Medicine**; 77(9):932.
10. Buckingham, S. (2000) Clinical competency: the right assessment tools? **Journal of Child Health Care**. 4(1):19-22.
11. Burnard P. (1992) Learning nursing knowledge. IN Robinson K. and Vaughan B. eds **Knowledge for nursing practice**. Butterworth Heinemann, Oxford, 172-184).
12. Calman, L, Watson, R, Norman, I, Redfern, S and Murrells, T. (2002) Assessing practice of student nurses: methods, preparation of assessors and student views. **Journal of Advanced Nursing**. Volume 38, Issue 5, Page 516.
13. Chabeli, M.M. (2001) Nurse educators' perceptions of OSCE as a clinical evaluation method. Objective Structured Clinical Examination. Curationis: **South African Journal of Nursing**. 24(1):84-92.
14. Cohen, R., Reznick, R.K., Taylor, B.R., et al. (1990) Reliability and validity of the objective structured clinical examination in assessing surgical residents. **American Journal of Surgery**. 160(3):302-5.
15. Coovadia and Mossa (1985) A comparison of traditional assessment with the objective structured clinical examination (OSCE). **Medical Journal** 17; 67(20):810-2.
16. Cooper, A. Canadian Alliance of Physiotherapy Regulators, (2006) Clinical Skills Assessment.
17. Cusimano, M. D., Cohen, R., Tucker, W., Munaghan, J., Kodama, R., Rez (1994) A comparative analysis of the cost of administration of an objective structured clinical examination. **Academic Medicine** 69(7):571-6.
18. Harden, Stavenson, Downie, W. W., Wilson, G. M. (1975) Assessment of clinical competence using objective structured examination. **British Medical Journal**. Volume 1, Issue 5955, pages 447-451.
19. Howley, I. (2004) Performance assessment where We've Been and Where We're Going. **Evaluation & the Health Professions**, Vol. 27, No. 3, 285-303.
20. Joellen W. and Janice (1996) The advanced practice nurse. New York, The Tiresias Press.
21. Langford N. J., Landray, Martin U., Kendall M. J and Ferner R. E. (2004) Testing the practical aspects of therapeutics by objective structured clinical examination. **Journal of Clinical Pharmacy & Therapeutics**. Volume 29, Issue 3, Page 263.
22. Latif, A. (1992) An examination of the examinations: the reliability of the objective structured clinical examination and clinical examination. **Medical Teaching**; 14(2-3):179-83. PMID: 1406127.
23. Lee, S.L.S, Wilkinson, B.J, Battles and Hynan .S.L. (2003) An objective structured clinical examination to evaluate health historian competencies. **Transfusion**. Volume 43, Issue 1, Page 34.
24. Lewin, K. (1958) Group decision and social change. In: E. Maccoby (Eds.) Reading in social psychology (3rd). New York: Holt, Rinehart and Winston.
25. Mahara, M. (1998) A perspective on clinical evaluation in nursing education. **Journal of Advanced Nursing**. Volume 28, Issue 6, Page 1339.
26. McCourt C., Gail Thomas B. (2001) Evaluation of a problem-based curriculum in midwifery. **Midwifery**. 17(4):323-31.
27. Miller GE. (1990) The assessment of clinical skills/competence/performance. **Academic. Medicine**. 65:563-7.
28. Nicol, M. (1998) Assessment of clinical skills: a new approach to an old problem. **Nurse Education Today**; 18 (8), pp.601-9.
29. Norcin, J. (2003) ABC of learning and teaching in medicine: Work based assessment. **British Medical Journal**; 326:753-755.
30. Norman, I.J., Watson, R., Murrells, T., Calman, L. and Redfern, S. (2002) The validity and reliability of methods to assess the competence to practise of pre-registration nursing and midwifery students. **International Journal Nursing Study**; 39(2):133-45.
31. O'Neill, A. (1996) Objectively assessing nursing practices: a curricular development. **Nurse Education Today**; 16 (2) Apr 96, p.121-6.
32. Ross, M., Carroll, G., Knight, J., Chamberlain, M., Fothergill-Bourbonnais, F. and Linton, J. (1988) Using the OSCE to measure clinical skills performance in nursing. **Journal of Advanced Nursing** 13, 45.
32. Senanayake, M. (2001) The OSCE. **Journal of Child Health**. 30:24-27.
33. Watson, R, Stimpson, A., Topping, A. and Porock, D. (2002) Integrative Literature Reviews and Meta-Analyses, Clinical competence assessment in nursing: a systematic review of the literature. **Journal of Advanced Nursing**. Volume 39, Issue 5, Page 421.

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