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Original research

Experiences of using an OSCE protocol in clinical examinations of nursing students - A comparison of student and faculty assessments

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ABSTRACT

Peer-assessment in nursing education using an OSCE protocol is an increasing educational activity that complements that of teachers. However, little is known about how students' and teachers' assessments correspond. The study aimed to compare OSCE assessments made by student examiners and faculty examiners during examinations of clinical skills in undergraduate nursing education. Four cohorts of third-year nursing students participated between 2014 and 2016. The students underwent a clinical examination of the management of central venous catheters and totally implantable venous access devices. Students who performed the examinations were observed both by a faculty examiner and student examiner. Both observers used the same OSCE protocol for the assessment but independently. The OSCE protocols from both faculty and student examiners were reviewed and compared. Total agreement between the student and faculty examiner was reached in 127 of 135 (94%) paired protocols. The level of agreement was substantial with a kappa value of 0.79 (95% CI 0.65–0.93). The conclusion was that the level of agreement between student and faculty examiners was high when using an OSCE protocol in clinical examinations of two different clinical skill tasks. The structured checklist (OSCE protocol) was easy to use for the student examiners despite the lack of experience or training in advance.

1. Introduction

Developing clinical skills is a pillar of healthcare education. An efficient way of accomplishing changes in the behaviors of trainees is by providing feedback and through formative assessment during clinical work and examination (Norcini and Burch, 2007). However, performing clinical examinations during patient care to assess whether clinical skills are learned is associated with difficulties for both students and assessors (Harden and Laidlaw, 2016; Harden et al., 1975; Norcini and Burch, 2007). For example, there may be variation of the severity of the patients' conditions which may hamper the assessment of the students' clinical skills. Using a simulation setting instead of a clinical setting offers possibilities to tailor and standardise specific tasks to be examined and to create equal conditions for the students, as well as a safe environment where learning can not only be assessed but also enhanced (Bagnasco et al., 2016; Kneebone, 2005; Okuda et al., 2009).

The objective structured clinical examination (OSCE) has been used in various simulated learning situations, including examination of technical skills as well as communication skills in both medical and nursing education programmes. The OSCE was originally developed for medical education and consists of several stations (Harden et al., 1975). A student performs and is assessed on a clinical task at each station, e.g., auscultation of the heart, which can take about 4–5 min. Then, after a signal, the student moves on to the next station and the next clinical task is assessed (Harden and Gleeson, 1979). A number of students move in a rotating fashion between stations. An assessment of whether the student has passed or failed is made with a structured protocol used by the examiner.

The OSCE has later spread to several other health educations programs, including pharmacy, physiotherapy and speech pathology (Terry et al., 2017).

OSCEs were introduced in 1984 in nursing education programs and have been found to be a valid, reliable and feasible method for examinations of clinical skills worldwide (Jelly and Sharma, 2017; McWilliam and Botwinski, 2012; Sola et al., 2017). However, in the context of nursing education, the OSCE with its assessment by a structured protocol has been criticized for fragmenting patient care by splitting clinical tasks into separate stations, and thereby losing the

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overall perspective of nursing (Rushforth, 2007). The use of OSCE in nursing education has evolved into longer sequences (10–30 min) and fewer stations, trying to achieve a more holistic approach (Rushforth, 2007). In Australia, Best Practice Guidelines for the use of OSCEs have been developed focusing on nursing students' learning. The guidelines recommend a holistic judgment of the students' performance related to clinical practice as a whole, rather than independent skills (Kelly et al., 2016; Nulty et al., 2011).

OSCE protocols to assess students' clinical skills can be used by a teacher, a standardized patient (SP) or by a fellow student. Several advantages and disadvantages with using different assessors have been reported in the scientific literature, depending on the context. For example, trained SPs can be a quality assurance tool in the examination of communication skills among both medical students (Shirazi et al., 2014) and nursing students (Bagnasco et al., 2016). However, SP examiners scored the students lower compared with the teachers when assessing communication skills in psychiatric care (Whelan et al., 2009). In contrast, another study showed that SP examiners scored students significantly higher in clinical skills such as examination of the knee, compared with teachers (McLaughlin et al., 2006).

Medical students have been shown to serve as reliable peer examiners of clinical skills using an OSCE protocol by giving the same score as faculty examiners in both specific stations, e. g., pain and depression, as in the overall score of six stations (Basehore et al., 2014). Peer-assessment has also been described, by the medical students themselves, as a useful learning activity for medical students (Burgess et al., 2013). The research literature has also showed that meticulous examiner training improves inter-rater reliability of scoring methods as it ensures that all raters interpret the checklists similarly (Malau-Aduli et al., 2012). This may not be entirely possible when students are examiners.

Peer-assessment in nursing education using an OSCE protocol is a relatively new educational activity and little is known about how students' and teachers' assessments correspond with each other. The aim of the present study was to compare OSCE assessments made by student examiners and faculty examiners during the examinations of two clinical skills in undergraduate nurse education.

2. Methods

2.1. Study design

The study had a quasi-experimental design with the following research questions:

1. What is the level of agreement between faculty examiners and student examiners using an OSCE protocol?
2. Are there any specific patterns regarding divergent assessments?

2.2. Study population and sample

The study took place at a clinical training center adjacent to an urban hospital in Sweden. Four cohorts of third-year nursing students were invited to participate between 2014 and 2016. The students underwent a clinical examination of the management of central venous catheters and totally implantable venous access devices. The students received written information about the clinical examination that included two elements: performing the clinical task and observing and giving oral feedback to another fellow student. The purpose with the formative feedback was to enhance the students' learning. The inclusion criterion was that the students were willing to use an OSCE protocol when observing a fellow student perform the clinical examination. Informed consent was collected from the students before the clinical examination. A total of 188 students were eligible and 148 (79%) of them fulfilled the inclusion criteria and participated in the study. There was a total of six clinical faculty examiners involved during the study period; the first and the last author (PL and EJA) had the overall responsibility for the examinations and participated in the assessments of all four cohorts, the other four faculty examiners contributed at least with six assessments each. All faculty examiners had earlier experiences of using OSCE protocols in clinical examinations.

Table 1
Two examples of items from the central catheter OSCE protocol.

Item	A	F	Comments
Protect work clothes with a plastic apron			
Checking catheter position by aspirating gently until blood is seen in the tubing, but not all the way up into the syringe.*			

* = mandatory item.
A = approved.
F = failed.

2.3. Study instruments

There were two different clinical tasks to be examined; injection of medication through a central venous catheter and insertion of an implantable port needle. For each of those elements, an OSCE protocol was constructed based on national Swedish guidelines in the Handbook of Healthcare (Vårdhandboken, 2014). Both OSCE protocols consisted originally in a checklist of 14 items, that is, clinical task to perform, and an overall assessment of the whole clinical examination (checkmark of either "approved" or "failed"). Twelve of the 14 items were compulsory and had to be performed according to the protocol in order to be approved in the overall assessment. See Table 1 for item examples.

2.4. Procedure

The students were divided in pairs and each student was examined for one of the two clinical skill tasks, randomly selected. The student who performed the examination was observed both by a faculty examiner and the other student. Both observers used the same OSCE protocol for the assessment independently of each other. The students had not seen the OSCE protocols before the clinical examination took place, while the faculty examiner had used it before. When the first student in each pair had carried out the first clinical skill task, oral feedback was given by the student observer based on the OSCE protocol. The faculty member monitored the feedback and could if necessary correct it. Then the students changed places and the second clinical skill task was performed by the other student, observed by the faculty examiner and the first student. As the two tasks were very different, it was assumed that the second student would not have an advantage of giving feedback first. After oral feedback from the student observer, the faculty examiner informed both students, one by one in private, about the result of the examination based on the OSCE protocol assessment by the faculty examiner.

The protocols were marked with a code to ensure that correct comparisons were made between the students' and faculty examiners' OSCE. The review of the protocols was made by the first and last author, PL and EJA.

2.5. Ethical considerations

Participation in the study was voluntary and the students could withdraw their consent at any time without giving any explanation. The students were guaranteed confidentiality and that non-participation did not affect the faculty examiners' assessment in any way. This study did not require formal ethical approval according to the Swedish Ethical Review Act, as it did not entail the handling of sensitive personal data. However, it required formal oral consent by the participants and approval by the head of the Division of Nursing at the university; both

were obtained. The study followed the ethical principles of the World Medical Association Declaration of Helsinki (WMA, 2013).

2.6. Analysis

The inter-observer reliability between the faculty and student examiners' overall assessments was tested using Cohen's kappa statistics. This is the most commonly used test that measures the level of agreement between two independent observers (Viera and Garrett, 2005). To interpret Cohen's kappa, we used Landis & Koch's criteria: values of less than 0.40 reflect slight or fair agreement, 0.41–0.60 would be a moderate agreement, 0.61–0.79 would be a substantial agreement and values of 0.80 or above indicate an almost perfect agreement (Landis and Koch, 1977). The IBM SPSS Statistics software version 23 (IBM Corp., Armonk, NY, USA) was used for statistical analyses.

3. Results

A total of 148 student examinations with OSCE protocols from both faculty and student examiners were reviewed and compared. Of these, 126 students (85%) were assessed as approved by the faculty examiners and 110 (74%) were assessed as approved by the students (Table 2). The 22 students who were assessed as failed by the faculty examiners were in nineteen cases also assessed as failed by the fellow students. In six cases where the faculty examiner had passed the student, the student examiner had assessed the examination as failed. The remaining thirteen OSCE protocols from students had missing data in mandatory items and could not be classified as approved or failed. Of those, twelve students were approved and one was failed by the faculty examiners. The remaining 135 cases were used in the statistical analysis.

Total agreement between the student and faculty examiner was reached in 127 of the 135 cases (94%), see Table 3. The level of agreement was substantial with a kappa value of 0.79 (95% CI 0.65–0.93).

The eight divergent OSCE protocol assessments, of which six were assessments of the clinical task *Insertion of an implantable port needle*, were then interpreted by the authors. Two of the students were assessed as failed by the faculty examiner but approved by the observing student. In one case the faculty examiner failed the student due to lack of using gloves during insertion of the port needle. This was noted by the observing student with a remark but assessed in the OSCE protocol as approved, thus, making the correct observation but writing in the wrong column in the OSCE protocol. In the other case, the faculty examiner failed the student due to lack of control of catheter position before using the central line. This was not observed by the fellow student.

In the six cases in which the faculty examiner had approved the student but the fellow student had not, the reasons were diverse. In one case the student observer was an exchange student with limited knowledge of the Swedish language and did not notice that the performing student made a correct identity check of the patient. In another case the student observer felt that the patient was not informed properly before the needle insertion, but the faculty examiners assessed this moment as approved. In one case the observing student had misinterpreted the OSCE protocol and failed the performing student in a non-mandatory moment. In the other three cases the observing students' reasons to fail their fellow student were due to inadequate aseptic techniques.

Table 2
Description of results in all 148 OSCE protocol assessments.

	Approved	Failed	Missing data	Total
Faculty examiners	126	22	0	148
Student examiners	110	25	13	148

Table 3
Agreement in the 135 OSCE protocols with an overall assessment made by both faculty examiners and student examiners.

	Student approved	Student failed	Total
Faculty approved	108 (80%)	6 (4%)	114 (84%)
Faculty failed	2 (2%)	19 (14%)	21 (16%)
Total	110 (82%)	25 (18%)	135 (100%)

4. Discussion

In this study, the researchers compared OSCE assessments made by student examiners and faculty examiners during the examinations of two clinical skills in undergraduate nursing education. The main finding was that the agreement between faculty and student examiners was high. This indicates that fellow students may assess clinical skills in nursing education.

The correlation between student and faculty examiners in the present study is in line with the findings by Basehore et al. (2014) who studied third year medical students assessing peers on the same level in a clinical examination. In that particular study, structured checklists were used in six OSCE stations. Correlations were strong (0.70–0.85, $p = 0.001$) between students and teachers in both single OSCE stations as in the overall OSCE. The same results were reported by Chenot et al. who did not find any significant differences between medical students and faculty examiners during an OSCE examination (Chenot et al., 2007).

In the context of emergency care, third year medical student examiners gave their fellow students significantly better scores than faculty examiners during an examination of seven OSCE stations (Iblher et al., 2015). However, the authors conclude that even if the discrepancies were statistically significant the effect sizes were small. Notable is that at one of the stations (pediatric emergencies) the faculty members gave higher scores than the student examiners. Also interesting is that the largest difference between student and faculty examiners (20.5 vs 17.8, maximum score 25) was at the "trauma management" station where no OSCE protocol was used (Iblher et al., 2015). This indicates difficulties for student examiners to assess fellow students without a structured checklist.

Burgess et al. reported that medical student examiners' OSCE protocol grades were higher and in a majority of cases (55%) the grades were changed to a lower level by senior academic teachers (Burgess et al., 2013). The examination included both clinical and communication skills such as history taking, physical examination and procedures. The authors concluded that special training should be provided to student examiners in order to improve the global assessment and to achieve objectivity, but also that it was valuable for students to examine fellow students as a learning activity. In contrast to our study the students were responsible for setting the grades which might have influenced the assessment to be more positive than the faculty teachers. In the present study, the student examiners were not responsible for the results of the examination, that is, whether the student was failed or approved. It is not known if our student examiners would have given higher grades if they were alone responsible for setting them, but the use of a structured checklist, the OSCE protocol, has in other studies reduced that risk (Basehore et al., 2014; Chenot et al., 2007).

Even if the level of agreement was high in our study, there were eight out of 135 paired protocols where the student and faculty examiners had different perceptions about whether an observed student should be approved or not. As the experienced faculty member's assessment was the official grade, the student's divergent assessment can be considered as an error. Only two of the eight cases were errors of commission (giving credit when not justified) and six were errors of omission (not giving credit when justified). The unexpectedly low proportion of errors of commission is interesting as earlier research has

shown that experienced and/or trained examiners are more critical, and that training mainly reduces the errors of commission (van der Vleuten et al., 1989).

The student examiners in the present study had no earlier training in assessment with OSCE and had not even seen the OSCE protocol in advance. Interestingly, the vast majority of the students seemed to use the OSCE protocol without difficulties (first and last authors' personal observation). One reason might be that the OSCE protocol was based on the Swedish national guidelines on management of central venous catheters and totally implantable venous access devices. All students had prepared themselves theoretically and practically in both clinical skill tasks as they were going to be examined themselves, and the elements of the OSCE protocol were familiar as they were directly taken from the national guidelines. The OSCE protocol was also designed as a structured checklist which facilitates the assessment.

The student examiners in our study gave oral feedback to their fellow student immediately after the assessment. We did not investigate how the students perceived giving and receiving feedback, but other researchers have described the benefits of peer feedback in nursing education. Using an OSCE protocol has been shown to facilitate both giving and receiving feedback. Mårtenson and Löfmark (2013) studied nursing students during a clinical examination in their final semester and found that the students were satisfied with the feedback they received after an OSCE examination. Rush et al. (2012) reported that giving and receiving peer feedback, reflection and working with peers in small groups was particularly valuable for clinical skills learning among first year nursing students. In a qualitative questionnaire study of a peer teaching and assessment initiative among nursing students the opportunity to communicate both good and bad news was considered beneficial for future clinical practice (Ramm et al., 2015). The learning perspective of peer assessments has been highlighted by several researchers. Cushing et al. studied medical and nursing students taking part in a formative OSCE with immediate peer feedback (Cushing et al., 2011). The majority of the students stated that the individual feedback was helpful and aided learning. A recent review concluded that peer assessment and feedback in the OSCE promoted learning (Khan et al., 2017). The authors called for research comparing the quality of assessment made by trained and untrained peers. Our study may contribute with knowledge as the student examiners had no previous training using OSCE protocols.

The results of this study may have implications for nursing education and practice. Student examiners could well be used in structured training and when practicing specific clinical tasks. More research is needed to explore whether student examiners should be responsible for determining final results. The use of OSCE protocols facilitates clinical training and can be used for education and examination as well as in clinical hours for both undergraduate nursing students and in advanced practice nursing education (Aronowitz et al., 2017).

This study has limitations. First, only one education center participated in the study, reducing the ability to generalize the results. Further, the students did not receive training in using the OSCE protocol nor were they given access to them in advance. On the other hand, the students were informed that they should provide feedback to their fellow students. Another limitation is that in our study, only two clinical skill tasks were assessed. A wider perspective of clinical skill tasks could have increased the generalizability of the study. Considering that the student examiners were not responsible for the examination our results can also be questioned in terms of transferability to other examination situations.

5. Conclusions

The level of agreement between student and faculty examiners was high when using an OSCE protocol in clinical examinations of two different clinical skill tasks. The structured checklist (OSCE protocol) was easy to use for the student examiners despite the lack of experience or training in advance. Future research could focus on effects on learning when peer assessment and feedback is used in nursing education.

Declarations of interest

The authors report no conflicts of interest and are alone responsible for the content and writing of this manuscript.

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Appendix A. Supplementary data

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