



## Effect of Objective Structured Clinical Examination on Nursing Students' Clinical Skills

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### ABSTRACT

Considering the daily increasing changes in clinical training approaches, the necessity of using new evaluation methods in proportion with these approaches is also becoming more and more obvious for measuring all of the cognitive, emotional and psychomotor dimensions of students. The present study was designed and conducted for reviewing the effect of objective structured clinical examination method on the clinical skills of nursing students. In this quasi-experimental study, 48 nursing students have participated that were randomly assigned to two groups of intervention and control. The intervention group students were evaluated at the end of educational period of their clinical skills and principles course using objective structured clinical examination (OSCE). The OSCE included five core skills in this course: assessing and fulfilling patients' basic needs, dressing up, injectable drug therapy, non-injectable drug therapy, infection control. The control group students were evaluated using the routine method. Both groups of students were followed up in the next semester and were compared in terms of learning enhancement in these five skills. Evaluation of procedures was based on valid and reliable check-lists made by the researcher. Results were analyzed using descriptive and inferential statistics (Chi-square, independent and paired T tests). The mean score of the final evaluation in the intervention group was significantly higher than that of the control group ( $P=0.000$ ). Final evaluation scores of the intervention group students showed a better performance than their previous semester ( $P=0.000$ ), while the final evaluation scores of the control group students showed a lack of progress in their skills ( $P<0.05$ ). It seems that this evaluation method also is a support for students' learning and resulted in improvement of clinical skills among them. Accordingly, it is recommended that nursing education centers apply this method to assess students' clinical skills in conjunction with other methods, to help promote their learning.

**Key words:** Nursing, Evaluation, OSCE, Clinical Skills

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### INTRODUCTION

More than half of courses of the nursing training programs has been assigned to clinical training (1).

Designers of the nursing training programs consider clinical training to be the main part of these programs. Clinical training is a strategy adopted by nurses to achieve clinical competence and qualification (2). In this regard, one of the important and challenging issues in clinical training is the issue of evaluating the training of students in this field (3).

A proper training evaluation should measure a wide spectrum of skills and cognitive, attitudinal and skill-related goals (4). An effective evaluation not only motivates students, but also helps the examiners to evaluate their activities and if trainees receive feedback, their learning skill can be effectively promoted (5).

Clinical evaluation methods that are accompanied with feedback evaluate factors that were difficult for the traditional methods to evaluate and they also enhance students' learning. One of these methods is the objective structured clinical examination (OSCE) method which is a method for evaluating clinical skills from an objective perspective. In this method, a precise checklist of different practical subjects is designed and the competence of students in practical skills is evaluated. To this end, numerous skill and question stations (a number of 5 to 30 stations) are designed and the student stops for 5 to 15 minutes at each station and answers some questions or performs a procedure that is assessed item by item based on the designed checklist (6). At the time of designing the test, examiners determine whether or not a practical station requires a real patient (7). The lower the number of examiner and the higher the number of stations is, the higher the stability (reliability) of the examination would be (8). One of the advantages of this method is that it is a proper method for evaluating clinical skills and it is more valid than old traditional evaluations. In this method, all of the candidates take the same stations and all of the evaluation conditions (type of skill, time of assessment and question) are the same for all of them and the evaluation of students' qualification is fair. In addition, examiner variable is eliminated and the marking is the same, therefore this method is more reliable. Moreover, since the students are able to give feedback, the problems can be solved and the student can learn the examined subject better (9).

In the traditional and conventional evaluation method, students' assessment was limited to subjective information and a precise evaluation of the clinical skills of students was not focused on in this method; however, it is obvious that practical tasks and skills play a key role in medical training and subjective knowledge is the second priority (10). Furthermore, using this evaluation method has made students dissatisfied; in such a way that research results have shown that 62% of male students and 82% of female students believed that not all of their skills could be evaluated using the conventional (traditional) evaluation method and this dissatisfaction can be a preventive factor in learning (11).

Up until now, numerous studies have been conducted in Iran and other parts of the world that focused on reviewing the effective of the OSCE method on the satisfaction of professors and students with this method of evaluation in comparison with the traditional method. But Because of according to the definitions, accurate evaluation in itself, affects the development of knowledge and skills of learners, so we decided to test this hypothesis evaluate nursing students' clinical skills and principles using the OSCE method and measure its impact in comparison with the conventional evaluation method.

## MATERIALS AND METHODS

This was a quasi-experimental study of two groups. In this study, clinical skills and principles course of nursing students was evaluated using two methods of traditional and OSCE, and the effect of these two methods on the clinical skills of students were compared with. The researcher first obtained permission from the Ethics Committee of the Research Department in Shahid Beheshti University of Medical Sciences. Then, after explaining the purpose and method of the study and making students and instructors interested in the study, all of the students in the first semester of bachelor of nursing program in the Faculty of Nursing and Midwifery of Shahid Beheshti University who were interns in Taleghani Hospital, were randomly divided into two groups of intervention (24 students) and control (24 students). The OSCE method was used for evaluating intervention group students at the end of their clinical training course. The students in the control group were evaluated using the conventional evaluation method. In this method, the overall skill of the students was subjectively evaluated by the instructor throughout the course and the based on scoring is done. In the intervention group, the clinical skills of students were evaluated using the OSCE method. The OSCE comprises five stations which are mostly applicable clinically for students at this course. These five stations are: assessing and fulfilling patients' basic needs (regarding the patient's age, motion status and type of disease), dressing up (closed wound, open wound and drain), injectable drug therapy (recognition of the drug injection method including intramuscular, intravenous, infusion and type of solvents), non-injectable drug therapy (oral, local, inhaler, fumigation and spacer) and infection control (different types of isolation, separating wastes, etc.). All the stations were given an equal time of 7-minute and the interval between stations was 2 or 3 minutes. The researcher became coordinated with the staff and personnel of the unit as well as patients in order to prepare the stations and since the unit that had

been chosen had the highest number of patients hospitalized in it and the highest number of procedures could have been done in it, therefore only real patients were used at all of the stations, except for the fifth station (infection control) where the students answered the questions orally (for example: what type of isolation is needed for ulcerative secretion? or what color the bag used for the pharmaceutical wastes of the patients should be?). Each group of 12 students was trained with a different instructor. At the final day of the course, all of the students were evaluated at the same time. The students became familiar with the OSCE and how it is conducted by a briefing session. The OSCE was designed and carried out in accordance with the standards and principles of designing and conducting the OSCE method; in this way that for each station, the volunteer guide, the examiner's guide, scoring checklist and the clinical scenario were designed. At each station, the student first reads the volunteer guide and then performs the required skill in due time according to the clinical scenario presented at the station and then moved on to the next station. The examiner watched the student while he/she performed the procedure and the performance of the student was scored using the scoring checklist. If the procedure was not performed accurately, the examiner would give the student feedback while he/she performed the procedure and if the procedure was performed accurately, the student would receive positive feedback by the examiner. At all stations, a great emphasis was put on the relationship of the student with the patient, meeting the needs of patients, recognizing techniques accurately and performing the procedure accurately. Each student would immediately leave the unit after performing all of the tasks at all of the stations, and other students would wait in another room in the unit. The criterion for passing the test in each station was to get 50% of the total score of each station. Obtaining 50% to 70% of the score suggested a good performance and obtaining scores higher than 75% indicated excellent performance and scores lower than 50% suggested undesirable performance.

Ultimately, students that succeeded in obtaining the desirable score, reached to the next course (internal-surgical<sub>1</sub>) in the next semester. Students in the control group were also accepted to move on to the next semester after being examined using the conventional method and obtaining the quorum score. In the next semester, students of both groups of control and intervention were followed and compared with one another in terms of the aforementioned five skills once throughout the course.

The data collection tools in this study were researcher-made clinical skill examination checklists with a five-point Likert scale, in which the score zero suggested that the examiner had not observed a proper behavior on the part of the student while performing the procedure, the score 1 meant lower than expected, the score 2 meant student's behavior was at the borderline of being good, the score 3 meant the student had lived up to the expectation of the examiner and the score 4 meant that the student had exceeded the expectations of the examiner.

In order to prepare and psychometrics of checklists the researcher searched for information using electronic and library sources associated with how to perform each of these procedures and a preliminary draft checklist was prepared for each procedure. Then, these drafts were given to 10 of the faculty members who were skilled in clinical matters and after applying their opinions, the final checklists were prepared under the supervision of the research team.

To determine the reliability, the inter-rater reliability method was used in such a way that three of the clinical instructors observed and evaluated 5 students at the same time in terms of performing each procedure and the agreement between the examiners was estimated by using the intra cluster correlation test and the intra cluster correlation coefficient for all of the checklists was calculated to be equal to 0.94.

To fulfill the objectives, descriptive statistics were used for analyzing the data and for numerically describing the results (such as frequency distribution table, mean and standard deviation) and inferential statistics were used for comparing the variables and recognizing the relationships between them. To measure the normality of the data, Kolmogorov-Smirnov test was used. The Chi-square test was used for comparing the demographic characteristics of the two groups and the paired t-test and independent t-test were used for comparing the achievement of goals by the members of the two groups. The SPSS ver.19 software was used for the statistical calculations of interest for the information obtained from this study.

## RESULTS

In reviewing the homogeneity of the two groups, the two groups had no significant difference in terms of age and grade of diploma by independent t-test. Also, there was no significant difference between two groups in terms of gender variable using chi-square test. The descriptive results of demographic variables in the two groups have been displayed in table 1.

**Table 1: Demographic Characteristics by Group**

Items	Mean $\pm$ SD		Statistical Test		
	Intervention	Control	df	t	P
Age (years)	19.83 $\pm$ 2.53	19.91 $\pm$ 1.71	22	-1.04	0.32
Average of diploma	15.85 $\pm$ 2.43	16.64 $\pm$ 2.19	22	-0.34	0.97
Item	Categories	Intervention	Control	Statistical Test	
Gender	Female		13(54.2)	11(45.8)	$\chi^2 = 0.232$ P = 0.62
	Male		11(45.8)	13(54.2)	

**Table 2: Comparison of skills scores in two evaluation periods in the intervention group**

Skill	First evaluation	Second evaluation	df	t	P
Assessment and meet the first-line needs of patient	22.2 $\pm$ 4.6	30.8 $\pm$ 3.8	23	14.8	0.000
Dressing up	26.3 $\pm$ 6.5	38.5 $\pm$ 2.8	23	11.7	0.000
Injectable drug therapy	53.1 $\pm$ 10.4	71.3 $\pm$ 6.2	23	12.8	0.000
Non-injectable drug therapy	34.5 $\pm$ 8.1	45.9 $\pm$ 4.7	23	10.2	0.000
Infection control	71 $\pm$ 12	90.3 $\pm$ 5.9	23	10.8	0.000

In reviewing the relationship between demographic information and the score of five clinical procedures using Pearson correlation coefficient, was found that none of the processors had a significant relationship with age and gender ( $r=0.28$  and  $p<0.016$ ), but the score of two non-injectable drug therapy and infection control with an average of diploma had a significant relationship ( $r=0.40$  and  $p<0.000$ ).

All of the students in the control group had succeeded in getting the desirable score from the subjective evaluations as always; while among the students in the intervention group, three students were not able to get the score they needed for passing procedures: assessing and fulfilling patients' basic needs and injectable drug therapy, that for these students test was repeated one month later with the students in the next group so that they would be able to obtain the quorum score.

Ultimately, all of the students in the control group and the intervention group reached to the next semester and were assessed and compared with one another throughout their internal – surgical<sub>1</sub> course in terms of their performance associated with five main skills so that this question would be answered: does OSCE method have an impact on the clinical skills of students relative to the traditional evaluation method? In other words, is the performance of students who are evaluated using the OSCE method reinforced and will they be more prepared and more skilled in the following semesters?

The results obtained from comparing the final scores of the evaluation of the students in the intervention group with the score obtained by them from the previous semester showed that the performance of these students had improved after a period of OSCE

method and receiving objective and subjective feedbacks throughout the evaluation which are some of the characteristics of this type of evaluation; in such a way that the scores obtained by these students in each procedure related to items such as precision, speed and remembering the skills were higher than their scores from the previous semester and the correlated t-test showed a significant difference between the scores obtained from the two evaluation courses. The highest increase was seen respectively in the scores of procedures: assessing and fulfilling patients' basic needs, injectable drug therapy and dressing up in this group. These results have been presented in table 2.

In addition, the results of comparing the final scores of the evaluation of the students in the control group with their scores from the previous semester showed that the scores of this group of students has not been significantly increased after the end of the course which the traditional evaluation method was used and the scores given to some of the skills hadn't change or it had even decreased. This information has been presented in table 3.

The results of comparing the final scores of the evaluation of the control group and the intervention group have been presented in table 4. According to the information presented in table 4, the independent t-test showed a significant difference between the scores obtained from the evaluation of procedures in the two groups. The results of this study showed that the performance of students in the next semester was significantly higher in the intervention group than the control group given the difference between the evaluation of the two groups and the effect of the OSCE method on the enhancement of learning and reinforcement of the weaknesses of students in association with the five main clinical skills of them;

**Table 3: Comparison of skills scores in two evaluation periods in the control group**

Skill	First evaluation	Second evaluation	df	t	P
Assessment and meet the first-line needs of patient	23.4 ± 4	24.2 ± 4.6	23	-0.8	0.46
Dressing up	27.8 ± 4.4	28.9 ± 3.4	23	-0.9	0.23
Injectable drug therapy	58.5 ± 7.8	56.3 ± 7.6	23	-2.0	0.27
Non-injectable drug therapy	36.2 ± 4.8	38.8 ± 4.1	23	-0.8	0.36
Infection control	75.5 ± 6.4	75.4 ± 6.6	23	-1.6	0.48

**Table 4: Comparison of the final scores of skills in two groups**

Skill	Intervention	Control	df	t	P
Assessment and meet the first-line needs of patient	30.8 ± 3.8	24.2 ± 4.6	46	6.5	0.000
Dressing up	38.5 ± 2.8	28.9 ± 3.4	46	9.8	0.000
Injectable drug therapy	71.3 ± 6.2	56.3 ± 7.6	46	6.2	0.000
Non-injectable drug therapy	45.9 ± 4.7	38.8 ± 4.1	46	6.9	0.000
Infection control	90.3 ± 5.9	75.4 ± 6.6	46	8.2	0.000

in such a way that the mean score of the students in the intervention group in each of these five skills was higher than that of the students in the control group and this difference was also statistically significant.

## DISCUSSION

This study has been conducted for comparing the effect of the new method of evaluation, i.e. the OSCE, with an routine evaluation method, on the learning and status of the clinical skills of nursing students. Reviewing the relationship between students' age and gender with the scores given to each of the five skills showed that there was no significant difference between them. This finding complies with the results of the study conducted by Habibi et al (2013) (12). But, Sinclair and Cleland (2007) study showed that male students who were academically weaker, might not use the feedback they receive for evaluating their learning experiences (13). Studying the relationship between the total diploma average and the score of clinical skills of students, it became clear that the relationship was only significant in two procedures: non-injectable drug therapy and infection control; in such a way that students with higher averages obtained higher marks in these two procedures. Also, In the study of Vaughan and Florentine (2013), there was a significant difference between these two variables: average of previous semesters and the mean score of clinical skills in the orthopedic unit; in such a way that students with higher averages in the previous semesters were more skillful in the orthopedic unit (14). In the present study, the only significant relationship between the diploma average and the score of clinical skills was seen in the two procedures that were mostly theoretical and no significant difference was seen in other procedures that were mostly practical. However, it can't be absolutely

pointed out that the level of clinical skills of students or the type of their skill have a direct relationship with the diploma average or their average in previous semesters and in order to review this relationship, further studies and larger sample volume are needed. On the other hand, in the present study, the most progress of the students in the intervention group was seen in procedures that were mostly practical such as dressing up, injectable drug therapy and fulfilling patients' basic needs, that this finding as compared to other studies in this field is a new finding.

In general, the results of this study showed that the OSCE method has a more exponential effect on the improvement of the level of clinical skills of nursing students in comparison with the routine and traditional evaluation method. Clark et al (2011) also conducted a study and showed that a checklist-based evaluation method because of more precise and accurate and reduces the effect of the examiner's subjective judgment and giving a clinical scenario to the student, helps the student acquire more accurate skills and learning by reinforcing students' clinical judgment and power of thinking and specifies their weaknesses in performing each procedure (4). Villegas et al. (2016) also used the OSCE method for evaluating the skills of nursing students and explained the enhancement of students' skills as follows: in this way, students exercise and learn all of the points associated with intended skills in practice (15).

By taking this point into consideration that not only the training and leaning goals in the nursing training program are cognitive goals but they are also emotional and psychomotor objectives (16) and since the carrying out an accurate evaluation from the beginning of the nursing training program will increase the clinical competence of nursing students

(17, 18), the great barrier on the way of training nursing students is that they have not been accurately evaluated from the beginning of entering clinical environments and they have not become well prepared for entering more advanced stages in terms of intended clinical skills. This finding complies with the results of other studies (19, 20, 21); thus, it can be concluded that an accurate learning is a valuable and scientific learning and in the end, the student, the examiner and the patient take advantage of accurate skill trainings. Therefore, using modern evaluation methods that are based on a direct observation of student's performance and a checklist-based evaluation, help ensure the student, the instructor and the department that the students have acquired what is needed to the society and the patients and the students have moved on to the next level by acquiring clinical competence. This type of evaluations can reflect problems and deficiencies as clear as a mirror and encourage diligent and strong students (22); because according to the existing evidences, the majority number of medical sciences students believe that the traditional evaluation method does not evaluate what it's supposed to (23, 24) or when this method is used, the evaluation condition is not the same for all students (25) and in this method overcoming subjective (non-objective) judgment and evaluation in clinical training is quite difficult (26). In the study of Selim et al (2012) was also specified that using OSCE can be quite useful for enhancing the learning of skills of nursing students (8). Other studies have also shown that OSCE can be used for evaluating preliminary to advanced skills of nursing students and it can be embedded in the nursing curriculum at all levels (27, 28, 29).

### CONCLUSION

As a learning and evaluation tool, OSCE supports students' learning. In other words, OSCE will contribute to the improvement of students in their curricula not only as an evaluation tool but also as a pedagogical tool and an opportunity for long-term learning. Using OSCE at the end of each clinical experience helps students learn communicative skills and understand the complexities of taking care of each patient and be more creative thinkers. In addition, the episodic nature of this method proposes a true reflection of the abilities of students and recognizes new findings. Of course, adjusting standard criteria of evaluation is a time-consuming process, but it is suitable compact assessment that can evaluate a large number of students at the same time. Therefore, it is necessary to pay more attention to this evaluation method for evaluating the procedures in nursing training programs so that it would be possible to

achieve the ultimate goals of nursing training programs which is training competent nurses and ensuring that the patients are received high-quality care.

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