

Investigating the Impact of the Direct Observation of Procedural Skills Assessment on the Learning and Satisfaction of the Operating Room Students of Neyshabur University of Medical Sciences, Iran, in 2022

Abstract

Background: The assessment of learners is a fundamental element in medical science curricula. The Direct Observation of Procedural Skills (DOPS) exam is a valuable way to assess clinical skills. The present study aimed to assess the clinical skills of operating room students of Neyshabur University of Medical Sciences, Iran, using the DOPS exam, and determine the effect of the exam on the learning and satisfaction of the learners. **Materials and Methods:** The current study was a semi-experimental study that used a single-group posttest study design. The statistical sample included 30 operating room students. The 5 skills were selected for assessment and the assessment checklist was designed by the researcher and approved by the expert panel. Moreover, 3 researcher-made questionnaires were used to examine the students' skills and opinions regarding facilitating learning and their satisfaction with the DOPS examination. Mann-Whitney, Kruskal-Wallis, and Wilcoxon tests were used to analyze the data. **Results:** The results showed that there was a significant difference between the scores of the students in the first and second examinations ($z = -4.243, p < 0.001$), and the students' scores increased significantly on the second examination. The learners were satisfied with the way the DOPS exam was conducted, and their satisfaction score of this exam was 90.7 out of 120. Furthermore, students agreed that this exam affected learning facilitation. Their score on the effectiveness of this exam was 93.9/120. **Conclusions:** Although the DOPS examination is one of the clinical assessment methods for learners, it can be used as an instructional tool in the learning process.

Keywords: Assessment, direct observation of procedural skills, learning, satisfaction

Introduction

The improvement and quality of the university curriculum is a critical point that is presently being highlighted.^[1] One of the most important parts of the curriculum is assessment, which plays an important role in improving efficiency and quality. Assessment is a systematic process of gathering, analyzing, and interpreting data to understand the level of students' learning.^[2] Correct assessment and its results can have a significant impact on the entire curriculum by guiding teachers and learners, and can be more influential in the success or failure of a program than any other factor. In the past, the main function of assessment was limited to measuring the amount of learning of learners, but it seems that this view is changing, and today, instead of assessment of learning, assessment for learning has been proposed.^[3] A look at the process of change

in assessment and assessment science shows that today we are witnessing an increasing number of assessment methods and their specialization. However, one of the main challenges in medical education is the inclination of faculty members toward traditional and subjective assessment methods and the difficulty of assessing performance and supervising students in clinical courses.^[4] Most assessments are assessments of learning rather than assessments for learning, usually not based on the expected capabilities of the learner, and in most cases, valid and reliable tools are not used to assess skills. The teaching and assessment methods are not appropriate, and the necessary motivation is not created in the learners.^[5] The studies conducted on the clinical assessment of students indicate weakness in this field. A study by the Association of American

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Access this article online

Website: <https://journals.iwv.com/jnmr>

DOI: 10.4103/ijnmr.ijnmr_312_23

Quick Response Code:



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How to cite this article: Ebrahimpour-Sadagheyani H, Saadati SM, Tatari F. Investigating the impact of the direct observation of procedural skills assessment on the learning and satisfaction of the operating room students of Neyshabur University of Medical Sciences, Iran, in 2022. *Iran J Nurs Midwifery Res* 2025;30:110-5.

Submitted: 14-Oct-2023. **Revised:** 31-Aug-2024.

Accepted: 01-Sep-2024. **Published:** 15-Jan-2025.

Medical Colleges showed clinical assessments were poorly implemented, and most of the students' clinical encounters were not observed by faculty members during training and assessment.^[6] The study by Waqar also found that more than 50% of students were not observed in clinical training and assessment, and they received feedback in only 20% of cases.^[7] Without direct observation and feedback, there is no opportunity to assess and improve clinical skills, and the continuation of this situation and the use of traditional methods in assessment leads to the wasting of resources and a decline in the quality of care.^[8] Studies indicate that students are also not satisfied with the present clinical assessments.^[8,9] Therefore, it seems that students' assessment methods should be closer to real and objective methods in order to determine whether the student will be able to perform his/her occupational duties in practice.^[10] Moreover, appropriate feedback should be provided in the assessment so that the rate of learning skills increases and performance is improved.^[11,12]

Today, we are witnessing the emergence of various assessment methods such as portfolios, Objective Structured Clinical Exams, Mini Clinical Exams, and Direct Observation of Procedural Skills (DOPS) for the clinical assessment of students. DOPS is a tool that assesses learners' practical skills in an objective and structured way. This method creates the opportunity to provide feedback to the learners and makes them concentrate on the main points of performing the skills.^[13] In this method, the student is directly observed by the assessor while performing the procedure in the real environment, and the assessor records the results of the observations in a structured checklist and gives feedback to the student.^[14] Various skills, including preparations before performing procedures, types of procedures such as venipuncture, dressings, injections, disinfection techniques, managing how to perform procedures, counseling, and communication skills can be assessed through DOPS examination.^[15] In the operating room discipline, learners are acquainted with the regulations of the operating room and surgical technologies and learn patient care and management. Graduates of the operating room discipline are members of the health care team who play a role in helping to perform surgeries with favorable results, and the correct performance of this role requires the acquisition of various procedural skills.^[16]

Currently, some studies have been conducted on the implementation of the DOPS method for assessing medical students^[17-21]; however, these studies have mainly investigated the validity and reliability of the DOPS exam and the level of satisfaction of the students with this exam, but its educational effectiveness and the role of the exam in facilitation of students' learning has not been considered. Singh *et al.*^[17] conducted the DOPS exam among dental students in India. The results showed

that the students were satisfied with the exam, and 83% of them demanded that this method be extended to other clinical areas, preferably from the beginning of the clinical course.^[17] Farajpour *et al.*^[18] also reported that medical students and faculty members found the DOPS exam to be an acceptable and applicable assessment method in educational centers and were satisfied with the exam, so they recommended its implementation in assessing the clinical skills of medical students. In the study by Alborzi *et al.*^[19] regarding the validity and reliability of the DOPS exam, the content validity, face validity, construct validity, and reliability of the exam were confirmed. To the best of our knowledge, so far no research has been performed on the implementation of the DOPS exam in operating room students. Therefore, the present study aimed to assess the clinical skills of operating room students of Neyshabur University of Medical Sciences, Iran, using the DOPS exam, and determine the effect of the exam on the learning and satisfaction of the learners.

Materials and Methods

This article was part of a developmental study. The current study was a semi-experimental study that used a single-group post-test study design. The study started in September 2021 and ended in May 2023. In this research, the total of 30 operating room students in the fifth semester of Neyshabur University of Medical Sciences, who were studying in the academic year 2022-2023 were included in the study through census sampling method and after obtaining informed consent. The examiners included 2 faculty members of the department of the operating room who had teaching experience in academic courses and were willing to participate in the study. The inclusion criteria were studying in the 5th semester of the operating room course in the scrub skills training course and willingness to participate in the study. The exclusion criteria were attending the university as a guest student. First, the purpose of the study was explained to the participants by researchers, and separate workshops were held for faculty members and students to familiarize them with the DOPS exam. The skills assessed in this study included handwashing, gowning, gloving, preparation of the operating table, sponge count, and draping the patient, which was assessed in the real environment of the elective abdominal surgery operating room.

In the current study, data were collected using 3 researcher-made questionnaires. Cronbach's alpha coefficient was used to determine the reliability of the questionnaires, and it was 0.845 for the first questionnaire and 0.827 for the second questionnaire. Students were observed by 2 raters. The assessors were 2 faculty members of the department of the operating room, who were also in charge of training students. Inter-rater reliability method was used to determine the reliability. The 2 assessors observed and assessed 5 students together during the

procedure, and the agreement between the assessors was measured using the Intraclass Correlation Coefficient (ICC) and the Kappa test for each statement. ICC value was 0.5, and the Kappa coefficient was 0.6. The exam schedule was compiled by the department of operating room and presented to students and assessors. The DOPS exam was conducted twice for the students for selected skills during the internship period, and the students were assessed by the assessors using a questionnaire. The time of each exam was 20 minutes, and 5 minutes were dedicated to providing feedback. Learners were allowed to take pictures of their questionnaires so that they could assess their performance. Finally, the students completed the survey questionnaires. After data gathering, the data was entered into SPSS software (version 26; IBM Corp., Armonk, NY, USA). Descriptive statistics (mean, percentage, and standard deviation), inferential statistics, and Mann-Whitney, Kruskal-Wallis, and Wilcoxon Tests were used to analyze the data at a significance level of $\alpha = 0.05$. Non-parametric Tests were used due to the non-normality of the main variable.

Ethical considerations

Informed consent was obtained from all participants, and all clauses related to this research in the Helsinki Treaty were considered. The Ethics Committee of the National Agency for Strategic Research in Medical Education (NASR) approved this study with the code IR.NASRME.REC.1400.292.

Results

The mean (SD) age of the female ($n = 5$) and male students ($n = 25$) was 21.1 (1.8) years and 20.6 (0.6) years, respectively; moreover, 46.66% of the students were married and 36.66% were natives.

The results of the present study showed that there was a significant difference between the scores of the students in the first and second examinations ($z = -4.243$, $p < 0.001$), and the students' scores increased significantly on the second examination [Table 1].

The research findings indicated the learners' satisfaction score of this exam was 90.7 out of 120, which represents 75.58% of the total score. Moreover, the students' opinions regarding the implementation of the examination were not affected by their skill scores, which are presented in Table 2.

In addition, the study results regarding the students' opinions about the effectiveness of the DOPS exam in facilitating learning and skills showed that the learners' assessment score of this exam was 93.9 out of 120, which represents 78.25% of the total score. Furthermore, the students' opinions regarding the impact of the DOPS exam on facilitating learning were not affected by their skills scores [Table 3].

Discussion

The main objectives of the current study were to determine the effect of the DOPS on learners' learning and determine the level of learners' satisfaction with the DOPS exam. The results of the study showed that the students' scores in the second DOPS increased significantly compared to the first exam in all levels of clinical skills. These results are in complete alignment with the study by Tenzin *et al.*^[20] which investigated the effect of using the DOPS exam to assess learning in obstetrics and gynecology postgraduate students at Bhutan Medical University. In addition, the study by Azeem *et al.*^[21] in India assessed the mini-implant insertion skills of 20 dental students and found that the average scores of all orthodontic trainees improved significantly after DOPS compared to before DOPS.

It is worth noting that in the past, the main function of assessment was to measure the amount of learning of learners, but it seems that today this view is changing, and the perspective of assessment for learning has replaced assessment of learning. The results of the current study and the above-mentioned parallel studies indicate that the DOPS exam, in addition to being used as an appropriate method for assessment purposes, can be used as an instructional tool to influence students' learning and can also be used in students' education and development.

The findings of the present study regarding the level of students' satisfaction are in line with the study by Farajpour *et al.*,^[18] which was conducted to investigate the satisfaction of medical interns and faculty members with the DOPS exam at the Islamic Azad University of Mashhad, Iran. The study by Kamat *et al.*^[22] in India also showed that 92% of anesthesiology postgraduate students were satisfied with the DOPS test and believed that this test assesses practical skills better than the traditional assessment methods. In only one study, students were not satisfied with the DOPS exam because they believed that the faculty members did not have the necessary ability to perform this exam, the time considered for observing the examinees was not suitable, and the exam taken was not compatible with the curriculum.^[23] However, in our study, the highest degree of students' satisfaction with the exam was due to the adequacy of the exam time, the appropriate number of assigned procedures, and the manner of monitoring and attention of the examinees. Moreover, in our study, the majority of students agreed with the implementation of this method in other departments and believed that the DOPS exam was consistent with the presented lesson plan, all of which indicates the high satisfaction of the students with the exam. In any case, the training of assessors should be conducted carefully.^[24,25]

Moreover, the results of the current study regarding the students' opinions about the effectiveness of the DOPS exam in facilitating the learning of skills showed that the majority of the students agreed that this exam had an

Table 1: Mean and standard deviation of students' skills scores in the first and second direct observation of procedural skills (DOPS) exams (minimum score: 0; maximum score: 10)

Skill Number	Skill Title	First exam (n=30) Mean (SD)	Second exam (n=30) Mean (SD)	p
1	Handwashing	6.59 (2.04)	9.65 (.45)	Z=-4.547, p<0.001
2	Gowning	6.55 (1.59)	9.68 (.45)	Z=-4.684, p<0.001
3	Gloving	6.70 (2.10)	9.57 (.71)	Z=-4.545, p<0.001
4	Preparation of the Operating Table	6.25 (2.17)	9.55 (.53)	Z=-4.601, p<0.001
5	Draping the Patient	6.10 (2.50)	9.67 (1.26)	Z=-4.623, p<0.001

Data are expressed as mean±standard deviation. p value based on Wilcoxon test

Table 2: Students' satisfaction with the direct observation of procedural skills (DOPS) exam and its relationship with the scores of each skill

Question Number	Question	Score (out of 120)	p, df=3				
			First Skill	Second Skill	Third Skill	Fourth Skill	Fifth Skill
1	Before participating in the exam, I learned about how it was implemented	92	0.384	0.754	0.824	0.863	0.473
2	I had enough time to perform the required skill.	104	0.548	0.456	0.517	0.540	0.763
3	The location of the exam was physically suitable (like light and sound).	87	0.188	0.380	0.079	0.049	0.122
4	The number of assigned procedures was appropriate for measuring the students' clinical skills.	99	0.392	0.261	0.197	0.876	0.990
5	The supervision and attention of the assessor faculty members were as expected.	97	0.404	0.530	0.465	0.666	0.464
6	There were the necessary tools to perform the requested procedures.	95	0.333	0.553	0.629	0.377	0.192
7	I was given enough feedback after the exam.	78	0.150	0.497	0.335	0.056	0.130
8	I experienced a little stress in this exam.	67	0.351	0.188	0.291	0.063	0.186
9	The assessed procedures were consistent with the presented course plan	93	0.814	0.773	0.703	0.770	0.563
10	I recommend performing the DOPS exam in other clinical departments	95	0.354	0.175	0.737	0.710	0.709
Mean (SD)		90.7 (10.29)	p-value based on Kruskal-Wallis Test				
Percentage agree and completely agree		75.58%					

Table 3: Students' points of view regarding the impact of the DOPS exam on easing learning and its relationship with the scores of each skill

Question Number	Question	Score (out of 120)	p, df=3				
			First Skill	Second Skill	Third Skill	Fourth Skill	Fifth Skill
1	The DOPS exam makes students focus on the goals of learning skills.	104	0.689	0.786	0.517	0.512	0.220
2	The DOPS exam questionnaires are beneficial as a guide on how to perform the skills correctly	99	0.744	0.451	0.975	0.710	0.537
3	The DOPS exam allows students to plan and regularly practice skills.	81	0.210	0.394	0.270	0.049	0.106
4	The DOPS exams provide the opportunity to communicate more with faculty members.	96	0.881	0.469	0.387	0.091	0.147
5	The DOPS exam provides the basis for thinking and self-assessment.	101	0.191	0.277	0.483	0.723	0.763
6	The DOPS exam provides an opportunity to remind the strengths and weaknesses of students about the processes.	101	0.441	0.192	0.161	0.284	0.712
7	The DOPS exam has a positive effect on student independence	85	0.611	0.535	0.582	0.419	0.544
8	The DOPS exam motivates students to learn more and increases their interest in clinical skills.	90	0.301	0.397	0.739	0.835	0.572
9	Performing the DOPS exam causes more stress in students compared to the other exams.	74	0.322	0.328	0.452	0.030	0.050
10	The DOPS exam is beneficial in improving the clinical performance of students.	103	0.158	0.249	0.629	0.844	0.761
Mean (SD)		93.90 (10.88)	p-value based on Kruskal-Wallis Test				
Percentage agree and completely agree		78.25%					

effect in facilitating learning. Furthermore, the majority of students believed that this method is beneficial in improving the students' clinical performance. The findings of Singh et al.,^[17] who conducted the DOPS exam on dental students

in India, are also consistent with the findings of the current study. The study results showed that the learners expressed their satisfaction with and acceptance of this method and felt that it helped them learn better skills, and most of the students demanded that this method be developed in other clinical sites, preferably from the start of the clinical course.^[17] In the study by Tenzin *et al.*,^[20] practically all learners considered the DOPS to be efficient in easing students' learning. In another research in Pakistan, 13 radiology residents were assessed for their fluoroscopy skills using the DOPS exam.^[26] Most of the learners stated that this exam was effective in increasing their fluoroscopy skills, and 100% of the students believed that DOPS is better than conventional end-of-rotation written feedback for fluoroscopy.^[26]

In addition, the findings of the present study on the effectiveness of the DOPS exam in facilitating learning and skills showed that the most positive opinions of the students included focusing the learners on the goals of learning skills, providing an opportunity to remind the strengths and weaknesses of the learners, and effectiveness and usefulness of the exam in promoting the clinical performance of the learners. The least positive opinion of the learners was that it caused stress in students compared to other exams. Providing feedback is one of the strengths of the DOPS exam, which the students in this study understood correctly. More than 93% of the students believed that the immediate feedback provided by the faculty members after performing the skill was helpful for their progress. Other studies also emphasize the impact of feedback on the learning outcomes of learners.^[27-29] Feedback is the communication link between assessment and learning and makes assessment serve more learning. The information that a person obtains through feedback from the difference between his performance and the standards of the questionnaire causes him to improve his performance and progress in skill acquisition.

In our study, 30% of the students believed that the DOPS exam was highly stressful. In the study by Liu *et al.*,^[30] 50% of learners felt that the exam atmosphere was stress-free. Other studies have also pointed out that this exam is stressful.^[14,31] One of the reasons for the low level of students' stress in our study could be the participation of faculty members in the training class before the exam. The anxiety caused by the exam may have an inappropriate effect on the quality of the work, but it seems that the knowledge of the faculty members about this issue and the effort to create a stress-free environment during the exam can help improve the students' stress.

The limitation of the present study was that the effect of the DOPS exam on facilitating the learning of students and their level of satisfaction with the exam was only evaluated in one educational group and without a control group.

Conclusion

The comparison of the scores of the first and second rounds of the DOPS exam showed that this exam has a positive effect on students' learning, and the students believed this exam was effective in easing their learning and skills acquisition, and expressed high satisfaction with the exam. Therefore, this exam can be used as a clinical assessment method and as an instructional tool in students' learning. According to the results, it is recommended that universities and faculty members use this method to assess students' clinical performance. Moreover, it is suggested that universities plan and implement empowerment workshops for students and faculty members about the DOPS exam.

Acknowledgments

This study was approved by the National Agency for Strategic Research in Medical Education (NASR) with code 4000428. The authors would like to thank the NASR for their support and all participants for their willingness to participate to this study.

Financial support and sponsorship

National Agency for Strategic Research (NASR)

Conflicts of interest

Nothing to declare.

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