ORIGINAL RESEARCH ORİJİNAL ARAŞTIRMA

DOI: 10.5336/nurses.2024-106886

The Relationship Between Nursing Students' Objective Structured Clinical Examination Skills in Care Practices with Theoretical Knowledge and Practical Achievements: A Retrospective, Descriptive Study

Hemşirelik Öğrencilerinin Bakım Uygulamalarındaki Objektif Yapılandırılmış Klinik Sınav Becerilerinin Teorik Bilgi ve Uygulama Başarıları ile İlişkisi: Retrospektif, Tanımlayıcı Bir Çalışma

İlkin YILMAZ[a], Gülşah GÜROL ARSLAN[a], Sevda SÖNMEZ[b], Dilek ÖZDEN[a]

[a]Dokuz Eylül University Faculty of Nursing, Department of Nursing, Department of Nursing Fundamental, İzmir, Türkiye
[b]Dokuz Eylül University Health Sciences Institute, Department of Nursing, İzmir, Türkiye

This study was presented as an oral presentation at 3rd International & 7th National Fundamental Nursing Care Congress, October 25, 2024, İzmir, Türkiye.

ABSTRACT Objective: Assessing nursing students' competence requires valid, reliable, and objective tools. The Objective Structured Clinical Examination (OSCE) evaluates cognitive and behavioral dimensions of learning. This study aimed to identify common errors made by nursing students during OSCE exams and examine the relationship between their theoretical and clinical practice grades with OSCE performance. **Material and Methods:** The study was conducted retrospectively. The study sample consisted of 443 students who took the fundamentals of nursing course during the 2018-2019 and 2019-2020 academic years. Data were collected retrospectively from student OSCE records and student information system between 2nd and 30th November 2020. The Students' Descriptive Characteristics Form, Categorised Steps of Care-oriented Skills Form, and Care-oriented Skills Checklists, which were developed by the researchers, were used for data collection. **Results:** In care-oriented OSCE, students commonly performed well in providing patient information, selecting appropriate materials, removing used materials properly, and recording procedures. However, frequent mistakes included poor skill execution and non-compliance with infection control principles. A significant positive correlation was found between OSCE grades and theoretical (r=0.812), practice (r=0.263), and final grades (r=0.265) (p<0.001 for all). **Conclusion:** OSCE was a valid and reliable method for skill assessment. Increasing the number of skill stations could enhance its representativeness. Future studies could explore factors behind students' low OSCE grades.

Keywords: Clinical competence; examination questions; psychomotor skill; students; nursing

ÖZET Amaç: Hemşirelik öğrencilerinin yeterliklerini değerlendirmek için geçerli, güvenilir ve objektif araçlar gereklidir. Objektif Yapılandırılmış Klinik Sınav (OYKS), öğrenmenin bilişsel ve davranışsal boyutlarını değerlendirir. Bu çalışma, hemşirelik öğrencilerinin OYKS sınavlarında sık yaptığı hataları belirlemeyi ve teorik ile klinik uygulama notları ile OYKS performansları arasındaki ilişkiyi incelemeyi amaçlamıştır. **Gereç ve Yöntemler:** Çalışma, retrospektif olarak yürütülmüştür. Örneklem, 2018-2019 ve 2019-2020 akademik yıllarında hemşirelik esasları dersini alan 443 öğrenciden oluşmaktadır. Veriler, 2-30 Kasım 2020 tarihleri arasında öğrenci OYKS kayıtları ve not giriş sisteminden retrospektif olarak toplanmıştır. Verilerin toplanmasında araştırmacılar tarafından oluşturulan Öğrenci Tanıtım Özellikleri Formu, Bakım Odaklı Becerilere Yönelik Kategorize Edilmiş Adımlar Formu ve Bakım Odaklı Beceriler Kontrol Listeleri kullanılmıştır. **Bulgular:** Bakım odaklı OYKS'de öğrenciler, hasta bilgilendirme, uygun malzeme seçimi, kullanılan malzemeleri uygun şekilde uzaklaştırma ve işlemi doğru kaydetme adımlarında genellikle başarılı olmuştur. Ancak, sık yapılan hatalar arasında beceri uygulamalarında yetersizlik ve enfeksiyon kontrol ilkelerine uyulmaması yer almıştır. OYKS notları ile teorik (r=0.812), uygulama (r=0.263) ve final notları (r=0.265) arasında anlamlı pozitif yönde bir ilişki bulunmuştur (hepsi için, p<0.001). **Sonuç:** OYKS, beceri değerlendirmede geçerli ve güvenilir bir yöntemdir. Beceri istasyonlarının artırılması, sınavın tüm becerileri temsil etme gücünü artırabilir. Gelecekteki çalışmalarda, öğrencilerin düşük OYKS notlarının nedenleri incelenebilir.

Anahtar Kelimeler: Klinik yeterlilik; sınav soruları; psikomotor beceri; öğrenciler; hemşirelik

TO CITE THIS ARTICLE:
Yılmaz İ, Gürol Arslan G, Sönmez S, Özden D. The relationship between nursing students' objective structured clinical examination skills in care practices with theoretical knowledge and practical achievements: A retrospective, descriptive study. Turkiye Klinikleri J Nurs Sci. 2025;17(3):770-9.

Correspondence: İlkin YILMAZ
Dokuz Eylül University Faculty of Nursing, Department of Nursing, Department of Nursing Fundamental, İzmir,Türkiye
E-mail: ilkinyilmaz85@gmail.com

Peer review under responsibility of Turkiye Klinikleri Journal of Nursing Sciences.

Received: 19 Nov 2024 ***Received in revised form:*** 02 Apr 2025 ***Accepted:*** 11 Apr 2025 ***Available online:*** 12 May 2025

The acquisition of clinical knowledge and skills encompasses nearly the entirety of nursing students' educational experience. Assessment and evaluation have an important role in controlling students' access to competence in terms of skills and practices for the purposes of the program.[1,2] While different assessment and evaluation methods such as written exams, assignments and projects can be used to evaluate students' cognitive field learning, different clinical exam methods such as the Objective Structured Clinical Examination (OSCE), Mini-Clinical Exam, Direct Observation of Transactional Skills, portfolio evaluation, Performance Observation, and 360 Degree Evaluation designed to assess the affective and behavioural dimensions of learning can be used.[3,4]

OSCE, first defined by Harden et al. is an exam recommended for the evaluation of professional skills and aims to measure clinical competence through direct observation. It has been accepted as the main standard thanks to its validity and reliability.[5] Today, it is widely used in health fields such as nursing, midwifery, medicine, physiotherapy, dentistry, and paramedics.[1,6-12] It is known that the OSCE is used in various nursing faculties in Turkey to evaluate nursing skills.[1,8,13]

In the OSCE exam, students are provided a clinical case scenario to practice and asked to practice it. The student is expected to encounter this scenario in the time period determined for the station, by thinking seriously and critically. The student's knowledge, skills and behaviour are evaluated with pre-prepared checklists as the purpose of the exam foresees. Thus, an objective and structured clinical exam is created and standardized by checklists, the content of which is pre-designed to asses various levels of clinical skills.[1] With this exam structure, the OSCE allows to evaluate the cognitive, effective, behavioural dimensions of students according to Bloom's taxonomy, and the competence and performance on the path from knowledge to action according to Miller's pyramid of competence. Thus, it is possible to evaluate the knowledge, skills, behaviour and attitude towards the clinic as a whole with the performance of the students.[14-16]

There are studies suggesting that the OSCE, which is usually applied at the end of the academic year as a summative assessment tool, can actually serve as a predictor of scores obtained from other summative assessment methods that reflect annual academic success.[1,10] These studies, conducted in the fields of nursing, medicine, and physiotherapy, have reported a strong correlation between OSCE performance and subsequent clinical practices as well as mid-term or final exams.[1,10,11] In nursing, literature includes validity and reliability studies related to OSCE, which evaluates a range of profession-specific skills such as communication, care, and treatment.[1,7,17-21] Some studies have specifically focused on the assessment of communication skills, as well as those that examine both care and treatment practices within the same study.[1,7,8,13,17-20,22-24] However, this study focuses solely on care-related skills and does not include any treatment-based skill practices. While national-level studies have typically examined only two, three or four skills, a greater number of skills were analyzed, and the total sample size was considerably large in the present study.[1,8,13,23] Similar to the study by Özden et al. both validity and reliability analyses were conducted, and the relationship between clinical performance and theoretical achievement was examined.[1] These features contribute to the originality of the study.

In this study, the validity and reliability results of OSCE for nursing care skills are presented. In addition, the relationship between the OSCE scores for care skills and the scores obtained from midterm exams, clinical practice, and final exams during the semester is examined.

MATERIAL AND METHODS

DESIGN AND SETTING

The research was carried out retrospectively at the faculty of nursing of a university. The research questions are as follows:

A. What is the validity and reliability of OSCE checklists?

B. What are the procedure steps in which students often make mistakes in the OSCE exam?

C. What is the relationship between students' OSCE, clinical practice, final exams, and end-term grades end of the year?

PARTICIPANTS

The population of the study was composed of 539 students who studied in the second year of the faculty of nursing in the fall semester of the 2018-2019 (n=209) and 2019-2020 (n=234) academic years and took nursing principles courses. The OSCE skills with a Cronbach's alpha coefficient below 0.67, as well as 86 evaluated students and 10 students repeating the semester, were excluded from the sample.[25] The study was completed with 443 (82.18%) students.

DATA COLLECTION

Data collection was carried out between November 2-30, 2020, by two researchers. Institutional permission and ethics committee approval were obtained. Students' demographic data and exam scores were retrieved from the Student Information and Grading System, while OSCE scores and step-based data were obtained from archived exam documents. Data were recorded using the Students' Descriptive Characteristics Form, the Categorised Steps of Care-oriented Skills Form, and the OSCE Checklists, all developed based on the literature.[6,10,16,26-29]

Students' Descriptive Characteristics Form: This form included eight questions on age, gender, practice wards, OSCE, laboratory (care- and drug administration-oriented), clinical practice, and final exam grades. Scores for midterm, final, and clinical practice ranged from 0-100.

Written exams were multiple-choice, revised annually through item analyses. Clinical grades were based on skill performance, professional attitudes, behaviours, and care plans, evaluated using checklists from skill manuals. Care plan evaluation was grounded in the Functional Health Patterns Model and principles from the care plan preparation course. At semester's end, clinical practice was assessed using a 25-item, 100-point evaluation form.

Categorised Steps of Care-oriented Skills Form: Communication with the patient, appropriate material selection, inspection, main procedure steps related to skills, infection control (compliance with asepsis principles, hand washing, wearing sterile gloves, contamination status), appropriate disposal of contaminated materials, recording of the procedure were categorised from the OSCE checklists in order to examine the most common incorrect mistakes.

Care-oriented Skills Checklists for OSCE: At the beginning of the 2018-2019 fall semester, two lecturers developed checklists for oral care, central venous catheter (CVC) care, tracheostomy stoma care, Foley catheter care, wound care, abdominal examination, peripheral venous catheter (PVC) care, and respiratory sounds auscultation. Content validity was assessed by seven nursing fundamentals experts, yielding CVI values between 0.97-0.99. Following revisions, the checklists were used in OSCEs for two years. Each checklist included 11-16 items, scored on a 100-point scale, with higher weights for skill-specific steps (8-12 points) and lower weights (4-8 points) for universal steps such as hand hygiene, preparation, patient communication, and documentation. Skills were rated as completed (x points), partially completed (x/2 points), or not done (0 points). Cronbach's alpha values were acceptable for most checklists, except for CVC (0.430) and PVC (0.652), which were excluded from analyses (Table 1).

TABLE 1: Checklist name of the skills and their psychometric properties used in the OSCE exam

Name of the skill	Total item number	Total number of students' who took the exam	Cronbach alpha value
Wound care	14	84	0.686
Tracheostomy stoma care	16	83	0.838
Central venous catheter care	15	51	0.430
Foley catheter care	17	89	0.825
Oral care	14	51	0.799
Oscultation of the respiratory sounds (posterior)	16	36	0.845
Oscultation of the respiratory sounds (anterior)	15	34	0.741
Peripheral venous catheter care	15	35	0.652
Abdominal examination	18	66	0.835

CONDUCTING THE OSCE

Since the 2018-2019 fall semester, the Department of Nursing Fundamentals at Dokuz Eylul University has conducted OSCEs for undergraduate students before clinical practice. Students were informed orally and

in writing at the semester's start, one week before, and immediately prior to the exam. To standardize evaluations, meetings were held with lecturers and guide nurses, and each station was jointly assessed by a faculty member and a clinical nurse to ensure accurate observation.

Students were randomly allocated to nine OSCE stations using sealed envelopes prepared the day before. On exam day, lists were privately distributed, and students' mobile phones and bags were collected to prevent communication. Each student was assessed on two skills—one nursing care and one treatment procedure—selected by a closed-draw method. The drawing box, prepared with identical folded papers, ensured fairness and prevented students from sharing station content afterwards.

Exam rooms were arranged to allow observation from multiple angles, and students were guided through one-way corridors to maintain security. They entered according to randomized class lists, completed identity checks, and drew lots for care skills. Students attended stations twice: first for care practices, then for drug administration (treatment-related OSCEs were detailed in Özden et al.'s study.[1]

Before performing, students were shown the materials and given a standardized, consistent, objective and comprehensible scenario of three to four sentences describing the skill. Handwashing was standardized within the scenario, so students did not repeat it. Each student had one minute to prepare and eight minutes to complete the procedure. After finishing at one station, they proceeded to the next, with all stations located on the same floor.

To preserve exam integrity, academic and non-departmental staff monitored corridors, preventing interaction. Corridors were organized with separate entrances and exits. Evaluation was conducted immediately after each performance by both the lecturer and the guide nurse, using structured checklists. Scores were assigned collaboratively, covering every item.

At the end of the exam, students were invited to provide written feedback on their experience, ensuring that both performance outcomes and student perspectives were systematically collected.

ETHICAL APPROVAL

This study was approved by the Dokuz Eylül University Non-invasive Research Ethics Board of the University (date: September 14, 2020; no: 2020/21-32). Institution in which the research was conducted also provided the written permission. The study was conducted in accordance with the Principles of the Declaration of Helsinki.

DATA ANALYSIS

The data were analyzed using SPSS v.22.0 (IBM Corporation, USA). Descriptive statistics (number, percentage, mean, and standard deviation) were calculated, and relationships between exam grades were examined with correlation analysis.

RESULTS

As shown in Table 2, 66.8% of participants were female, and the mean age was 20.37±1.02 years. Over half (52.8%) took the exam in the 2019–2020 academic year. The mean scores were 61.47±18.19 for care-oriented OSCE, 64.36±13.17 for laboratory exams, 81.72±9.42 for clinical practice, and 63.53±9.15 for the final exam (all over 100 points).

Table 3 presents the distribution of caregiving skills. Students frequently provided patient informa-

TABLE 2: Students' descriptive characteristics (n=443)

	n	%
Gender		
Female	275	62.1
Male	168	37.9
Academic years		
2018-2019	209	47.2
2019-2020	234	52.8
Wards		
Internal units	221	49.89
Surgical units	222	50.11
	X̄±SD	**Minimum-maximum**
Age	20.37±1.02	19-24
Exam grades		
Care-oriented OSCE	61.47±18.19	4-96
Laboratory (total OSCE)	64.36±13.17	18-95
Clinical practice	81.72±9.42	50-100
Final	63.53±9.15	39-89

SD: Standard deviation; OSCE: Objective Structured Clinical Examination

TABLE 3: Distribution of caregiving skills practised*

	Completed		Completed with error/fault		Uncompleted		Completed with error/ fault and uncompleted in total	
	n	%	n	%	n	%	n	%
Providing information to the patient								
Wound care (n=84)	58	69.0	3	3.6	23	27.4	26	31
Tracheostomy stoma care (n=83)	66	79.5	1	1.2	16	19.3	17	20.5
Foley catheter care (n=89)	77	86.5	1	1.1	11	12.4	12	13.5
Oral care (n=51)	40	78.4	1	2.0	10	19.6	11	21.6
Auscultation from the posterior region of the lungs (n=36)	33	91.7	0	0	3	8.3	3	8.3
Auscultation from the anterior region of the lungs (n=34)	28	82.4	0	0	6	17.6	6	17.6
Abdominal examination (n=66)	62	93.9	1	1.5	3	4.5	4	6
Proper selection of materials								
Wound care (n=84)	84	100	0	0	0	0	0	0
Tracheostomy stoma care (n=83)	83	100	0	0	0	0	0	0
Foley catheter care (n=89)	89	100	0	0	0	0	0	0
Oral care (n=51)	51	100	0	0	0	0	0	0
Auscultation from the posterior region of the lungs (n=36)	36	100	0	0	0	0	0	0
Auscultation from the anterior region of the lungs (n=34)	34	100	0	0	0	0	0	0
Abdominal examination (n=66)	66	100	0	0	0	0	0	0
Inspection/area observation								
Wound care (n=84)	3	3.6	43	51.2	38	45.2	81	96.4
Tracheostomy stoma care (n=83)	37	44.6	19	22.9	27	32.5	46	55.4
Foley catheter care (n=89)	30	33.7	7	7.9	52	58.4	59	66.3
Oral care (n=51)	19	37.3	6	11.8	26	51.0	32	62.7
Auscultation from the posterior region of the lungs (n=36)	36	100	0	0	0	0	0	0
Auscultation from the anterior region of the lungs (n=34)	34	100	0	0	0	0	0	0
Abdominal examination (n=66)	39	59.1	4	6.1	23	34.8	27	40.9
Practice of the skill								
Wound care (8 items for the skill; total 84x8=672 items for 84 students)	424	63.09	161	23.96	87	12.95	248	36.91
Tracheostomy stoma care (9 items for the skill; total 83x10=830 items for 83 students)	421	50.72	196	23.61	213	25.67	409	49.28
Foley catheter care (11 items for the skill; total 89x11=979 items for 89 students)	486	49.65	172	17.56	321	32.79	493	50.35
Oral care (8 items for the skill; total 51x8=408 items for 51 students)	211	51.72	95	23.28	102	25	120	48.28
Auscultation from posterior region of the lungs (6 items for the skill; total 36x6=216 items for 36 students)	170	78.70	38	17.60	8	3.70	46	21.30
Auscultation from anterior region of the lungs (9 items for the skill; total 34x9=306 items for 34 students)	90	29.42	107	34.96	109	35.62	216	70.58
Abdominal examination (12 items for the skill; total 66x12=792 items for 66 students)	411	51.89	97	12.25	284	35.86	381	48.11
Infection control								
Wound care (n=84)	8	9.5	11	13.1	65	77.4	76	90.5
Tracheostomy stoma care (n=83)	11	13.3	19	22.9	53	63.9	72	86.7
Foley catheter care (n=89)	33	37.1	33	37.1	23	25.8	56	62.9
Oral care (n=51)	25	49.0	24	47.1	2	3.9	26	51
Auscultation from the posterior region of the lungs (n=36)	36	100	0	0	0	0	0	0
Auscultation from the anterior region of the lungs (n=34)	34	100	0	0	0	0	0	0
Abdominal examination (n=66)	66	100	0	0	0	0	0	0
Removing correctly the used materials from the environment								
Wound care (n=84)	57	67.9	11	13.1	16	19.0	27	32.1
Tracheostomy stoma care (n=83)	57	68.7	13	15.7	13	15.7	26	31.3
Foley catheter care (n=89)	66	74.2	4	4.5	19	21.3	23	25.8
Oral care (n=51)	40	78.4	3	5.9	8	15.7	11	21.6
Auscultation from the posterior region of the lungs (n=36)	36	100	0	0	0	0	0	0
Auscultation from the anterior region of the lungs (n=34)	34	100	0	0	0	0	0	0
Abdominal examination (n=66)	66	100	0	0	0	0	0	0
Recording the procedure								
Wound care (n=84)	70	83.3	1	1.2	13	15.5	14	16.7
Tracheostomy stoma care (n=83)	54	65.1	3	3.6	26	31.3	29	34.9
Foley catheter care (n=89)	65	73.0	1	1.1	23	25.8	24	27
Oral care (n=51)	37	72.5	0	0	14	27.5	14	27.5
Auscultation from the posterior region of the lungs (n=36)	33	91.7	0	0	3	8.3	3	8.3
Auscultation from the anterior region of the lungs (n=34)	27	79.4	1	2.9	6	17.6	7	20.6
Abdominal examination (n=66)	59	89.4	1	1.5	6	9.1	7	10.6

*Row percentage was calculated.

TABLE 4: Correlation analysis between students' grades for care-related OSCE, total OSCE (laboratory), practice and final grades (n=443)

		Laboratory	Clinical practice	Final
OSCE-care	Pearson correlation (r)	0.812	0.263	0.265
	p value	<0.001	<0.001	<0.001
LAB	Pearson correlation (r)		0.318	0.331
	p value		<0.001	<0.001

OSCE: Objective Structured Clinical Examination; LAB: Laboratory

tion, selected appropriate materials, and documented steps correctly, but often skipped skill application and infection control. More than half did not observe the wound area, tracheostomy stoma, perineal area, or oral mucosa. At least half omitted or skipped Foley catheter care, anterior lung auscultation, and oral care.

As shown in Table 4, Pearson correlation analysis indicated statistically significant positive correlations between care-related course grades and laboratory (total OSCE), practice, and final grades (r=0.812, r=0.263, r=0.265; p<0.001 for all).

DISCUSSION

Valid and reliable assessment methods are essential indicators of competence and skill development. The OSCE is widely regarded as the gold standard for assessing clinical competence.[2] In this study, we aimed to determine the validity and reliability of OSCE checklists, examine their relationship with students' grades, and identify common malpractices. Seven of nine skill checklists were found valid and reliable. Significant correlations were observed between OSCE grades and laboratory, practice, and final exam grades. Students most frequently erred in skill-specific steps and infection control procedures.

The CVI of the checklists was found at good to excellent levels, consistent with literature. For example, Chabrera et al. reported CVI values between 0.82-0.95 for ten OSCE checklists, and Huang et al. reported values between 0.85-1.0 across eight stations.[20,21] Our CVI findings align with these results. Although two checklists were excluded due to Cronbach's alpha values below the threshold, the remaining demonstrated acceptable to high reliability.

Reliability in OSCE studies is often evaluated using inter-rater agreement or internal consistency.[17,18,21,22] In our study, inter-rater reliability was not tested, because a single evaluator was responsible for student assessments. Instead, internal consistency was measured with Cronbach's alpha, which showed good to excellent reliability. Reported values in the literature typically range from 0.65 to 0.88, supporting the consistency of our findings.[1,7,20] This may be attributed to the development of checklists based on established literature.

Only a limited number of studies have examined the relationship between OSCE performance and other exams. Özden et al. reported a weak but statistically significant correlation between OSCE, clinical practice, and midterm exam results, noting that OSCE scores were higher than midterm but lower than clinical practice scores.[1] Similarly, Lee et al. found that students who passed the graduation exam had higher OSCE scores, while nurses who later resigned had lower OSCE performance.[7]

Internationally, the OSCE is widely used to assess clinical knowledge and skills across disciplines. Couto et al. observed that medical students' OSCE scores were lower than oral exams but higher than progress tests, with significant positive correlations across semester grades.[10] Graham et al. found a moderate correlation between dental students' practice grades and OSCE scores, supporting validity and reliability.[30] Terry et al., studying physiotherapy students, reported low but significant correlations between OSCE, written exams, and seminar presentations.[11]

Across various fields, findings consistently show relationships between OSCE and other theoretical or practical exams, suggesting predictive value for later assessments. In the present study, weak to moderate correlations were found. This may be explained by the structure of the OSCE, which included only one care-related and one treatment-related skill, while other exams assessed multiple skills and knowledge through verbal or written responses.

In the OSCE exam, students were evaluated on only two of the more than 20 practices. Thus, in fact, it was expected that the two skills would represent

the assessment of all skills. In the final exam, questions were asked about the procedural steps of all skills, the reasons for the skills (reasons for their implementation), complications related to skills, and pathophysiological mechanisms.[31] The students answered the question from many different fields, from the level of knowledge to the level of assessment according to Bloom's taxonomy.[31] For this reason, the final grades and the OSCE exam are similar, although they do not have a direct and a high relationship. During clinical practice, students were evaluated on other important topics such as communication skills, ethical principles, as well as basic nursing skills. Clinical practice does not consist of the implementation of only a few skills, as in the case of the OSCE. Students get the opportunity to experience more difficult and complex skills such as suctioning and tracheostomy care in a real patient in clinics with skills that are simpler and have fewer procedural steps, such as measuring blood glucose levels.[32,33] Thus, skill learning is consolidated.[33] The reason why the students' OSCE grades are lower compared to clinical practice may be due to the inability to practice enough before the OSCE and the multifaceted evaluation during clinical practice.

Students often make mistakes during the OSCE by performing procedures such as wound care, tracheostomy stoma care, Foley catheter care, and oral care without adequately observing the practice area. During procedures such as wound care and tracheostomy stoma care, students often fail to adhere to the principles of surgical asepsis, while in Foley catheter care, they violate the principles of medical asepsis. Additionally, they frequently neglect to wear disposable gloves and fail to wash their hands after completing the procedure.

A limited number of studies examining practice errors related to the procedural steps have been accessed. In the study of Gürol Arslan et al., the steps of administering drugs from the central venous catheter at different treatment hours of intensive care nurses were examined.[34] It has been reported that all nurses (100%) applied material preparation and 93.3% applied glove-wearing steps at a high rate before the drug administration procedure, but hand washing skills after the procedure were performed at very low rates (13.3-23.3% at different treatment hours). In the study conducted by Özden et al., subcutaneous injection, intramuscular injection, medication administration through a peripheral catheter, and blood sampling procedures were examined. Among these procedures, the most accurately performed steps were material selection, providing information to the patient before the procedure, and wearing gloves. The most frequently reported errors involved checking materials, assessing the injection site, and procedure-specific skill steps. Additionally, handwashing could not be observed in this study, as it was already included in the scenario provided to the students.[1]

In our study, there is no data on whether the students wash their hands before the procedure because the statement that they perform the hand washing procedure is included in the OSCE scenarios given to the students. The fact that all students fully realize the material preparation is in accordance with the literature. It is observed that students do not comply with the procedural steps such as providing and maintaining asepsis principles during wound care, tracheostomy care and foley catheter care at a high rate. As for the skills that must be followed by the rules of medical asepsis, it was found that hand washing was not performed at a high rate after the procedure. The results of the study are similar to the literature.

After the exam, it was seen that the students started the procedure sterile, especially in wound and tracheostomy care, and then contaminated their hands during the practice. Possible anxiety of students may also have caused a violation of asepsis. Although anxiety levels were not examined in the study, it was stated by lecturers during the post-exam meeting and noted in students' written feedback that they were anxious and nervous during the exam, which may have been due to the fear of making mistakes and the uncertainty about which skill would be assessed. Skills that require sterile techniques and multiple procedural steps during skill learning are difficult to learn and cause anxiety for fear of making mistakes in the student.[33] Reasons such as the fact that the OSCE exam was administered before the clinic, there was not enough practice, and exam excitement may

have increased anxiety in the student, eventually lowered their score. In studies where students were asked to provide feedback after the OSCE, it was found that 71% of the students considered the OSCE to be stressful, and they rated their OSCE-related stress as 8 out of 10.[8,18] It was also reported that students experienced stress due to time pressure during the exam.[1] Although the OSCE was described as educational and helpful in reinforcing a sense of confidence, it was also found to cause fear and anxiety.[13] Additionally, some students stated that they did not want to be reassessed through OSCE.[8] In our study, it is thought that the stress experienced by students during the OSCE may have stemmed from not knowing which skill they would be assessed on. Although sample OSCE videos, written, and verbal explanations provided at least one week before the exam could help eliminate uncertainty regarding the exam in general, they could not remove the uncertainty about which specific skill would be evaluated. Therefore, students' fear of making mistakes may have turned into a concern about grades, contributing to their stress and potentially leading to errors during the exam.

LIMITATIONS

The few numbers of students per exam station, each student taking an exam from only 1 maintenance skill practice, the fact that students experienced each skill in only 1 laboratory day before OSCE may have affected the OSCE grades. The fact that most of the common skills items (providing information, preparing materials, inspecting, infection control, waste management, registration of the procedure) in the OSCE checklists were made by students is considered to be a factor in the low Cronbach's alpha values. Skill checklists will be evaluated with repeated analyses in the upcoming OSCE exams and the necessary revisions will be applied. The pilot study could not be conducted due to the nature of the study. Due to the insufficient number of teaching staff, the students took an exam on the care and treatment practices. It is possible that some aspects of the students' performance may not have been visible to the 2 evaluators during the exam. Moreover, since different evaluators were present in each room, full standardization among instructors may not have been achieved.

CONCLUSION

The study concluded that the OSCE, applied with various skills, demonstrated validity and reliability, though it may serve as a low-level predictor for future exams. The CVC and peripheral intravenous catheter care (PICC) care checklists were revised, and further validity and reliability analyses are planned. Sharing OSCE scores and checklists with students may help reinforce skills and correct mistakes. Increasing the number of stations could improve the exam's ability to reflect a broader range of clinical competencies.

To enhance the effectiveness and sustainability of OSCE, integrating it into other courses and better preparing students is recommended. Objective assessment could be supported by having 2 faculty members conduct simultaneous evaluations and by recording the process. Updating skill steps, developing new scenarios and checklists, using moulage for realism, and keeping the lab open for independent practice are also suggested. Replacing clinical nurse mentors with faculty members and recording the assessments could help ensure standardization and improve reliability in future evaluations.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept:** İlkin Yılmaz, Gülşah Gürol Arslan, Sevda Sönmez, Dilek Özden; **Design:** İlkin Yılmaz, Gülşah Gürol Arslan, Sevda Sönmez, Dilek Özden; **Control/Supervision:** İlkin Yılmaz, Gülşah Gürol Arslan; **Data Collection and/or Processing:** İlkin Yılmaz, Gülşah Gürol Arslan, Sevda Sönmez; **Analysis and/or Interpre-

tation: *İlkin Yılmaz, Sevda Sönmez;* ***Literature Review:*** *İlkin Yılmaz, Gülşah Gürol Arslan, Sevda Sönmez, Dilek Özden;* ***Writing the Article:*** *İlkin Yılmaz, Gülşah Gürol Arslan, Sevda Sönmez, Dilek Özden;* ***Critical Review:*** *İlkin Yılmaz, Gülşah Gürol Arslan, Sevda Sönmez, Dilek Özden;* ***References and Fundings:*** *İlkin Yılmaz, Gülşah Gürol Arslan, Sevda Sönmez, Dilek Özden.*

REFERENCES

1. Özden D, Gürol Arslan G, Ertuğrul B, Adanır A. Hemşirelik öğrencilerinin objektif yapilandirilmiş klinik sinav becerisinin teorik ve uygulama başarisi ile ilişkisi [The relationship of nursing students' objective structured clinical exam skills with theoretical and practical success. Dokuz Eylül Üniversitesi Hemşirelik Fakültesi Elektronik Dergisi. 2022;15(4):487-506. [Crossref]
2. Solà-Pola M, Morin-Fraile V, Fabrellas-Padrés N, Raurell-Torreda M, Guanter-Peris L, Guix-Comellas E, et al. The usefulness and acceptance of the OSCE in nursing schools. Nurse Educ Pract. 2020;43:102736. [PubMed]
3. Ismail SM, Rahul DR, Patra I, Rezvani E. Formative vs. summative assessment: impacts on academic motivation, attitude toward learning, test anxiety, and self-regulation skill. Lang Test Asia. 2022;12(1):40. [Crossref] [PMC]
4. Epstein RM. Assessment in medical education. N Engl J Med. 2007;356(4):387-96. [Crossref] [PubMed]
5. Harden RMG, Downie WW, Stevenson M, Wilson GM. Assessment of clinical competence using objective structured examination. Br Med J. 1975;1:447-51. [Crossref] [PubMed] [PMC]
6. Demirağ H, Göktaş Ş, Yıldırım E, Tamgül M, Gökçe M, Akkaya T. Objektif yapılandırılmış klinik sınavı (OYKS) kullanılarak paramedik öğrencilerin mesleki becerilerinin değerlendirilmesi [Evaluation of professional skills of paramedic students by using objective structured clinical exam (OSCE)]. Gümüşhane Univ Sağlık Bilim Derg. 2018;7(4):65-73. [Link]
7. Lee KC, Ho CH, Yu CC, Chao YF. The development of a six-station OSCE for evaluating the clinical competency of the student nurses before graduation: a validity and reliability analysis. Nurse Educ Today. 2020;84:104247. [Crossref] [PubMed]
8. Madenoğlu Kıvanç M, Türen S, Gül A, Miral M, Atakoğlu R, Kara Özçalık C. Hemşirelik eğitiminde öğrenci değerlendirme stratejisi: objektif yapılandırılmış klinik sınavı [Student assessment strategy in nursing education: objective structured clinical examination]. Sağlık ve Yaşam Bil Derg. 2023;5(2):80-6. [Crossref]
9. Malakooti N, Bahadoran P, Ehsanpoor S. Assessment of the midwifery students' clinical competency before internship program in the field based on the objective structured clinical examination. Iran J Nurs Midwifery Res. 2018;23(1):31-5. [PubMed] [PMC]
10. Couto LB, Durand MT, Wolff ACD, Restini CBA, Faria M Jr, Romão GS, et al. Formative assessment scores in tutorial sessions correlates with OSCE and progress testing scores in a PBL medical curriculum. Med Educ Online. 2019;24(1):1560862. [Crossref] [PubMed] [PMC]
11. Terry R, Hing W, Orr R, Milne N. Relationships between pre-clinical summative assessment scores and the clinical performance of physiotherapy students. J Allied Health. 2020;49(1):e13-e19. [PubMed]
12. Albannaa R, Almela T. Evaluation of objective structured clinical examination-assessed competence and perceived confidence in oral surgery among final-year undergraduate student. J Dent Educ. 2025. [Crossref] [PubMed]
13. Akın Korhan E, Tokem Y, Uzelli Yılmaz D, Dilemek H. Hemşirelikte psikomotor beceri eğitiminde video destekli öğretim ve OSCE uygulaması: bir deneyim paylaşımı [Video-based teaching and OSCE implementation in nursing psychomotor skills education: sharing of an experience]. İzmir Kâtip Çelebi Üniversitesi Sağlık Bilimleri Fakültesi Dergisi. 2016;1(1):35-7. [Link]
14. Miller GE. The assessment of clinical skills/competence/performance. Acad Med. 1990;65(9 Suppl):S63-7. [PubMed]
15. Adams NE. Bloom's taxonomy of cognitive learning objectives. J Med Libr Assoc. 2015;103(3):152-3. [PubMed] [PMC]
16. Brown J. Preparation for objective structured clinical examination: a student perspective. J Perioper Pract. 2019;29(6):179-84. [Crossref] [PubMed]
17. Mortsiefer A, Karger A, Rotthoff T, Raski B, Pentzek M. Examiner characteristics and interrater reliability in a communication OSCE. Patient Educ Couns. 2017;100(6):1230-4. [Crossref] [PubMed]
18. Goh HS, Ng E, Tang ML, Zhang H, Liaw SY. Psychometric testing and cost of a five-station OSCE for newly graduated nurses. Nurse Educ Today. 2022;112:105326. [Crossref] [PubMed]
19. D'Aoust R, Slone SE, Russell N, Budhathoki C, Ling C. PRIME-nurse practitioner competency model validation and criterion based OSCE rubric interrater reliability. BMC Med Educ. 2024;24(1):124. [Crossref] [PubMed] [PMC]
20. Chabrera C, Diago E, Curell L. Development, validity and reliability of objective structured clinical examination in nursing students. SAGE Open Nurs. 2023;9. [Crossref] [PubMed] [PMC]
21. Huang HP, Chao LF, Wang YH, Liu YM, Ni LF, Jane SW. The establishment and examination of the reliability, validity, discrimination, and difficulty of nursing Objective Structured Clinical Examination (OSCE). Hu Li Za Zhi. 2017;64(6):67-76. Chinese. [Crossref] [PubMed]
22. Bagnasco A, Tolotti A, Pagnucci N, Torre G, Timmins F, Aleo G, et al. How to maintain equity and objectivity in assessing the communication skills in a large group of student nurses during a long examination session, using the Objective Structured Clinical Examination (OSCE). Nurse Educ Today. 2016;38:54-60. [Crossref] [PubMed]
23. Akın Korhan E, Uzelli Yılmaz D, Ceylan B, Akbıyık A, Tokem Y. Hemşirelikte psikomotor becerilerin öğretiminde senaryo temelli öğrenme: bir deneyim paylaşımı [Scenario based teaching in nursing psychomotor skills education: sharing of an experience]. İzmir Kâtip Çelebi Üniversitesi Sağlık Bilimleri Fakültesi Dergisi. 2018;3(3):11-6. [Link]
24. Bani-Issa W, Al Tamimi M, Fakhry R, Tawil HA. Experiences of nursing students and examiners with the Objective Structured Clinical Examination method in physical assessment education: a mixed methods study. Nurse Educ Pract. 2019;35:83-9. [Crossref] [PubMed]
25. Taber KS. The use of Cronbach's alpha when developing and reporting research instruments in science education. Res Sci Educ. 2018;48(6):1273-96. [Crossref] [PubMed]
26. Aronowitz T, Aronowitz S, Mardin-Small J, Kim B. Using Objective Structured Clinical Examination (OSCE) as education in advanced practice registered nursing education. J Prof Nurs. 2017;33(2):119-25. [Crossref] [PubMed]
27. Chongloi N, Thomas P, Hansaram, Ara M, Deepak KK. Attitudes of undergraduate nursing students toward Objective Structure Practical Examination: an Exploratory study. Int J Nurs Sci. 2016;4(1):68-72. [PubMed] [PMC]
28. Daniels VJ, Pugh D. Twelve tips for developing an OSCE that measures what you want. Med Teach. 2018;40(12):1208-13. [PubMed]

29. East L, Peters K, Halcomb E, ve ark. Evaluating objective structured clinical assessment (OSCA) in undergraduate nursing. Nurse Educ Pract. 2014;14(5):461-7. [Crossref] [PubMed]

30. Graham R, Zubiaurre Bitzer LA, Anderson OR. Reliability and predictive validity of a comprehensive preclinical OSCE in dental education. J Dent Educ. 2013;77(2):161-7. [PubMed]

31. Bektaş M, Akdeniz Kudubeş A. Bir ölçme ve değerlendirme aracı olarak: yazılı sınavlar [As a measurement and evaluation tool: written exams]. DEU Hemş Yüksekok Elektron Derg. 2014;7(4):330-6. [Link]

32. Hengameh H, Afsaneh R, Morteza K, Hosein M, Marjan SM, Abbas E. The effect of applying direct Observation of Procedural Skills (DOPS) on nursing students' clinical skills: a randomized clinical trial. Glob J Health Sci. 2015;7(7 Spec No):17-21. [Crossref] [PubMed] [PMC]

33. Aldridge MD, Hummel F. Nursing students' perceptions of skills learning: a phenomenological study. Nurse Educ. 2019;44(3):170-4. [Crossref] [PubMed]

34. Gürol Arslan G, Özden D, Alan N, Yilmaz İ, Ayik C, Göktuna G. Examination of nursing drug administration practices via central venous catheter: An observational study. J Vasc Access. 2020;21(4):426-33. [Crossref] [PubMed]