

## Implementing OSCE Exam for Undergraduate Pharmacy Students: A Two Institutional Mixed-Method Study

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### ABSTRACT

**Introduction:** This study evaluates undergraduate pharmacy students' and examiners' perceptions of implementing OSCE exam.

**Methods:** A sample of 185 undergraduate pharmacy students (138 from Zarqa University and 47 from Yarmouk University) and 20 examiners were invited to complete a quantitative survey and qualitative focus group discussion, respectively.

**Results:** 103 out of 185 (56%, response rate) undergraduate pharmacy students completed the quantitative survey, with 11 examiners out of 20 (55%) agreeing to participate in the examiners' focus group discussion. Most pharmacy students agreed that OSCE exam was a practical and useful experience (74.8%) and should be part of the assessment in other pharmacy courses (61.2%). However, less than a quarter thought that OSCE exam was not fair (17.5%), very intimidating (20.4%), and needed more time (29.1%). Examiners were generally in favour of OSCE exam being well-organised and well-administered despite the need for a large place to conduct and a good number of pharmacy staff to implement.

**Conclusion:** Pharmacy students and examiners agreed that OSCE exam is an excellent and preferable clinical assessment tool. This study provides a scheme to evaluate OSCE exam as a clinical assessment tool and would help policy-makers gain more insight into the impact of implementing OSCE exam on students' clinical knowledge and communicational skills development and learning process.

**Keywords:** Clinical Performance, Pharmacy Education, OSCE Exam, Undergraduate Pharmacy Students, Mixed-Method, Pharmacy Training.

### 1. INTRODUCTION

Advances in pharmacy practice have transformed pharmacists' role from traditional dispensing to more patient-centred care practices (1–3). Pharmacists are currently assigned to provide pharmaceutical care services focusing on patient interviewing, taking a medication

history, identifying medication-related problems, and designing an evidence-based pharmaceutical care plan (2,4–6). The advancement of the pharmacist's role should be met by restructuring the pharmacy education and assessment from focusing only on medicine compounding, selling, and dispensing to include pharmaceutical care provision (7–11).

The undergraduate pharmacy education in Jordan has changed tremendously, evidenced by the shift from a customer-based approach to a patient-centered approach (2,12–14). However, pharmacy schools in Jordan still

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adopt the traditional approach for evaluating undergraduate students' clinical competence (14). This approach has many limitations, such as low standardisation, subjectivity in evaluation, time-consuming, and testing of a limited number of intended learning outcomes (7,15). Such limitations posed a challenge that necessitates the search for standardised, more effective, and objective performance-based assessment tools (16,17).

Objective Structured Clinical Examination (OSCE) exam is a valuable tool for evaluating medical, pharmacy, and nursing students' clinical skills performance, and many studies have focused on using and introducing OSCE earlier in the pharmacy curriculum (18–22). The significance of OSCE exam is that it measures cognitive learning, essential practice skills, and the ability to communicate effectively using problem-solving skills (23–25). Pharmacy Schools at Zarqa and Yarmouk University have adopted OSCE exam as part of the curriculum change toward enhancing students' capabilities to provide a patient-centered approach to evaluate undergraduate pharmacy students' clinical and communicational skills and based on the recommendations of the pharmacy training committee and considering students' and academic staff feedback. Other universities, such as Jordan University of Science and Technology and the University of Jordan, have adopted OSCE exams for evaluating undergraduate Pharm D students. For example, data from the study conducted to assess the first-time implementation of OSCE exam for undergraduate Pharm D students at the University of Jordan showed a positive influence of OSCE exam on both students and pharmacy staff and opened the door for the implementation of OSCE at pharmacy schools in Jordan (26). This study aimed to evaluate quantitatively the undergraduate pharmacy students and qualitatively the examiners' perceptions toward the OSCE exam implementation in pharmacy schools of two Jordanian universities using a mixed method design.

## **2. METHODS**

**2.1 Compliance with ethical standards:** This study was approved by the University Ethics Committee (supplementary material), and was given an approval number (1/3/2019-2020). Also, an informed consent form was obtained from all participants, ensuring that participation was voluntary and participants could withdraw at any stage, with their answers treated confidentially.

### **2.2 Study design setting and OSCE exam implementation**

This is a mixed-method study where a quantitative survey (from Zarqa and Yarmouk universities) and qualitative focus group discussion (only from Zarqa University) were used to collect perceptions from undergraduate pharmacy students and examiners about OSCE exam implementation directly after finishing OSCE exam.

The undergraduate pharmacy students who underwent OSCE exam as a part of a compulsory exam of a 3-credit pharmacy training course at Zarqa University and a 3-credit pharmaceutical care course at Yarmouk University were invited to participate. Data were collected from 103 undergraduate pharmacy students who agreed to participate. OSCE exam, which was conducted at the end of the summer (August 2021) semester (Zarqa University) and the end of the second (May 2021) semester (Yarmouk University) of the academic year (2020-2021), was composed of two stations (i.e., mini OSCE). The first station consists of a multiple-choice question focusing on the required knowledge that pharmacy students should have, such as generic and brand names, primary care diseases, and rational medication use. The second station focused on simulated patient case scenarios, and pharmacy students were required to provide patients with oral, face-to-face pharmaceutical care. The clinical pharmacy training committees (i.e., at Zarqa and Yarmouk universities) that designed OSCE exam had two academics (i.e., HA and MN) who already had experience in OSCE

implementation. Also, the OSCE exam setup was reviewed by two Academics, one physician, and one community pharmacist.

An anonymous survey to assess the student's perception toward OSCE exam implementation was delivered by hand along with pharmacy students' feedback on the same day (i.e., after the OSCE exam was finished) and was filled out by undergraduate pharmacy students from the two universities. The survey was developed based on a comprehensive literature review (21,27–33) and modified according to the experts' (three senior academics, one community pharmacist, and one physician) feedback to fit the study aims. The experts commented on the survey items' wording, clarity, and comprehensiveness and whether each item was relevant to the study aims. The authors reviewed the experts' feedback and comments and used them to refine the final version of the survey. The first section of the survey asks about student background information (i.e., educational level, age, and gender). The second, third, fourth, and fifth sections of the 3- point Likert scale survey (i.e., agree, neutral, and disagree) ask about OSCE exam attributes, performance, objectivity, scores, and outcomes.

After finishing the OSCE exam, examiners were invited to a group discussion to explore their perception of the OSCE exam implementation. The focus group discussion interview guide was developed based on the determined OSCE exam setup (i.e., mini OSCE) and the aims of this study and reviewed by two academic experts on qualitative research. During the "group discussion," examiners were asked general questions about exam implementation, logistics, and outcomes (supplementary material).

### **2.3 Data analysis**

Descriptive statistics were used to analyse the

undergraduate pharmacy student's survey results using SPSS (V23). Students' scores and regression analysis were also conducted. The focus group discussion (only at Zarqa University) was audio-recorded, and transcription was produced verbatim by two researchers (HA and MN). The transcription data were read and re-read before being qualitatively analysed and coded manually by HA (i.e., the moderator/facilitator of the focus group discussion) using thematic analysis into major and minor themes according to the six phases described by Braun and Clarke (34) and reviewed by MN. The results (i.e., the major and minor themes) were shared with our 11 examiners as part of the checking and validation process to ensure the data's accuracy, resonance, and credibility.

## **3. RESULTS**

### **3.1 Student Perceptions (Quantitative part)**

#### **3.1.1 Demographics data**

A sample of 185 pharmacy students (138 from Zarqa University and 47 from Yarmouk University) was targeted, with only 103 (73 from Zarqa University and 30 from Yarmouk University) pharmacy students completing the survey (response rate 56%).

The pharmacy students' ages range from 19 to 45 years. Around two-thirds (N=72, 70.6%) studied pharmacy at Zarqa University, and the vast majority of students were female (N=79, 76.7%), and around half were in their fifth (last) year of study (N=53, 51.5%). Only one-third had a pharmacy diploma before completing a bachelor's degree. Demographic data were summarised in Table (1). Six students reported being in their first, second, and third years held a pharmacy diploma before enrolling in the third-year level and were all studying at Zarqa University.

**Table 1: Characteristics of the study sample (N=103)**

Parameter	N (%)
<b>*Age in years</b>	
18 – 26	89 (86.4%)
27 – 40	8 (7.8%)
> 40	2 (1.9%)
<b>*Gender</b>	
Male	19 (18.4%)
Female	79 (76.7%)
<b>*University</b>	
Zarqa Private University	72 (70.6%)
Yarmouk Governmental University	30 (29.4%)
<b>Having a pharmacy Diploma before studying for a Bachelor of Pharmacy degree</b>	
Yes	29 (28.2%)
No	74 (71.8%)
<b>*Bachelor of pharmacy year level of study</b>	
First-year (holding diploma in pharmacy)	2 (1.9%)
Second-year (holding diploma in pharmacy)	1 (1.0%)
Third-year (holding diploma in pharmacy)	3 (2.9%)
Fourth-year	39 (37.9%)
Fifth-year	53 (51.5%)

\* Some data was missing; subsequently, totals do not always add to 103.

### 3.1.2 Pharmacy Students' Perceptions of OSCE exam attributes, performance, scoring, objectivity, feedback, and outcomes

As shown in Table 2. The majority of pharmacy students agreed on OSCE exam attributes; they were given full OSCE exam directions (N=61, 59.2%), OSCE exam was well administered (N=67, 65.0%), and OSCE exam allowed them to highlight their areas of weaknesses (N=64, 62.1%). On the other hand, a few pharmacy students thought that OSCE exam was not fair (N=18, 17.5%), very intimidating (N=21, 20.4%), and needed more time (N=30, 29.1%). Regarding OSCE exam performance, the majority of pharmacy students agreed that instructions given before and during starting

OSCE exam were clear (N=71, 68.9%), beneficial (N=72, 69.9%), and provided the opportunity to learn (N=70, 68%). Also, most of the pharmacy students agreed that OSCE exam was practical and gave them useful experience (N=77, 74.8%), communication skills were essential during OSCE exam (N=87, 84.5%), and feedback given after OSCE exam was necessary for learning (N=78, 75.7%). Finally, when asking about OSCE exam outcomes, most of the students agreed that OSCE exam made them aware of the types of mistakes that could happen during the dispensing process in real practice (N=74, 71.8%), counselling process (N=72, 69.9%) and that OSCE exam should be included as an assessment method in other pharmacy classes (N=63, 61.2%).

**Table 2: Pharmacy Students' perceptions of OSCE exam attributes, performance, scoring, objectivity, feedback, and Outcomes (N=103)**

Questionnaire Item	Response		
	Disagree, N (%)	Uncertain, N (%)	Agree, N (%)
<b>Points of evaluation</b>			
<b>The OSCE attributes</b>			
Full directions were given about OSCE by the school of pharmacy staff	5 (4.9%)	37 (35.9%)	61 (59.2%)
The OSCE was well administered by the school of pharmacy staff	7 (6.8%)	28 (27.2%)	67 (65.0%)
The OSCE is well structured and sequenced by the school of pharmacy staff	7 (6.8%)	35 (34.0%)	61 (59.2%)
The OSCE was appealing	3 (2.9%)	38 (36.9%)	60 (58.3%)
The OSCE was less stressful than other exams	46 (44.7%)	23 (22.3%)	33 (32.0%)
The OSCE allowed you to highlight the area of weaknesses you have as a pharmacy student	8 (7.8%)	31 (30.1%)	64 (62.1%)
<b>The OSCE performance</b>			
Instructions were given clearly <i>before</i> the OSCE	10 (9.7%)	22 (21.4%)	71 (68.9%)
Instructions <i>before</i> the OSCE was beneficial for the exam performance	5 (4.9%)	26 (25.2%)	72 (69.9%)
Instructions <i>during</i> the OSCE were clear and unambiguous	11 (10.7%)	31 (30.1%)	61 (59.2%)
The OSCE provided you with opportunities to learn	7 (6.8%)	22 (21.4%)	70 (68.0%)
<b>The OSCE scoring, objectivity, and feedback</b>			
The OSCE was practical and useful experience	5 (4.9%)	21 (20.4%)	77 (74.8%)
Communication skills are essential during the OSCE	5 (4.9%)	11 (10.7%)	87 (84.5%)
OSCE scores were affected by personalities and social relations	15 (14.6%)	20 (19.4%)	68 (66.0%)
Feedback given after OSCE by the pharmacy staff was clear and unambiguous	11 (10.7%)	31 (30.1%)	61 (59.2%)
Feedback given after OSCE was necessary for learning	6 (5.8%)	17 (16.5%)	78 (75.7%)
Feedback given after OSCE was objective and not subjective	7 (6.8%)	33 (32.0%)	60 (58.3%)
<b>Outcomes of the OSCE</b>			
The OSCE made students aware of the types of mistakes that can be made in the course of pharmacists' dispensing process	4 (3.9%)	22 (21.4%)	74 (71.8%)
The OSCE made students aware of the types of mistakes that can be made in the course of a pharmacists counseling process	3 (2.9%)	25 (24.3%)	72 (69.9%)
The OSCE should be included as an assessment method in other pharmacy classes	8 (7.8%)	29 (28.2%)	63 (61.2%)

### 3.1.3 Assessment of factors affecting pharmacy students' perception toward implementing OSCE exam as a clinical performance-based assessment tool

As shown in Table 3, pharmacy students at Zarqa University were more uncertain than pharmacy students at

Yarmouk University in that; the pharmacy staff well-administered OSCE exam ( $p = 0.025$ ), OSCE exam setting, and content at each station were compatible with real situations ( $p = 0.009$ ), and OSCE exam allowed to compensate pharmacy students weaknesses area ( $p =$

0.014). Also, pharmacy students at Yarmouk University were more agreed than pharmacy students at Zarqa students in that; OSCE exam covered broad areas of pharmacy training ( $p = 0.04$ ), allowed them to highlight their areas of weaknesses ( $p < 0.001$ ), instructions were given clearly before OSCE exam ( $p = 0.02$ ), the time at each station was adequate ( $p < 0.001$ ), and that OSCE exam made pharmacy students aware of the types of mistakes during dispensing and counselling processes ( $p =$

0.011, 0.005 respectively). Lesser-year students were more uncertain than fifth-year students in that; OSCE exam setting and content at each station were compatible with real situations ( $p = 0.004$ ) and awareness of the nature of OSCE exam ( $p = 0.049$ ). Alternatively, fifth-year pharmacy students were more agreed than lesser years students in that; instructions were given clearly before OSCE exam ( $p = 0.008$ ), instructions were beneficial ( $p = 0.003$ ), and clear and unambiguous ( $p < 0.001$ ).

**Table 3: Assessment of factors affecting pharmacy students' perception toward implementing OSCE exam as a clinical performance-based assessment tool (N=103)**

Parameter	Demographic variable (p-value, comments)				
	Gender	Age groups	University	Studying year	Diploma before BSc
<b>The OSCE attributes</b>					
Full directions were given about OSCE by the school of pharmacy staff	0.08	0.69	0.014 Zarqa students were more uncertain than Yarmouk students	0.02 Fifth-year students agreed more than lesser-year students	0.35
Awareness about the level of information needed for OSCE was appropriate	0.33	0.11	0.09	0.24	0.11
The OSCE was well administered by the school of pharmacy staff	0.01 Females agreed more than males	0.41	0.025 Zarqa students agreed more than Yarmouk students	0.19	0.12
The OSCE is well structured and sequenced by the school of pharmacy staff	0.12	0.48	0.76	0.85	0.23
The OSCE setting and content at each station were compatible with real situations (authentic)	0.92	0.64	0.009 Zarqa students were more uncertain than Yarmouk students	0.004 Lesser-year students were more uncertain than the fifth-year students	0.73
The OSCE was fair	0.21	0.29	0.112	0.31	0.36

Parameter	Demographic variable (p-value, comments)				
	Gender	Age groups	University	Studying year	Diploma before BSc
The OSCE was very intimidating	0.07	0.56	<0.001 Yarmouk students disagreed more than Zarqa students	0.12	0.52
The OSCE was very stressful	0.15	0.44	<0.001 Zarqa students agreed more than Yarmouk students	<0.001 Lesser-year students agreed more than the fifth-year students	0.16
The OSCE was appealing	0.56	0.99	0.26	0.37	0.14
The OSCE was less stressful than other exams	0.32	0.38	<0.001 Zarqa students disagreed more than Yarmouk students	0.03 Lesser-year students disagreed more than the fifth-year students	0.04 Students with Diplomas disagreed more than those not having diplomas before BSc.
More time was needed	0.35	0.34	0.029 Zarqa students agreed more than Yarmouk students	0.58	0.72
The OSCE covered broad areas of pharmacy training	0.49	0.65	0.04 Yarmouk students agreed more than Zarqa students	0.59	0.37
The OSCE allowed you to highlight the area of weaknesses you have as a pharmacy student	0.89	0.75	<0.001 Yarmouk students agreed more than Zarqa students	0.17	0.016 Students not having Diplomas agreed more than those with diplomas before BSc.
The OSCE allowed you to compensate for the area of weaknesses you have as a pharmacy student	0.10	0.51	0.014 Zarqa students were more uncertain than Yarmouk students	0.12	0.15

Parameter	Demographic variable (p-value, comments)				
	Gender	Age groups	University	Studying year	Diploma before BSc
<b>The OSCE performance</b>					
Awareness of the nature of the OSCE	0.61	0.50	0.008 Yarmouk students agreed more than Zarqa students	0.05 Lesser-year students were more uncertain than the fifth-year students	0.36
Instructions were given clearly <i>before</i> the OSCE	0.16	0.24	0.002 Yarmouk students were more agree than Zarqa students	0.008 The fifth-year students agreed more than lesser-year students	0.31
Instructions <i>before</i> the OSCE were beneficial for the exam performance	0.33	0.89	0.07	0.003 The fifth-year students year agreed more than lesser-year students	0.53
The OSCE tasks reflected those taught	0.91	0.29	0.002 Yarmouk students agreed more than Zarqa students	0.04 The fifth-year students agreed more than lesser-year students	0.33
Time at each station of the OSCE was adequate	0.08	0.17	<0.001 Yarmouk students agreed more than Zarqa students	0.13	0.48
Instructions <i>during</i> the OSCE were clear and unambiguous	0.36	0.22	<0.001 Yarmouk students agreed more than Zarqa students	<0.001 The fifth-year students agreed more than lesser-year students	0.12
Tasks asked during the OSCE were fair	0.96	0.74	0.68	0.80	0.34
The sequence of stations was logical and appropriate	0.07	0.78	0.06	0.25	0.26



Parameter	Demographic variable (p-value, comments)				
	Gender	Age groups	University	Studying year	Diploma before BSc
The OSCE provided you with opportunities to learn	0.70	0.84	0.003 Yarmouk students agreed more than Zarqa students	0.38	0.27
<b>The OSCE scoring, objectivity, and feedback</b>					
The guidance about the OSCE scoring system was given	0.21	0.98	0.75	0.68	0.47
The OSCE scores provide a true measure of essential clinical skills required for you as a pharmacy student	0.63	0.16	0.73	0.89	0.06
The OSCE scores were standardized	0.91	0.20	0.06	0.21	0.89
The OSCE was practical and useful experience	0.19	0.32	0.003 Yarmouk students agreed more than Zarqa students	0.26	0.11
Communication skills are essential during the OSCE	0.20	0.94	0.017 Yarmouk students agreed more than Zarqa students	0.78	0.38
OSCE scores were affected by personalities and social relations	0.24	0.89	0.003 Yarmouk students agreed more than Zarqa students	0.16	0.85
Feedback given after OSCE by the pharmacy staff was clear and unambiguous	0.77	0.50	<0.001 Yarmouk students agreed more than Zarqa students	0.13	0.07
Feedback given after OSCE was necessary for learning	0.19	0.87	0.024 Yarmouk students agreed more than Zarqa students	0.56	0.67

Parameter	Demographic variable (p-value, comments)				
	Gender	Age groups	University	Studying year	Diploma before BSc
Feedback given after OSCE was objective and not subjective	0.21	0.73	0.003 Yarmouk students agreed more than Zarqa students	0.60	0.78
The overall quality of the feedback given to you after the OSCE was good	0.19	0.56	0.21	0.48	0.52
<b>Outcomes of the OSCE</b>					
The OSCE made students aware of the types of mistakes that can be made in the course of the pharmacist dispensing process	0.81	0.78	0.011 Yarmouk students agreed more than Zarqa students	0.59	0.38
The OSCE made students aware of the types of mistakes that can be made in the course of a pharmacists counseling process	0.15	0.21	0.005 Yarmouk students agreed more than Zarqa students	0.95	0.91
The OSCE should be included as an assessment method in other pharmacy classes	0.36	0.27	0.001 Yarmouk students agreed more than Zarqa students	0.51	0.38

\* Gender (reference; male), Age group (Reference; 18-26 years), University (Reference; Zarqa University), Studying year (Reference; first year), Having a pharmacy before (Reference; yes).

\* Chi-Square correlation test  $\chi^2$  and Fisher exact tests were used to test the correlations.

The study shows positive students' OSCE perception scores of 33.13 ( $\pm$  4.02) out of 44. Simple linear and multiple regression analyses were conducted to assess the correlation

between demographic factors and the students' OSCE perception scores. Table 4 shows that all tested variables were not significant predictors for this score ( $p > 0.05$ ).

**Table 4: Assessment of different predictive factors affecting students' OSCE perception score (N=103)**

Independent variables	Dependent variable: students' OSCE perception score			
	Standardised Coefficients Beta	P-value#	Standardised Coefficients Beta	P-value\$
University type (Zarqa, Yarmouk)	0.023	0.068	0.170	0.161
Age group (18-26, 27-40, > 40)	0.010	0.731	0.062	0.551
Gender (male, female)	0.001	0.317	0.082	0.445

Independent variables	Dependent variable: students' OSCE perception score			
	Standardised Coefficients Beta	P-value#	Standardised Coefficients Beta	P-value\$
Having a pharmacy Diploma before studying for a Bachelor of Pharmacy degree (Yes, No)	-0.009	0.731	-0.080	0.485
Bachelor of pharmacy year level of study (1st, 2nd, 3rd,4th,5th)	0.027	0.829	0.080	0.506

#: using simple linear regression, \$: using stepwise multiple linear regression.

### 3.2 Examiner's Perceptions (Qualitative part)

Four major themes were identified (table 5): "OSCE exam implementation and logistics," "OSCE exam objectivity and fairness," "OSCE exam compared to traditional examination methods," and "Advantages and disadvantages of implementing OSCE."

#### 3.2.1 Examiner's Perceptions demographics data

The focus group discussion was completed with 11

examiners out of 20 (55%) who participated in the OSCE exam at Zarqa University. Examiners' age was between 26 to 45 years. Also, around (55%) of examiners were female. The academics comprised the majority of the examiners (64%), followed by community pharmacists (27%) and physicians (9%). Only three examiners (27%) had their first-time OSCE exam experience. Focus group discussion participants' characteristics were summarised in Table (4).

**Table 4: Focus group discussion participants' characteristics at Zarqa University**

Parameter	N (%)
<b>Age in years</b>	
26 - 35	3 (27%)
36 - 45	8 (73%)
<b>Gender</b>	
Male	5 (45%)
Female	6 (55%)
<b>Occupation</b>	
Academics	7 (64%)
Community pharmacist	3 (27%)
Physician	1 (9%)
<b>Experiences as OSCE examiner</b>	
First time as an OSCE examiner <sup>1</sup>	3 (27%)
Experienced OSCE examiner	8 (73%)

<sup>1</sup> The first time as an OSCE examiner was all academics.

#### 3.2.2 OSCE exam implementation and logistics

Examiners were in favour that OSCE exam was well-organised and well-administered. Regarding OSCE exam attributes, examiners felt that pharmacy students were given clear instructions before entering OSCE exam station and adequate time to provide pharmaceutical care. Also,

examiners ensured that they were oriented before starting OSCE exam, organisers and invigilators allowed an easy flow of pharmacy students for each exam centre with little or no distractions, and patients were well-trained and informed about each clinical case scenario. Lastly, regarding OSCE exam logistics, examiners believed that OSCE exam was vast

and challenging to organise based on having 10 OSCE exam centres that require a large place and a good number of pharmacy staff to conduct and that each exam centre requires two examiners and one patient (i.e., 30 academic/non-academic staff). However, having ten exam centres allowed examining many pharmacy students in a short time. The following quotes illustrate the former points:

“There is a significant and clear organizational effort to implement OSCE exam. Also, the exam invigilators and the security person facilitate the OSCE exam flow ” (Examiner 1, Male, Academic).

“Students were familiar with the exam directions. Also, I felt as an examiner that the OSCE exam flow was smooth, and the students were oriented and familiar with the case scenarios. ” (Examiner 3, Male, Community pharmacist).

“ Despite the tremendous administrative effort, I think having many exam centers is very challenging and requires a large number of examiners and patients. (Examiner 4, Female, Academic). “Yes, I totally agree; this makes the OSCE exam implementation more stressful and difficult” (Examiner 6, Male, Physician).

### **3.2.3 OSCE exam objectivity and fairness**

Examiners were in favour that OSCE exam centres' environment reflected fair and well-developed real clinical case scenarios covering common diseases and clinical skills, and different competencies such as communicational skills, counseling and patient education, dose optimisation, adverse drug reactions, patient up or down referral, and responsible primary care management. The following quotes illustrate the former points:

“I think the clinical case scenarios were more practical and reflected the reality, and the students have shown good skills and abilities to respond to these cases” (Examiner 5, Female, Academic).

“The students showed good knowledge and communicational skills to deal with clinical case scenarios during OSCE exam” (Examiner 11, Female, Academic)

“The clinical case scenarios contain common diseases

and medications related to primary care” (Examiner 8, Male, Community pharmacist). “I agree; I felt that students understand their role when referring patients back to the primary care physician” (Examiner 6, Male, Physician).

### **3.2.4 OSCE exam compared to traditional examination methods**

Examiners favored the OSCE exam as preferable but more challenging to conduct compared to other clinical examination forms. Also, examiners believed that OSCE exam was more stressful for pharmacy students, who were sometimes intimidated by the exam. Despite this, examiners supported the idea that OSCE exam would uncover more strengths and weaknesses the pharmacy students might have compared to other forms of clinical examination and that the feedback provided to pharmacy students was essential in enhancing their self-development of clinical knowledge and skills. The following quotes illustrate the former points:

“Despite the difficulty of conducting OSCE exam and the fear and tension of some students, OSCE exam is far better than the traditional exams” (Examiner 10, Female, Academic).

“OSCE exam is significant considering the fact that pharmacist role is now more patient centred” (Examiner 7, Female, Academic).

“According to my experience as a community pharmacist, I do believe that pharmacy students should have more OSCE exams than the classical way of examinations” (Examiner 2, Female, Community pharmacist).

### **3.2.5 Advantages and disadvantages of implementing OSCE**

Examiners were in favour that OSCE exam would positively impact pharmacy students' learning process in terms of clinical knowledge and communicational skills. However, OSCE exam would require pharmacy students to have good pharmacist-patient communication skills and clinical knowledge to perform well during OSCE exam. The following quotes illustrate the former points:

“ OSCE exam measures both student's knowledge and

clinical skills. To be honest, I am thinking of implementing OSCE exam at our faculty of pharmacy” ( Examiner 9, Male, Academic).

“Despite the logistical costs, time, and staff requirements, undoubtedly, OSCE advantages outweigh the disadvantages” (Examiner 2, female, Community pharmacist).

**Table 5: Focus group discussion major and minor themes**

<p><b>1. OSCE exam implementation and logistics</b></p> <p><i>OSCE exam was well-organised and well-administered</i></p> <ul style="list-style-type: none"> <li>- Clear OSCE exam instructions.</li> <li>- OSCE case scenario training</li> <li>- OSCE exam orientation.</li> <li>- OSCE exam implementation process.</li> <li>- Adequate time per OSCE station.</li> <li>- Easy OSCE exam flow.</li> </ul> <p><i>OSCE exam required large numbers of staff and large space to conduct</i></p> <ul style="list-style-type: none"> <li>- Ten OSCE exam centres.</li> <li>- Examiners per OSCE station.</li> <li>- Patient per OSCE station.</li> <li>- Invigilators and pharmacy staff.</li> <li>- A large number of pharmacy students.</li> </ul>
<p><b>Objectivity and fairness</b></p> <p><i>OSCE exam clinical case scenarios covered common clinical and communicational skills</i></p> <ul style="list-style-type: none"> <li>- OSCE exam centres environment.</li> <li>- Primary care problems mimic real case scenarios.</li> <li>- Clinical case scenarios competencies.</li> <li>- Clinical case scenarios were well-developed.</li> <li>- Clinical case scenarios were fair.</li> <li>- Pharmacy students' feedback.</li> <li>- Pharmacy students' self-development of clinical knowledge and skills.</li> </ul>
<p><b>OSCE exam compared to traditional examination methods</b></p> <ul style="list-style-type: none"> <li>- OSCE exam is preferable.</li> <li>- OSCE exam is more challenging.</li> <li>- OSCE exam is more stressful.</li> <li>- OSCE exam is more competency-based.</li> </ul>
<p><b>Advantages and disadvantages of implementing OSCE</b></p> <ul style="list-style-type: none"> <li>- OSCE exam has a positive impact on the learning process.</li> <li>- OSCE exam uncovered clinical knowledge.</li> <li>- OSCE exam uncovered communicational skills.</li> <li>- OSCE exam student performance.</li> <li>- OSCE exam is stressful.</li> <li>- OSCE exam is sometimes intimidating.</li> </ul>

#### 4. DISCUSSION

The impact of OSCE exam in evaluating student knowledge, communication, and clinical skills competencies was evident in many studies (35–38). OSCE exam has been used to assess students' knowledge gained (i.e., to “show how”) (39–42), their ability to memorise and reproduce the information (i.e., students “know” and “know-how”) (39–42), and making students more self-aware and encourages them to identify their strengths and weaknesses.

Findings from the quantitative part showed that most pharmacy students agreed on receiving full clear, beneficial OSCE exam directions; OSCE exam was practical and well administered, OSCE exam allowed them to learn, highlighted their areas of weaknesses, and identified the mistakes that occurred during dispensing and counselling process. However, less than a quarter of pharmacy students thought that OSCE exam was not fair, very intimidating, and required more time. This is consistent with the results of other studies (21,26,33,43,44). For example, results from a study evaluating the use of a community pharmacy-based OSCE to consider self-care clinical skills in first-year pharmacy students in the school of pharmacy University of Arizona (USA) showed that the majority of students believed that OSCE exam was fair, covers a wide clinical wide range of vital clinical skills and that OSCE exam provided a practical experience and valuable learning opportunity (43). Also, results from another study showed that most students believed that OSCE exam was fair, covered the necessary knowledge and competencies, and that OSCE exam was well-administered and well-organised (21). However, the majority of students in this study (21) believed that OSCE exam was stressful and intimidating, contrasting the results of our study. Lastly, results from a Jordanian study (26) that evaluated OSCE exam in undergraduate Pharm D students at Jordan University revealed that a significant number of students believed that the time for each station was inappropriate, which contrasts with the results from our study. Although the Jordanian study raised a concern that the time may be considered a problem affecting student concentration in the

exam, one study (42) reported that increasing the station time had no significant impact on student's performance during OSCE exam.

Pharmacy students at Zarqa University were more uncertain than pharmacy students at Yarmouk University in that; OSCE exam was well-administered, the content at each station was compatible with real situations, and OSCE allowed to compensate for the area of pharmacy students' weaknesses. Also, pharmacy students at Yarmouk University agreed more than pharmacy students at Zarqa students in that; OSCE exam covered broad pharmacy training topics, instructions were given clearly, time was adequate, and OSCE exam made students aware of mistakes that occurred during dispensing and counselling processes. The reasons behind these differences were not evaluated in this study, which may be a limitation to this study; however, it may be related to the differences in the number of pharmacy students and examiners required and the type of pharmacy course (i.e., pharmacy training vs. pharmaceutical care).

Findings from the qualitative part showed that examiners were in favour that OSCE exam would positively impact pharmacy students' learning process in terms of clinical knowledge and communicational skills in which pharmacy students are required to perform well during OSCE exam. Also, examiners agreed that OSCE exam was preferable but more challenging to implement and that OSCE exam was more stressful for pharmacy students who were sometimes intimidated by the exam.

This study uses a mixed-method design to highlight pharmacy students' and examiners' perceptions about implementing OSCE exams for undergraduate pharmacy students. This study involved a good number of pharmacy students from two universities (one private and one governmental) in different areas in Jordan; however, the findings drawn from this study may not be generalizable. Pharmacy students were asked to complete the survey, and the examiners to participate in the focus group directly after the end of OSCE exam; this could be a limitation of this study.

Also, examiners examined only one station and were unaware of what was happening in other stations; this would affect their perception of various OSCE exam aspects and would be another limitation of this study. Lastly, having 11 examiners are slightly higher than what you expect in the focus group (generally 6-10 participants, and the cut line below 12) (45), and there is a possibility that examiners' would lead each other during focus groups despite the presence of a well-trained focus group moderator/facilitator and assistant. This would be another limitation of this study.

This study provides a scheme to examine OSCE exam as a clinical assessment tool for undergraduate pharmacy students and would help policy-makers gain more insight into the impact of implementing OSCE exam on the development and learning process of students' clinical knowledge and communicational skills.

## 5. CONCLUSIONS

This study provided insight into implementing OSCE exam for undergraduate pharmacy students. Findings showed a positive perception of OSCE exam, which was perceived as a practical clinical assessment tool, and the implementation of the OSCE exam at Zarqa and Yarmouk universities was valuable and worthy. This would enlighten policy-makers

about the significance of implementing OSCE exam for students' clinical knowledge and communicational skills development and learning processes. Future studies should focus more on clinical competencies and the OSCE exam's influence on pharmaceutical care and policy change.

### Declarations

**Author's contribution:** Hamza Alhamad contributed to the design and conception of the study, acquisition of data, analysis and interpretation of data, drafting of the article, critically revising, and final approval of the version to be published. Deema Jaber and Mohammad B. Nusair contributed to analyzing and interpreting data, drafting the article, critically revising, and final approval of the version to be published. Finally, Fares Albahar, Sahar M Edaily, Nazek Qasim Al-Hamad, and Haneen Basheer contributed to data acquisition, analysis, interpretation of data, drafting of the article, and final approval of the version to be published.

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## دراسة أثر تطبيق امتحان الاوسكي السريري على طلبة بكالوريوس الصيدلة باستخدام طرق بحثية مختلطة

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### ملخص

**المقدمة:** تقيم هذه الدراسة تصورات طلاب الصيدلة الجامعيين والممتحنين حول تطبيق امتحان الاوسكي السريري. **منهجية البحث:** تم استخدام تصميم الدراسة المختلطة ذات المنهج الكمي والنوعي في هذه الدراسة. **النتائج:** شارك في هذه الدراسة 103 من اصل 185 طالب (نسبة المشاركة 56%) و 11 من اصل 20 ممتحن (نسبة المشاركة 55%) اتفق معظم طلاب الصيدلة على أن تطبيق امتحان الاوسكي السريري كان تجربة عملية ومفيدة وأن اختبار الاوسكي يجب أن يكون جزءاً من التقييم في مواد الصيدلة الأخرى. ومع ذلك ، يعتقد نسبة قليلة أن اختبار الاوسكي لم يكن عادلاً ، ومخيفاً للغاية ، ويحتاج الطالب مزيداً من الوقت اثناء الامتحان. اما بالنسبة لآراء الممتحنين فانهم يعتقدون أن امتحان الاوسكي السريري كان منظم جيداً وتمت ادارة الامتحان على اكمل وجه على الرغم من الحاجة إلى مكان كبير لإجراء الامتحان وعدد كبير من موظفي الصيدلة لتنفيذه. **الخلاصة:** اتفق طلاب الصيدلة والممتحنون على أن اختبار الاوسكي هو أداة تقييم سريرية ممتازة وبديل مفضل كامتحان يقيس المعلومات العلمية والمهارات السريرية. توفر هذه الدراسة منهجاً لالية تطبيق امتحان الاوسكي كأداة للتقييم السريري وطريقاً يساعد صانعي السياسات والتشريعات المرتبطة بمهنة الصيدلة على اكتساب المزيد من التبصر من خلال معرفة اثر تطبيق امتحان الاوسكي السريري على المعرفة السريرية للطلاب وعلى تنمية مهارات الاتصال وعملية التعلم لديهم. **الكلمات الدالة:** تقييم الأداء السريري، التعليم الصيدلي، امتحان الاوسكي، طلاب بكالوريوس صيدلة، المنهج المختلط، التدريب الصيدلي.

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