



# Evaluation of simulation using objective structured clinical examination (OSCE) among undergraduate nursing students: A systematic review

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## ARTICLE INFO

### Keywords:

Clinical assessment skills  
Clinical competence  
OSCE  
Nursing simulation  
Nursing students  
Perception

## ABSTRACT

**Background:** The advantages of the objective structured clinical examination (OSCE) in assessing the skills of nursing students have been recognized, but still contested.

**Aim:** This systematic review aimed to compare and contrast OSCE use across countries as a simulation assessment tool incorporating perspectives of nursing students.

**Methods:** A systematic literature was conducted utilizing Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). The databases that were featured are EBSCO, Google Scholar, ScienceDirect, and PubMed from 2017 to 2022. The Mixed Method Assessment Tool (MMAT) was used to assess the quality of the studies. The National Health and Medical Research Council's standards were also used to evaluate quantitative studies.

**Results:** There were 182 articles found in a literature search. A total of 18 articles met the inclusion criteria. Students reported that the OSCE is well-structured, sequential, and covers a wide range of knowledge and skills. Despite the fact that it is stressful, expensive, and requires more time for preparation and implantation, many still prefer it because of its benefits.

**Conclusions:** This review can conclude that students exhibited favorable perspectives toward using OSCE, contributing to the development of clinical skills, and increasing self-confidence in their knowledge. Conducting more research related to the comparison of OSCE to clinical practice scores outcomes is advised and strategies for lowering stress and cost exam are recommended.

## 1. Introduction

### 1.1. Background

Assessing knowledge, skills, and attitudes properly for nursing students are considered critical for their professional growth and imminent employment (Bindon, 2017; Hanshaw & Dickerson, 2020; Valsaraj et al., 2019). There is a constant requirement to boost internal quality assurance to enhance the learning approach and evaluation methods for undergraduates. In nursing faculties, an appropriate evaluation system is a basic concern for students' simulation performance that supports mastery of nursing students' practical skills who may take care of patients after graduation (Bryant et al., 2020).

Historically, simulation was first used in education after World War Two. Nursing instructors employed static manikins that have evolved nowadays to high fidelity with advanced monitor and computer

technologies. This technology opens up new possibilities for teaching scenarios to student nurses, as well as critical reasoning and feedback on practice and insight into the lived experience (Edward & Chukwuka, 2020). Moreover, many types of research indicate that assessing clinical competency is of great importance when evaluating the expected learning outcome of nursing simulation (Bryant et al., 2020; Massey et al., 2017; Solà et al., 2017).

Globally, nursing faculties use a range of assessment techniques in simulations to measure student performance. They range from local traditional to more organized, valid, reliable, and globally standardized assessment methods like objective structured clinical examination (OSCE) (Solà-Pola et al., 2020). The OSCE method was developed in the 1970s to measure students' cognitive knowledge, effective communication, and psychomotor clinical skills in an objective, fair, and valid manner (Harden & Gleeson, 1979; Harden et al., 1975; Johnston et al., 2017). The OSCE, which includes many standardized scenarios and

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grading rubrics, is nowadays universally accepted as the gold standard and universal framework for evaluating medical students' clinical competency (Majumder et al., 2019).

The nursing simulations that employ traditional course evaluation methods (TEM) are criticized for being teacher-focused, subjective, poor reliability, lack of standardization, inconsistency, high examination bias, focusing on factual knowledge, and incapability to assess a wide range of skills (Entesar, 2019; Majumder et al., 2019). Several empirical studies implemented all over the world supported the use of the OSCE in several health sciences such as physical therapy, pharmacy, and medicine, and found that students scored significantly higher with the OSCE and preferred the OSCE over TEM and other evaluation methods (Awad et al., 2017; Jelly & Sharma, 2017; Mohsen et al., 2021). They all insist that, unlike a traditional clinical examination, the OSCE can assess areas that are crucial to a healthcare professional's competence, such as communication skills and the ability to deal with the unexpected behavior of the patient (Talwalkar et al., 2020).

The established learning process in the simulation must integrate reflection and experience in order for students to develop their perspectives (Arrogante et al., 2021; Stogniyev, 2020). The debriefing stage of the simulation-based experience after implementing a simulated scenario using the OSCE evaluation tool is where crucial learning takes place (Committee, 2016b). Debriefing, according to International Nursing Association for Clinical Simulation and Learning INASCL, is a post-experience reflection where teachers provide feedback to students on their work and students examine their feelings and question, and self-reflect to assess their learning to fill in their gaps (Committee). By using this evaluation strategy, students develop their perspectives, and comprehension and facilitate the transmission of knowledge, skills, and attitudes with an emphasis on best practices to ensure safe, high-quality patient care and the expansion of the participant's professional position. Students' perspectives may necessitate learning cognitively to reframe and cause students' interpretations to alter (Committee, 2016a). Academics exhibited seven best practice guidelines (BPG) that were developed, tested, and came up with an evidence-based reference, especially in the affective domain that maximizes the benefits of OSCE that prepares students for future clinical practice (Kelly et al., 2016).

Many academic institutions in the world have adopted the use of OSCE to assess clinical competency, such as the United States (Obizoba, 2018), China (Shen et al., 2018), Spain (Solà et al., 2017), and Australia (Massey et al., 2017). Regionally, several Arab countries such as Saudi Arabia (Entesar, 2019), United Arab Emirates (Bani-Issa et al., 2019), and Egypt (Mohsen et al., 2021) used the OSCE as a formal method for evaluating practice competency in nursing clinical courses.

Despite the fact that the evidence basis for OSCE is extensive, limited literature review research has been undertaken to compare and contrast using OSCE in nursing simulations worldwide. Student engagement in the evaluation process is crucial for OSCE development and outcomes would add to nursing practice and education. Therefore, this systematic review aimed to evaluate, compare and contrast how well OSCE was effectively utilized globally as an assessment tool in nursing simulation incorporating nursing students' perspectives.

## 2. Methods

### 2.1. Review question

The Population, Intervention, Comparison, and Outcomes (PICO) model was deemed suitable (Dickson, 2017), and the following was included in this review: P, undergraduate nursing students; I, employing OSCE as a simulation's assessment instrument; C, comparing the use of OSCE globally; O, advantages and disadvantages of using OSCE. As a result of including these terms, the review question led to the following: What are the similarities and differences between using OSCE globally and from the perspective of nursing students?

### 2.2. Search strategy

Any English language original study published between 2017 and September 2022 was evaluated in this systematic review of quantitative, quantitative, and mixed studies. The following databases were used in the analysis: EBSCO, Google Scholar, ScienceDirect, and PubMed, which aided in the identification of the kind and range of research that might be available for synthesis. The primary search terms were: OSCE (Objective Structured Clinical Examination) AND Simulation AND nursing students OR nursing competence, simulation, nursing students, TEM (Traditional evaluation method), OSCE (Objective Structured Clinical Examination), clinical competence, clinical assessment skills, practical assessment, and clinical simulation [MeSh]. After that, the reference lists of the articles were checked to determine whether they contained any irrelevant articles. Shea et al., (2007) explained the steps for doing the review. Searching the literature, reading and extracting data from journal articles, synthesizing data into a summary table, and finding the main themes that comprise the recommendations were the processes taken. Because the indexing terms in various electronic databases differ, distinct search algorithms were established for each search. The PRISMA (Preferred Items for Reporting Systematic Reviews and Meta-analyses) was used to assess the quality of the included studies as part of the methodology in this systematic review (Shamseer et al., 2015). Fig. 1 provides a full overview of the search approach and description of the included and excluded studies.

### 2.3. Inclusion criteria

Inclusion criteria for systematic review focused on nursing students around the world who were enrolled in simulation courses and used OSCE with high-fidelity simulators. The studies included all types of research involving quantitative, qualitative, and mixed methods, were written in the English language and published between 2017 and 2022 with a final search date of September 30, 2022.

### 2.4. Exclusion criteria

The exclusion criteria included nursing students not practicing simulation and the OSCE method; participants who are not nursing students, studies not in English, incomplete fundamental information to extract data.

### 2.5. Data quality assessment

The Mixed Method Assessment Tool (MMAT) was used to assess the quality of the eighteen papers (Hong et al., 2018). The MMAT has previously been used by researchers to evaluate the quality of data from mixed-method, qualitative, and quantitative approaches (Tobiano et al., 2015). They were given quality ratings ranging from 100 %, which meant all requirements had been met, to 0 %, which meant no criteria had been met. Each article was evaluated impartially by the researcher (K.M), who discussed the MMAT scores. The quality scores were not used to eliminate studies, rather, they were utilized to determine how each study might add to the overall picture. Quantitative investigations were also evaluated in accordance with the standards of the National Health and Medical Research Council (NH&MRC, 2007).

### 2.6. Screening

The researcher independently assessed the identified studies' eligibility. Initially, this was done based on their titles. Articles with headings that claimed that they would offer details pertinent to the researcher chose the subjects for the study. Subsequently, the reviewer read the articles' abstracts, which preselected and pulled up the complete texts of the publications who's the study's inclusion criteria were met by the abstracts. Likewise, publications with inadequate information in their

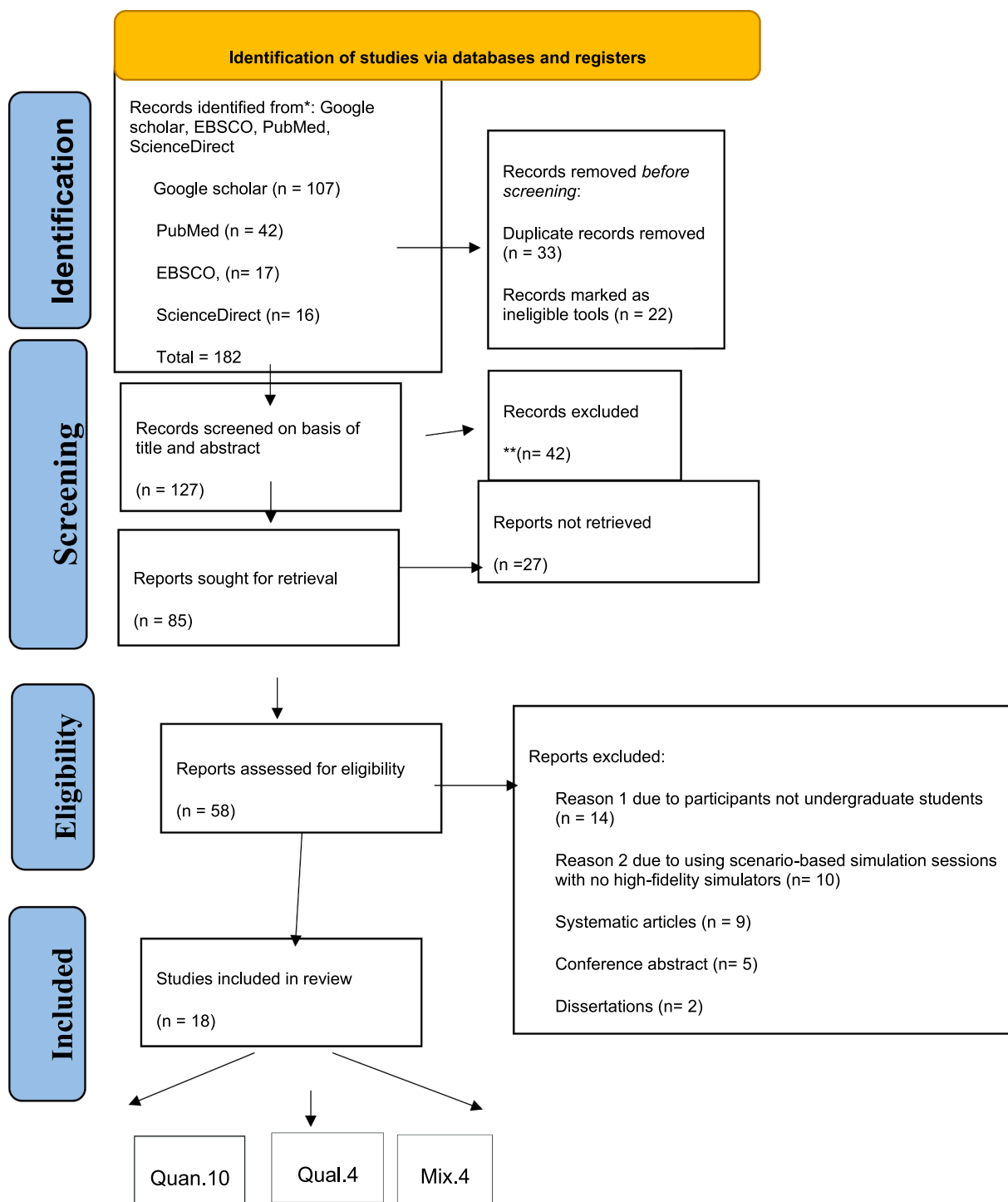


Fig. 1. PRISMA flow diagram (adopted from Shamseer et al. (2015)).

abstract’s information needed to decide whether to include them were further found. Following the removal of duplicates, the sole researcher independently examined all the texts for analysis, excluding any articles that did not meet the inclusion criteria. Lastly, by using a similar procedure, the researcher examined the bibliographic used references to identify further sources possibly pertinent studies.

### 3. Results

Eighteen articles (four qualitative, ten quantitative, and four mixed) were included in the systematic review. Table 1 shows the studies

‘results with MMAT quality assessment. The scores for the included studies ranged from 75 to 100 %. Studies were undertaken in Australia, Spain (three studies), the USA, the United Arab Emirates, Sweden, the Kingdom of Bahrain, Egypt (three studies), Oman, China (two studies), Malawi, Saudi Arabia, Lebanon, and India. Participants in the studies ranged from 10 to 2,445. Details of assessment methods attributed to simulation nursing students are explained by looking for the right instruments to assess skill proficiency and information required for practice and assembling three major themes: OSCE organization and entities, instrumentation of the OSCE modality, and OSCE implementation drawbacks.

**Table 1**  
Summary of the studies involved in the systematic review.

n	Main author, year of publication, country	Aim	Study design	Sample size	Competence focus	Findings	NHMRC Study Rating	Overall AMSTAR-M score
1	Massey et al. (2017) Australia	Boost student preparation for the OSCE with practice	Mixed method	730	Acute care	The online OSCE exemplars all increased the self-rated student knowledge, confidence, and capacity for preparation, but had no impact on performance. Students who failed the OSCE had high correlations between their practicum and OSCE scores ( $r = 0.68$ ), showing that the OSCE was successful in predicting clinical practice failure.	1 V	75 %
2	Raurell-Torredà et al. (2018) Spain	Identify areas where the nursing curriculum needed to be improved and to identify OSCE students who are failing to succeed in clinical rotations.	Quantitative method-Cohort study	120	Medical-surgical	The students perceived the OSCE as a learning opportunity and a chance to obtain feedback. It improved their knowledge of the required competencies, increased their accountability, and confirmed their confidence in situations that were remarkably comparable to those in actual practice.	111–2	75 %
3	Solà-Pola et al. (2020) Spain	Examine the usefulness and acceptance of an OSCE.	A qualitative study.	70	Basic nursing subjects	The OSCE's reliability was demonstrated by the Cronbach alpha, which was 0.665. Each station's content validity ranges from 0.90 to 1, and the written fundamental examination score's criteria validity was positive. ( $R = 0.611$ , $p = 0.000$ ).	N/A	100 %
4	Shen et al. (2018) China	Create, implement and assess the validity and reliability of an OSCE-based examination model for "fundamental nursing".	Quantitative-descriptive design	99	Fundamental skills.	The results revealed the OSCE was a reliable evaluation technique that improved students' preparation for in-depth training and clinical settings. Instead, the test was viewed as stressful by the students, emphasizing the need for more time at the OSCE stations.	1 V	100 %
5	Fawaz and Alsalamah (2021) Lebanon.	Evaluate the necessary nursing abilities through OSCE perspective measurements.	Mixed method	315	Medical- surgical	Students emphasized that the OSCE was a useful assessment tool, improved in-depth learning, increase confidence, accountability, and better prepare them for clinical practice. Students also perceived the exam to be a stressful experience, citing the need for more time	1 V	100 %
6	Bani-issa et al. (2019) UAE	Employing the OSCE to measure the physical assessment skills of nursing students and examiners.	A mixed method cross- sectional/ focus group	55	Physical assessment	The level of agreement between the student and faculty examiner during the OSCE evaluations was quite high, with a Cohen's kappa score of 0.79 (95 % CI 0.65–0.93).	111–1	75 %
7	Lyngå et al. (2019) Sweeden	Compare the OSCE assessments made by the examiners during the clinical skills exams for nursing students in undergraduate programs.	Quasi-experimental design.	148	Central venous catheters care.	Students demonstrated that the OSCE enhanced their capacity to perform the core nursing competencies by fostering greater critical thinking abilities, self-confidence, and coping methods. It identified areas	1 V	100 %
8	John (2020) Kingdom of Bahrain.	Identify students' experiences using the OSCE as an assessment instrument and explore their feedback to improve quality of instruction.	Mixed methods	122	Physical assessment			

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Table 1 (continued)

n	Main author, year of publication, country	Aim	Study design	Sample size	Competence focus	Findings	NHMRC Study Rating	Overall AMSTAR-M score
9	Obizoba (2018) United States.	Look at ways to make OSCE problems less difficult in bachelor's degrees for nurses.	Qualitative	10	Quality and Safety Education for Nurses (QSEN) competencies	that needed improvement. The most common OSCE problems cited by students are a lack of realistic scenarios and stress. The faculty employed five mitigating OSCE strategies: administrative assistance, clinical instructors during evaluation, faculty OSCE education, limiting validation to the necessary skills necessary for professional practice, and coordination among all course faculty members.	N/A	100 %
10	Awad et al. (2017) Egypt	Examine the way in which the students handled the OSCE that was used to evaluate their clinical abilities.	Quantitative/cross-sectional	132	Neonatal airway resuscitation, NG-Tube insertion, cord care, first aid and communication skills.	In comparison to other test formats, the OSCE exam was evaluated by the majority of students (95.4 %) as being correctly planned, organized, timed, and fair in judging knowledge.	1 V	100 %
11	Valsaraj et al. (2019) Oman.	Comprehend how undergraduate nursing students perceived the OSCE as a tool for clinical evaluation, by contrasting the outcomes of the OSCE with written clinical assessments in mental health nursing	Quantitative method	39	Mental Health Nursing Clinical practice.	There was a significant difference between the mean scores for the written clinical test (Mean = 29.67, SD = 3.35) and the OSCE (Mean = 31.03, SD = 3.05; t = 2.24, p = 0.031). Over the clinical written examination, OSCE is preferred by 51 %.	1 V	80 %
12	Yuan, 2021, China.	Analyze the validity, reliability, difficulty level, discriminability, and communications skills of nursing students in the OSCE.	Quantitative/cross-sectional	54	Fundamentals of nursing, health assessment, and medical-surgical nursing.	Nursing OSCE evaluation skill test difficulty coefficients were moderate with high discrimination indices and acceptable reliability and validity.	1 V	100 %
13	Msiska et al. (2019) Malawi	Examine the stress associated with an OSCE.	Qualitative/interviews	30	Laboratory skills	The OSCE in the skills lab and the unfamiliarity of the examiners are more likely to generate stress than the clinical settings where students train.	N/A	100 %
14	Solà et al. (2017) Spain.	Analyze how nursing professors feel about using the OSCE as an evaluation method in Catalan nursing programs.	Qualitative/interviews	15	Clinical practice	Teachers stress that the OSCE should be used in conjunction with other forms of evaluation because of its dual role as a formative and evaluative assessment tool that boosts students' feedback on their performance.	N/A	100 %
15	Jelly and Sharma (2017) India.	Assess the knowledge and attitudes of B.Sc. nursing students when providing prenatal care utilizing TEM and OSCE	Quantitative evaluative comparative research (quasi-experiment)	37	Antenatal care (ANC)	The mean scores of students practicing OSCE were more than that in TEM. Examiners and students agreed that the OSCE was preferable to the TEM.	111-1	100 %
16	Entesar (2019) Saudi Arabian	Find out the nursing students' perceptions on the OSCE assessment approach.	Quantitative/observational study design.	50	Maternal and neonatal health.	The majority of students provided positive feedback on the OSCE test's structure, content, reliability, and validity.	1 V	100 %
17	Mohsen et al. (2021) Egypt	To evaluate nursing students' skills in health assessment using OSCE.	Aquasi-experimental pre-post-test design.	140	Medical health assessment.	There were statistically significant differences in the students' assessments of the quality, reliability, validity, and general knowledge of the OSCE between the pre- and post-intervention periods.	111-1	100 %

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Table 1 (continued)

n	Main author, year of publication, country	Aim	Study design	Sample size	Competence focus	Findings	NHMRC Study Rating	Overall AMSTAR-M score
18	Safaa (2020) Egypt	Examine how pediatric nursing students performed in the OSCE and TCE	A quasi-experimental intervention/control group	288	Pediatric nursing procedure: oxygen administration, cardiopulmonary resuscitation and suction.	There was a statistically significant difference between the pediatric nursing students' TCE and OSCE total performance scores	111–1	100 %

MMAT: The Mixed Method Assessment Tool, NHMRC: The National Health and Medical Research Council, OSCE: objective structured clinical examination, TEM: Traditional evaluation method, N/A: Not Available, N: Number, TCE: traditional clinical examination, QSEN: Quality and Safety Education for Nurses, SD: standard deviation.

### 3.1. OSCE organization and entities

According to several studies, the OSCE method has been widely used globally in a range of health fields, in which students rotate across stations where they complete clinical activities based on pre-determined scenarios (Awad et al., 2017; Fawaz & Alsalamah, 2021; Jelly & Sharma, 2017; Solà et al., 2017). The results of the OSCE assessment are tallied using a checklist and are available in a variety of subjects. To ensure mastery of related clinical abilities, the clinical procedure evaluation should be done in no more than 10 min at each station (Stogniyev, 2020; Yuan, 2021). Teachers make sure that students are familiar with the OSCE procedure before the exam and have received sufficient training to master the necessary skills to guarantee that the method is followed to the letter. Twelve out of 18 (67 %) of the studies showed that OSCE is well-structured and sequenced with sufficient instructions (Awad et al., 2017; Bani-Issa et al., 2019; Entesar, 2019; Fawaz & Alsalamah, 2021; John, 2020; Lyngå et al., 2019; Mohsen et al., 2021; Obizoba, 2018; Raurell-Torredà et al., 2018; Safaa, 2020; Shen et al., 2018; Valsaraj et al., 2019), adequate lighting, quiet, ventilation, the presence of necessary tools, and high-quality simulators (Fawaz & Alsalamah, 2021). Majumder et al. (2019) found in a study conducted at the Cave Hill campus in India Faculty of Nursing, that students perceive positive feedback on the OSCE's management, organization, structure, instructions, tasks, and station sequence as well as its planning, timing, announcements, and examination room quality. The OSCE test, according to the students, would be a suitable tool for covering the course goals (Bani-Issa et al., 2019; Majumder et al., 2019; Yuan, 2021). In another study conducted by Bani-Issa et al. (2019) in UAE, students indicated that early planning and organization are required to increase OSCE's evaluative efficacy.

### 3.2. Instrumentation of OSCE modality

The OSCE, as agreed by students, is fair and covers a broad variety of skills and knowledge. It allows them to develop their abilities in most areas (Awad et al., 2017; Bani-Issa et al., 2019; Jelly & Sharma, 2017; John, 2020; Obizoba, 2018; Solà et al., 2017; Valsaraj et al., 2019). OSCE allows them to think, complete processes with greater time, and prevent evaluator bias (Awad et al., 2017; Bani-Issa et al., 2019; Jelly & Sharma, 2017). For numerous reasons, OSCE, according to the majority of students, is more valid and reliable than other evaluation tools. Firstly, it comprises a broad range of subjects and clinical competences that enable nursing students to make up for missed assignments (Awad et al., 2017; Bani-Issa et al., 2019; Jelly & Sharma, 2017; Solà et al., 2017; Valsaraj et al., 2019). Secondly, the OSCE is unaffected by societal bias based on gender, race, religion, or socioeconomic background, unlike other techniques. Finally, the same assignments are graded for all students (Awad et al., 2017; Bani-Issa et al., 2019; John, 2020). Moreover, many researchers have verified the OSCE method's validity and reliability (Jelly & Sharma, 2017; John, 2020; Lyngå et al., 2019; Shen et al., 2018; Yuan, 2021). Awad et al. (2017) confirmed that the

predictive validity of the OSCE was established by its correlation to subsequent clinical outcomes. Also, in the same study, OSCE was discovered to give a preferable predictor of performance than the student grades and was a greater predictor of final written and case-based exams than other examinations.

The outcomes of the OSCE were more closely related to final written tests and total marks than the results of the traditional oral exam and clinical evaluation (Bani-Issa et al., 2019; Raurell-Torredà et al., 2018; Yuan, 2021). The OSCE method allows students to examine their clinical practice's strengths and weaknesses. Of the 18 articles included, students regularly state in many studies (n = 10) that OSCE gives them more opportunities to discover their weaknesses and work (Awad et al., 2017; Bani-Issa et al., 2019; Fawaz & Alsalamah, 2021; John, 2020; Obizoba, 2018; Raurell-Torredà et al., 2018; Safaa, 2020; Solà-Pola et al., 2020; Solà et al., 2017; Valsaraj et al., 2019). It also improves self-assessment reflection during debriefing and helps students learn how to implement clinical tasks in the future (Solà-Pola et al., 2020).

OSCE was evaluated as a summative and formative evaluation method in many researches (Awad et al., 2017; Bani-Issa et al., 2019; John, 2020; Lyngå et al., 2019; Massey et al., 2017; Mohsen et al., 2021; Obizoba, 2018; Raurell-Torredà et al., 2018; Solà et al., 2017; Yuan, 2021). Teachers discovered that using OSCE as a formative evaluation tool helps students organize their clinical experience. Positive feedback encourages students to discuss their simulation experiences, increase confidence in their knowledge, and prepares them for more professional practice (Awad et al., 2017; Solà et al., 2017; Stogniyev, 2020). Students also believed that the OSCE evaluated a broader range of cognitive and clinical abilities than traditional techniques. In qualitative research of students' attitudes towards OSCE, these sentiments were similarly expressed amongst nursing students in Spain, where "test efficiency" was the main theme excerpted from students' quotes (Solà et al., 2017).

OSCE has also been shown to be a more effective technique for assessing end-of-course simulations, and it is critical to use it in conjunction with or instead of other evaluation tools when determining competency (Awad et al., 2017; Solà et al., 2017). In other studies, teachers discovered that the OSCE assessment method should be used in conjunction with other assessment models that evaluate students from a variety of perspectives rather than on an ad hoc basis. Furthermore, incorporating formative evaluation into OSCE assessments aids in recognizing students' strengths and flaws so that they can be improved (Awad et al., 2017; John, 2020; Solà-Pola et al., 2020; Solà et al., 2017).

Simulation is designed to mimic real-world clinical circumstances, making it easier to adjust in the real world. According to nine (50 %) studies, many people believe that simulations help students get ready for clinical practice in the real world [4, 6, 20, 21, 27–30, 34]. In other words, the environment's complexity and the OSCE assessment's testing of a variety of abilities prepare students for clinical practice in the real world. Several studies have been undertaken to assess positive and negative prior judgments as well as their consequences, as well as insights into simulated concerns. This aids students in evaluating their abilities and achieving clinical competency. As a result of challenges to

practicing competencies in diverse simulation scenario contexts, students are inspired to seek out venues that allow them to adapt to unique experiences and unexpected events in the field (John, 2020; Solà et al., 2017). The OSCE's ability to detect correctly the risk of poor performance in clinical practice was the main finding of a cohort study with 120 Spanish nursing students in which cumulative content and skills summative assessments were assessed jointly by academic and clinical lecturers (Raurell-Torredà et al., 2018). Results indicated a strong correlation between students who fail OSCE and practicum scores ( $r = 0.62$ ). No studies were found to reflect the same correlation in Asia or other parts of the world. The OSCE is also favored by teachers and examiners since it takes less time to examine a larger number of students (Solà et al., 2017). It has been found that OSCE assessments incorporate knowledge and clinical practice competencies that students develop throughout their education (John, 2020; Shen et al., 2018; Solà-Pola et al., 2020; Solà et al., 2017). Therefore, OSCE is recommended to be integrated into the curriculum of the nursing program and for all academic years, where students get hands-on instruction in clinical practices that maximize knowledge retention (Raurell-Torredà et al., 2018; Safaa, 2020). The theoretical benefit of OSCE is that it objectively tests students at all four levels of competence, which is critical for effective learning and assessment (Miller, 1990; Mohsen et al., 2021; Raurell-Torredà et al., 2018; Safaa, 2020). The assessment of knowledge (Knows) lies at the bottom of the pyramid, followed by (Knows How), both of which are easily examined using traditional methods. The (Shows How) and (Does) levels of the pyramid, which are thoroughly examined in the OSCE stations, are the top two levels of the pyramid (Miller, 1990).

### 3.3. OSCE implementation drawbacks

Several researchers have indicated that the OSCE is stressful (Bani-Issa et al., 2019; John, 2020; Massey et al., 2017; Obizoba, 2018). OSCE can be as stressful as TEM for some students, while it can be more difficult than other examinations for others (Valsaraj et al., 2019). Anxiety appeared as a prominent finding from student reactions in an OSCE exam in Malawi (Msiska et al., 2019). Notwithstanding the anxiety that comes with OSCE, students were more likely to prefer it over other methods because of the advantages it brought. Furthermore, students' unfamiliarity with the OSCE technique appears to be a source of worry. Students who had formerly experienced OSCE showed less anxiety than those who had never been exposed to it (Jelly & Sharma, 2017; Msiska et al., 2019; Solà et al., 2017). In their study, Massey et al. (2017) found that students who had previously used a blended learning strategy such as a video exemplar had increased self-confidence and involvement in the OSCE procedure. The cost of administering an OSCE is typically higher than that of a TEM. However, some people believe it is cost-effective. Given the increased cost of OSCE, students in an Egyptian survey of 132 pediatric student nurses agreed that it was well worth the time and effort (Awad et al., 2017). Teachers feel that by pooling resources and expertise across OSCE-using nursing schools, expenses might be reduced (Solà et al., 2017).

At stations, certain skills are assessed according to some and may not accurately reflect the entire experience of real patients. Analyzing the entire patient entails more than just examination of individual parts; it also needs adjustments just for the sake of effectiveness, based on the principle of putting forth the least amount of effort (Obizoba, 2018). Other issues raised during OSCE implementation include the availability of assessors who are proportional to the sum of stations. Several stations necessitate more time. This necessitates the presence of the examiners, which is not always feasible. The same training should be given to all assessors, which is challenging to achieve. This calls into question the OSCE's objectivity. Changing examiners at different stations and locations can also be a negative and exhausting experience for students (John, 2020; Msiska et al., 2019).

According to other studies, the OSCE exam is more difficult than

other assessment tools (John, 2020). The real-world clinical space is not as well-equipped as the OSCE practical area, with fewer resources, equipment, and supervision. Instructors want students to perform in ideal ways in conditions that are distressing to them. Simulation fidelity is one issue that comes up in OSCE evaluations. The artificial manikins made several pupils feel unrealistic, outmoded, insecure, and unable to interact (John, 2020). Academics have also underlined the difficulties and complications of recreating the real world properly. They also claimed that practicing with real patients helped boost their self-esteem (John, 2020). But, on the other hand, an Egyptian study found that OSCE is based on reality, with the complexity of skills being duplicated using the real clinical learning environment (Awad et al., 2017).

## 4. Discussion

This systematic review aimed to compare and contrast how well OSCE was utilized globally during the assessment of nursing students. Three major themes emerged: OSCE organization and entities; instrumentation of the OSCE modality, and OSCE implementation drawbacks. The most notable finding in this systematic review is the consistency of most papers (60 %) in better reliability and validity, fairness, and precision of the OSCE in which students' cognitive abilities and understanding of the learning topics have improved (Awad et al., 2017; Bani-Issa et al., 2019; Entesar, 2019; Fawaz & Alsalamah, 2021; Jelly & Sharma, 2017; John, 2020; Mohsen et al., 2021; Safaa, 2020; Shen et al., 2018; Valsaraj et al., 2019; Yuan, 2021). This improved knowledge enhanced the psychological influences such as higher self-confidence and independence, which is also consistent with 50 % of the studies (Awad et al., 2017; Bani-Issa et al., 2019; John, 2020; Massey et al., 2017; Mohsen et al., 2021; Msiska et al., 2019; Safaa, 2020; Solà-Pola et al., 2020; Teles et al., 2020). It also showed improved practical and clinical skills such as better communication, history-taking, patient assessment, the clinical performance of procedures, and better clinical decisions that ultimately result in benefiting the patients (Raurell-Torredà et al., 2018). A similar conclusion was reached by another previous systematic review (Johnston et al., 2017), where most nursing students agreed that OSCE is more objective and fair than other evaluation methods, as evidenced by 60 % of the articles (Awad et al., 2017; Bani-Issa et al., 2019; Fawaz & Alsalamah, 2021; Jelly & Sharma, 2017; John, 2020; Raurell-Torredà et al., 2018; Solà-Pola et al., 2020; Teles et al., 2020). Students also believed that the OSCE worked better in assessing their actual knowledge and skills (Awad et al., 2017; Bani-Issa et al., 2019; John, 2020; Obizoba, 2018; Teles et al., 2020). The OSCE is well-structured and sequenced (Bani-Issa et al., 2019), and the OSCE highlights areas of weakness (Bani-Issa et al., 2019; John, 2020; Raurell-Torredà et al., 2018; Solà-Pola et al., 2020). Although the OSCE required extra resources to prepare the scenarios and set the stations, most students agreed, in congruence with Jelly & Sharma's study (2019), that it gave them more time to think and more freedom to perform the procedures compared to TEM.

It is agreed among reviewers that the higher scores achieved in OSCE compared to TEM and other assessment forms are consistent with six (40 %) studies (Awad et al., 2017; Bani-Issa et al., 2019; Jelly & Sharma, 2017; Raurell-Torredà et al., 2018; Solà et al., 2017; Valsaraj et al., 2019). This could be because OSCE tested a wider variety of skills and could compensate for their weaknesses. This discussion leads us to conclude that OSCE is a better evaluation tool and a better educational curriculum in parallel. Conversely, although students found OSCE stressful in previous studies (Awad et al., 2017; Bani-Issa et al., 2019; John, 2020; Msiska et al., 2019), there was a significant difference in the stress induced by OSCE versus other assessment tools. Students reported anxiety while performing the OSCE exam. Although some anxiety is linked to exams, the elevated levels of anxiety discovered in this study appeared to be unique to the OSCE. The examination environment, task sequencing, student understanding of work elements and requirements, and insufficient training prior to exam have all been highlighted as key

sources of anxiety for OSCE (Duran-Snell, 2021; Stogniyev, 2020). These results go in line with another previous systematic review (Johnston et al., 2017), and in line with a semi-structured interview conducted by John et al. (2020). However, studies point out that students and faculty have distinguished many approaches that may mitigate the anxiety raised by such origins (Aronowitz et al., 2017; Bani-Issa et al., 2019; Solà-Pola et al., 2020; Teles et al., 2020). Indeed, if they have prior experience and are allowed more time for the OSCE exam until they have become accustomed to it, its advantages are likely to become more prominent and concerns about its stress will dissipate (Stogniyev, 2020). This emphasizes the importance of incorporating the affective part of student learning into a curriculum that uses OSCEs as an assessment tool.

In contrast to some studies (Jelly & Sharma, 2017), others showed no significance in using extra human resources. The same human resources were used because of the integrative method (John, 2020; Obizoba, 2018). And because high-fidelity simulation is the most prominent form of simulation utilized in the OSCE literature, the inclusion of OSCE-based studies using high-fidelity simulation may have bolstered the case for its usage.

But, despite the fact that clinical evaluation was implemented during a simulated scenario via OSCE reflecting a real-world clinical setting as agreed by students in several studies (Aronowitz et al., 2017; Kelly et al., 2016; Solà-Pola et al., 2020; Stogniyev, 2020; Teles et al., 2020), there was a paucity of literature relating students' simulation-based learning to clinical performance at the point of patient care. In addition, this systematic study revealed a gap in the literature regarding OSCE with nursing students who mostly used randomized controlled trials as their experimental designs (RCT) at three points in time (pre, post, and follow-up). The studies that used this comparison and confirmed the superiority of OSCE to other assessment tools were cross-sectional and quasi-experimental designs (Fawaz & Alsalamah, 2021; Jelly & Sharma, 2017). Literature may suggest that more studies need to be conducted utilizing experimental RCT that link causal intervention and outcomes to investigate students' perceptions of both evaluation systems, which can be generalized.

## 5. Limitations

This systematic review pointed out that these findings may raise concerns based on a specific population of nursing students rather than other undergraduate students of other health disciplines like medicine, pharmacology, or physiotherapy. To confirm these findings, more research on various groups of students who might take an OSCE is needed. And since this systematic review evaluates a definite format of OSCE in a given situation with nursing students, it is difficult to generalize its outcomes to other populations. Also, the findings of this systematic review reveal a gap in the literature, with few studies correlating OSCE to real-world clinical practice and even fewer comparing OSCE to TEM using RCTs. Furthermore, studies published in languages other than English are excluded, and there may be other studies undertaken and published in non-English-speaking periodicals.

## 6. Implications

The findings of the literature review have implications for nursing education, practice, and research. The study results indicate that the use of OSCE as an assessment approach in simulation nursing can result in better evaluation outcomes and higher student satisfaction. Another implication is that examining the correlation between employing OSCE in nursing simulation and real-world clinical practice to see how it affects bedside patient care outcomes would add to nursing science and practice. The essence of student-centered and self-directed evaluation cast benefits in nursing education improves the healthcare services provided to patients and identifies potential gaps in the curricular content. As a result, these findings make it more encouraging to

accelerate the use of the OSCE method as a tool for assessing nursing faculty ability, mainly at nursing colleges.

## 7. Conclusion

The positive feedback on students' experience towards OSCE contributed to the dominance of it over other assessment tools in many facets of student evaluation validated by findings in this systematic review. According to published studies, students believed it to be a valid, fair, and objective means of evaluating clinical knowledge, skills, and attitudes. Concerns about the need for work in the logistics of the OSCE preparations appeared minor in this review. Despite the fact that it is stressful, students prefer it because of its benefits. This systematic review has provided knowledge regarding OSCE and demonstrated its use in nursing colleges, which has resulted in broad acceptance in many simulation nursing schools throughout the world, contributing significantly to nursing science and education. Additional studies are recommended utilizing other designs not described in this systematic review, such as RCT to investigate students' perceptions of OSCE with other evaluation tools.

## Funding

No specific grant was given to this research by any funding organization in the public, private, or nonprofit sectors.

## Registration

This article had a registration number in PROSPERO (CRD42022333914).

## Declaration of Competing Interest

The author declares that there have been no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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