ATINER's Conference Paper Proceedings Series
EDU2019-0174
Athens, 23 January 2020

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Hao Bin Yuan

Athens Institute for Education and Research
8 Valaoritou Street, Kolonaki, 10683 Athens, Greece

ATINER's Conference Paper Proceedings Series
EDU2019-0174
Athens, 23 January 2020ISSN: 2529-167X

Hao Bin Yuan, Associate Professor, Macao Polytechnic Institute, Macao

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ABSTRACT

This paper describes the design of the Objective Structured Clinical Examination (OSCE) in high-fidelity simulations for assessing nursing students' clinical competency. The OSCE stations includes nursing assessment, decision making, nursing interventions, health education. All scenarios are designed using the high-fidelity simulator which is a computer-controlled human patient simulator (HPS, SimMan). Student standard patients are involved for enhancing the realism of interactions in the scenario. The first station for nursing assessment (10 minutes) includes collecting current medical history, physical examination and psychosocial assessment, etc., mainly assessing nursing assessment ability, communication skills, data collection skills and professional attitude as well. The second station for nursing diagnoses (10 minutes). The candidates should analyze the medical records and collected data, and propose the nursing diagnosis/care problems and think about what kinds of nursing interventions should be taken for the problems. It is used to evaluate the abilities of case analysis, condition observation and problem handling, and familiarity with nursing diagnosis. The third station is nursing skill exam (20 minutes). The relevant nursing skill is implemented for the nursing diagnosis/reasonable problem. The fourth station is health education (10 minutes). It is used to assess the ability of health education and communication skills. It is the observational measurement with three levels (Incorrect or Omitted, Partially Correct, Correct). The OSCE is used to evaluate students' clinical competency in a specific simulated situation by two raters. The higher score indicated the better competency in clinical performance. The inter-rater reliability should be established for minimizing the possibility that the scores would vary from rater to rater. The OSCE can be used to assess nursing students' comprehensive clinical skills, clinical thinking, problem-solving and communication ability in clinical setting. It is necessary to enhance the realism of the scenario with physical props and psychosocial interactions.

Keywords: *Clinical competency, High-fidelity Simulation, Nursing, Student, OSCE*

Introduction

Nursing is a competency-based practice profession, and plays a central role in health care delivery systems. Competency is a basis for curricular development, evaluation and accreditation for professional development (Leung,Trevena and Waters, 2016).The nursing curriculum integrates both theoretical and clinical skills training processes. Holistic nursing care demands the comprehensive competency for having the effective therapeutic relationship with the clients and high-quality care giving (Sastrefullana, et al., 2014). The contextualization of learning is central to competency integration. As facing the changeable and complex clinical situations, the graduates need such knowledge, skills, and abilities to deliver the qualified and effective nursing care. The aim of nursing education is to provide the professional knowledge, skills, and abilities which enable graduates to think critically, solve problems, and make important clinical decisions (Pepin et al., 2017).

Clinical simulation is used to foster the students' development of the inner resources needed to integrate competencies. It is a method used for learning techniques and developing cognitive,socio-emotional and team-work skills with non-real patients within a controlled and safe environment (Yuan and Williams, 2015). Those simulated scenarios generate stress, tension and distracting information, that are similar to what the student will deal with in real clinical situation. This allows the student to develop the needed clinical competencies that will ensure a good performance in real clinical contexts (Yuan, Williams and Chan, 2014).

Objective and accurate evaluation of students' competencies are essential for efficient nursing care. The educators should consider how to evaluate students' competencies through the objective standardized approaches. It is necessary to create the contextualized scenarios with a high-fidelity simulation for developing the objective evaluation of clinical competencies.

Literature Review

The current complex health care situation creates the different challenges in developing students' knowledge and skills. Learning by doing isn't always practical or cost-effective to engage in skill training with real patients due to the increased acuity of patients and patient safety issues. The focus of clinical education is facilitating the development of knowledge application, accurate clinical judgment and skill development. Educators should find adequate clinical experiences for their students to ensure their competency.

Simulation

Simulation becomes the way to promote clinical reasoning and judgment and facilitate deeper learning and knowledge transformation (Yuan, 2018). Fidelity refers to the extent to which the appearance and behavior of the simulator or the

simulated system represents reality (Pagecutrara, 2014). The power of simulation based learning largely centers on the opportunity for the learner to practice and learn in the environment as close to reality as possible. The closer a learning experience resembles a real event, the easier it is for a learner to transfer gained knowledge and skills to the real world (Khalaila, 2014). There are three types of simulation with different abilities to mimic reality. Low-fidelity simulation uses manikins that are less similar to reality, such as intravenous injection training arms, intramuscular injection hips. Intermediate-fidelity simulation uses manikins that offer breath sounds, heart sounds and bowel sounds, and they allow for initiation of IV therapy but lack the complexity and realism of patient scenarios. High-fidelity simulation (HFS) is an approach to experiential learning using life size manikins with actual physiological and pharmacological responses, and sophisticated interactive capability in realistic scenarios. These devices replicate many human physiological functions and anatomical features and provide a very realistic situation both in psychological and engineering technology. Students can make, detect and correct patient care errors without negative consequences (Shin, Park and Kim, 2015). HFS has been proposed as a novel supplemental teaching-learning strategy to enhance the transfer of student confidence and competence from the classroom to the clinical nursing environment (Chamberlain, 2015).

Clinical simulation centers on the opportunity for the learner to practice and learn in an environment as close to reality as possible and allows students to construct knowledge and develop clinical competence. Simulation presents real-life practical problems that demand active engagement of learners in critical thinking and build learners' confidence in their decision-making abilities. The use of simulation as a teaching strategy is gaining wider acceptance in nursing education in both the school and clinical settings (Mendelberg, 2015).

In nursing education, simulation is becoming foundational for clinical learning, particularly in the areas of safety, problem solving, communication, and team building. Nurse educators have incorporated simulation into basic and graduate nursing programs as well as hospital-based orientation and continuing education programs. Using simulation is helpful for learners to improve their clinical competency, and confidence with regard to patient safety and valuable communication skills (Wang, et al.,2015). High-fidelity simulators mimic actual physiology, responding to physical and pharmacology interventions. Using high-fidelity simulators to simulate actual clinical practice could provide students with greater contextual reality (Woodruff, Neill and Walton-Moss, 2017).

Students frequently experience anxiety in clinical practice settings that limits full integration of theory to practice. By engaging in simulated learning activities, students may experience a decrease in anxiety, which may promote more meaningful learning. Students may improve in their ability to transfer new knowledge to clinical practice if they perceive themselves as competent in the application of required knowledge and skills (Yuan,2018). Although simulation-based education is becoming more common, outcomes research on the use and effectiveness of simulation is inconsistent and varies in methodological rigor and substantive focus (Hayden, Smiley and Gross, 2014). High-fidelity simulation is an experiential learning using life size manikins with actual physiological responses

and interaction in realistic scenarios. It has been proposed as a novel supplemental teaching-learning strategy to enhance the transfer of student competence from the classroom to the clinical situation (Yuan, Williams and Chan, 2014).

Competency

Competencies are defined as the mobilization of complex knowledge of how to deal with a set of specific situations. Competencies identify clear outcome expectations for graduates in relation to health system needs and manifest the integration of specific knowledge, skills, and attitudes acquired through learning(Pepin et al., 2017). Competence after the use of high-fidelity simulation in nursing education were discussed in the reviewed studies. A mixed contribution of high-fidelity simulation to clinical competence was found through systematic review . The majority of students considered high-fidelity simulation as helpful in enhancing their clinical problem-solving ability, clinical reasoning and team collaboration. Conversely, when transferring learning experience to real clinical settings, students may focus on individual bits of information and lack a unified view of the whole (Yuan, Williams and Fang, 2012). The results of Blum et al. (2010) indicated no significant differences in clinical competence in traditional group and simulation group. These variations in the duration of simulation and measurement of competence may influence the outcomes.

Objective Structured Clinical Examination (OSCE)

The Objective Structured Clinical Examination (OSCE) is a performance-based testing. It is the observational measurement which is used to assess students' clinical competence and to test some knowledge, skills, judgment and clinical reasoning which are not easily tested with pen-and-paper methods. The OSCE has become a standard method of assessment in clinical competence, skills and communications. It assesses competency, based on objective testing through direct observation. The OSCE has been used to evaluate the abilities to obtain and interpret data and handle unpredictable patient conditions in clinical examination (Harden, Lilley and Patricio, 2016).

The OSCEs with high-fidelity simulation can establish communication skills for enhancing students' understanding and respect of diverse cultures and religions, and minimize patient and examiner variation in the assessment of clinical skills as well. The components of competence are structured with attention being paid to the objectivity of the examination. In the simulated clinical scenarios, the students are observed and evaluated as they go through a series of stations in which they interview, examine and treat standardized patients. But no current study explores the observational measurement of students' clinical competence by OSCE in simulation.The objective measurements in assessing nursing competency need to be explored.

Objective

This paper describes the design of the Objective Structured Clinical Examination (OSCE) in high-fidelity simulations for assessing nursing students' competence in undergraduate education.

Theoretical Framework

Cognitive learning theory was used to practice, and refine nursing competency. Cognitive learning is defined as the acquisition of knowledge and skill by mental or cognitive processes. In cognitive learning, the individual learns by listening, watching, touching, reading, or experiencing and then processing and remembering the information. Cognitive learning is the way learners process and organize information and make judgments based on their observations. Learners perceive stimuli and decide how to process the information and use previous experience to guide their behaviors or performance (Cools & Van den Broeck, 2007). Cognitive learning enables students to create and transmit a complex culture including symbols, values, beliefs and norms.

Simulation based learning is consistent with cognitive learning theory since it is interactive, builds on prior knowledge, and relates to real clinical problems. The basis for simulations is on the learners' changes in conceptualization of knowledge, attitudes, values and beliefs, not on behaviors related to reinforcement of skills (Barton, Bruce and Schreiber, 2018). Knowledge is generated when an individual's perspective is transformed as a result of exposure to the situation in which students are required to put their thoughts into action. Simulation activity is an appropriate mechanism for achieving this goal by providing an opportunity for students to confront a disorienting dilemma and explore their emotional and intellectual reaction without risks associated with clinical responsibility (Kaddoura, 2010). This allows students to increase their competence in a safe setting, to integrate a full range of knowledge, attitudes and skills to respond effectively. Competencies incorporate understanding of knowledge, problem-solving, clinical judgment and clinical, technical and interpersonal skills. Knowledge is developed through action research to inform practices and is used to modify and improve an innovation as it is being implemented. Reflective practice increases in cognitive complexity parallel to the increase in simulation complexity in order to measure the increases in student conceptual learning (Leigh, et al., 2016). Therefore, the OSCEs are designed to evaluate the performances in the knowledge, skill and cognitive/ affective domains.

Participants

The OSCEs are designed for testing clinical competencies in baccalaureate nursing students. A purposive sampling is used to invite all year two and year four baccalaureate nursing students who had completed courses in fundamentals of

nursing, health assessment and medical-surgical nursing to participant in this study. Informed consent was obtained, and the participation is voluntarily.

The Design of OSCE

The OSCEs are designed to evaluate the clinical competence which refers to the comprehensive abilities to problem solving, decision making, critical thinking, case management and client communications and ethical consideration.

The OSCE stations includes health assessment, decision making, nursing interventions, health education. First station for nursing assessment (10 minutes) includes collecting current medical history, past history, family history, physical examination and psychosocial assessment, etc., mainly assessing nursing assessment ability, communication skills, data collection skills and professional attitude as well. The second station for nursing diagnoses (10 minutes). The candidates should analyze the medical records and collected data, and propose the nursing diagnosis/care problems and think about what kinds of nursing interventions should be taken for the problems. It is used to evaluate the abilities of case analysis, condition observation and problem handling, and familiarity with nursing diagnosis. The third station is nursing skill exam (20 minutes). The relevant nursing skill is implemented for the nursing diagnosis/reasonable problem. The fourth station is health education (10 minutes). It is used to assess the ability of health education and communication skills.

The simulation offered a realistic learning environment for tutors to assess students' clinical performance. The following is one example of OSCEs simulation.

Case introduction: Hypoxia

1. Setting the Scene**:** The simulation takes place in an emergency department. The resident is in bed. The certified nurses provide the care for the patient.
2. Technology used**:** All scenarios are designed using the high-fidelity simulator which is a computer-controlled human patient simulator (HPS, SimMan). The SimMan is a full-body manikin with a realistic upper airway, chest movement, variable cardiac and breath sounds and a palpable pulse, an ability to verbal some symptoms and respond to interventions. Student standard patients (SSPs) are involved for enhancing the realism of interactions in the scenario.
3. Running the scenario:

The narrator**:** Mr. Wang, a 84-year old man, was from a long-term care setting.

SimMan: The voice sounds are nausea, vomiting and coughing. The limbs are cold. He is sweating. Eyes are half closed. His lips are cyanotic. He presents shallow breathing with the abdominal respiration.

Parameter setting for the HPS: The data will be shown as they are detected.

T 37.8 ºC, BP 130/75mmHg, respiratory rate is 30 /min, heart rate is 116/min, SpO_2 is 83 %. . His FEV1 is 26% and FEV1/FVC is 38%. Lung sound**:** Crackles on the left side; Wheezing on the right side; Heart sound: normal

Standard patients: SP presents unsteady gait.

SP said: "I don't fell well. I am so sick. I can't breathe. My chest is stuffy. I fell dizzy and fatigue. I am thirsty."

The inquiry response: The response information will be provided as they are inquired.

Diseases history: chronic obstructive pulmonary disease COPD for 15 years, Hypertension for 20 years, BP 130-140/80-90 mmHg with medicine, Diabetes Mellitus DM for 10 years. The client has been hospitalized twice due to chest infections during the last 12 months.

Smoking history: 40-years, is still smoking.

Dietary history: Sweet food is favorite.

Laboratory testings: The laboratory reports will be shown as they are mentioned by students.

The arterial blood gases are reported as pH 7.25, bicarbonate (HCO_3^-) 23 mEq/L (norm 22~26 mEq/L), $PaCO_2$ 55 mmHg (norm 35~ 45 mmHg), PaO_2 56 mmHg (norm 80~100 mmHg).

Blood glucose is 11.1mmol/L (norm 3.89 ~ 6.11mmol/L).

White blood cell count: $12.2x10^9$/L (norm 4 ~ 11 $x10^9$/L), neutrophils accounted for 90% (norm 55~70%).

Hemoglobin: 11gm/dl (norm 14~18 gm / dl). Hematocrit 46% (norm 42~54%);

Electrolyte: Sodium (Na+): 129 mEq / L (norm 135~145 mEq / L), Potassium (K+): 5.4mEq / L (norm 3.5~5.0 mEq / L) ; chloride 96.0 mmol/L (norm 96 ~ 106 mmol/L)

Urea nitrogen 28 mg / dl (norm 6 ~ 23 mg / dl), creatinine: 1.8 mg / dl (norm 0.7~1.5 mg / dl), SGPT70U/L (norm 5~40U/L), SGOT 50U/L(norm 5~40U/L) ;

Tasks:

1. Station I Nursing assessment (10 minutes): Please conduct the health assessment for this client.
2. Station II Nursing diagnoses (10 minutes): Please verbalize the meanings of the medical parameter; Identify the abnormal conditions with explanation of possible causes; Identify the nursing diagnoses with supportive data.
3. Station III Nursing intervention (20 minutes): Please deal with the patient conditions according to the physician's prescription.
4. Station IV Health education (10 minutes): Please provide the health education for this client.

The evaluation forms are shown in Table 1, 2, 3 and 4. It is the observational measurement with three levels (Incorrect or Omitted, Partially Correct, Correct). The higher score indicated the better competency in clinical performance.

Table 1. *OSCE Health Assessment Tool*

Marking criteria	Correct	Partially Correct	Incorrect/ Omitted
1) Provides appropriate introduction	1	------	0
2) Checks the physician's prescription, client's ID number and name	2	1	0
3) Symptom enquiry: hypoxia timing and severity	2	1	0
4) Symptom enquiry: relieving factor and provoking factors	2	1	0
5) Physical examination: blood pressure, pulse	2	1	0
6) Physical examination: Temperature and respiratory rate	2	1	0
7) Physical examination: lung sound, heart sound	2	1	0
8) Physical examination:bowel sounds, skin exam, joint, eye, and mouth.	2	1	0
9) Laboratory testings: arterial blood gases	2	1	0
10) Patient education: What happened to the patient?	2	1	0
11) Patient education: What does the patient need to pay attention to?	2	1	0
12) Patient education: What's the nurse going to do for the patient?	2	1	0
13) History assessment: disease, medicine	2	1	0
14) History assessment: allergy, operation	2	1	0
15) History assessment: family, special dietary,	2	1	0
General			
16) Good communication skills demonstrated	2	1	0
17) Clear, structured history taking	2	1	0
18) Open ended question used	2	1	0
19) For the patient to comment on : this student made it easy for me to talk overall rating (acceptable, Cause for concern, unacceptable)	2 A	1 C	0 U
Total			( )/39

Table 2. *OSCE Nursing Diagnoses Tool*

Marking criteria	Correct	Partially Correct	Incorrect/ Omitted
1) Verbalize the meanings of FEV1	2	1	0
2) Verbalize the meanings of FEV1/FVC	2	1	0
3) Verbalize the meanings of the report of arterial blood gases testing: *increased* $PaCO_2$ and decreased PaO_2,	2	1	0
4) Verbalize the abnormal conditions : *low* SpO_2, *cyanosis*	2	1	0
5) Verbalize the abnormal conditions : *weakness,* low Hemoglobin	2	1	0
6) Verbalize the abnormal conditions : *increased temperature, BP*	2	1	0
7) Verbalize the abnormal conditions : *increased RR, and heart rate*	2	1	0
8) Verbalize the abnormal conditions : *high blood glucose, increased* White blood cell count,	2	1	0
9) Verbalize the abnormal conditions : low sodium, high potassium	2	1	0
10) Verbalize the abnormal conditions : liver and renal functions are abnormal.	2	1	0
11) Explain potential causes for abnormal signs	4	2	0
12) Verbalize the nursing diagnoses at this moment in the scenario:			

Hypoxia with supportive data	2	1	0
Fever with supportive data	2	1	0
Hyperglycaemia with supportive data	2	1	0
Electrolyte disorder with supportive data	2	1	0
Activity Intolerance with supportive data	2	1	
Knowledge deficit with supportive data	2	1	0
Risk for falling with supportive data	2	1	0
Priority of diagnoses	2	1	0
Total			( )/38

Table 3. *OSCE nursing Intervention Tool*

Marking criteria	Correct	Partially Correct	Incorrect/ Omitted
1) Provides appropriate introduction and appease the patient	2	1	0
2) Checks the physician's prescription	1	--	0
3) Check client's ID number and name	1	--	
4) Hypoxia management:			
Reassess the SpO_2, pulse rate	2	1	0
Appropriate position	2	----	0
Instruct the breathing pattern	2	----	0
Buckle back expelling phlegm	2	----	0
Observe oxygen saturation	2	----	0
Medication according to the prescription	2	----	0
Venturi oxygenation	2	----	0
Oxygen concentration according the report of Blood testings	2	----	0
5) Assess the vital signs: blood pressure, heart rate	2	1	0
6) Assess the vital signs: Respiratory rate, temperature	2	1	0
Hyperglycaemia management:			
Assess the medication and diet	2	1	0
Assess the related signs (pulse, thirsty, urinate)	2	1	0
7) Subcutaneous injection of insulin according to the prescription:			
Injection method	2	1	0
Site selection	2	----	0
Dose	2	----	0
Aseptic principle	4	2	0
8) Fever management	2	1	0
9) Management of electrolyte disorder: intravenous infusion			
Injection method	2	1	0
Site selection	2	1	0
Dose	2	----	0
Aseptic principle	4	2	0
10) Instructions for attention	4	2	0
General			
11) Good communication skills demonstrated	2	1	0
12) Clear, structured instruction	2	1	0
13) Focus on patients' reactions	2	1	0
14) Reassess the patient conditions	2	1	0
15) For the patient to comment on: this student made it easy for me to talk overall rating (acceptable, Cause for concern, unacceptable)	2 A	1 C	0 U
Total		( )/64	

Table 4. *OSCE Health Education Tool*

Marking criteria	Correct	Partially Correct	Incorrect/ Omitted
1) Provides appropriate introduction and Appease the patient	2	1	0
2) Checks the physician's prescription, client's ID number and name	2	1	0
3) Assess patient condition: disease knowledge, perceptive to his conditions	2	1	0
4) Assess patient condition: belief, religion, culture,	2	1	0
5) Assess patient condition: hobby, educational levels,	2	1	0
6) Assess patient condition: memory, Cognitive state	2	1	0
7) Assess patient condition: hearing, Vision,	2	1	0
8) Knowledge about the disease: COPD, Hypertension, and Diabetes Mellitus			
COPD: risk factors	2	1	0
COPD: symptoms and signs	2	1	0
COPD: medication	2	1	0
COPD: monitoring precursory symptoms	2	1	0
Hypertension: risk factors	2	1	0
Hypertension: symptoms and signs	2	1	0
Hypertension: medication	2	1	0
Hypertension: monitoring precursory symptoms	2	1	0
Diabetes Mellitus: risk factors	2	1	0
Diabetes Mellitus: symptoms and sign	2	1	0
Diabetes Mellitus: medication	2	1	0
Diabetes Mellitus: monitoring precursory symptoms	2	1	0
9) Dietary instruction	2	1	0
10) Activity instruction	2	1	0
11) Smoking cessation	2	1	0
12) Life-style adjustment	2	1	0
13) Social support at a long-term care setting	2	1	0
General			
14) Good communication skills demonstrated	2	1	0
15) Clear, structured instruction	2	1	0
16) Focus on patients' feedback	2	1	0
17) Reconfirm important information	2	1	0
18) For the patient to comment on: this student made it easy for me to talk overall rating (acceptable, Cause for concern, unacceptable)	2 A	1 C	0 U
Total			( )/58

Quality Assurance of the OSCEs

The audiovisual system is used to record the interactions between candidates and the SimMan. The simulated plot is controlled by the computer system. Each station was videotaped in order to enable the examiners to make the recording objectively during the OSCEs and to provide detailed feedback to the candidates after OSCEs. The OSCE assessment tools are used by two qualified raters for assessing students' clinical competencies in a specific simulated situation. Two examiners observe candidates' assessment performance, commutation skill,

interactions with the SimMan through the audiovisual system, and make the recording on the OSCE assessment tools.

Validity and Reliability of the OSCEs

The validity of the OSCEs is assessed by the face validity from expert panel. The expert panel consisted of five persons with expertise in nursing education, learning theory, simulation and clinical practices. The comments are considered for the revision of the assess forms.

The inter-rater reliability should be established for minimizing the possibility that the scores would vary from rater to rater. Inter-rater reliability is the consistency of performance (the degree of agreement) among different raters when the same criteria are used to score the performance of subjects at the same time. Pearson product-moment correlation coefficient (r) is used as an index of agreement among two raters. For controlling raters' biases, the inter-rater reliability of each assessment tool should be established. The interrater reliability over 0.8 is considered as a satisfied consistence among raters.

Lessons Learned

Objective evaluation of clinical competencies is a key component of nursing education. The OSCEs have the potential to provide students with feedback on the clinical performance and reflect the strengths and weaknesses. In the literature review, the OSCE was reported positively as an assessment method for clinical competence, but some students felt stressful during the OSCE since they should pay more attention the changeable situation and should make a decision using previous knowledge and experiences and conduct the intervention to deal with unexpected events (Tan et al., 2018). The OSCE assessment method consists of a given number of "show how to do in simulated scenarios" stations at a given time that focus on safe patient care (Isaak, Chen and Hob, 2017). OSCEs can establish communication skills to advance students' understanding and respect of diverse cultures, religions and values (Harden, Lilley and Patricio, 2016).

The OSCEs can be carried out using paper based methodology. The manual calculation of results and inputting the scores into a database are time-consuming, and are subject to human errors. In this case, OSCE software needs to be developed by computer system. It was reported that the advantages of the OSCEs using an electronic hand-held device include speed of data gathering, simplicity of data evaluation and fast automatic feedback. The process of examination can be recorded for immediate feedback giving (Rush, et al., 2014).

On the other hand, increasing multicultural diversity generates a challenge on providing culturally competent care for both nurses and patients. As nurse educators play an important role in developing students' cultural awareness, knowledge, and competency in clinical situation. More simulation with standard patient need to be used in the design of OSCEs on cultural assessment in order to

elicit students' attitudes toward cross-cultural situations, and to enhance their communication skills within multicultural clinical environment.

Recommendations

The use of clinical simulation in conjunction with clinical experiences becomes popular in nursing education, but there is lacking robust research and evidence that supports clinical simulation as an effective teaching method in fostering student competence required nursing care. More reliable and valid OSCEs need to be designed using simulated patients and scenarios for training and testing students' clinical competency. On the other hand, awareness in culture diversity between nurses and patients may influence their therapeutic communication and the implantation of nursing care plan. Culture diversity in nursing care should be involved in further assessment of nursing competences.

Conclusions

The OSCEs within clinical simulation can engage students with patients from different backgrounds in a safe and controlled learning environment. The simulation also offered a realistic learning environment for teachers to assess students' clinical competence. The OSCE can be used to assess nursing students' comprehensive clinical skills and the abilities to clinical thinking, problem-solving and communication in clinical setting.

Acknowledgments

Thanks to Macao Polytechnic Institute for Research Project (RP/ESS-06/2017).

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