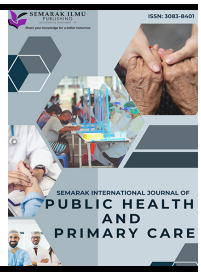
SEMARAK ILMU PUBLISHING

Semarak International Journal of Public Health and Primary Care

Journal homepage:
https://semarakilmu.my/index.php/sijphpc/index
ISSN: 3030-5519



Integrating Soft Skills in Nursing Clinical Skill Assessments for Aseptic Procedures: A Clinical Audit Approach

Thandar Soe @ Sumaiyah Jamaludin[1], Mohd. Said Nurumal[1,*], Norfadzilah Ahmad[1], Siti Aesah @ Naznin Muhammad[2], Chong Mei Chan[3], Wulan Noviani[4]

[1] Kulliyyyah of Nursing, International Islamic University Malaysia, Kuantan Campus, Pahang, Malaysia
[2] Sultan Ahmad Shah Medical Centre @ IIUM, Jalan Sultan Haji Ahmad Shah, Bandar Indera Mahkota, 25200 Kuantan, Pahang, Malaysia
[3] Department of Nursing Science, University of Malaya, Kuala Lumpur, Malaysia
[4] School of Nursing, Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Yogyakarta, Yogyakarta, Indonesia

ARTICLE INFO

Article history:
Received 27 December 2024
Received in revised form 17 February 2025
Accepted 1 March 2025
Available online 15 March 2025

Keywords:
Structured clinical skill assessment; soft skills; aseptic procedure; undergraduate nursing programme

ABSTRACT

Nursing academics play a crucial role in cultivating appropriate attitudes towards aseptic techniques among nursing students. It is imperative to raise awareness among students about their responsibility in preventing healthcare-associated infections to improve patient outcomes and quality of life, starting with teaching and assessing these principles during their education, ensuring a balance between technical proficiency and the essential soft skills inherent to nursing care. This study aimed to examine the soft skill elements in objectively structured clinical skill assessment on aseptic procedures in the undergraduate nursing programme. A clinical audit was carried out on the retrospective structured clinical skill assessment exam questions by using the clinical skill assessment index III (CSAI-III) instrument. A total of 51 aseptic procedures set of exam questions were collected from 7 higher learning institutions in Malaysia where they offered the undergraduate nursing programme. The data were analysed descriptively. There were 51 aseptic procedures out of 237 collected exam documents found and analysed in this study. The aseptic procedures were grouped into 11 types to make them more specific. Although there are nine soft skill elements were identified in relation to aseptic procedures, including communication, social and responsibility, critical thinking, problem-solving, teamwork, leadership, professional and ethical decision-making, numeracy, and interpersonal skills. However, communication skills were predominantly present in 80.4% of the OSCE documents analyzed, while other soft skill elements were notably absent from the assessment rubrics. Notably, all 51 aseptic procedure assessments provided necessary equipment, eliminating the need for students to gather items, though none specified allocated time for scenario review, and only 43.1% included clear instructions for students. Thus, the current aseptic procedure checklist of clinical skill assessment needs improvement, especially the soft skills components. Besides, higher-learning nursing institutions in Malaysia should visit and revise the content of their checklist and the related materials if they are concerned about quality graduates and ultimately improve the quality nursing care towards their patients.

* *Corresponding author.*
E-mail address: mohdsaid@iium.edu.my

https://doi.org/10.37934/sijphpc.3.1.2130b

1. Introduction

The evolving demands of healthcare underscore the importance of both technical and soft skills in nursing. While technical expertise is vital for clinical competency, soft skills such as communication, critical thinking, problem-solving, social responsibility, and ethical decision-making are equally essential for delivering nursing care that meets the standards of high-quality patient outcomes [1]. The Objective Structured Clinical Examination (OSCE) format is widely used in nursing programs to evaluate the competencies skills of clinical procedures; however, it predominantly focuses on technical aspects, potentially overlooking essential soft skills that impact patient interactions and outcomes [2]. The significance of incorporating soft skills in clinical skill assessments is particularly relevant in aseptic procedures, where nurses' ability to maintain infection control relies not only on technical accuracy but also on the ability to communicate effectively and demonstrate accountability [3].

In this study, soft skills refer to non-technical competencies such as communication, teamwork, problem-solving, critical thinking, and ethical decision-making, which are essential for effective clinical practice and patient care. On the other hand, the aseptic procedure is one of the core procedures for the undergraduate nursing programme. When soft skills are integrated with aseptic procedures practices designed to prevent contamination and maintain sterility during clinical interventions like wound dressing and catheter insertion these skills complement technical abilities, fostering holistic nursing care, enhancing patient safety, and supporting professional development. Moreover, soft skills are integral to successful healthcare delivery, influencing outcomes such as patient satisfaction and adherence to treatment plans [1,2]. Within the OSCE framework, these skills have been examined across various disciplines, including medicine and allied health fields, with findings underscoring their importance for clinical competency [3]. Communication, a key component, has been identified as essential for effective patient interactions and teamwork. Studies have highlighted that while some OSCEs incorporate communication, other soft skills, such as problem-solving and ethical decision-making, are often overlooked [1,2]. In Malaysia, there is limited research addressing the inclusion of these elements in nursing assessments, suggesting a gap in the curriculum that could impact nursing graduates' readiness for clinical practice [1,2].

Healthcare-associated infections are a significant global concern, with aseptic procedures representing a foundational preventive measure [4,5]. Nursing educators play a pivotal role in cultivating an understanding of these techniques and the soft skills necessary to implement them effectively in performing aseptic procedures. There is a growing emphasis on the importance of soft skills, including communication, leadership, and ethical decision-making, as fundamental components of nursing education [1,5]. However, in Malaysia, where the nursing field continues to evolve, there remains a gap in the structured integration of these soft skills within clinical skill assessments for nursing students specifically for aseptic procedures [1,2,7].

Protective measures against errors in aseptic procedures are influenced by various factors, including proper preparation and execution, healthcare professionals' numeracy skills, education, effective communication, interdisciplinary collaboration, leadership abilities, and systemic changes relevant to infection prevention and control [8-11]. Aseptic procedures not only require technical proficiency but also demand the application of soft skills such as critical thinking, teamwork, and communication to ensure holistic and safe patient care.

Previous research highlights that structured clinical skill assessments for aseptic procedures can evaluate nine essential soft skills: communication skills (CS), social skills and responsibilities (SSR), critical thinking skills (CTS), problem-solving skills (PSS), teamwork skills (TS), leadership skills (LS), professional and ethical decision-making skills (PEDMS), numeracy skills (NS), and interpersonal skills

(IS) [6]. These competencies are crucial for effective nursing practice, contributing to both clinical outcomes and patient satisfaction.

Despite the critical importance of soft skills, current assessment of clinical skills procedures for nursing students disproportionately emphasizes technical competencies while soft skills often receive minimal attention. This imbalance limits the comprehensive evaluation of nursing competencies required for delivering holistic patient care. The lack of emphasis on soft skills in assessment practices may result in graduates who are technically competent but underprepared for real-world healthcare environments where interpersonal interactions, ethical decision-making, and teamwork play pivotal roles.

Therefore, this study aimed to examine the integration of soft skill elements in objectively structured clinical skill assessments of aseptic procedures within undergraduate nursing programs in Malaysia. Addressing this gap is essential to ensure that future nursing graduates are equipped with both technical and non-technical competencies, fostering comprehensive patient care and professional growth.

2. Methodology

This study was conducted across Malaysian higher learning institutions offering the undergraduate nursing programme, with voluntary participation. A clinical audit method was employed, focusing on objectively structured clinical skill assessment (OSCE) exam questions. Following the necessary approvals, the researcher reached out to all 12 higher learning institutions, encompassing both public and private entities from Malaysia's eastern and western regions. Gatekeepers were assigned at each institution to facilitate access to OSCE exam questions, which are treated as confidential documents. Ultimately, five institutions, comprising three public and two private, agreed to participate, and the names of these institutions were kept confidential.

The study utilized the Clinical Skill Assessment Index III (CSAI-III) tool, which demonstrated strong content validity (CVI = 1) and high reliability (Cronbach's Alpha = 0.9) [6]. The CSAI-III tool was employed to audit OSCE exam questions related to aseptic procedures. It evaluates ten domains: 1) Procedure type, 2) Soft skills, 3) Equipment, 4) Student instructions, 5) Clinical scenario, 6) Model usage, 7) Duration, 8) Assistance, 9) How many marks are allocated for soft skills, and 10) Opportunities for soft skills measurement within the procedure.

A total of 237 retrospective OSCE documents were collected from the participating institutions, of which 51 sets specifically related to aseptic procedures were identified and audited. These included clinical case scenarios, procedure checklists, examiner comments, and documentation charts. Descriptive analysis was used to interpret the findings of this study.

Ethical approval for the study was obtained from the International Islamic University Malaysia Research Ethics Committee, with the ethics approval number IREC 2019-129. Furthermore, explicit consent was obtained from all participating higher learning institutions, ensuring adherence to ethical standards and the maintenance of confidentiality throughout the research process.

3. Results

There were 51 aseptic procedures out of 237 OSCE documents found and analysed in this study. The aseptic procedures were grouped into 11 types to make them more specific. Among the 51 aseptic procedures, performing dressing procedures accounted for 17 (33.4%), as shown in Table 1. There were 3 types of dressing procedures performed, despite 4 types being identified. Simple wound dressing accounted for 9 (19.7%), tracheostomy wound dressing 3 (5.9%), stoma wound

dressing 1 (2%), and umbilical cord care dressing 4 (7.8%) out of 51 aseptic procedures. The remaining aseptic procedures found are insertion of the urinary catheter 8 (15.7%), insertion of IV cannula 1 (2%), endotracheal suctioning 3 (5.9%), removal of drainage tube 3 (5.9%), suture removal 3 (5.9%), downing sterile glove and gown 8 (15.7%), oral/nasal suctioning 2 (3.9%), surgical hand rub 1 (2%), and others (IV-line care 1 (2%), clip removal 2 (3.9%).

Moreover, from the audit findings from the examiner's comment documents, it was found that 4 out of 9 simple wound dressing procedures have students break the sterility technique during their assessment. Furthermore, students do not maintain sterility techniques while performing the endotracheal suctioning procedure. Maintaining the sterilisation method is crucial in dressing or suctioning to prevent unnecessary complications.

In terms of the soft skill elements for the aseptic procedure, 9 elements of soft skills were identified related to this procedure as described above: communication skills (CS), social skills and responsibilities (SSR), critical thinking skills (CTS), Problem-solving skills (PSS), teamwork skills (TS), leadership skills (LS), professional and ethical decision-making skills (PEDMS), numeracy skills (NS), and interpersonal skills (IS). It was found that most of the OSCE documents of aseptic procedure skill assessment have CS 41 (80.4%), and 10 (19.6%) do not even have CS, as shown in Table 1. However, other soft skill elements were not found in this aseptic procedure's checklist/rubric.

It was found that the necessary equipment was laid out for the student in all the collected 51 (100%) aseptic procedures skill assessments, as shown in Table 1. Students do not have to gather any required items or equipment for the respective aseptic procedure before performing it. All the required items have been prepared and laid out for them on the trolley. Therefore, students do not have to think about what equipment is required before starting the aseptic procedure.

Among the 51 (100%) aseptic procedures of OSCE documents, none of the assessment documents mentioned the allocated time for the student to read the scenario and the question before starting the procedure, as shown in Table 1. However, regarding the clear instruction for the students, it was found that 22 (43.1%) out of 51 aseptic procedure documents have mentioned the instruction for the student to perform the procedure, whereas it was not mentioned in 29 (56.9%) aseptic procedure documents.

For the clinical case scenario domain, it was found that all aseptic procedure's clinical scenario 51 (100%) falls under a simple case scenario regardless of the type of procedure, as shown in Table 1. Among the 9 simple wound dressing procedure case scenarios, 5 of them do not even mention "*what type of wound*", "*where is the location of the wound*", and "*what is the cause of the wound*". It was just written like "*perform dressing*". These kinds of case scenarios need improvement.

Another important component under this domain of the CSAI-III tool is whether the clinical scenario matched the assessment objective. Thus, the researcher audited the clinical case scenario and the objective of the structured clinical skill assessment. It was found that 11 (21.6%) out of 51 aseptic procedure documents only have a matching clinical scenario and their assessment objective. 40 (78.4%) of the aseptic procedure documents do not mention the assessment objective.

The CSAI-III tool's sixth domain is about the type of model used in the aseptic procedure, as described in the last chapter. Based on the audited documents of the aseptic procedure, it was found that all 42 (82.4%) aseptic procedures have used the Mannequin as the model, and 9 (17.6%) have used an actor as the model in the skill assessment, as shown in Table 1. Another aspect audited from the sixth domain in the CSAI-III tool is whether the model is suitable for the assessed procedure It was found that 34 (66.7%) used the suitable model, and 17 (33.3%) did not use the proper model in the aseptic procedure clinical skill assessment. For instance, using the mannequin in the assessment of endotracheal suctioning skills and using the mannequin in the assessment of skills on IV-line care.

These are examples of improper model usage in the clinical skill assessment. It also could be one of the factors that the student is not applying the required soft skills in this procedure.

The CSAI-III tool's duration refers to the allocated time for the student to complete the aseptic procedure, as described in the last chapter. Based on this clinical audit study, all 51 (100%) aseptic procedures allocate 5 minutes for the students to complete the procedure. For the second aspect of this domain, it was found that 23 (45.1%) aseptic procedures have enough time allocation whereas 28 (54.9%) aseptic procedures do have not enough allocated time for the students to perform them. Furthermore, based on the examiner's comments about the nature of the question being asked to the students, some aseptic procedures cannot be completed within 5 minutes, for instance, performing eye dressing and instillation of eye drops, cord care dressing and so on. Since the students are given only 5 minutes to complete the procedure, the nursing academic should prioritise which clinical skill assessment to assess the student's competency level.

In domain 8 of the CSAI-III tool, the researcher audited any assistance provided to the students while performing the aseptic procedure. There was no evidence found in any single aseptic procedure document which mentioned assistance provided for the students in the collected 51 (100%) aseptic procedure documents.

The researcher also conducted the clinical audit on soft skills components for aseptic procedures checklists/rubrics. Although 9 soft skill elements have been identified for the aseptic procedure, as mentioned earlier, a "0" mark is allocated for 12 (23.5%) procedures, 2 marks are allocated for 35 procedures (68.7%), and 3 marks are allocated in 4 procedures (7.8%) out of 20 steps in their checklist/rubrics. It can be said that soft skills marks are not given in favour of the current structured clinical skill assessment. Furthermore, in the audit findings from the examiner's comment documents, it was found that 20 examiners wrote about poor Communication skills and students broke the sterility technique during their assessment. This is also an alarming issue and needs to rectify what was the reason.

In the last domain of CSAI-III, the researcher conducted the clinical audit on the opportunity of soft skills that can be measured in the aseptic procedure on the collected checklists/rubrics and their clinical scenario. It was found that 51 (100%) aseptic procedures' checklists/rubrics contain only CS, and the other soft skill elements such as SSR, CTS, PSS, TS, PEDMS, NS, and IS are not present.

Table 1
Overview of nursing core procedure area 3: Aseptic procedure (n=51, N=237)

Domain	Variable	Frequency (n)	Percentage (%)
1) Type of procedure	1) Dressing procedure		
	• Simple wound dressing	9	17.7
	• Complex wound dressing	0	0
	• Tracheostomy dressing	3	5.9
	• Stoma wound	1	2
	• Others (cord care)	4	7.8
	2) Insertion of urinary catheter	8	15.7
	3) Insertion of IV cannula	1	2
	4) Endotracheal suctioning	3	5.9
	5) Tracheostomy suctioning	2	3.9
	6) Removal of the drainage tube	3	5.9
	7) Suture removal	3	5.9
	8) Downing Sterile Glove and Gown	8	15.7
	9) Oral/nasal Suctioning	2	3.9
	10) Surgical Hand Rub	1	2
	11) Others (clip removal/IV-line care)	3	5.9

2) Soft skill elements	1)	Communication skills	41	80.4
	2)	Social skills and responsibilities	0	0
	3)	Critical thinking skills	0	0
	4)	Problem-solving skills	0	0
	5)	Teamwork skills	0	0
	6)	Leadership skills	0	0
	7)	Professional and ethical decision-making skills	0	0
	8)	Numeracy skills	0	0
	9)	Interpersonal skills		
3) Equipment	1)	Has been laid out for the student	51	100
	2)	Has been laid out with an unnecessary requirement	0	0
	3)	Students need to prepare themselves	0	0
	4)	Others (specify)		
4) Instruction for the student	1)	Time allocation	0	100
	2)	Is the instruction given clearly	22	43.1
5) The clinical scenario	1)	Case scenario		
		a) Simple	51	100
		a) Medium	0	0
		b) Complete	0	0
		c) Complex	0	0
	2)	Is the clinical scenario matches the assessment objective?	11	21.6
6) Model usage	1)	Model		
		a) Mannequin	42	82.4
		b) High fidelity	0	0
		c) Actor	9	17.6
		d) Others	0	0
	2)	Model usage suitable for the procedure is assessed	34	66.7
7) Duration	1)	5 minutes	51	100
	2)	> 5 minutes	0	0
	3)	Others (Specify)	0	0
	4)	Is the time allocation enough to complete the procedure?	23	45.1
8) Assistance	Any assistance is provided for the procedure?		0	0
9) How many marks are allocated for soft skills?	"0" (23.5%) marks are allocated for 12 procedures". 2 marks (68.7%) for 35 procedures and 3 marks (7.8%) for 4 procedures out of 20 steps.			
10) The opportunity of soft skills that can be measured in the particular procedure	√ Communication skills	√ Social skills and responsibilities	√ Critical thinking skills	
	√ Problem-solving skills	√ Teamwork skills	√ Leadership skills	
	√ Professional and ethical decision-making skills	√ Numeracy skills	√ Interpersonal skills	

4. Discussion

Nursing academics play an important role in ensuring that nursing students develop appropriate attitudes towards aseptic techniques when they are handling aseptic procedures. Raising awareness among nursing students of their responsibility in preventing the occurrence and reducing the transmission of healthcare-associated infection as an ongoing endeavour is required, with the laudable aim of preventing complacency and ultimately improving patient outcomes. To achieve all

those aims and objectives, it should start by teaching and assessing them when nursing students are still at their learning institutions.

Based on the current clinical audit, nearly half of the students break the sterility method while they are performing the aseptic procedures in their OSCE. We need to look at what are the issues that caused them to break the sterilization method while performing their clinical skill assessment on the "aseptic procedure". The healthcare-associated infections (HCAIs) are the most frequently reported adverse events in the current healthcare delivery system [12,13]. Furthermore, the HCAIs in 7 and 10 out of every 100 hospitalized patients in high-income countries and low- and middle-income countries respectively [13]. Therefore, nursing students need to know the consequences of breaking the sterility technique in aseptic procedures. Not only that they also should be assessed on their competency skills in this particular field.

Looking at soft skills components in the aseptic procedure's checklist, only CS has been found in the 41 documents and the other 10 documents do not even mention CS in the checklist. Although 9 types of soft skills elements were identified for the aseptic procedure as described in the previous chapter, most of the soft skills elements were not found in the OSCE checklist. Performing the aseptic procedure requires to have efficient knowledge and soft skills. For instance, CT, PES and SSR should be on the checklist of insertion of catheterization procedures since this procedure required to expose the patient's private parts and some cases are handled by a different gender in some situations [14]. Teamwork skill (TS) is required in the cord care dressing procedure, it was due to handling the small baby and the mother at the same time. Similar findings in previous studies where highlighted that these skills underscore the need for clear components in structured clinical skills assessments to enhance students' competency skills [15,16].

The scenario used in all the 51 aseptic procedures was a simple case scenario. Some clinical scenarios do not even describe the type of wound that requires dressing which leads to limitations in students' CTS. The instruction of the clinical case scenario is more focused on task-oriented. The CTS is an essential component of professional responsibility and quality nursing care, especially dealing with aseptic procedures. Moreover, CTS is the ability to think systematically and reflect on the reasoning process used to ensure safe nursing practice in nursing [14-18]. Thus, CTS helps make appropriate decisions and quality nursing care while performing the aseptic procedure.

In this study, the majority of the aseptic procedures used mannequins and the time allocation for assessment was "5 minutes" which was the same as medication procedures and transfusion-related procedures regardless of the type of aseptic procedure. Besides, the allocation of soft skills marks also varies from "0" to "4" marks. Some of the scenarios have the instruction of two procedures to be performed within 5 minutes. This type of question should not be asked in OSCE due to limited time. Besides, some of the aseptic procedures were not suitable for using mannequins, for instance, the ETT suctioning procedure should use a high-fidelity model instead of using a mannequin. Some of the aseptic procedures such as the insertion of CBD procedure cannot be completed within 5 minutes and students did not complete this CBD procedure within "5 minutes" in this study.

From the examiner's comments on this aseptic procedure, it was found that most of the students broke the sterility technique and failed the clinical exam. This is a similar finding to previous studies where they found in their control group, the skills performance of nursing students was very poor in wound dressing and suctioning procedures [19,20]. However, the contrasting finding from this study was their participants (nursing students) had a good skill performance in female catheterization procedures in their OSCE. Thus, the current aseptic procedure checklist needs improvement, especially the soft skills components. Besides, higher-learning nursing institutions should visit and revise the content of their checklist and the related materials if they are concerned about quality graduates.

5. Conclusions

This clinical audit examined the integration of soft skill elements within structured nursing clinical skill assessments, specifically for aseptic procedures in the Malaysian undergraduate nursing programme. The findings underscored a significant imbalance in the current assessment of clinical skills procedures, which predominantly emphasize technical competencies while soft skills critical for holistic and patient-centred nursing care are frequently overlooked or inadequately represented.

While communication skills were consistently present in the assessment criteria for aseptic procedures, reflecting their acknowledged importance, other pivotal soft skills, such as teamwork, problem-solving, critical thinking, professional and ethical decision-making, social skills and responsibilities, leadership, numeracy, and interpersonal skills, were either absent or underrepresented. This limited focus on soft skills restricts the ability of assessment frameworks to comprehensively evaluate nursing competencies and adequately prepare students for the complexities of real-world clinical practice.

Addressing this gap is essential to ensure that nursing graduates are equipped not only with technical proficiency but also with the non-technical competencies needed for effective interdisciplinary collaboration, ethical decision-making, and patient-centred care. Strengthening the integration of soft skills in clinical skill assessments will contribute to producing well-rounded nursing professionals capable of delivering high-quality and holistic healthcare.

6. Recommendation

To address the identified gaps in soft skill integration within structured clinical skill assessments for aseptic procedures, a comprehensive review and enhancement of assessment frameworks is recommended. The current focus on technical competence should be expanded to include a broader range of soft skills essential for holistic nursing care. Assessment criteria should be revised to incorporate tasks and scenarios that evaluate competencies such as teamwork, critical thinking, problem-solving, leadership, and ethical decision-making. For example, scenario-based assessments can simulate real-world clinical challenges, encouraging students to demonstrate these skills while adhering to aseptic techniques.

The development of targeted assessment tools is also necessary to ensure the objective evaluation of soft skills. Rubrics or structured observation checklists could be designed to assess communication, interpersonal skills, professional responsibility, and numeracy during aseptic procedures. These tools would provide a standardized approach to measuring non-technical competencies, offering insights into students' readiness for patient-centered care.

Additionally, training programs for faculty and examiners are crucial to align assessment practices with the expanded criteria. These programs can help educators recognize and evaluate soft skills effectively while maintaining consistency in grading. Collaboration among higher learning institutions is also encouraged to establish standardized guidelines for assessing soft skills in nursing education. This joint effort can promote uniformity in assessments, enhancing the overall quality of nursing graduates across institutions.

By implementing these recommendations, the undergraduate nursing programme can ensure that their assessments not only test technical proficiency but also foster the development of soft skills. This holistic approach will better prepare nursing graduates to meet the complex demands of modern healthcare environments.

Acknowledgement
This research was not funded by any grant. The creation of this manuscript is part of a PhD project.

References
[1] Jamaludin, Thandar Soe Sumaiyah, Mohd Said Nurumal, Norfadzilah Ahmad, Siti Aesah, Naznin Muhammad, and Chong Mei Chan. "Soft skill elements in structured clinical nursing assessment for undergraduate nursing students: A systematic review." *Enfermeria clinica* 31 (2021): S58-S62. https://doi.org/10.1016/j.enfcli.2020.10.019
[2] Jamaludin, Thandar Soe Sumaiyah, Mohd Nurumal, Norfadzilah Ahmad, Siti Aesah Naznin Muhammad, and Chong Mei Chan. "Soft skills elements in structured clinical skill assessment: a qualitative study." *Bali Medical Journal (Bali MedJ)* 11, no. 3 (2022): 1666-1674.https://doi.org/10.15562/bmj.v11i3.3721
[3] Cömert, Musa, Jördis Maria Zill, Eva Christalle, Jörg Dirmaier, Martin Härter, and Isabelle Scholl. "Assessing communication skills of medical students in objective structured clinical examinations (OSCE)-a systematic review of rating scales." *PloS one* 11, no. 3 (2016): e0152717. https://doi.org/10.1371/journal.pone.0152717
[4] Sartelli, Massimo, Corrado P. Marini, John McNelis, Federico Coccolini, Caterina Rizzo, Francesco M. Labricciosa, and Patrizio Petrone. "Preventing and Controlling Healthcare-Associated Infections: The First Principle of Every Antimicrobial Stewardship Program in Hospital Settings." *Antibiotics* 13, no. 9 (2024): 896. https://doi.org/10.3390/antibiotics13090896
[5] Hawker, Clare, Dinah Gould, Molly Courtenay, and Deborah Edwards. "Undergraduate nursing students' education and training in aseptic technique: A mixed methods systematic review." *Journal of Advanced Nursing* 78, no. 1 (2022): 63-77.
[6] Jamaludin, Thandar Soe Sumaiyah, Mohd Said Nurumal, Norfadzilah Ahmad, Siti Aesah Naznin Muhammad, and Chong Mei Chan. "Development and evaluating content validity of clinical skill analysis index tools." *Open Access Macedonian Journal of Medical Sciences* 9, no. T5 (2021): 6-12. https://doi.org/10.3889/oamjms.2022.7824
[7] Nurumal, Mohd Said, Norfadzilah Ahmad, Siti Aesah, Naznin Muhammad, and Mei Chan Chong. "Soft Skill Components in Structured Nursing Clinical Skill Assessment on Assisted Procedures: A Clinical Audit." *International Journal of Care Scholars* 7, no. 2 (2024): 24-30. https://doi.org/10.31436/ijcs.v7i2
[8] Hawker, Clare, Molly Courtenay, and Dinah Gould. "How aseptic technique is taught to undergraduate student nurses: A qualitative study." *Nurse Education Today* 122 (2023): 105717. https://doi.org/10.1016/j.nedt.2023.105717
[9] Gould, Dinah, Clare Hawker, Jane Chudleigh, Nicholas Drey, Rosemary Gallagher, and Edward Purssell. "Survey with content analysis to explore nurses' satisfaction with opportunities to undertake continuing professional education in relation to aseptic technique." *Nurse Education Today* 98 (2021): 104749. https://doi.org/10.1016/j.nedt.2021.104749
[10] Larti, Negin, Mozhgan Jokar, Fatemeh Maraki, Akram Aarabi, and Mohammad Reza Zarei. "Comparison of the knowledge and performance of surgical technicians and technologists regarding the observance of the aseptic technique." *Iran Journal of Nursing* 32, no. 118 (2019): 1-10. https://doi.org/10.29252/ijn.32.118.1
[11] Nurumal, M. S., T. S. S. Jamaludin, N. Ahmad, S. A. N. Muhammad, and C. M. Chan. "Numeracy Skills for Undergraduate Nursing Students' Clinical Skill Assessment: An Expository Analysis." *Nursing & Healthcare International Journal* 2 (2022): 1-5.
[12] Gould, Dinah, and Nicholas Drey. "Student nurses' experiences of infection prevention and control during clinical placements." *American Journal of Infection Control* 41, no. 9 (2013): 760-763. https://doi.org/10.1016/j.ajic.2013.01.025
[13] `World Health Organization. WHO global report on traditional and complementary medicine. World Health Organization. (2019).
[14] Bako, Aliyu, Fatin Aliah Phang, Jaysuman Pusppanathan, and Nina Diana Nawi. "Critical thinking and teaching conception of nigerian physics teachers in inquiry-based learning classroom." *International Journal of Advanced Research in Future Ready Learning and Education* 34, no. 1 (2024): 77-92. https://doi.org/10.37934/frle.34.1.779
[15] Jamaludin, Thandar Soe Sumaiyah. "Integration of Islamic values in undergraduate nursing program: An expository analysis." *International Journal of Care Scholars* 2, no. 2 (2019): 5-8. https://doi.org/10.31436/ijcs.v2i2.125
[16] Nurumal, Mohd Said, and Norfadzilah Ahmad. "The Art of Nursing: Time to Resuscitate." *International Journal of Care Scholars* 6, no. 2 (2023): 1-3.
[17] Msosa, Annie, Judith Bruce, and Rosemary Crouch. "Effect of a formative assessment intervention on nursing skills laboratory learning in a resource-constrained country." *Nurse Education Today* 97 (2021): 104677. https://doi.org/10.1016/j.nedt.2020.104677
[18] Gould, Dinah J., Jane Chudleigh, Edward Purssell, Clare Hawker, Sarah Gaze, Deborah James, Mary Lynch, Nicola Pope, and Nicholas Drey. "Survey to explore understanding of the principles of aseptic technique: Qualitative

content analysis with descriptive analysis of confidence and training." *American Journal of Infection Control* 46, no. 4 (2018): 393-396. https://doi.org/10.1016/j.ajic.2017.10.008

[19] Christiana, Adewunmi Mosunmola, and R. A. Salawu. "Outcome of nurse-led intervention on knowledge and practice of aseptic technique among surgical nurses in two teaching hospitals in Lagos State, Nigeria." *Midwifery* 4, no. 2 (2020): 88-104. https://doi.org/10.52589/AJHNMWCH721KJ

[20] Nasiri, Morteza, Shahrzad Yektatalab, Marzieh Momennasab, and Fatemeh Vizeshfar. "Using objective structured clinical examination (OSCE) for circulating and scrub skills of first-semester operating room technology students: is it valid and reliable?." *Heliyon* 9, no. 3 (2023). https://doi.org/10.1016/j.heliyon.2023.e14395