



## Effectiveness of Simulation Based Learning on Clinical Skills Competence among Undergraduate Nursing Students

Zeeshan Ahmed<sup>1</sup>, Altaf Hussain<sup>2</sup>, Badil<sup>1</sup>, Ghulam Murtaza<sup>1</sup>, Perdhoomun<sup>1</sup>, Zeeshan Manzoor<sup>1</sup>, Rubina Memon<sup>1</sup>

<sup>1</sup>Dow Institute of Nursing and Midwifery, Dow University of Health Sciences, Karachi, Sindh, Pakistan.

<sup>2</sup>Memon College of Nursing, Memon Medical Institute Hospital, Karachi, Sindh, Pakistan.

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**Corresponding Author:** Zeeshan Ahmed, Faculty of Nursing & Midwifery, Ziauddin University, North Nazimabad Campus Karachi., Pakistan  
Email: [altaf.hussain@mhcf.edu.pk](mailto:altaf.hussain@mhcf.edu.pk)

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### ABSTRACT

**Objective:** To evaluate the enhancement of clinical skills competence in undergraduate nursing students through the implementation of simulation-based learning (SBL) to bridge the gap between theoretical knowledge and clinical practice. **Methods:** A quasi-experimental, single-group pre-post assessment study was conducted. Eighty students were selected by non-probability convenience sampling. Written consent was obtained, and a pre-assessment was carried out using a head-to-toe assessment checklist. The intervention involved visualizing a video and a demonstration of the head-to-toe assessment skill in class using scenario-based methods. A post-assessment was performed using the same checklist. Data were analyzed using SPSS version 26. **Results:** There was a significant improvement in skills after the intervention. The overall mean score increased from  $6.35 \pm 2.41$  before the intervention to  $14.43 \pm 2.75$  after the intervention ( $p < 0.0001$ ), as measured by a paired t-test. **Conclusion:** The study demonstrated that SBL significantly enhances clinical skills competence among undergraduate nursing students. The findings support the adoption of SBL as an effective teaching methodology that leads to considerable improvement in clinical performance.

### INTRODUCTION

Simulation-based learning (SBL) transforms traditional classroom and clinical environments into realistic settings. In healthcare, simulation aims to better prepare students to handle real-world scenarios, protect patients from harm, reduce errors, and enhance nurses' clinical expertise [1]. This methodology improves students' knowledge, attitudes, and skills in the clinical setting and provides opportunities to develop critical thinking, clinical reasoning, and psychomotor skills [2,3]. SBL allows students to practice behavioral, cognitive, and motor skills in a realistic hospital environment, thereby reinforcing clinical competence [4].

Studies have examined SBL's impact on nursing education by highlighting improvements in knowledge, skills, attitudes, and overall competence [5]. Recent research indicates that early practical training using SBL can enhance nursing students' clinical skills, which in turn may lead to improved patient care outcomes [6,7].

Additionally, the incorporation of films, scenario models, and role-play simulations in teaching has been shown to enhance decision-making and critical thinking [8,9].

SBL may improve patient outcomes by ensuring that future nursing professionals attain high competency levels. Therefore, this study addresses the critical need for effective clinical skills training among undergraduate nurses.

### METHODOLOGY

A quasi-experimental, single-group, pre-post assessment study was conducted between November 2023 and February 2024 at a private nursing college in Karachi. Ethical approval was obtained from the Institutional Review Board of Memon Medical Institute Hospital, Karachi (Approval No: IRB/MMIH/2024/10). Written permission was granted by the principal of the college. Confidentiality and anonymity were maintained.

Informed consent was obtained. Participation was voluntary, and students could withdraw at any time without penalty. Inclusion Criteria: Undergraduate nursing students with full-time status who completed courses in Anatomy, Physiology, Health Assessment, and Basic Nursing. Exclusion Criteria: Students unwilling to participate or enrolled in other programs, and absent during data collection. The sample size was calculated using OpenEpi software. Convenience sampling was used. Demographic data included age, gender, year of study, residence, Grade Point Average (GPA), and previous exposure to head-to-toe assessment. The checklist used was adapted from Taylor's Clinical Nursing Skills (2019) [11]. The checklist (0-18) assessed: meet & greet, orientation, communication, skin inspection and palpation, nail, hair, scalp, head, and face inspection. Participants underwent pre-assessment using the checklist. A teaching session followed, including a video and in-class demonstration of the head-to-toe assessment. Post-assessment was conducted using the same checklist. Statistical Analysis: Data were analyzed using SPSS version 26. Frequencies and percentages were calculated for categorical variables. Means and standard deviations were computed for numerical variables. Paired t-tests compared pre- and post-scores.  $P < 0.05$  was considered significant.

**RESULTS**

Eighty students participated in the study. Mean age was  $22 \pm 1.5$  years. 52.5% were male while 53.8% were in the third year of BSN, and 47.5% lived in urban areas. The average GPA was  $3.7 \pm 0.3$ .

**Table 1**  
*Sociodemographic Characteristics*

Variables	Frequency	Percentage
<b>Age groups</b>		
≤20 years	13	16.3
>20 years	67	83.7
<b>Gender</b>		
Male	42	52.5
Female	38	47.5
<b>Year of Study</b>		
Second year	37	46.3
Third year	43	53.7
<b>Place of residence</b>		
Urban	38	47.5
Rural	42	52.7
<b>Grade point</b>		
<3.5	15	18.8
≥3.5	65	81.3
<b>Previous exposure to head-to-toe assessment</b>		
Yes	75	93.8
No	5	6.3

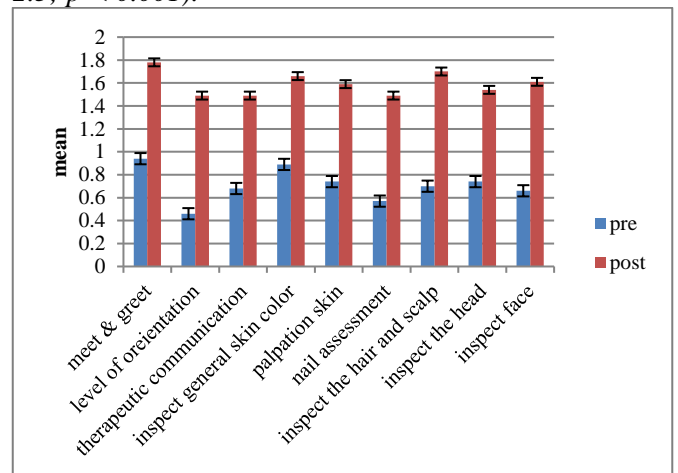
**Table 2**

*Post teaching session no students were unsatisfactory in "meet & greet" and "hair/scalp inspection. The significant improvements were seen in components like skin palpation, nail assessment, and face inspection.*

Items	Groups	Pre-learning n(%)	Post-learning n(%)	P-value
Meet & greet	Unsatisfactory	17(21.3)	0(0)	-
	Satisfactory/Good	63(78.8)	80(100)	
Level of orientation	Unsatisfactory	51(63.8)	4(5)	<0.001
	Satisfactory/Good	29(36.3)	76(95)	
Therapeutic communication	Unsatisfactory	36(45)	6(7.5)	<0.001
	Satisfactory/Good	44(55)	74(92.5)	
Inspect general skin color	Unsatisfactory	11(13.8)	4(5)	0.118
	Satisfactory/Good	69(86.3)	76(95)	
Palpation skin	Unsatisfactory	23(28.8)	1(1.3)	<0.001
	Satisfactory/Good	57(71.3)	79(98.8)	
Nail assessment	Unsatisfactory	37(46.3)	4(5)	<0.001
	Satisfactory/Good	43(53.8)	75(93.8)	
Inspect the hair and scalp.	Unsatisfactory	28(35)	0(0)	-
	Satisfactory/Good	52(65)	80(100)	
Inspect the head	Unsatisfactory	24(30)	1(1.3)	<0.001
	Satisfactory/Good	56(70)	79(98.8)	
Inspect face	Unsatisfactory	31(38.8)	1(1.3)	<0.001
	Satisfactory/Good	49(61.3)	79(98.8)	

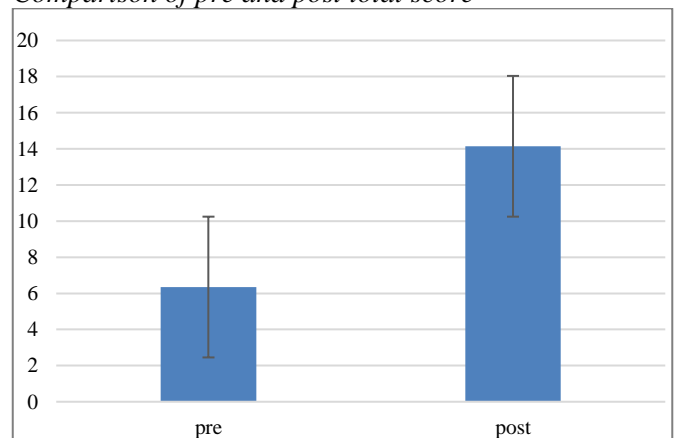
**Figure 1**

*Pre and Post Total Score Comparison (Mean pre-score =  $6.3 \pm 2.4$ ; post =  $14.4 \pm 2.8$ ; mean difference =  $8.1 \pm 2.3$ ;  $p < 0.001$ ).*



**Figure 2**

*Comparison of pre and post total score*



**Table 3**  
*Stratified Comparison by Participant Features*

Characteristics	Pre		Post		Paired Sample t-test		
	Mean	SD	Mean	SD	Mean difference	Std. Deviation	p-value
<b>Age groups</b>							
≤20 years	6	2.9	14.7	1.8	8.7	2.4	<0.001
>20 years	6.4	2.3	14.4	2.9	7.9	2.8	<0.001
<b>Gender</b>							
Male	6.4	2.6	14.5	2.4	8.1	0.4	0.009
Female	14.3	2.2	14.3	3.1	8.1	0.4	0.002
<b>Year of Study</b>							
Second year	6.5	2.2	14.1	3.5	7.6	3.2	<0.001
Third year	6.3	2.6	14.7	1.9	8.4	2.3	<0.001
<b>Place of residence</b>							
Urban	6.6	2.5	14.8	2.6	8.2	2.8	<0.001
Rural	6.1	2.3	14.1	2.9	8	2.7	<0.001
<b>Grade point</b>							
<3.5	5.5	2.3	13.3	2.2	7.8	2.3	<0.001
≥3.5	6.5	2.4	14.6	2.8	8.1	2.8	<0.001
<b>Previous exposure to head-to-toe assessment</b>							
Yes	6.3	2.4	14.4	2.8	8.1	2.7	<0.001
No	7	2.3	14.4	2.1	7.4	3.4	0.008

## DISCUSSION

The findings indicate that nursing students' scores in head-to-toe assessment skills significantly increased after the simulation-based learning intervention (post-test mean score 14.35 compared to pre-test mean score 6.14). These results are consistent with previous studies. For instance, a study in the USA reported significantly higher scores in the intervention group ( $M = 14.69$ ,  $p < 0.001$ ) [12]. Similarly, an Italian study demonstrated an improvement in scores following clinical simulation, with post-test improvements from 11.94 to 12.94 [13]. A study from Taiwan showed significant differences in competency after SBL, further supporting the credibility of this teaching method [14]. Spanish research has also highlighted that simulation bridges the theory-practice gap, accelerating the transition between classroom instruction and clinical practice [15].

The implications of these findings are far-reaching for nursing practice, educational strategies, and healthcare policy. Given the constraints of time, financial resources, and technology, further comparative analyses of SBL versus conventional teaching methods could provide deeper insights.

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Future qualitative research might explore factors influencing the effective application of SBL in nursing education, including organizational culture, resource allocation, and faculty training.

## CONCLUSION

Simulation-based learning (SBL) significantly reduced the gap between theory and practice in nursing education. SBL greatly improves clinical skills, particularly in the execution of a thorough head-to-toe assessment. The results strongly support the wider implementation of SBL in nursing curricula as it enhances student performance, reduces patient risks, and ultimately contributes to improved patient care and the quality of nursing practice.

## Authors' Contribution

**ZA:** Original draft and Methodology

**BD:** Responsible for integrity of research, Final Review

**AH:** Supervision and Review

**GM, RM:** Conceptualization

**P, ZM:** Manuscript writing and Visualization

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