Original Research Article

IMPACT OF STRUCTURED SKILLS-LAB TRAINING ON OSCE PERFORMANCE IN UNDERGRADUATE NURSING EDUCATION AT JINNAH HOSPITAL, LAHORE

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ABSTRACT

Background: *Objective Structured Clinical Examination (OSCE) is a cornerstone of clinical competence assessment in undergraduate nursing education. Despite its widespread adoption, inconsistent student preparedness and variability in psychomotor skill acquisition remain significant challenges, particularly in low- and middle-income countries. Structured skills-lab training has been proposed as a practical approach to standardize clinical exposure, enhance hands-on proficiency, and improve examination performance, yet local evidence from Pakistan is limited.* **Objective:** *To evaluate the effect of structured skills-lab training on OSCE performance among undergraduate nursing students.* **Study Design:** *Quasi-experimental study.* **Settings:** *Undergraduate nursing program at Jinnah Hospital, Lahore, Pakistan.* **Duration of Study:** *January 2025 to June 2025.* **Methods:** *A total of 90 undergraduate nursing students were enrolled and allocated into two groups: a structured skills-lab training group (n = 45) and a standard training group (n = 45). The intervention comprised a structured skills-lab program incorporating deliberate practice, standardized procedural checklists, supervised hands-on sessions, and formative feedback. The comparison group continued with routine teaching methods. OSCE performance was assessed before and after the intervention using standardized stations and validated scoring rubrics. Between-group comparisons were performed using appropriate inferential statistics. Effect size was calculated using Cohen's d, and multivariable linear regression analysis was applied to adjust for baseline OSCE scores and relevant academic covariates.* **Results:** *Baseline OSCE scores were comparable between the two groups. Following the intervention, students in the structured skills-lab group achieved significantly higher mean OSCE scores than those in the standard training group (73.6 ± 7.5 vs. 66.5 ± 6.4; p < 0.001). The mean improvement in OSCE scores was also significantly greater in the intervention group (15.2 ± 6.8 vs. 7.4 ± 6.5; p < 0.001), demonstrating a large educational effect size (Cohen's d = 1.02). Station-level analysis revealed the most significant performance gains in psychomotor and safety-critical skills, including infection control, intravenous cannulation, and medication administration. Structured skills-lab training remained an independent predictor of higher post-intervention OSCE scores after adjustment for baseline performance and academic factors.* **Conclusion:** *Structured skills-lab training significantly enhances OSCE performance and clinical competence among undergraduate nursing students. Incorporation of structured skills-lab programs into undergraduate nursing curricula may strengthen assessment outcomes and better prepare future nurses for safe and effective clinical practice in resource-constrained healthcare settings.*

Keywords: Skills-Lab Training; OSCE; Nursing Education; Clinical Competence; Simulation-Based Learning

INTRODUCTION

The Objective Structured Clinical Examination (OSCE) has emerged as a pivotal assessment tool in nursing education, providing a structured, standardized approach to evaluating students' clinical competence. Its significance is underscored by its ability to provide an objective assessment of both technical and non-technical skills essential for effective clinical practice (1, 2). Structured Skills-Lab training is an educational intervention designed to enhance nursing students' practical skills and thereby improve their performance in the OSCE. This study investigates the impact of structured Skills-Lab training on the OSCE performance of undergraduate nursing students. Previous studies have demonstrated that Skills-Lab training significantly influences the acquisition of clinical skills. For example, a systematic review found that training in these environments enhances students' procedural knowledge and skills, thereby promoting confidence during assessments (3). Burgess and McGregor reported that integrating peer-assisted learning alongside traditional teaching methods can further amplify students' capabilities, significantly impacting their OSCE outcomes (4). Furthermore, a study found that participation in Skills-Lab training improved nursing students' perceptions of their readiness for clinical practice (3).

The implementation of structured training approaches appears to yield substantial benefits not only for skill acquisition but also for reducing students' examination anxiety. It is posited that this anxiety reduction enhances overall OSCE performance (5). For instance, Yang et al. noted the importance of formative assessments in providing timely feedback, which positively influences student confidence and performance during critical evaluations such as the OSCE (6). These findings align with those of Rahim et al., who identified a substantial increase in student readiness and performance metrics post Skills-Lab training (3).

Moreover, numerical outcomes from various studies illustrate the effectiveness of structured Skills-Lab training. In a recent study, students who participated in systematic training showed a notable improvement in their OSCE scores compared to those without similar preparation (5). Other research indicates that a significant percentage of students report increased competence after engaging in Skills-Lab activities, which correlates with enhanced overall performance in practical examinations (7).

In Pakistan, integrating structured Skills-Lab training into nursing curricula is particularly relevant given the growing demand for competent healthcare professionals who can navigate complex clinical environments. With a burgeoning healthcare system, it becomes imperative to ensure that nursing graduates are well-equipped with the

necessary skills to provide quality care (3). Thus, this study aims to provide empirical evidence to enhance curriculum development and pedagogical strategies in nursing education in Pakistan.

METHODOLOGY

This study was conducted at a tertiary care hospital in Pakistan over six months from July to December. An undergraduate nursing cohort was evaluated to determine the impact of structured skills-lab training on performance in an Objective Structured Clinical Examination (OSCE). A total sample size of 90 participants was targeted, consistent with the planned educational evaluation and the feasibility of delivering OSCE stations within the study window.

Undergraduate nursing students enrolled in the relevant academic year and scheduled for OSCE assessment during the study period were considered eligible. Participants were included if they consented to participate and were available for both baseline and post-intervention assessment. Students were excluded if they were on extended leave during the training period, missed either the OSCE sitting, or had incomplete records for primary outcomes. After eligibility confirmation and consent, students were allocated to two equal-sized groups: a structured skills-lab training group and a standard training group.

The intervention consisted of a structured skills-lab training program delivered in small groups. The program emphasized deliberate practice, standard checklists, stepwise skill demonstration, supervised hands-on repetition, and immediate formative feedback. Core nursing skills aligned with undergraduate competencies were covered, including infection control and PPE, vital signs assessment, IV cannulation, medication administration principles, wound dressing, and therapeutic communication. Sessions were scheduled regularly across the training window and facilitated by trained nursing faculty and clinical instructors using standardized instructional materials to reduce inter-instructor variability. The comparison group continued routine teaching and usual clinical exposure without the structured skills-lab schedule and feedback framework.

OSCE performance was the primary outcome. A structured OSCE blueprint was developed to ensure content validity across stations and alignment with undergraduate learning outcomes. Stations were standardized with predefined checklists and global rating components. Examiners were oriented to station objectives, scoring rubrics, and checklist interpretation before assessments. The OSCE was conducted at baseline before the training period and again after its completion, using comparable station content and marking standards. To minimize bias, station instructions, scoring criteria, and time allocations were uniform across groups, and logistical procedures were kept consistent at both assessment points.

Participant characteristics, including age, gender, residence, prior OSCE exposure, academic performance indicators, clinical exposure duration, and self-study time, were recorded using a structured proforma. A brief self-reported confidence rating related to clinical skills was also obtained to contextualize baseline preparedness. Data were anonymized using unique identifiers to maintain confidentiality, and records were stored securely with access restricted to the study team.

Data analysis was performed using standard statistical software. Continuous variables were summarized as mean ± standard deviation, while categorical variables were reported as frequencies and percentages. Baseline comparability between groups was assessed using independent-samples t-tests for continuous variables and chi-square or Fisher's exact tests for categorical variables, as appropriate. The primary analysis compared post-intervention OSCE scores and change scores (post-pre) between groups, with statistical significance set at $p < 0.05$. Effect size for educational impact was quantified using Cohen's d for the post-intervention difference. Station-wise scores were compared to identify domains most responsive to the intervention. A multivariable linear regression model was developed to estimate the independent association of structured skills-lab training with post-intervention OSCE scores while adjusting for baseline OSCE score and key covariates, including GPA and self-study time, selected a priori based on educational plausibility. Ethical considerations were addressed through institutional approval processes, voluntary participation, and written informed consent.

RESULTS

Ninety undergraduate nursing students were included (n = 90). The overall mean age was 20.8 ± 1.4 years, and most participants were female (n = 70, 77.8%). Participants were allocated to a structured skills-lab training group (n = 45) and a standard training group (n = 45). Baseline demographic and academic characteristics were comparable between groups, supporting balance before outcome assessment (Table 1).

Baseline academic indicators and clinical exposure were also similar between groups (Table 2), reducing the likelihood that differences in OSCE outcomes were driven by pre-existing academic advantage.

At baseline (pre-intervention), total OSCE scores were comparable between the structured skills-lab group and standard group. Following the training period, the structured skills-lab group demonstrated significantly higher post-intervention OSCE scores, with a clinically meaningful effect size (Table 3). The mean improvement in OSCE score (post minus pre) was 15.2 ± 6.8 points in the structured skills-lab group compared with 7.4 ± 6.5 points in the standard group (between-group difference in change = 7.8 points, 95% CI 5.0 to 10.6; $p < 0.001$). The standardized effect (Cohen's d) for the post-intervention difference was 1.02, indicating a significant educational impact.

Station-level analysis showed that the structured skills-lab training produced the most pronounced gains in psychomotor and safety-critical skills (infection control, IV cannulation, medication administration). At the same time, communication-based stations also improved, but with comparatively smaller margins (Table 4). This pattern suggests that deliberate practice with feedback notably strengthened procedural accuracy, sequencing, and aseptic technique.

Consistent with the score differences, competency outcomes favored the structured skills-lab group. The pass rate (defined as a total OSCE score of at least 60) was higher in the structured skills-lab group (93.3%) than in the standard group (77.8%), and a greater proportion achieved "high competence" (OSCE at least 75) (Table 5). These findings support both statistical and practical significance, indicating that structured skills-lab training can shift the distribution of performance upward rather than only improving average scores.

In multivariable linear regression adjusting for baseline OSCE score, gender, residence, GPA, and self-study time, structured skills-lab training remained an independent predictor of higher post-intervention OSCE score (Table 6). Baseline OSCE and GPA also predicted post-intervention performance, indicating that prior competence and academic attainment contribute to OSCE outcomes, but the training effect persisted after adjustment.

Overall, the dataset demonstrates that structured skills-lab training produced significant and consistent improvements in OSCE performance, strengthened station-level procedural competency, and increased the proportions of passes and high-competence scores among undergraduate nursing students in a tertiary-care setting in Pakistan.

Table 1: Demographic characteristics of participants (n = 90).

Variable	Total (n=90)	Skills-lab (n=45)	Standard (n=45)	p-value
Age (years), mean ± SD	20.8 ± 1.4	20.7 ± 1.3	20.9 ± 1.5	0.52
Female, n (%)	70 (77.8)	35 (77.8)	35 (77.8)	1.00
Male, n (%)	20 (22.2)	10 (22.2)	10 (22.2)	1.00
Urban residence, n (%)	58 (64.4)	30 (66.7)	28 (62.2)	0.65
Rural residence, n (%)	32 (35.6)	15 (33.3)	17 (37.8)	0.65
Prior formal OSCE exposure, n (%)	27 (30.0)	14 (31.1)	13 (28.9)	0.82

Table 2: Baseline academic and training characteristics (n = 90)

Variable	Skills-lab (n=45)	Standard (n=45)	p-value
Previous semester GPA, mean ± SD	3.11 ± 0.39	3.08 ± 0.41	0.71
Clinical rotation completed (weeks), mean ± SD	7.6 ± 1.9	7.4 ± 2.0	0.63
Self-study time (hours/week), mean ± SD	6.8 ± 2.4	6.5 ± 2.6	0.56
Baseline skills confidence (0 to 10), mean ± SD	5.1 ± 1.6	5.0 ± 1.7	0.83

Table 3: OSCE performance before and after training (n = 90)

Outcome (0 to 100)	Skills-lab (n=45) mean ± SD	Standard (n=45) mean ± SD	Between-group p-value
Pre-intervention OSCE score	58.4 ± 7.9	59.1 ± 8.1	0.68
Post-intervention OSCE score	73.6 ± 7.5	66.5 ± 6.4	<0.001
Mean change (post minus pre)	15.2 ± 6.8	7.4 ± 6.5	<0.001

Table 4: Station-wise OSCE scores after training (post-intervention)

OSCE station/domain (0 to 10)	Skills-lab (n=45) mean ± SD	Standard (n=45) mean ± SD	p-value
Hand hygiene and PPE	8.4 ± 1.0	7.3 ± 1.2	<0.001
Vital signs assessment	7.9 ± 1.1	7.2 ± 1.0	0.002
IV cannulation	7.6 ± 1.2	6.4 ± 1.3	<0.001
Medication administration	7.8 ± 1.1	6.8 ± 1.2	<0.001
Wound dressing	7.5 ± 1.2	6.7 ± 1.1	0.001
Therapeutic communication	7.1 ± 1.0	6.6 ± 1.1	0.03

Table 5: Competency outcomes based on OSCE performance (n = 90)

Outcome	Skills-lab (n=45) n (%)	Standard (n=45) n (%)	p-value
Pass (OSCE ≥ 60)	42 (93.3)	35 (77.8)	0.03
High competence (OSCE ≥ 75)	23 (51.1)	11 (24.4)	0.008
Borderline (OSCE 50 to 59)	2 (4.4)	8 (17.8)	0.04
Fail (OSCE < 50)	1 (2.2)	2 (4.4)	0.56

Table 6: Predictors of post-intervention OSCE score (multivariable linear regression).

Predictor	Adjusted beta (B)	95% CI	p-value
Structured skills-lab (vs standard)	6.1	3.4 to 8.8	<0.001
Baseline OSCE score (per 1 point)	0.44	0.27 to 0.61	<0.001
GPA (per 1.0 point)	3.2	0.4 to 6.0	0.03
Self-study (per 1 hour/week)	0.28	0.02 to 0.54	0.04
Female (vs male)	0.9	-1.7 to 3.5	0.50
Urban (vs rural)	1.1	-1.3 to 3.6	0.36

DISCUSSION

The findings from our study highlight the significant impact of structured Skills-Lab training on the OSCE performance of undergraduate nursing students in Pakistan. Our results showed that the structured training group achieved a post-intervention OSCE score improvement of 15.2 ± 6.8 points, compared to 7.4 ± 6.5 points in the standard training group, with a substantial between-group difference of 7.8 points (p < 0.001). This difference was corroborated by Cohen's d value of 1.02, indicating a significant educational effect. This aligns with recent literature suggesting that structured training methodologies can enhance clinical competencies in nursing students, fostering procedural flexibility and acute care responses, contributing positively to OSCE outcomes (8).

Table 1 indicates that the demographic and academic characteristics of the participants were comparable across both groups. These baseline similarities are vital and are consistent with the findings of Jamaludin et al., who emphasized the importance of uniform baseline characteristics to attribute observed performance differences solely to the intervention. This reinforces the notion that pre-existing attributes and academic advantages do not skew OSCE performance outcomes, which is critical in establishing the rigor of our experimental design [8]. Our study's post-intervention results demonstrated that participants who underwent structured Skills-Lab training performed significantly better on specific psychomotor skills, such as IV cannulation and medication administration, resulting in the most significant score improvements. These results align with those of Mårtensson et al., who found that deliberate practice, coupled with instructor feedback, substantially improved nursing students' psychomotor skills (9). The

efficacy of repeated practice under structured conditions was similarly highlighted by Barnard et al., who noted that active learning methods contributed significantly to competency in clinical skills among nursing students (10). The station-level analysis, as presented in Table 4, indicated pronounced benefits in stations focusing on infection control, IV cannulation, and medication administration. The structured Skills-Lab training promoted greater procedural accuracy, echoing results reported by Ibrahim et al., who found that structured simulation environments led to improved competency in crucial clinical aspects among nursing students. Moreover, our findings regarding communication-based stations, which improved albeit slightly, were consistent with results from recent studies indicating that soft skills can be more challenging to cultivate through structured methods (8).

The competency outcomes showed a notably higher pass rate in the structured Skills-Lab group (93.3%) compared to the standard group (77.8%). This improvement substantiates the conclusions of Delva et al., who found that competency-oriented training is associated with higher pass rates and better overall competency in nursing education (11). Furthermore, the increase in the proportion of students achieving "high competence" (51.1% vs. 24.4%) reflects the enhanced performance attributable to structured training, confirming that such interventions create an upward shift in the competency distribution rather than merely improving average scores (10).

In our multivariable analysis, structured Skills-Lab training emerged as an independent predictor of higher OSCE scores, even after adjusting for potentially confounding variables, including baseline GPA and self-study time. These findings are consistent with those of Lee et al., suggesting that structured interventions profoundly influence educational outcomes in controlled assessments such as the OSCE (12). The persistent effect of skills training supports the notion that structured educational interventions can effectively prepare nursing students for clinical responsibilities.

In the Pakistani context, where nursing education is evolving rapidly amidst a growing demand for adequately trained healthcare professionals, the implications of our findings are particularly relevant. The integration of structured Skills-Lab training could address the skills gap in nursing education, helping to produce graduates who are not only knowledgeable but also adept in essential clinical skills necessary to meet the healthcare needs of the population (9). As the healthcare system continues to modernize, adopting effective training strategies, as demonstrated in this study, will be crucial for enhancing nursing students' competency and ultimately improving patient care outcomes.

CONCLUSION

This study provides robust evidence that structured skills-lab training leads to substantial and clinically meaningful improvements in OSCE performance among undergraduate nursing students. By emphasizing deliberate practice, standardized assessment, and formative feedback, the intervention not only increased mean OSCE scores but also improved pass rates and high-competence achievement, particularly in psychomotor and safety-critical skills. These findings underscore the value of structured skills-lab integration within undergraduate nursing curricula, especially in developing healthcare systems where consistent clinical exposure may be limited. Adoption of structured skills-lab training can strengthen workforce readiness, improve assessment reliability, and ultimately contribute to safer patient care.

DECLARATIONS

Data Availability Statement
All data generated or analysed during the study are included in the manuscript.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTION

TAHIRA SHAHEEN (Principal)
Conception of Study, Final approval of manuscript.
Study Design, Review of Literature
AINI AHMAD (Senior Lecturer)
Conception of Study, Development of Research Methodology Design, Study Design, Review of manuscript, and final approval of manuscript.
Manuscript drafting.
RUSLI BIN NORDIN (Dean)
Manuscript revisions, critical input.
Data entry, data analysis, and drafting an article.

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