RESEARCH ARTICLE

# Impact of nurse-led educational intervention on nurse's knowledge about patient safety after cardiac catheterisation

Zahid Ali[1], Amjad Ali[2], Muhammad Tariq Farman[3], Hira Fatima Waseem[4], Tariq Aziz[5]

## Abstract

**Objective:** To assess the impact of educational intervention on nurse's knowledge related to patient safety after cardiac catheterisation in tertiary care settings.

**Method:** The quasi-experimental study was conducted from October 2022 to May 2023 after approval from the ethics review board of Dow University of Health Sciences, Karachi, and comprised staff nurses working in cardiac catheterisation laboratory, cardiac care unit and allied departments of 4 tertiary care hospitals. After baseline assessment, those with knowledge score <70% were enlisted for educational intervention which was done in small groups and lasted about 120 minutes. Nurses' knowledge was reassessed post-intervention. Data was analysed using SPSS 21.

**Results:** Findings of this study highlighted that majority of the participants 52 (66.66%) were male with the mean age of overall study contributors being 29.34±3.32 years. Mean baseline knowledge score was 1.27±0.44 which increased to 1.90±0.30 post-intervention (p<0.001). Mean knowledge score was significantly associated with demographic and professional characteristics (p<0.001).

**Conclusion:** The educational intervention successfully enhanced the knowledge scores of cardiac nurses regarding patient safety following cardiac catheterisation.

**Keywords:** Educational intervention, Knowledge, Patient safety, Cardiac catheterisation. (JPMA 75: 70; 2025)

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## Introduction

Coronary artery disease (CAD) is a non-communicable condition that resulted in approximately 17.8 million fatalities globally in 2017, with a significant impact observed in low- and middle-income countries (LMICs).[1] The World Health Organisation (WHO) stated that in 2008, there were 18 million fatalities due to cardiovascular diseases (CVDs), and it was expected to increase to 23 million by 2030.[2] Out of 56.4 million reported mortalities, 30 million are attributed to the top 10 primary causes, which include conditions, such as stroke and ischaemic heart disease (IHD).[3]

In Pakistan, the burden of CAD is significant across all age groups, particularly among individuals aged 45 years and above. It is noteworthy that the incidence of CAD has nearly doubled since 1970 in urban Karachi.[4] With the increasing prevalence of CVDs in Pakistan, captures around 34% of the country's deaths and in each hour, approximately 12 people lose their lives due to CVDs.[5]

Hyperlipidaemia, notably elevated low-density lipoprotein (LDL) levels, was the most prevalent risk factor for CVDs, with a prevalence of 61.2%, followed by hypertension at 46.8%, obesity 14.8%, and hyperglycaemia 8.8%.[6]

Cardiac catheterisation is globally accepted as a diagnostic and interventional method in modern medicine, hailed as the benchmark for assessing heart issues. This procedure is employed by cardiologists or heart specialists to evaluate heart function and to identify CVDs with precision.[7] However, it serves as a diagnostic tool as it assesses the blood flow, anatomy and physiology of the heart. In a therapeutic capacity, it also functions as an alternative to open heart surgery.[8]

After undergoing percutaneous coronary intervention, individuals may experience complications, and the incidence rate associated with the local access site ranges from 1% to 10%, leading to elevated patient morbidity and mortality. Previous studies have linked this rise to increased risks of pseudoaneurysm rupture, enlargement of haematomas leading to tissue necrosis or affecting nearby neurovascular structures, and thromboembolism. Additionally, bleeding resulting from the puncture of an artery or vein may require transfusion or may prolong the hospital stay. A haematoma is defined as the accumulation

[1,2]Dow Institute of Nursing and Midwifery, Dow University of Health Sciences, Karachi, Pakistan; [3]Dow Institute of Cardiology, Dow University of Health Sciences, Karachi, Pakistan; [4]School of Public Health, Dow University of Health Sciences, Karachi, Pakistan; [5]College of Nursing Male, Sindh Government Lyari General Hospital, Karachi, Pakistan.

**Correspondence:** Hira Fatima Waseem. e-mail: hira.waseem@duhs.edu.pk

ORCID ID: 0009-0002-4569-0319

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of blood in the soft tissue of the upper thigh or lower abdomen[9]. Ensuring patient safety after cardiac catheterisation is essential for promptly identifying and managing complications. Nurses who can swiftly recognise complications are best positioned to take immediate action, thereby enhancing positive patient outcomes.[10]

Nurses have a significant impact on patient safety given their responsibilities that involve continuous patient monitoring and coordinating care. Additionally, nurses are often the first to notice safety concerns and deliver top-notch care within healthcare institutions.[11]

Patient safety is compromised due to deficient knowledge and incompetent practice of nurses. This can lead to problems, disability, or even death. Early detection of complications and appropriate care is crucial for quick treatment and minimising complications. Additionally, nursing care is essential for the completion of the procedure. The current study was planned to assess the impact of educational intervention on nurse's knowledge related to patient safety after cardiac catheterisation in tertiary care setting.

## Subjects and Methods

The quasi-experimental study was conducted from October 2022 to May 2023 at 4 tertiary care hospitals in Karachi. After approval from the ethics review board of Dow University of Health Sciences (DUHS), Karachi, the sample size was determined using Power Analysis & Sample Size (PASS) version 21[12] by applying a correlation of knowledge and performance score 0.216[13] with 95% confidence interval (CI) and 95% power of the test. The sample was raised using non-probability purposive sampling technique among the nurses who were registered with the Pakistan Nursing and Midwifery Council (PNMC), had completed their probationary period, and were working in cardiac catheterisation laboratories, generally called 'cath labs', intensive care units (ICUs) and associated departments at Dow University Hospital (DUH), Doctor Ruth Katherina Martha Pfau Civil Hospital Karachi (CHK), Patel Hospital (PH) and Tabba Heart Institute (THI). Permission was secured from the heads of each hospital. After taking written informed consent, all the participants were subjected to baseline assessment using a predesigned questionnaire, which consisted of two parts. In the first part, the participants provided demographic and professional data, while the 10-item second part explored nurses' knowledge about patient's safety after cardiac catheterisation. The cumulative score for all knowledge items ranged 0-10. An overall score of 7(70%) was used as cut-off for adequate knowledge, whereas <70% was considered inadequate knowledge. The validity of the content was accomplished by 7 panels of medical and nursing experts, and the consensus among experts about the structured interviewing questionnaire was 97%, whereas Cronbach alpha value, used for the structured knowledge questionnaire, was 0.91[(13)]. Nurses who had knowledge scores <70% were included, while those with knowledge score 70% or higher were excluded as they already had sound knowledge. Besides, head nurses/in-charge nurses and student nurses were also excluded because they were not directly involving in nursing care.[14]

Those enlisted for educational intervention were grouped into smaller units of up to 10 participants per group, and were notified 2 days prior to the intervention. Brochures were provided to them as well. The presentation strictly adhered to the standard guidelines outlined in Brunner and Suddarth's textbook of medical-surgical nursing (12th edition)[15] and the current American Heart Association (AHA)[16,] guidelines on cardiac catheterisation. The intervention lasted approximately 120 minutes. The lecture was conducted face-to-face in the seminar hall, covering fundamental information regarding the knowledge of patient safety after cardiac catheterisation. One month after the intervention session, a post-test assessment was done using the same tool to evaluate the acquired knowledge.

Data was analysed using SPSS 21. Data was expressed as mean ± standard deviation for continuous variables, and as frequencies and percentages for categorical variables. Data normality was assessed using the Shapiro-Wilk test. Normally distributed data was assessed using paired sample t-test to examine the significant change in participants' mean knowledge scores post-intervention. Additionally, demographic variables were compared with participants' knowledge scores. McNemar's two paired proportion test was used for the comparison of knowledge level at baseline and post- intervention. P≤0.05 was considered significant.

## Results

Findings of this study highlighted that majority of the participants 52 (66.66%) were male with the mean age of overall study contributors being 29.34±3.32 years. Mean baseline knowledge score was 1.27±0.44 which increased to 1.90±0.30 post-intervention (p<0.001). Mean knowledge score was significantly associated with demographic and professional characteristics (Table 1). The post-intervention scores improved significantly among nurses at all the 4 participating hospitals (Table 2). At baseline, 26.9% participants had an adequate level of knowledge, improved upto 89.7% in post assessment (Table 3).

**Table-1:** Comparison of mean knowledge score across demographic and professional characteristics of the participants

| Variables | Categories | Pre-assessment Knowledge Mean ± SD | Post-assessment Knowledge Mean ± SD | Paired "t" test Value |
|---|---|---|---|---|
| Gender | Male | 1.31 ± 0.466 | 1.92 ± 0.269 | <0.001* |
| | Female | 1.19 ± 0.402 | 1.85 ± 0.368 | <0.001* |
| Marital Status | Married | 1.29 ± 0.462 | 1.91 ± 0.288 | <0.001* |
| | Unmarried | 1.25 ± 0.438 | 1.89 ± 0.321 | <0.001* |
| Qualification | Nursing Diploma + One-year specialty | 1.15 ± 0.357 | 1.90 ± 0.309 | <0.001* |
| | GBSN/Post RN BScN | 1.47 ± 0.507 | 1.90 ± 0.305 | <0.001* |
| Age group | 20-25 Years | 1.21 ± 0.412 | 1.86 ± 0.351 | <0.001* |
| | 26-30 Years | 1.32 ± 0.476 | 1.96 ± 0.200 | <0.001* |
| | 31-35 Years | 1.25 ± 0.452 | 1.75 ± 0.452 | 0.007* |
| | >35 Years | 1.33 ± 0.492 | 2.00 ± 0.000 | 0.001* |
| Cardiac Unit Experience | <1 Year | 1.19 ± 0.402 | 1.77 ± 0.430 | <0.001* |
| | 1-5 Years | 1.33 ± 0.477 | 1.95 ± 0.216 | <0.001* |
| | 6-10 Years | 1.20 ± 0.422 | 2.00 ± 0.000 | <0.001* |

SD: Standard deviation, GBSN: Generic Bachelor of Science in Nursing, Post RN BScN: Post-RN Bachelor of Science in Nursing

**Table-2:** Comparison of baseline and post-intervention mean knowledge scores among the participating hospitals

| Variables | Pre-assessment Knowledge Mean ± SD | Post-assessment Knowledge Mean ± SD | Paired "t" test Value |
|---|---|---|---|
| **THI** | 1.29 ± 0.458 | 1.94 ± 0.236 | <0.001* |
| **DUH** | 1.28 ± 0.458 | 1.84 ± 0.374 | <0.001* |
| **CHK** | 1.27 ± 0.467 | 1.91 ± 0.302 | 0.002* |
| **PH** | 1.14 ± 0.378 | 1.86 ± 0.378 | 0.008* |
| **Overall study settings** | 1.27 ± 0.446 | 1.90 ± 0.305 | <0.05* |

THI: Tabba Heart Institute, DUHS: Dow University Hospital, CHK: Civil Hospital Karachi, PH: Patel Hospital.
*p-value calculated by using Paired sample t-test

**Table-3:** Comparison of baseline and post-intervention knowledge level of the participants

| Pre and post-educational interventional knowledge | Adequate | | Inadequate | | *p*-value |
|---|---|---|---|---|---|
| | n | (%) | n | (%) | |
| Pre educational intervention knowledge | 21 | (26.9) | 57 | (73.1) | |
| Post educational intervention knowledge | 70 | (89.7) | 08 | (10.3) | <0.05* |

*p-value calculated by using McNemar's test (Two-sample paired proportion)

## Discussion

The present study found variation in the knowledge level improvement between male and female subjects, which was in line with a study in Egypt.[17] However, contrasting results were reported in India.[18] In the present study, females exhibited a higher mean difference in knowledge scores compared to males, which was consistent with a study in India,[18] while contrasting results were reported in Egypt[17,19] and Pakistan.[20]

The current study observed that unmarried individuals had a significant mean score difference in knowledge. This was in line with one study,[18] while contrasting results have been reported as well.[17,21]

The current study identified a significant mean difference in knowledge score among participants with a general nursing diploma compared to those with (Generic Bachelor of Science in Nursing/ Post-RN Bachelor of Science in Nursing) GBSN/Post RN BScN. The result was consistent with one study,[18] while contrasting results have been reported as well.[17,22]

The current study found that participants aged 20-25 years and >35 years showed significant mean differences in knowledge compared to other age groups. These findings were supported by some studies,[17,19] while contrasting results have also been reported.[21]

In the current study, participants with 6-10 years of experience showed significant mean differences in knowledge compared to other experience-based categories. The finding was in line with one study(17), while contrary results have also been reported.[18]

The present study observed a notable difference in the mean knowledge scores among all the selected hospitals after the educational intervention, which was consistent with earlier studies.[13,17,23]

The number of nurses with adequate knowledge increased significantly in the current study after the educational intervention. This result aligned with earlier findings.[24-26]

The strength of the study is that it was conducted at 4 public and private hospitals in a metropolitan city.

The current study also had its limitations as the distribution of the sample among the selected settings was not consistent. Besides, the study also lacked randomisation.

In the light of the current findings, it is recommended to hold regular evaluation of nurses' knowledge and skills to identify the necessary steps they should take to handle various issues in clinical settings. Also, nursing administration and nursing educational services departments need to develop and implement standardised nursing care protocols to reduce complications.

## Conclusion

The educational intervention programme successfully enhanced the knowledge scores of cardiac nurses regarding patient safety after cardiac catheterisation.

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## References

1. WHO CVD Risk Chart Working Group. World Health Organization cardiovascular disease risk charts: revised models to estimate risk in 21 global regions. Lancet Glob Health 2019;7:e1332-45. doi: 10.1016/S2214-109X(19)30318-3
2. Şahin B, İlgün G. Risk factors of deaths related to cardiovascular diseases in World Health Organization (WHO) member countries. Health Soc Care Community 2022;30:73-80. doi: 10.1111/hsc.13156
3. Mensah GA, Roth GA, Fuster V. The Global Burden of Cardiovascular Diseases and Risk Factors: 2020 and Beyond. J Am Coll Cardiol 2019;74:2529-32. doi: 10.1016/j.jacc.2019.10.009
4. Shahid SU, Shabana, Cooper JA, Beaney KE, Li K, Rehman A, et al. Genetic risk analysis of coronary artery disease in Pakistani subjects using a genetic risk score of 21 variants. Atherosclerosis 2017;258:1-7. doi: 10.1016/j.atherosclerosis.2017.01.024
5. Perdigoto C. Mutations: Dawn of the Human Knockout Project. Nat Rev Genet 2017;18:328-9. doi: 10.1038/nrg.2017.35
6. Liaquat A, Javed Q. Current Trends of Cardiovascular Risk Determinants in Pakistan. Cureus 2018;10:e3409. doi: 10.7759/cureus.3409
7. Shaik FA, Slotwiner DJ, Gustafson GM, Dai X. Intra-procedural arrhythmia during cardiac catheterization: A systematic review of literature. World J Cardiol 2020;12:269-84. doi: 10.4330/wjc.v12.i6.269
8. Hicks KA, Mahaffey KW, Mehran R, Nissen SE, Wiviott SD, Dunn B, et al. 2017 Cardiovascular and Stroke Endpoint Definitions for Clinical Trials. Circulation 2018;137:961-72. doi: 10.1161/CIRCULATIONAHA.117.033502
9. Naddaf A, Williams S, Hasanadka R, Hood DB, Hodgson KJ. Predictors of Groin Access Pseudoaneurysm Complication: A 10-Year Institutional Experience. Vasc Endovascular Surg 2020;54:42-6. doi: 10.1177/1538574419879568
10. Coomes EA, Haghbayan H, Cheema AN. Distal transradial access for cardiac catheterization: A systematic scoping review. Catheter Cardiovasc Interv 2020;96:1381-9. doi: 10.1002/ccd.28623
11. Rahman H, Demir OM, Ryan M, McConkey H, Scannell C, Ellis H, et al. Optimal Use of Vasodilators for Diagnosis of Microvascular Angina in the Cardiac Catheterization Laboratory. Circ Cardiovasc Interv 2020;13:e009019. doi: 10.1161/CIRCINTERVENTIONS.120.009019
12. NCSS Statistical Software. PASS 2023: Power Analysis & Sample Size, Version: 15.0.13. [Online] 2020 [Cited 2024 November 26]. Available from URL: https://www.ncss.com/download/pass/updates/pass15/
13. Keshk LI, Elgazzar SE. Creating Learning Guideline for Nurses Caring for Patients Safety Undergoing Cardiac Catheterization. Res J Educ 2018;4:101-9. doi: 10.32861/rje.102.35.38.
14. Ali HAE, Ali MM. Effect of Designed Teaching Protocol Regarding Patients' Safety after Cardiac Catheterization on Nurses' Performance and Patients' Incidence of Vascular Complications. Int J Stud Nurs 2019;4:107-20. doi: 10.20849/ijsn.v4i1.555.
15. Smeltzer SCO, Bare BG, Hinkle JL, Cheever KH. Brunner & Suddarth's Textbook of Medical-surgical Nursing. Philadelphia, PA: Lippincott Williams & Wilkins, 2010; pp 1114-2240.
16. Virani SS, Newby LK, Arnold SV, Bittner V, Brewer LC, Demeter SH, et al. 2023 AHA/ACC/ACCP/ASPC/NLA/PCNA Guideline for the Management of Patients With Chronic Coronary Disease: A Report of the American Heart Association/American College of Cardiology Joint Committee on Clinical Practice Guidelines. Circulation 2023;148:e9-1. doi: 10.1161/CIR.0000000000001168
17. Hamed AM, Shehata AE, Soliman GH, Elwan WM. Effect of patient's safety educational program on nurses' performance for patients undergoing cardiac catheterisation. Menoufia Nurs J 2023;8:167-85. doi: 10.21608/menj.2023.290973.
18. Shini SL, Paul L, Smitha PV. Effectiveness of nursing care protocol on knowledge and practice among staff nurses regarding management of patients undergoing coronary angioplasty. Glob J Res Anal 2018;7:4-5. doi: 10.36106/gjra.
19. Aburaghif LF, Hassan NK. Effectiveness of an educational program on nurse's knowledge concerning complications of cardiac catheterisation among children at Al-Nassirhya Heart Center. Kufa J Nurs Sci 2016;6:82-92. doi: 10.36321/kjns.vi20163.2308.
20. Yaqoob A, Barolia R, Noor A, Nazar A. Knowledge and practices among nurses regarding patients' care following cardiac catheterisation at a tertiary care hospital in Karachi, Pakistan. Open J Nurs 2019;9:809-34. doi: 10.4236/ojn.2019.98062
21. George P, Umadevi AK. Effectiveness of Structured teaching programme on knowledge of staff nurses regarding coronary angiogram at a selected hospital, Bangalore. Int J Health Sci Res 2021;6:431-7. doi: 10.52403/ijshr.20210770.
22. Obaid HM, Mohammed SJ. Effectiveness of educational program on nurses knowledge toward nursing management for patients undergoing percutaneous coronary intervention in cardiac center at Al-Dewaniyah city. Iraqi Nat J Nurs Spec 2020;33:12-20.
23. Kalra S, Ramesh A. Assessment of the effectiveness of planned teaching on knowledge regarding cardiac catheterisation among staff nurses working in selected hospitals. Int J Nurs Educ 2019;11:140. doi: 10.5958/0974-9357.2019.00106.5.
24. Kousar F, Yaqoob A, Afzal M, Khan MS. Effect of educational intervention on knowledge among female nurses regarding pre and post angiographic care. J Med Health Sci 2022;16:272-4. doi: 10.53350/pjmhs22161272.
25. Ghareeb S, Abouelezz ZGME. Efficacy of coaching program on nurses'performance regarding caring of patients undergoing cardiac catheterisation. Ann For Res 2022;65:8786-806. doi: 10.5281/zenodo.7185713.
26. Shrestha N, Shrestha P, Yadav RD. The effectiveness of video assisted teaching programme on knowledge regarding percutaneous transluminal coronary angioplasty among nursing staff. J Uni Coll Med Sci 2019;7:54-6. doi: 10.3126/jucms.v7i2.27140.

**AUTHORS' CONTRIBUTIONS:**
**ZA:** Concept, drafting, data collection and designing the methodology.
**AA:** Reviewing, critical analysis, data interpretation and final approval.
**MTF**: Validating the study idea and final proofreading.
**HFW:** Data analysis and interpretation.
**TA:** Data collection, compilation and literature review.