



## Original Article



## Evaluation of Nurses' Knowledge and Performance Related to Patient Safety Following Cardiac Catheterization

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### ABSTRACT

Cardiac catheterization is a crucial medical procedure that requires adherence to standardized care protocols and the proficiency of trained, competent healthcare professionals to achieve optimal outcomes. **Objectives:** To evaluate nurses' knowledge and performance regarding patient safety following cardiac catheterization. **Methods:** A cross-sectional analytical study design was used among staff nurses who are working in the Cath-Lab and coronary care unit of four tertiary care hospitals from October 2022 to May 2023. A non-probability purposive sampling technique on a sample of n=90 participants was employed in this study. The Institutional Review Board granted approval and consent was obtained from all relevant study sites. The data were analyzed using both descriptive and inferential statistical methods, with a p-value of  $\leq 0.05$  regarded as statistically significant. **Results:** Outcomes of the current study represent that most of the nurses, 62 (68.9%), possessed an inadequate level of knowledge, while 28 (31.1%) displayed an adequate level. Furthermore, 81 (90%) of the nurses were noted to perform unsatisfactory levels of practice. Whereas, only 9 (10%) nurses were observed to carry out a satisfactory level of practice and there was a significant but weak correlation found between the total score of knowledge and performance with ( $p < 0.05$ ). **Conclusions:** It was concluded that the study participants displayed, an inadequate level of knowledge and unsatisfactory level of practice concerning patient safety after cardiac catheterization in caring for such patients.

### INTRODUCTION

Coronary artery disease (CAD), also known as coronary heart disease (CHD) or simply heart disease (HD), is the most common type of cardiovascular disease (CVD) and is responsible for nearly half of all CVD-related deaths globally. It represents a significant public health concern in adults, with high rates of both illness and death, worldwide, the number of deaths linked to coronary heart disease (CHD) was 7.2 million in 2012, and it is expected to surpass 11.1 million by 2020 [1]. Globally, Indo-Asian populations show one of the highest risks for CAD, and it is therefore not surprising that CHD is now the primary cause of death among people in the Indo-Pakistan region [2]. In Pakistan, the burden of CAD is significant across all age groups, particularly among individuals aged 45 and above. It is

noteworthy that the incidence of CAD has nearly doubled since 1970 in urban Karachi [3]. Coronary catheterization is an invasive procedure designed to visualize the coronary arteries, assess their degree of opening, and determine the extent of any blockages. This procedure requires putting a thin, flexible wire into either the femoral or radial artery [4]. Various catheters are used for heart catheterization, differing in kind, type, and size. These catheters are divided into two main categories: diagnostic catheters and interventional catheters. However, it plays a diagnostic role by evaluating the blood flow, anatomy, and physiology of the heart. Additionally, it serves as a therapeutic option, providing a substitute for open heart surgery [5]. Nurses working in the Cardiac Catheterization Laboratory (CCL)

have a crucial role in delivering high-quality care to patients. Gaining knowledge and staying updated with current evidence-based practices are essential for becoming an effective and efficient nurse [6]. Patient safety is a critical global public health concern. At times, healthcare errors can lead to severe consequences such as death, disability, or extended treatment. Additionally, these errors can result in indirect healthcare costs, and productivity losses, and can negatively impact patient perception, attitudes, and trust in healthcare services [7]. Research has shown that nursing knowledge and performance related to patient safety following cardiac catheterization is insufficient, highlighting the need for educational sessions for nurses. As primary healthcare providers, nurses must be skilled in assessing, detecting, and managing issues related to vascular site complications. Therefore, a proficient nurse with extensive knowledge and practical skills is essential in any healthcare setting, including cardiovascular intervention facilities, to enhance patient recovery and ensure higher-quality care [8]. Prompt and accurate decision-making is vital for improving patient safety. Additionally, nursing care is crucial and beneficial for ensuring the procedure that's why ongoing assessment of knowledge and practice is very essential.

This study aims to evaluate the knowledge and performance of study contributors concerning patient safety following cardiac catheterization in tertiary care hospitals in Karachi.

## METHODS

This cross-sectional analytical study design was implemented with a non-probability purposive sampling technique. Whereas, the study sample comprises staff nurses working in the catheterization laboratory (Cath labs), intensive care units, and associated departments of respective study settings. The sample size was determined using Open-Epi software, with a 95% confidence interval, a 5% margin of error, and an excellent knowledge score of 5.7% based on a previous study [9], the calculated sample size was 83; however, principal investigator expanded the sample to n=90. Those nurses, who had registered with the Pakistan Nursing and Midwifery Council (PNMC) and completed their probationary period, were included in this study. Head nurses/in-charge nurses and student nurses were excluded, due to lack of direct involvement in nursing care. Following approval from the Institutional Review Board (IRB) (Ref: IRB-2609/DUHD/Approval/2022/987), permissions were secured from the respective Heads of the particular study settings for data collection. Data were gathered from nurses employed in the catheterization lab (Cath-Lab) the coronary care unit (CCU) and related departments of two private and public organizations in Karachi from October 2022 to May 2023. Each participant provided written informed consent. The questionnaire contains three parts. In the first section, participants are

required to provide socio-demographic details including age, marital status, gender, years of experience, and qualification. Moreover, the second part comprised 10 items related to nurses' knowledge and the third part contained 18 items related to nurses' performance about patient safety following cardiac catheterization. The cumulative scores for all knowledge and practice were 10 and 18 respectively. Each accurate response received a score of one, whereas incorrect answers were given to zero. An overall score equal to or exceeding 70% was regarded as sufficient for knowledge and satisfactory for practice, while, a score below 70% was considered as insufficient for knowledge and unsatisfactory practice. The Cronbach alpha values, used for the structured knowledge and practice questionnaires, were determined to be 0.91 and 0.94 respectively [10]. The data were analyzed by using IBM SPSS Statistics version 25.0. Demographics of study participants were presented by frequency and percentages, and knowledge and practice were assessed by rate and proportions along with levels, additionally, the relationship between knowledge and practice was assessed through correlation, with a p-value of <0.05 considered significant.

## RESULTS

The maximum proportion of the staff nurses 65.6% (n=59) were male and the majority 37.8% (n=34) of them followed the 20-25 years of age. Furthermore, most of them, 56.7% (n=51), were unmarried and 61.1% (n=55) of them had a general nursing diploma with a specialty. In addition, 53.3% (n=48) of study contributors had 1-5 years of job experience in the cardiac departments (Table 1).

**Table 1:** The Distribution of Participants by Frequency and Percentage Based On Their Demographic Status (n=90)

Demographic Variables	n (%)
<b>Hospitals</b>	
Tabba Heart Institute Karachi	43 (47.8%)
Dow University Hospital Karachi	26 (28.9%)
Dr. Ruth K.M Pfau Civil Hospital Karachi	12 (13.3%)
Patel Hospital Karachi	9 (10%)
<b>Age</b>	
20-25 Years	34 (37.8%)
26-30 Years	30 (33.3%)
31-35 Years	12 (13.3%)
>35 Years	14 (15.6%)
<b>Gender</b>	
Male	59 (65.6%)
Female	31 (34.4%)
<b>Marital Status</b>	
Married	39 (43.3%)
Unmarried	51 (56.7%)
<b>Qualification</b>	
General Nursing Diploma + Specialty	55 (61.1%)
Generic Bachelor of Nursing/Post Registered Nurses-Bachelor of Science in Nursing	35 (38.8%)

Cardiac Unit Experience	
<1 Year	31(34.4%)
1-5 Years	48(53.3%)
6-10 Years	11(12.2%)

68.9% of the study contributors had an inadequate level of knowledge, however only 31.1% demonstrated an adequate level of knowledge concerning patient safety related to cardiac catheterization. Furthermore, the highest correct knowledge response (88.9%) was obtained in item#01 and the lowest correct knowledge (33.3%) score was in item#02 (Table 2).

**Table 2:** Frequency of Knowledge Questions about Patient Safety Related to Cardiac Catheterization

Sr. no	Knowledge Questions	Correct	Incorrect
		n (%)	n (%)
1	KQ-1	80 (88.9%)	10 (11.1%)
2	KQ-2	30 (33.3%)	60 (66.7%)
3	KQ-3	64 (71.1%)	26 (28.9%)
4	KQ-4	64 (71.1%)	26 (28.9%)
5	KQ-5	33 (36.7%)	57 (63.3%)
6	KQ-6	31 (34.4%)	59 (65.6%)
7	KQ-7	49 (54.4%)	41 (45.6%)
8	KQ-8	38 (42.2%)	52 (57.8%)
9	KQ-9	58 (64.4%)	32 (35.6%)
10	KQ-10	45 (50%)	45 (50%)
11	<b>Level of the Knowledge</b>	<b>Adequate</b>	<b>Inadequate</b>
	<b>Total Score of Knowledge</b>	n (%)	n (%)
		28 (31.1%)	62 (68.9%)

The result of this current study is evident that the majority 90% of participants had possessed unsatisfactory practices in their clinical areas. Only 10% of the study participants exhibited a satisfactory level of performance concerning patient safety after a cardiac catheterization, although most of the study nurses (93.9%) did not perform the instruction of item#14, Furthermore, the majority of the nurses (94.4%) performed their safe practices in items#7 and item#8 (Table 3).

**Table 3:** Frequency of Practice Questions about Patient Safety Related to Cardiac Catheterization

Sr. no	Practice Questions	Done	Not Done
		n (%)	n (%)
1	PQ-1	20 (22.2%)	70 (77.8%)
2	PQ-2	78 (86.7%)	12 (13.3%)
3	PQ-3	46 (51.1%)	44 (48.9%)
4	PQ-4	22 (24.4%)	68 (75.6%)
5	PQ-5	7 (7.8%)	83 (92.2%)
6	PQ-6	36 (40%)	54 (60%)
7	PQ-7	85 (94.4%)	5 (5.6%)
8	PQ-8	85 (94.4%)	5 (5.6%)
9	PQ-9	53 (58.9%)	37 (41.1%)
10	PQ-10	27 (30%)	63 (70%)
11	PQ-11	83 (92.2%)	7 (7.8%)
12	PQ-12	70 (77.8%)	20 (22.2%)

13	PQ-13	84 (93.3%)	6 (6.7%)
14	PQ-14	6 (6.7%)	84 (93.3%)
15	PQ-15	37 (41.1%)	53 (58.9%)
16	PQ-16	83 (92.2%)	7 (7.8%)
17	PQ-17	80 (88.9%)	10 (11.1%)
18	PQ-18	29 (32.2%)	61 (67.8%)
19	<b>Level of the Practice</b>	<b>Satisfactory</b>	<b>Unsatisfactory</b>
	<b>The Total Score of Practice</b>	n (%)	n (%)
		29 (10%)	81 (90%)

Results showed a significant but weak correlation between overall knowledge and performance of study contributors concerning patient safety following cardiac catheterization in cardiac units ( $p < 0.05$ ) (Table 4).

**Table 4:** Correlation between Overall Knowledge Score and Practice Score

Variables		Practice	
Correlation	Knowledge	r	P
		0.230	0.029

## DISCUSSION

Patient safety is a critical aspect of healthcare organizations, with nurses serving as the backbone of these institutions. Ensuring that nurses are competent in their knowledge and skills, particularly in caring for patients following cardiac catheterization, is highly important. The current study seeks to evaluate nurses' knowledge and performance concerning the safety of patients following cardiac catheterization in tertiary care hospitals. The outcomes of the existing study displayed that more than one-third of the nurses were aged between 20 and 25 years. Approximately two-thirds of the nurses were male, more than half were unmarried, and more than sixty percent had a General Nursing Diploma and Specialty, whereas more than half of them had 1-5 years of experience in cardiac units. These results align with a study conducted in Egypt (2022) [11] while contrasting results were reported in studies conducted in Iraq [12, 13]. In this study level of knowledge was categorized as adequate and inadequate, however, the findings reveal that around 70% of nurses had an inadequate knowledge level during the assessment. This deficiency in nurses' knowledge could be due to a lack of opportunities for knowledge refreshment or fatigue resulting from an increased workload, which may limit their ability to stay updated with current information. The result aligns with earlier studies conducted in Egypt [14-15] while the opposite results were reported in studies conducted in Iraq (2022) [16]. In the present study, the level of practice was classified as either satisfactory or unsatisfactory. However, the results exposed that 90% of the study contributors revealed an unsatisfactory level of performance. This could be attributed to the need for increased years of experience in critical areas, which are

essential in such vital units; moreover, some nurses may rely on repetition and imitation in their work. The result aligns with earlier studies conducted in Pakistan (2022) [17]. However, contrasting findings were documented in research carried out in Egypt (2021)[18]. Furthermore, the present study showed, overall, the knowledge level about post-cardiac catheterization complications was higher than the practice level, however, there was variation existing between them, like the proportion of practice items, is greater as compared to knowledge, from entire components of the study tool, approximately 45 percent items of practice showed satisfactory performance related to patient care after a cardiac catheterization, while only 30 percent of knowledge items indicates as adequate, it clarifies that proportion of practice items are higher. The outcomes of this study showed a statistically significant but weak correlation between nurses' overall knowledge and practice scores related to patient safety following cardiac catheterization. These outcomes are consistent with a study undertaken in Egypt (2022) [19], whereas contrary findings were observed in a study conducted in Egypt[20].

## CONCLUSIONS

It was concluded that less than three-fourths of study participants, demonstrated an unsatisfactory knowledge level concerning patient safety after cardiac catheterization, while only one-tenth showed a satisfactory level of practice in caring for such patients. However, these results suggested that ongoing training programs are essential for nurses to keep their knowledge and practices up to date.

## Authors Contribution

Conceptualization: ZAK

Methodology: ZAK, AA, AK<sup>1</sup>, AK<sup>2</sup>, AFD

Formal analysis: AA, AK<sup>1</sup>

Writing review and editing: AA, Ak<sup>1</sup>

All authors have read and agreed to the published version of the manuscript

## Conflicts of Interest

All the authors declare no conflict of interest.

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