

# Nurses' Knowledge and Practice Regarding Patient Care Post Cardiac Catheterization at Selected Hospitals in Khartoum State 2023

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## Abstract

**Background:** Cardiac catheterization is diagnostic and therapeutic therapy for cardiac diseases but has potential complications that could affect the life of the concerned patient. These complications need early identification and to prevent issues of inequality with regard to standardized care policies, qualified staff is required.

**Objective:** The purpose of this study was to evaluate the present knowledge and practice of the nurses in the selected hospitals of Khartoum State regarding the post-cardiac catheterization care in the year 2023. It also aims to establish what affects their knowledge and practice in Cardiac wards and ICUs.

**Method:** Cross-sectional quantitative study was carried out in Omdurman, Elshab and Ahmed Gasim Hospitals from October 2022 to March 2023. Quantitative data was obtained from a structured questionnaire while the data analysis was made using the Statistical Package for Social Sciences version 26.0.

**Results:** 17(37.8%) participants had unsatisfactory knowledge and practice, and about 30 (66.7%) were satisfied regarding patient care after cardiac catheterization.

**Conclusion:** About 35% of participants had low awareness and experience. Nurses' knowledge needs frequent replenishment, and, thus, it is suggested to implement training more often to address the topic of the post-cardiac catheterization care.

**Keywords:** Cardiac catheterization, nurses, knowledge, practice.

## Introduction

**Background:** Cardiovascular diseases (CVDs) are the major cause of death globally. Approximately 56.4 million deaths were reported worldwide in 2015<sup>(1)</sup>. Out of 56.4 million deaths, 30 million were

due to the top 10 major causes, which also included Ischemic Heart Disease (IHD) and stroke<sup>(2)</sup>. The Centers for Disease Control and Prevention's (CDC's) report found that about 80 percent of deaths from coronary artery disease were caused by narrowing of

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the arteries, which leads to reduced blood flow to the heart. Preventable factors like obesity, poor physical activity, heavy drinking, eating unhealthy foods, and uncontrolled blood pressure and cholesterol are the main risk factors leading to heart disease <sup>(3)</sup>.

A cardiac patient is a critically ill patient because of a reduced cardiac output, decreased myocardial perfusion, abnormal cardiac rhythm, and severe valvular lesions. This patient requires continuous assessment and intervention to diagnose and manage their complicated medical conditions <sup>(4)</sup>. Cardiac catheterization is a process that is supposed to be the golden standard for diagnosing, evaluating, and treating cardiac diseases. One or more catheters are inserted through a peripheral blood vessel in either the antecubital artery or vein or femoral artery or vein with x-ray guidance <sup>(5)</sup>.

Cardiac catheterization is one of the best approaches to limit atherosclerotic disease progression, prevent or reduce complications, including death, and near-completely eliminate ischemic symptoms to improve quality of life and restore functional capacity <sup>(6)</sup>. Currently, an electrocardiogram (ECG) is normally used as the first tool for the initial screening of cardiovascular disorders and non-invasive diagnosis of life-threatening arrhythmias in clinical practice <sup>(7)</sup>. In critical care settings, ECGs provide nurses with information about the patient's electro cardiac record in a manner that is easy and fast to use. Nurses who care for critically ill patients need to have a thorough understanding of the information provided by the ECG, which includes heart rate, regularity of the rhythm, interval measurements, and characteristics of each waveform of the heart.

To minimize complications, optimizing, monitoring, and caring for post-catheterization patients by expert nurses will be helpful. Well-trained nurses will understand the type of complications that can occur and can have the skill of spotting them. Therefore, the proposed study aims to evaluate the nurses' knowledge and practice in relation to post-cardiac catheterization care in randomly selected hospitals in Khartoum State in the year 2023 limited to nurses working in the Cardiac wards and Intensive care units. It also wants to ascertain the variables regarding their information and implementation within such milieus.

## Material and methods

### *Study design*

This descriptive-quantitative hospital-based study was conducted in governmental hospitals in Khartoum state between the periods October 2022 and March 2023

### *Study setting*

The present study was carried out in the catheterization lab, cardiac units, and general ward in Omdurman Hospital, Elshab Hospital, and Ahmed Gasim Hospital

### *Sample size and sampling technique*

Due to the very limited staff in these units, the researcher took a census sampling all nurses staff who work in these hospitals were selected. There were 45 nurses. All nurses work in the catheterization lab, cardiac units, and general ward.

### *Tools of data collection*

The study adopted a self-developed questionnaire to measure the sample's knowledge about care after a procedure called cardiac catheterization. It consisted of two parts: of socio-demographic information (age, gender, education level, nursing experience, experience in cardiac units) and 17 multiple choice questions assessing the knowledge of the participants. This knowledge quiz was 17 items long with one point awarded for each correct answer and a total point range of 0-17 inclusive. Knowledge scores of less than 50% were categorized as poor knowledge, 50-79% as moderate knowledge and 80 and above as good knowledge. The questionnaire and consent form were administration through the Google forms.

### *Questionnaire for Practice*

The section consists of a Likert scale to measure the nurse's practice regarding patient care after cardiac catheterization. The scale consists of 20 items in which responses were answered in a 3-point Likert scale (always, sometimes, and never) and the scores ranged from 0-20). The scores less than (<50%) was considered a poor level of practice and the scores equal (50- < 80%) considered moderate level of practice and the scores equal or more than ( $\geq 80\%$ ) considered as good level of practice

### Data analysis procedure

First, the data was collected then cleaned, coded and entered to SPSS version 25.0 for analysis. Descriptive statistics was used to describe frequency and percentages and it was displayed in tables, Measure of (mean) was calculated. Cross tabulation done for association between the independent variables and dependent variables. The independent variables which become fitted equal to p-value of 0.00 was considered as statistically significant.

### Ethical consideration

The rights, dignity and privacy of participants got respected throughout this study to practice ethical research. Of note, email was used to seek consent and avoiding coercion, the participants were provided with the purpose and procedures of the research, and their rights including their right to withdraw from the study were disclosed to them. Privacy and participants' identification were ensured by using codes to label the responses and ensuring secure data to avoid the loophole that may allow unauthorized persons to gain access. Since there is no written ethical approval, every precaution to participate in this research was exercised and the study adhered to the principles of ethical research as outlined in the Declaration of Helsinki and other international guidelines. The study was found not to be risky for the participants and all results were analyzed in a neutral and clear manner

## Results

All the 45 participants in the study responded to the research questions, hence a 100% response rate, and of which 34 were females (75.6%). About 60 % of the respondents were 25-30 years They were 29 in number majority (64.4%) of whom had a Bachelor's degree in nursing. Out of the participants, 27 percent had worked in cardiac units for 1-5 years, and 48.9% of them worked in the catheterization labs. Half had completed formal training in cardiac catheterization; the other half had not (**Supplementary Table 1**).

The highest correct response rate of 66.7% was associated with local complications such as hematoma while the least of 6.7% was associated with AV fistula after catheterization (Table 1). There were 38 (84.4%) nurses with good knowledge scores, while the rest

7 (15.6%) had moderate knowledge (**Table 1a**).

For practice, 30 of them reported that they always checked the catheter insertion sites for bleeding, only 15 reportedly always assessed patients' food intake before operation and 17 never taught patients about sexual activity after catheterization. Hence, 37 (82.2%) respondents established moderate practice levels of radiation protection measures, whereas eight respondents had good practice (**Table 1b**).

The majority of nurses (66.7%) provided clear descriptions on care procedures after the procedure and assiduously checked for bleeding at the catheter insertion sites; 60% applied manual pressure. Half inaccurately checked urine frequency and restrained patients' arms. In general, 66.7% of respondents described the overall practice as satisfactory with workload as the key hindrance at 44.4 per cent followed by inadequate knowledge at 37.8% (**Table 2a and 2b**).

The mean knowledge score was 2.84 (SD = 0.367) and the mean practice score was 2.18 (SD = 0.387); The p values were finding significant at 0.000 levels which reveals that there were positive association between knowledge and practice (**Table 3**).

Moderate knowledge and practice levels were recorded among the nurses who were aged 21-30 and those who had 1-5 years of working experience. Single Nurses and Nurses with baccalaureate educations also had moderate aggregate knowledge and practice. The above trends were not influenced by attendance of cardiac related training as the majority of the participants demonstrated moderate knowledge and practice (**Table 4**).

**Table (1a) Response of Nurses on the Knowledge section on patient's care after cardiac catheterization N=45**

| Statement                                                                                    | frequency | Percent (%) |
|----------------------------------------------------------------------------------------------|-----------|-------------|
| <b>What are the local complications occurring in patients after cardiac catheterization?</b> |           |             |
| Stroke                                                                                       | 5         | 11.1        |
| Hematoma                                                                                     | 30        | 66.7        |

Continue.....

|                                                                                                                |    |      |
|----------------------------------------------------------------------------------------------------------------|----|------|
| AV fistula                                                                                                     | 3  | 6.7  |
| Thrombus formation                                                                                             | 7  | 15.6 |
| <b>How will you detect pseudo aneurysm after cardiac catheterization?</b>                                      |    |      |
| Pain at the puncture site                                                                                      | 18 | 40.0 |
| Severe bleeding from the puncture site                                                                         | 12 | 26.7 |
| Pulsatile swelling and bruit                                                                                   | 12 | 26.7 |
| Fever                                                                                                          | 3  | 6.7  |
| <b>When should you check the serum creatinine level of patients after cardiac catheterization?</b>             |    |      |
| Immediately after the procedure                                                                                | 13 | 28.9 |
| One day after the procedure                                                                                    | 17 | 37.8 |
| One week after the procedure                                                                                   | 8  | 17.8 |
| No need to check                                                                                               | 7  | 15.6 |
| <b>What is the complication of delayed sheath removal?</b>                                                     |    |      |
| Bleeding                                                                                                       | 25 | 55.6 |
| Thrombus formation                                                                                             | 15 | 33.3 |
| Air embolism                                                                                                   | 5  | 11.1 |
| <b>Development of contrast-induced nephropathy occurs</b>                                                      |    |      |
| One week after the procedure                                                                                   | 18 | 40.0 |
| 5days after the procedure                                                                                      | 6  | 13.3 |
| 2-3days after the procedure                                                                                    | 10 | 22.2 |
| One the day of procedure                                                                                       | 11 | 24.4 |
| <b>Who is at risk for developing renal failure after cardiac catheterization?</b>                              |    |      |
| Young adult                                                                                                    | 3  | 6.7  |
| Hypertensive patients                                                                                          | 22 | 48.9 |
| Elderly                                                                                                        | 15 | 33.3 |
| Dyslipidemia                                                                                                   | 5  | 11.1 |
| <b>For how long the patient's affected extremity should be kept immobilized after cardiac catheterization?</b> |    |      |

|               |    |      |
|---------------|----|------|
| 1-3hour       | 17 | 37.8 |
| 4-6hours      | 16 | 35.6 |
| 6-8hour       | 8  | 17.8 |
| above 8 hours | 4  | 8.9  |

**Table (1b) Response of Nurses on the Knowledge section on patient's care after cardiac catheterization N=45**

| Statement                                                                                           | frequency | Percent (%) |
|-----------------------------------------------------------------------------------------------------|-----------|-------------|
| <b>Who is at risk for developing pulmonary edema after cardiaccatheterization?</b>                  |           |             |
| LV failure                                                                                          | 17        | 37.8        |
| RV failure                                                                                          | 8         | 17.8        |
| AORTIC Regurgitation                                                                                | 7         | 15.6        |
| Pulmonary AV fistula                                                                                | 13        | 28.9        |
| <b>When you detect hematoma at the puncture site after cardiac catheterization, you should not.</b> |           |             |
| Elevate the bruised extremity                                                                       | 14        | 31.1        |
| apply ice                                                                                           | 15        | 33.3        |
| Lower the bruised limb                                                                              | 4         | 8.9         |
| Apply pressure bandage                                                                              | 12        | 26.7        |
| <b>How can we maintain homeostasis after sheath removal?</b>                                        |           |             |
| Topical application of medicine                                                                     | 5         | 11.1        |
| Closing the area with suture                                                                        | 6         | 13.3        |
| Application of plaster                                                                              | 10        | 22.2        |
| Manual/mechanical compression                                                                       | 24        | 53.3        |
| <b>What position will you provide for head end of the patient after procedure?</b>                  |           |             |
| Elevate 30 degree.                                                                                  | 20        | 44.4        |
| Elevate 90 degree                                                                                   | 5         | 11.1        |
| Elevate 60 degree.                                                                                  | 3         | 6.7         |
| Flat lying position                                                                                 | 17        | 37.8        |
| <b>What will you assess in the extremity used for access?</b>                                       |           |             |
| Lesion and swelling                                                                                 | 13        | 28.9        |

Continue.....

|                                                                                          |    |      |
|------------------------------------------------------------------------------------------|----|------|
| Temperature, color, pulses and discomfort.                                               | 19 | 42.2 |
| Motor and sensory activity                                                               | 9  | 20.0 |
| Reflexes and nerve function                                                              | 4  | 8.9  |
| <b>What may be the cause for getting renal complication during coronary angiography?</b> |    |      |
| Injection of dye.                                                                        | 18 | 40.0 |
| Vascular compromise and poor renal blood supply                                          | 16 | 35.6 |
| Use of premedication                                                                     | 4  | 8.9  |
| Use of manual compression over the access site.                                          | 7  | 15.6 |
| <b>What will you educate the patient with radial approach at discharge?</b>              |    |      |
| Don't lift anything heavy more than 10 pounds.                                           | 27 | 60.0 |
| Take bed rest for month.                                                                 | 8  | 17.8 |
| Limit fluid intake                                                                       | 9  | 20.0 |
| Take liquid diet for one week.                                                           | 1  | 2.2  |

|                                                                    |    |      |
|--------------------------------------------------------------------|----|------|
| <b>What the patient has to do if the incision bleeds at home?</b>  |    |      |
| Lie down and put pressure on it for 30 minutes & seek medical help | 27 | 60.0 |
| Put bandage and do activity                                        | 11 | 24.4 |
| c) Give compression for 5 minutes                                  |    |      |
| Give compression for 5 minutes                                     | 4  | 8.9  |
| Clean it and take bed rest                                         | 3  | 6.7  |
| <b>What is hematoma?</b>                                           |    |      |
| Localized swelling filled with fluid and pus                       | 5  | 11.1 |
| Presence of tumor inside vascular region                           | 6  | 13.3 |
| Localized swelling filled with blood                               | 29 | 64.4 |
| Presence of tumor outside the vascular compartment                 | 5  | 11.1 |
| <b>Mean knowledge score</b>                                        |    |      |
| Good knowledge ( $\geq 80\%$ )                                     | 38 | 84.4 |
| Moderate knowledge ( $50 < 80\%$ )                                 | 7  | 15.6 |

**Table (2a) Response of Nurses in the practice section on patient care after cardiac catheterization**

| Statement                                                                                      | Always    | Sometimes | Never     |
|------------------------------------------------------------------------------------------------|-----------|-----------|-----------|
| Do you Explain the post-procedure care to the patient?                                         | 30(66.7%) | 12(26.7%) | 3(6.7%)   |
| Do you remove the sheath?                                                                      | 17(37.8%) | 21(46.7%) | 7(15.6%)  |
| Do you apply manual/mechanical compression after sheath removal?                               | 27(60%)   | 9(20%)    | 9(20%)    |
| Do you apply manual pressure for 30-45 minutes after sheath removal?                           | 23(51.1%) | 14(31.1%) | 8(17.8%)  |
| Do you observe the catheter site insertion for bleeding or hematoma?                           | 30(66.7%) | 11(24.4%) | 4(8.9%)   |
| Do you assess the temperature, pulse and skin color of the extremity used for access?          | 28(62.2%) | 12(26.7%) | 5(11.1%)  |
| Do you assess the vital signs for (15-30) minutes for (2) hours initially and less frequently? | 28(62.2%) | 12(26.7%) | 5(11.1%)  |
| Do you monitor the patient by ECG?                                                             | 31(58.9%) | 11(24.4%) | 3(6.7%)   |
| Do you place the patient in a supine position a padded table in the room?                      | 22(48.9%) | 13(28.9%) | 10(22.2%) |
| Do you encourage patients to increase fluid intake?                                            | 25(55.6%) | 12(26.7%) | 8(17.8%)  |
| Do you observe signs of hypersensitivity to the contrast and other signs?                      | 27(60%)   | 15(33.3%) | 3(6.7%)   |



**Table (2b) Response of Nurses on the practice section on patient's care after cardiac catheterization**

| Statement                                                                                                                 | Always           | Sometimes | Never             |
|---------------------------------------------------------------------------------------------------------------------------|------------------|-----------|-------------------|
| Do you check the patient urine output?                                                                                    | 23(51.1%)        | 18(40%)   | 4(8.9%)           |
| Do you observe the extremity in which catheter inserted straight for 4-6 hours after procedure ?                          | 23(51.1%)        | 16(35.6%) | 6(13.3%)          |
| Do you immobilize the patient's arm on arm board, if the anti cubital vessels are used?                                   | 22(48.9%)        | 16(35.6%) | 7(15.6%)          |
| Do you apply pressure dressing over the insertion site when catheters withdraw?                                           | 29(64.4%)        | 9(20%)    | 7(15.6%)          |
| Do you apply a firm pressure over the site, if any bleeding occurs?                                                       | 25(55.6%)        | 13(28.9%) | 7(15.6%)          |
| Do you observe if there are complications after procedure?                                                                | 29(64.4%)        | 13(28.9%) | 3(6.7%)           |
| Do you assess for bruit in the access area?                                                                               | 24(53.3%)        | 19(42.2%) | 2(4.4%)           |
| Do you educate about sexual activity after procedure?                                                                     | 11(24.4%)        | 17(37.8%) | 17(37.8%)         |
| Do you give instruction to the patient for self management at home, before discharge                                      | 29(64.4%)        | 12(26.7%) | 4(8.9%)           |
| <b>How do you rate the overall level of your current practice regarding patient's care after cardiac catheterization?</b> | <b>Frequency</b> |           | <b>Percent(%)</b> |
| Very unsatisfactory                                                                                                       | 11               |           | 24.4              |
| Satisfactory                                                                                                              | 30               |           | 66.7              |
| Unsatisfactory                                                                                                            | 4                |           | 8.9               |
| If you are not very satisfied with your practice, what are the reasons?                                                   |                  |           |                   |
| I have no sufficient knowledge about patient care after cardiac catheterization                                           | 17               |           | 37.8              |
| Workload                                                                                                                  | 20               |           | 44.4              |
| Insufficient performance monitoring systems related to post cardiac catheterization care                                  | 4                |           | 8.9               |
| lack of cooperation between teams                                                                                         | 4                |           | 8.9               |
| <b>Mean practice score</b>                                                                                                | <b>frequency</b> |           | <b>Percent(%)</b> |
| Good practice ( $\geq 80\%$ )                                                                                             | 8                |           | 17.8              |
| Moderate practice ( $50 < 80\%$ )                                                                                         | 37               |           | 82.2              |
| Poor practice ( $< 50\%$ )                                                                                                | 0                |           | 0                 |

**Table (3) Mean standard deviation and p value for knowledge and practice**

| Variable  | mean | SD   | p value |
|-----------|------|------|---------|
| Knowledge | 2.84 | .367 | .000    |
| Practice  | 2.18 | .387 | .000    |

**Table (4) Correlation between socio demographic data and knowledge and practice**

| Variable                                           | Knowledge |          |      | Practice |          |      |
|----------------------------------------------------|-----------|----------|------|----------|----------|------|
|                                                    | Good      | moderate | poor | good     | moderate | Poor |
| <b>Age</b>                                         |           |          |      |          |          |      |
| 21-25                                              | 4         | 14       | 0    | 4        | 14       | 0    |
| ≥ 25-30                                            | 3         | 23       | 1    | 4        | 23       | 0    |
| <b>Marital status</b>                              |           |          |      |          |          |      |
| Single                                             | 4         | 21       | 1    | 4        | 22       | 0    |
| Married                                            | 3         | 16       | 0    | 4        | 15       | 0    |
| <b>Professional qualification</b>                  |           |          |      |          |          |      |
| Diploma                                            | 0         | 3        | 0    | 0        | 3        | 0    |
| Bsc                                                | 5         | 23       | 1    | 6        | 23       | 0    |
| Msc                                                | 2         | 11       | 0    | 2        | 11       | 0    |
| <b>Experience in nursing by years</b>              |           |          |      |          |          |      |
| 1-5                                                | 5         | 20       | 1    | 6        | 20       | 0    |
| more than 5 years                                  | 2         | 17       | 0    | 2        | 17       | 0    |
| <b>Experience in cardiac unit</b>                  |           |          |      |          |          |      |
| 1-5                                                | 5         | 20       | 1    | 5        | 22       | 0    |
| more than 5 years                                  | 2         | 17       | 0    | 3        | 15       | 0    |
| <b>Attended training of nurses related cardiac</b> |           |          |      |          |          | 0    |
| Yes                                                | 4         | 19       | 1    | 4        | 18       | 0    |
| No                                                 | 3         | 18       | 0    | 4        | 19       | 0    |

## Discussions

This descriptive, exploratory cross-sectional hospital/two study aimed to evaluate the nurse's knowledge and practice about post-cardiac catheterization care at the selected hospitals in Khartoum State. The majority (84.4%) of the participants had good knowledge as compared to the 15.6% participants who have moderate knowledge. Substantial results of our study are in line with a study conducted at Port Said Egypt where nurses' knowledge on post-cardiac catheterization care was 52% acceptable levels<sup>(8)</sup>. However, it is inconsistent with Thabet et al., in Egypt only 13% had the sufficient knowledge about them or none at all 87%<sup>(9)</sup>. This variation may be caused by differences in methods of assessment and training and or the education levels of trainees.

Our findings are in concordance with a study conducted in Ethiopia where 67.5% of the nurses had adequate practice; similar to Bakr A et al. where 62% of the nurses demonstrated satisfactory practice<sup>(10)</sup>. Although other areas were scored fairly well, patient education and protocol implementation were the lowest, indicating that further more strict protocols should be developed and patients and the general public educated more on the issue<sup>(11)</sup>.

A third of the nurses had received specific training in cardiac catheterization procedure while in Egypt, three-fourths of the nurses said the same. Education of caregivers therefore has to be undertaken frequently to enhance care and outcome<sup>(12)</sup>. This cross-sectional study also established a similar statistically significant relationship of BSc qualification, training in PCa catheterization and satisfactory knowledge as proposed earlier in Pakistan. and Nurses with satisfactory knowledge were 2.2 times more likely

to have satisfactory practice<sup>(10)</sup>. Work experience of more than 5 years was also other predictor that had significant positive correlation with practice level<sup>(10, 13)</sup>. Again, like in Egypt factors like knowledge deficit, consultant's heavy workload, and absence of monitoring of performance tainted practice<sup>(14)</sup>.

### Limitation

There were some limitations which the study encountered: The sample of the study was restricted to some selected hospitals in Khartoum State; hence the study was not generalized. However, being cross-sectional it does not allow for the study of changes over time, which may be an important factor. Further, the use of questionnaires allows only the participants' own evaluation of their knowledge and practices, which can be quite misleading. There is no pilot study done, which could threaten the validity of the questionnaire. Education and training of participants also gave variability that may cause confounding affects when comparing results. The study did not capture actual care delivery and could not provide detailed information on overall quality of clinical care; it did not reflect on potential extrinsic modulating factors that routinely impinge on practice such as workload and resource access. These measurement limitations indicate that more extensive, various, ordinary, and pilot studies should be chosen to boost the results' strength in the subsequent studies.

### Conclusion and Recommendation

The study revealed that more than one-third of the participants do not have satisfactory knowledge. Therefore, there is a need to design and implement knowledge-increasing training on patient care after cardiac catheterization.

Hospitals should annually give further training to nurses to enhance their knowledge of the care of patients after cardiac catheterization. They should also encourage and help nurses to attend national and international conferences, workshops, and training courses affiliated with the Ministry of Health related to nursing care for patients undergoing cardiac catheterization.

### Declarations and statements

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**Ethical Approval:** Not applicable

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