

## Nurses' Knowledge and Practice Regarding Care for Patients Undergoing Cardiac Catheterization

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### Abstract

**Background:** Cardiac Catheterization is a percutaneous treatment which is used in the diagnosis and management of various cardiac health problems. **Aim of the study:** was to assess nurses' Knowledge and Practice regarding care for patients undergoing cardiac catheterization. **Subjects and method:** **Research design:** A descriptive design was used. **Setting:** The study was conducted in Cardiac Care Units at Zagazig University Hospitals. **Subjects:** A convenient sample of 50 nurses. **Tools of data collection:** Two tools were used; Tool I: An Interviewing questionnaire for nurses, and Tool II: An observational checklist. **Results:** The present study clarified that 78% of the studied nurses had unsatisfactory level of knowledge, and 66% of the studied nurses had satisfactory level of practice regarding cardiac catheterization. **Conclusion:** it can be concluded that more than three quarter of the studied nurses had an unsatisfactory level of knowledge regarding patients undergoing cardiac catheterization, more than two third of studied nurses had satisfactory level of practice regarding care of patients undergoing cardiac catheterization. **Recommendation:** Educational program for nurses in caring cardiac catheterization unit to improve knowledge about patient safety and avoid complications after cardiac catheterization.

**Key words:** Cardiac catheterization, Nurses Knowledge, Practice, patients

### Introduction

Cardiac catheterization is an invasive procedure indicated in a wide variety of circumstances. It is used for diagnostic evaluation and therapeutic intervention in the management of patients with cardiac diseases <sup>(1)</sup>. Cardiac catheterization had several complications that embrace the following: infection, injury and pain at the Intra Venous site (IV) or sheath insertion site, blood clots and harming urinary organ may occur because of the distinction dye that is common in kidney disease and patients with Diabetes Mellitus (DM) <sup>(2)</sup>

Vascular complications include bleeding at the access site, hematoma, retroperitoneal bleeding, and pseudoaneurysms or arteriovenous fistula formation. Local complications at the sheath introduction site are among the most common problems seen after cardiac catheterization procedures. Bleeding due to perforation of a transversed artery or vein requiring transfusion and it prolongs the hospital stay. A hematoma is a collection of blood within the soft tissue of the upper thigh or lower abdomen <sup>(3)</sup>

Nursing care for patients undergoing cardiac catheterization requires an expert nurse who understands the types of complications that can occur, as well as the assessment skills to spot them. The combination of nursing knowledge and skills during the period before and after cardiac catheterization aims to assure safe and accurate procedure, and improving physical and mental health. Patient's education before cardiac catheterization is very important; the nurse should explain the procedure to the patients. A visit to the catheterization laboratory is also required and patients should watch a video of the procedure <sup>(4)</sup>

### Significance of the study:

The incidences of vascular access complications alone have been reported to be anywhere from 0.1% to 61%, depending on the definition of complications and covariates, including the type of procedure, anticoagulation, closure devices, age, sex, and comorbidities <sup>(5)</sup>. The nurses play a vital role to prevent, early detect and manage these complications. Vascular access complications may be a cause of

discomfort, prolonged hospital stay and impaired outcomes in patients undergoing cardiac catheterization procedures. The removal of femoral sheaths and management of related complications after cardiac catheterization procedures are predominantly the responsibilities of nurses in many acute and critical care settings. Thus, it is essential for nurses to understand the causes of and predisposing risk factors for vascular complications<sup>(6)</sup>

#### **Aim of the study**

The study was aimed to assess nurses' knowledge and practice regarding care for patients undergoing cardiac catheterization.

#### **Research questions:**

What is the level of nurses' knowledge regarding care for patients undergoing cardiac catheterization?

What is the level of nurses' practice regarding care for patients undergoing cardiac catheterization?

#### **Research design:**

A descriptive design was selected

#### **Study Setting:**

The present study was conducted in cardiac care units at Zagazig University hospitals, one is located the third floor of cardiac and thoracic hospital, Sednawy Hospital and other in fourth floor in the same building. There is also one in the ground floor of general Medical Hospital, each one consists of 10 beds, one ventilator and one monitor for each bed.

#### **Study Subjects:**

A convenient sample of 50 nurses caring patients undergoing cardiac catheterization and accept to participate in the study

#### **Tools of data collection:**

The data of this study were collected using the following tools:

#### **First Tool: Interviewing questionnaire for nurses.**

It was designed in Arabic form to avoid misunderstanding. It was designed by the researcher after reviewing of related literature **Chen and Croizer**<sup>(7)</sup> to

assess nurses' knowledge regarding risk factors and vascular complications for patients undergoing cardiac catheterization. This questionnaire consisted of 25 questions divided into two parts:

#### **Part 1: Demographic characteristics of the studied nurses:**

it included eight close ended questions about age, sex, marital status, qualifications, years of experience, years of experience in ICU, training courses, and benefits from courses.

**Part 2:** Questions to assess nurses' knowledge regarding vascular complications and risk factors for patients undergoing cardiac catheterization. It consisted of 17 multiple choice questions about definition of cardiac catheterization, types, indications, contraindications, risk of catheterization, factors to prevent complications, local complications, signs and symptoms of aneurysm, creatinine test, complications of delayed dressing removal, renal failure and dye used, vulnerable groups signs and symptoms of hematoma, patient's immobilizations after catheterizations, patients at risk for pulmonary edema, and nursing action regarding hematoma formation.

#### **The scoring system for knowledge:**

Scoring system for the knowledge items, score one for the correct answer and score zero for the incorrect answer. The total score was calculated for each nurse by adding the score items of questionnaire. The nurse had satisfactory level of knowledge when the total score equal or above 60% and unsatisfactory if below 60% based on statistical analysis.

#### **Second tool: An observational checklist:**

To assess the nurses' practice regarding care of patients undergoing cardiac catheterization. Developed by the researcher and guided by **Eisen et al., (8)**. It included 18 items about Explain the post procedure care, Remove the sheath, Observe the

catheter insertion site for bleeding or hematoma, Assess the skin color or temperature, Assess the vital signs for 15-30 minutes for 2 hours initially and less frequently, Assess for stability of pain, Monitor ECG, Place the patient in supine position, Encourage patient to increase fluid intake, Observe for signs of hypersensitivity to the contract and other sign, Check the patient output, Observe the extremity in which catheter inserted straight for 4-6 hours after procedure. Immobilizing the arm-on-arm board if the antecubital vessels are used, instruct patient to cough if there is chest discomfort. Press dressing over the insertion site during catheters withdrawal, applying firm pressure over the site, if any bleeding occurs. Monitor intake and output after 8 hours following the procedure, instruct patient for self-management at home before discharge.

**The scoring system For observational checklist:**

For observational checklist consisted of given score one for done step and score zero for the not done. The scores of items were summed up and the total divided by the number of the items, giving a mean score for the part. These scores were converted into percent scores. The nurse had satisfactory level of practice when the total score equal or above 80% and unsatisfactory if it below 80% based on statistical analysis.

**Content validity and Reliability:**

It was established for assure of content validity by a panel of seven expertise' from medical & Nursing staff member who revised the tools for clarity, relevance, comprehensiveness, understanding and ease for implementation and according to their opinion, minor modifications were applied. Reliability statistics of the tool 5, Cronbach's Alpha test was (0. 87) for all tools.

**Field work**

Field work of this study was executed in six months from July 2019 to

December, 2019. During this stage all the data were collected from the study nurses and patients. The first phase of the work is the preparatory phase that done by meeting with head of units to clarify the objective of the study and applied methodology. A nurses' time schedule and the nurse's assignments were obtained in order to plan data collection. Also, the researcher was observing nurses' practice about studied procedures. The time needed to complete the checklist varied ranged between 30- 45 minutes.

The second phase done by meeting study nurses and patients to give them instructions. The researcher met personally with each patient and explained the purpose of the study, then giving the questionnaire to nurses to fill it. Distribution of the questionnaire was done every day at the end of morning shift for nurses working at morning shift and gave the afternoon nurses before starting their work.

**Pilot study:**

A pilot study for tools of data collection was carried out in order to test where they are clear, understandable and feasible and applicability. For this study, the researcher randomly selected five nurses and five patients (10% of study sample) to participate in the pilot testing of the questionnaire and checklist, and the sample who shared in the pilot study not excluded from the study sample because of no modifications in the tool.

**Administrative and Ethical considerations:**

Submission of a formal letter was obtained from the Dean of the Faculty. Meeting and discussion were held between the researcher and the nursing administrative personnel to make nursing administrative personnel aware about the aims and objectives of the study as well as, to get better cooperation during the implementation of the study also oral consent from nurses and patients were obtained before starting data collection. The reactions of the administrative

personnel were very supportive for the study. At the interview, each nurse and patient were informed about the purpose, benefits of the study, and nurses and patients were informed that their participation is voluntary and have the right to withdraw from the study at any time without given any reason. In addition, confidentiality, and anonymity of the subjects were assured through coding of all data.

#### Statistical analysis:

Data collected throughout history, basic clinical examination, laboratory investigations and outcome measures coded, entered and analyzed using Microsoft Excel software. Data were then imported into Statistical Package for the Social Sciences (SPSS version 20.0) (Statistical Package for the Social Sciences) software for analysis. According to the type of data qualitative represent as number and percentage, quantitative continues group represent by mean  $\pm$  SD.

#### Results

**Table 1** Indicats that 62 % of studied nurses their age more than 30 years old with mean  $\pm$ SD 33.78  $\pm$ 6.0 and range 25-45. Also 100% of studied nurses were females, 82% of studied nurses were married and 74% of studied nurses had diploma degree. While, only 30 % of studied nurses received training courses about cardiac catheterizations. Moreover, the table illustrated that 60% of studied nurses had more than 10 years of experience in hospitals with mean  $\pm$ SD 12.85 $\pm$ 4.21, while 56% of studied nurses had more than 10 years of experience in ICU with mean  $\pm$ SD 8.88 $\pm$ 3.77.

**Table 2** Reveals 78% of the studied nurses had unsatisfactory level of knowledge. Mean whiles 22% of studied nurses had satisfactory level of knowledge regarding vascular complications and risk factors for patients undergoing cardiac catheterizations with Mean  $\pm$ SD 5.84 $\pm$ 2.8.

**Table 3** Finding of this study clarifies that 66% of studied nurses had

satisfactory level of practice regarding care of patients undergoing cardiac catheterization, while 34 % of studied nurses had unsatisfactory level of practice with Mean $\pm$ SD14.54 $\pm$ 2.49.

**Table 4** There was a highly statistically significant relation between un satisfactory level of nurses' knowledge and marital status, total years of experience and experience at CCU with p value (0.002, 0.0001, 0.005) respectively.

**Table 5** Clears that there was a statistically significant relation between nurses' level of practice and their age, marital status, education, total years of experience and experience in CCU with P value (0.00, 0.001, 0.048, 0.00, 0.00) respectively.

**Table6** There was a statistically significant positive correlation between knowledge score and practice score

#### Discussion

The result of the current study revealed that about two third of studied nurses, their age more than 30 years old ranged from 25-45years with mean  $\pm$  SD 33.78  $\pm$  6.0. All study nurses were females, more than three quarter of them were married and about three quarter of them had diploma in nursing. This may be due to the most student in faculty of Nursing in Egypt were females Less than two third of studied nurses had more than 10 years of experience in hospitals and more than half of them had more than 10 years of experience in ICU.

This finding agreed with **Ali & Ali**,<sup>(9)</sup> who reported in thesis entitled "Effect of designed teaching protocol regarding patients' safety after cardiac catheterization on Nurses' performance and patients' incidence of vascular complications "at Benha university hospital, that more than three quarter of nurses were female with mean age 30.60 $\pm$ 7.96, and more than three quarter of them were married. In the same line with **Thabet et al.**,<sup>(10)</sup> who reported in thesis entitled "Effect of developing and implementing nursing care standards on outcome of patient undergoing cardiac

catheterization” at Assuit university hospital, that years of experience of studied nurses ranged from five to ten years with mean  $\pm$ SD  $7.18 \pm 4.25$ .

This finding was not in accordance with **Ahmed**,<sup>(11)</sup> “Predictors of post cardiac catheterization, femoral artery hematoma and bleeding “in Alexandria university that less than half of nurses their age more than 30 years old and about two thirds of them had diploma degree.

The result of the current study clarified that more than three quarter of the studied nurses had un satisfactory total level of knowledge regarding cardiac catheterization, this obligation of nurses' knowledge might be as the result of lack of refreshment of the nurses' knowledge.

The present study clarified that less than three quarter of studied nurses had in correct knowledge about contraindications of cardiac catheterization.

This study result agreed with **Rushdy et al .,** (12) who reported in thesis entitled “Nurses' knowledge and practice regarding care of patients connected to intra-aortic ballon pump at Cairo University hospitals “in Cairo that the majority of the studied nurses were un satisfactory level of knowledge regarding contraindications of cardiac catheterization.

The most of the studied nurses had in correct knowledge about factors to prevent complications of cardiac catheterization. This study result agreed with **Rolley et al.,** (13) who reported in thesis entitled “Nursing care practices following percutaneous coronary mplications of cardiac catheterization.

The result of the current study showed that the majority of the studied nurses had in correct knowledge about discover expansion of aneurysms after cardiac catheterization. This study result supported **Mahgoub & Abdelhafez**,<sup>(18)</sup> who reported in thesis entitled “Effect of implementing Intra-Aortic Ballon Pump teaching program on critical care nurse's

intervention : results of a survey of Australian and New Zealand cardiovascular nurses “in Australia a New Zealand that the most of the studied nurses had un satisfactory knowledge regarding factors to prevent complications of cardiac catheterization. The study result was in the same line with **American Heart Association,** (14) who found that the majority of the studied nurses had un satisfactory level of knowledge regarding factors to prevent complications of cardiac catheterization

Less than three quarter of the studied nurses had in correct knowledge about complications of delay removal of dressing. This study result was in the same line with **XU et al.,** (15) who reported in thesis entitled “Nurses' knowledge of peripherally inserted central catheter maintenance and its influencing factors” in Hunan province, China that the studied nurses were poor in knowledge about complications of delay removal dressing of cardiac catheterization.

The finding of the current study revealed that less than three quarter of the studied nurses had in correct knowledge about local complications of cardiac catheterization. This study result was in the same line with **Hassan et al.,** (16) who found that the most of the studied nurses had in correct knowledge about local complications of cardiac catheterization. This study result disagreed with **Korean Smith et al .,** (17) who reported in thesis entitled “Safety of intra-arterial catheter directed thrombolysis” in Kirkuk city, that more than two third of the studied nurses had correct knowledge about local co knowledge and practice “at Assuit university hospital that the majority of the studied nurses had poor knowledge about discover expansion of aneurysms after cardiac catheterization.

The finding of the present study revealed that less than three quarter of the studied nurses had in correct knowledge about symptoms of collecting blood after cardiac catheterization. This

study result was in the same line with **Abdel Hafez**,<sup>(19)</sup> who reported in thesis entitled “ Nurses’ knowledge concerning implantable pacemaker for adult patients with cardiac rhythm disorder” at Alnassirrhya heart center in that the majority of the studied nurses had un satisfactory level of knowledge about symptoms of collecting blood after cardiac catheterization. This study result disagreed with **Hadi**,<sup>(20)</sup> who found that about three quarter of the studied nurses had correct knowledge about symptoms of thrombus after cardiac catheterization.

The result of the current study revealed that about three quarter of the studied nurses had in correct knowledge about pulmonary swelling after cardiac catheterization. This study result agreed with **Crowely**<sup>(21)</sup> who found that more than half of the studied nurses had in correct knowledge about pulmonary swelling after cardiac catheterization.

This disagreed with **Mohammed & Salah**,<sup>(22)</sup> who reported in thesis entitled “ Determining best nurse practice, Effectiveness of three groin compression methods following cardiac catheterization” in cardiac catheterization and coronary care units at National Institute of Heart in Embaba-Cairo that the majority of the studied nurses had good satisfactory level of knowledge about pulmonary swelling after cardiac catheterization.

The result of the current study clarified that more than three quarter of the studied nurses had un satisfactory total level of knowledge regarding cardiac catheterization, this obligation of nurses’ knowledge might be as the result of lack of refreshment of the nurses’ knowledge. Additionally, the nurses in Egypt are not utilized the autonomous self-learning. Another cause for lack of knowledge is nurses’ exhaustion due to increased work load which may hinder their ability to read and update their knowledge.

This study result agreed with **Hassan & Ali**,<sup>(23)</sup> who reported in thesis entitled “ Early sheath removal after

percutaneous coronary intervention using Assuit Femoral Compression Device is feasible and safe. Results of a randomized controlled trial” at Assuit University hospital that less than half of nurses had unsatisfactory knowledge regarding cardiac catheterization.

Also, the result in the same consequence with **Oisen et al.**,<sup>(24)</sup> who reported in thesis entitled “Effect of Developing and Implementing Nursing Care Standards on outcome of Patients Undergoing Cardiac Catheterization at Assuit university hospital “that there was satisfactory level of knowledge.

This study result disagreed with **Mahgoub et al.**,<sup>(25)</sup> who reported in thesis entitled “Impact of knowledge about Early Ambulation on patient’s satisfaction post Percutaneous Coronary Intervention ” at Assuit University Hospital, that the study had satisfactory level of knowledge.

The present study clarified that all of the studied nurses had satisfactory level of practice regarding explain post procedure care of patient undergoing cardiac catheterization. This might be due to sufficient in equipment and good cooperation between multidisciplinary health team members and patients. This study result was in the same line with **Mohammed & Salah**,<sup>(22)</sup> who reported that more than three quarter of the studied nurses had satisfactory level of practice about explain the post procedure care of patient undergoing cardiac catheterization.

This study result disagreed with **Mohammed et al.**,<sup>(26)</sup> who reported in thesis entitled “ Impact of Designed Nursing Educational protocol on Health Promotion for patients undergoing Coronary Artery Stent Outcome” at Assuit University Hospital that the studied nurses were un satisfactory level of practice about caring of patient undergoing cardiac catheterization and didn’t offer care to them. The study contradicted with **Ahmed & Gamal**,<sup>(27)</sup> who found that nurses didn’t explain the

procedure and its purpose fully to the patient.

The result of the present study revealed that less than three quarter of the studied nurses had satisfactory level of practice regarding sheath removal. This might be due to increase years of experience in ICU. This study result was in the same line with **Incardon**,<sup>(28)</sup> who reported in thesis entitled "Creating a self-learning module for nurses caring for patients undergoing Angioplasty and receiving Anticoagulation therapy" in American Association of critical care, that the studied nurses had satisfactory level of practice due to there was good knowledge related to the nursing care of patients receiving anticoagulation therapy as well as the management of angioplasty patients. This study result disagreed **Sulzback Hoke et al.**,<sup>(29)</sup> who found that the majority of the studied nurses were un satisfactory level of practice about removing sheath regarding patient undergoing cardiac catheterization.

The finding of the current study clarified that all the studied nurses had satisfactory level of practice regarding observing the catheter site for bleeding or hematoma due to good supervision , good observation and their good experience in ICU . This study result was in the same line with **Ferouze**,<sup>(30)</sup> who found that the studied nurses had satisfactory level of practice regarding observe the catheter site for hematoma and bleeding . In contrary with **Aburghif & Hassan**<sup>(31)</sup> who reported in thesis entitled " Effectiveness of educational program on nurses knowledge concerning complications of cardiac catheterization" at Al- Nassarihea that the majority of the studied nurses had un satisfactory level of practice regarding observe the catheter site for hematoma and bleeding .

The study result revealed that, The majority of the studied nurses had satisfactory level of practice regarding

assess the skin color or temperature . This study result agreed with **Abdelkareem**,<sup>(32)</sup> who reported in thesis entitled " Assessment of Nurse's Knowledge and Practice Regarding Care of Patients with Acute Coronary Syndrome" at Shendi University hospital that the majority of the studied nurses had agood practice level regarding assess the skin color or temperature and monitor the patient . This study result disagreed with **EL Aty**,<sup>(33)</sup> who reported in thesis entitled " Assessment of Nurses' Knowledge and Practice Regarding Care of Patients Undergoing Percutaneous Coronary Intervention " in Assuit that the studied nurses had poor practice about assess the skin color regarding care of patient undergoing cardiac catheterization .

The current study finding revealed that the majority of the studied nurses had satisfactory level of practice regarding observe signs of hypersensitivity to contrast and other signs. This study was in the same line with **Rolly et al .**,<sup>(13)</sup> who found that nurses had satisfactory level of practice regarding observe for signs of hypersensitivity to the contrast and other signs . This contradicted with **Azia**,<sup>(34)</sup> who found that the majority of the studied nurses had poor practice regarding observe for signs of hypersensitivity to the contrast and other signs.

The study revealed that the most of the studied nurses had satisfactory level of practice regarding observe the extremity in which catheter inserted straight for 4-6 hours after procedure . This study result agreed with **Shini & Smith**,<sup>(35)</sup> who found that the majority of the studied nurses had satisfactory level of practice regarding observe the extremity in which catheter inserted straight for 4-6 hours after cardiac catheterization . This study result contradicted by **Henedy & Elsayed** ,<sup>(36)</sup> who reported in thesis entitled " Nurses knowledge and practice regarding patient

safety post cardiac catheterization” at Shebien Elkoom , Menoufia that less than half of the studied nurses had un satisfactory level of practice regarding observe the extremity in which the catheter inserted straight for 4- 6 hours after cardiac catheterization .

The result of the current study revealed that the majority of the studied nurses had satisfactory level of practice regarding instruct patient for self management at home before discharge . This study result was in the same line with **Mahgoub et al.**,<sup>(25)</sup> who found that the majority of the studied nurses had satisfactory level of practice regarding instruct patient for self management at home before discharge . This study result disagreed with **Sameen**,<sup>(37)</sup> who found that three quarter of the studied nurses had un satisfactory level of practice regarding instruct patient for self management at home .

The present study revealed that more than two third of studied nurses had total satisfactory level of practice regarding cardiac catheterization. This could be due to Increase years of experience in ICU which is always required in such crucial and vital units. In addition to some nurses worked by repetition and imitation. This agreed with **Ali** ,<sup>(9)</sup> who reported that more than half of studied nurses had satisfactory level of practice.

Concerning relation between nurses' knowledge and total practice regarding cardiac catheterization, the result of the current study revealed that there was a statistical significant positive correlation between knowledge score and practice score. This agreed with **Rolley**,<sup>(13)</sup> who reported that there is positive correlation between knowledge and practice of studied nurses.

In contrary with **Longo et al.**,<sup>(38)</sup> who reported in thesis entitled “ Diagnostic cardiac catheterization and coronary angiography in the United States “ that there was no significant relation between knowledge and practice of studied nurses.

### **Conclusion**

According to the results of the present study, it can be concluded that more than three quarter of the studied nurses had un satisfactory level of knowledge regarding vascular complications and risk factors for patients undergoing cardiac catheterization. Also, more than two third of them had satisfactory level of practice regarding care of patients undergoing cardiac catheterization.

### **Recommendation:**

Based on the results of the present study the following recommendations are suggested:

- Updating knowledge and practice of ICU nurses through carrying out continuing educational programs regarding complications & risk factors for patients undergoing cardiac catheterization.
- Continous evaluation of nurses' knowledge and practice to identify nurses' needs.
- Encourage and help nurses to attend national and international conferences, workshops and training courses related to nursing care for patients undergoing cardiac catheterization.
- Educational program for cardiac catheterization unit nurses to improve knowledge about patient safety and avoid complications after cardiac catheterization.
  - The study should replicated on large sample to generalize the results

**Table 1: Frequency distribution of demographic characteristics for studied nurses (n = 50)**

Demographic characteristics for studied nurses	No			Age			%
Age							19
≤ 30	19	38.0	≤ 30	19	38.0	≤ 30	
>30	31	62.0	>30	31	62.0	>30	31
Mean± SD (Range)	33.78±6.0 (25-45)		Mean± SD (Range)	33.78±6.0 (25-45)		Mean± SD (Range)	33.78±6.0 (25-45)
Sex							50
Female	50	100.0	Female	50	100.0	Female	
Marital Status							
Married	41	82.0	Married	41	82.0	Married	41
Single	6	12.0	Single	6	12.0	Single	6
Widow	0	0.0	Widow	0	0.0	Widow	0
Education							37
Diploma	37	74.0	Diploma	37	74.0	Diploma	
Bachelors	7	14.0	Bachelors	7	14.0	Bachelors	7
Master	4	8.0	Master	4	8.0	Master	4
Institute	2	4.0	Institute	2	4.0	Institute	2
Experience (total) years							
≤10	20	40%	≤10	20	40%	≤10	20
>10	30	60%	>10	30	60%	>10	30
Mean± SD (Range)	12.85±4.21		Mean± SD (Range)	12.85±4.21		Mean± SD (Range)	12.85±4.21

**Table 2: Nurses' knowledge regarding patients undergoing cardiac catheterization (n= 50)**

Items of nurses Knowledge	Correct		Incorrect	
	No.	%	No	%
Definition of cardiac catheterization	22	44.0	28	56.0
Types of cardiac catheterization	24	48.0	26	52.0
Causes of cardiac catheterization	20	40.0	30	60.0
Indications of cardiac catheterization	24	48.0	26	52.0
Contraindications of cardiac catheterization	14	28.0	36	72.0
Risks of cardiac catheterization	31	62.0	19	38.0
Complications of cardiac catheterization	27	54.0	23	46.0
Factors to prevent complications of cardiac catheterization	3	6.0	47	94.0
Local complications occur to patient of cardiac catheterization	15	30.0	35	70.0
Discover expansion of Aneurysm after cardiac catheterization	7	14.0	43	86.0
Check level of creatinine in blood of patient after cardiac catheterization	3	6.0	47	94.0
Complications of delay removal dressing	14	28.0	36	72.0
Patients for renal failure after cardiac catheterization	18	36.0	32	64.0
Symptoms of collecting blood after cardiac catheterization	15	30.0	35	70.0
Long hours for patient should not move limb of surgery	19	38.0	31	62.0
Patients for pulmonary swelling after cardiac catheterization	13	26.0	37	74.0
If there is Pulmonary swelling	18	36.0	32	64.0
Knowledge	39		78.0	
Un satisfactory <60%	11		22.0	
Satisfactory ≥60%	11		22.0	
Mean ±SD	5.84±2.8			

**Table 3: Frequency distribution of nurses' practice regarding care of patients undergoing cardiac catheterization (n= 50)**

Items of Nurses practice	Done		Not done	
	No.	%	No	%
Explain the post procedure care	50	100.0	0.0	0.0
Remove the sheath	35	70.0	15	30.0
Observe the catheter site insertion for bleeding or hematoma	50	100.0	0.0	0.0
Assess the skin color or temperature	45	90.0	5	10.0
Assess the vital sign for 15-30 minutes for two hours initially and less frequently	36	72.0	14	28.0
Assess for stability of pain	36	72.0	14	28.0
Monitor the patient by ECG	31	62.0	19	38.0
Places the patient in a supine position a padded table in the room	33	66.0	17	34.0
Encourage patient to increased fluid intake	42	84.0	8	16.0
Observe for signs of hypersensitivity to the contract and other sign	43	86.0	7	14.0
Check the patient output	41	82.0	9	18.0
Observe the extremity in which catheter inserted straight for 4-6 hours after procedure	49	98.0	1	2.0
Immobilizes the arm-on-arm board, if the anticubital vessels are used	44	88.0	6	12.0
Instruct the patient to cough it there is a chest discomfort	36	72.0	14	28.0
Pressure dressing over the insertion site when catheters withdraw	36	72.0	14	28.0
Applies firm pressure over the site, if any bleeding occurs	34	68.0	16	32.0
Monitor intake output after 24 hours following the procedure	44	88.0	6	12.0
Instruct the patient for self-management at home, before discharge	42	84.0	8	16.0
Un satisfactory<80%	17		34.0	
Satisfactory≥80%	33		66.0	
Mean ±SD	14.54±2.49			

**Table 4: Relation between nurses' total knowledge score and nurses' demographic characteristics.**

Demographic characteristics	Knowledge				X <sup>2</sup> /t	P
	Unsatisfactory		Satisfactory			
	No	%	No	%		
<b>Age</b>						
≤ 30	16	84.2%	3	15.8%	0.68	0.407
> 30	23	74.2%	8	25.8%		
<b>Marital status</b>						
Married	33	80.5%	8	19.5%	12.47	0.002*
Single	6	100.0%	0	0.0%		
Divorced	0	0.0%	3	100.0%		
<b>Education</b>						
Diploma	29	78.4%	8	21.6%	3.47	0.32
Bachelors	4	57.1%	3	42.9%		
Master	4	100.0%	0	0.0%		
Institute	2	100.0%	0	0.0%		
Experience (Total) Mean ± SD years	10.58±3.2	16.9±5.8	3.83	0.0001*		
Experience in CCU Mean ± SD	7.25±2.4	10.63±3.8	2.54	0.005*		
<b>Training</b>						
Yes	12	80.0%	3	20.0%	0.05	0.82
No	27	77.1%	8	22.9%		

**Table 5: Relation between nurses' total practice score and nurses demographic characteristics.**

Demographic Characteristics	Practice				X <sup>2</sup> /t	P
	Un satisfactory		Satisfactory			
	No	%	No	%		
<b>Age</b>						
≤ 30	13	68.4%	6	31.6%		
> 30	4	12.9%	27	87.1%	16.18	0.00**
<b>Marital status</b>						
Married	11	26.8%	30	73.2%		
Single	6	100.0%	0	0.0%	14.13	0.001**
Divorced	0	0.0%	3	100.0%		
<b>Education</b>						
Diploma	11	29.7%	26	70.3%		
Bachelors	4	57.1%	3	42.9%		
Master	0	0.0%	4	100.0%	7.91	0.048*
Institute	2	100.0%	0	0.0%		
<b>Experience (Total) years</b> Mean ± SD	5.82±1.71	15.15±5.0	6.71	0.00**		
<b>Experience in CCU</b> Mean ± SD	4.29±1.22	9.91±3.3	5.84	0.00**		
<b>Training</b>						
Yes	8	53.3%	7	46.7%		
No	9	25.7%	26	74.3%	3.56	0.059

**Table 6: Correlation between Total knowledge score and Total practice score**

Total Practice score		Total knowledge score	
		R	P
-		0.363*	
			0.010*

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