



## Nurses' Role and Patients' Outcomes Regarding Care of Cardiac Catheterization

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### Abstract:

**Background:** Cardiac Catheterization (CC) is a diagnostic and interventional tool that is considered the gold standard for evaluating heart problems today. Nurses in the Cardiac Catheterization Lab (CCL) play an important role in providing patients with high-quality care. **Aim:** The study was aimed to evaluate nurses' role and patients' outcomes regarding care of cardiac catheterization. **Research design:** A descriptive design was used. **Tool of data collection:** A Structured Interview questionnaire for nurses, An Observational checklist and A Structured Interview Questionnaire for patients **Setting:** El Zagazig university hospital, cardiothorathic hospital and Elahrar hospital, Egypt. **Study subjects:** A purposive sample of patients in above settings, (50) and all available nurses working in the mentioned setting (50) nurse. **Result:** current study revealed that more than two third (68.0%) of studied nurse had unsatisfactory total knowledge regarding care of Cardiac Catheterization. More than half (56%) of studied nurse had satisfactory practice level regarding care of cardiac catheterization, according to nurses' practice regarding patient safety the majority (88.0%) of studied nurses had adequate level of practice, concerning patients 'outcome more than three quarter (76%) of the studied patients free from complications and more than half (56%) of the studied patients were dissatisfied regarding care post cardiac catheterization. **Conclusion:** the study finding concluded that there was a highly statistically significant positive correlation between total nurses' knowledge and nurses' practice regarding care of patient undergoing cardiac catheterization at ( $p = 0.000$ ). Also, there was a highly statistically significant positive correlation between total patients' satisfaction and nurses' knowledge and practice during cardiac catheterization at ( $p$  value was 0.005 and .007 respectively). **Recommendations:** develop an educational program for nurses in CC unit to provide the adequate performance needed to deal with such group of patients.

**Key words:** Cardiac Catheterization, Nurses Role, Patients 'Outcomes

### Introduction:

Cardiac catheterization (CC) is a diagnostic and interventional tool that is considered the gold standard for evaluating heart problems today. The recommendation

for CC is based on an appropriate risk-benefit ratio. Right heart catheterization left heart catheterization, or both can be referred to as cardiac catheterization.

Cardiologists can perform a variety of interventions depending on the clinical need, whether the procedure is diagnostic, therapeutic or interventional <sup>1&2</sup>. Nurses in the Cardiac Catheterization Lab (CCL) play an important role in providing patients with high-quality care. The key to becoming an effective and efficient nurse is through knowledge and current evidence-based practice. When possible, CC staff and nurses who care for post-cardiac catheterization procedure patients should collaborate to reduce complications and treat them when they occur. To achieve these objectives, nurses must assess and monitor patients carefully. Nurses who have received specialized cardiac training must assess, identify, and manage blood vessels. <sup>3</sup>.

Improving nursing knowledge and practice regarding safety measures is critical, which can be accomplished by developing standards of cardiac catheter nursing intervention, clearly identifying deficiencies in care provision, and raising nurses' awareness about their critical role in saving patient lives through safe practise. Maintaining safety measures during CC is critical for early identification and management of complications. Nurses who can identify complications quickly are in the best position to take critical action and improve patient outcomes. <sup>2</sup>.

### **Significance of the study:**

Cardiac catheterization is one of the most widely performed cardiac procedures.. According to the latest WHO data published in 2018 Coronary Heart Disease Deaths in Egypt reached 163,171 or 29.38% of total deaths. <sup>4&5</sup>.

On the other side, about 3600 patients with cardiac catheterizations are scheduled in 2020 at El zagazig university Hospital for catheterization, from this point Cardiac

catheterization is an extremely valuable procedure in diagnosis and treatment of cardiac diseases according to that nursing care for patients undergoing cardiac catheterization necessitates the use of an expert nurse who has sufficient knowledge and skills for caring of those patients in an attempt to find out the gaps in nursing knowledge and practices in order to improve the nursing performance and enhance the patient's outcomes.

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

The aim of this study was to evaluate nurses' role and patients' outcomes regarding care of cardiac catheterization.

### **Research Question:**

- 1-What is the level of nurse's knowledge regarding care of patient undergoing Cardiac catheterization?
- 2-What is the level of nurse's practices regarding care of patient undergoing cardiac catheterization?
- 3-What is the patients' outcomes post cardiac catheterization?

### **Subjects and methods:**

#### **Research design:**

A descriptive research design was carried out in this study.

#### **Setting:**

cardiac catheterization department at Zagazig University hospitals, Cardio Thoracic hospital and ELahrar hospital, Zagazig,Egypt.

#### **Subjects:**

A convenient sample of all available nurses working at El Zagazig Hospitals cardiac catheterization unites mentioned above was involved 50 nurse A purposive sample of 50 patients admitted to the mentioned above settings during the study was involved in the study with age from 18-60 years old , cooperative Patient, and first time for cardiac catheterization.

**Tools of data collection:**

**Tool 1: A Structured Interview questionnaire** composed of two parts:

**Part I:** Demographic data for nurses: Which was composed of seven closed ended questions including Age, sex, marital status, level of education, years of experience, work place, attended training courses and income <sup>6</sup>.

**Part II:** questionnaire to assess nurse's knowledge regarding care of cardiac catheterization which composed of (25) questions of multiple-choice questions.

**scoring system for nurses' knowledge:** the scoring of

question:(1,4,9,10,11,12,13,14,15,16,17,18, 19,20,21,23,24) was 1 for correct response and the incorrect zero, according questions number (2,3, 5,6,7,8,9,22,25) there is more than one answer, the scores of the items were summed-up and the total divided by the number of the items, giving a mean score for the part. Knowledge was considered satisfactory if the percent score was 70% or more, and unsatisfactory if less than 70% based on statistical analysis.

**Tool II: composed of two sections:**

**Section A: An Observational Checklist,** was developed by the researcher to assess nurse's practice regarding patient care, consisted of (31) point covering three parts: pre, during and post cardiac catheterization.

**Part 1- Pre cardiac catheterization:** consisted of (14) point, **Part 2-during cardiac catheterization** 9 points and **part 3-Post cardiac catheterization** consisted of 8 points.

**Section B:** An Observational Checklist to assess nurses 'practice regarding patient safety. It was guided by <sup>7&8</sup>. **Scoring system:** The items observed to be achieved were scored "1" and the items not achieved were scored "0". For each part, the practice was considered adequate if the percent

score was 70% or more, and inadequate if less than 70% based on statistical analysis. This high cutoff point was set because of the critical nature of the work of these nurses.

**Tool III: - A Structured Interview Questionnaire for patients**

**Part I: -. Demographic data for the patient** consisted of seven closed end questions such as Age, gender, marital status, occupation, level of education, residence and income.

**Part II: -Patient health history** consisted of 12 point which include present diagnosis, Chief complain, admitted the hospital before, reasons and times, type of cardiac catheter, previous cardiac examinations or investigations, Comorbidity, smoking history, medications, Procedure as data site of insertion, patient blood pressure, time of pressure heparin bolus and procedure results.

**Part III: - patients 'outcomes post cardiac catheterization** it covered two sections which are functional status and patient satisfaction.

**Section A: patient functional health status:** aimed to assess patient health status post cardiac catheterization included (hemodynamic data, Lab investigations, Complications)

**Section B: patient satisfaction:** aimed to assess patient' satisfaction with nurses and setting care provided it consisted of 17point: adapted from <sup>9</sup>.

Scoring system:it ranges from strongly agree score 5 ,agree score 4,uncertain score 3,disagree score 2, srrongly disagree score 1. as satisfied  $\geq 70\%$  and dis Satisfied  $< 70\%$

**Tools validity and reliability:**

Testing validity and reliability of the proposed tools by a jury of five experts, one of them professor and two assistant professors and two of them lecturers of medical surgical nursing who reviewed the tool's content for clarity, relevance, comprehensiveness, understanding, and ease for implementation. All recommended modifications were done. Reviews which were done by five experts supported the content validity of data collection tools. Cronbach's Alpha that used to measure the internal consistency (reliability of used tool) was 0.817 for knowledge, affect for nurses' practice regarding patient care was 0.81 and for nurses practice regarding patient safety was 0.869, while Cronbach's Alpha for patient's satisfaction was 0.825

**Field work:** This study was executed in six months from, January 2022 to June 2022. During this stage all the data were collected from the study subjects

The first phase of the work is the preparatory phase that done by meeting with head units after obtaining the official permissions, to clarify the objective of the study and applied methodology.

The second phase that done by meeting the study subjects, each nurse and each patient was met individually, got a full explanation about the aim of the study and was invited to participate. The nurse or patient who gave his/her verbal informed consent to participate was handed the interviewing questionnaire and was instructed during the filling.

- Each nurse observed for two shifts (morning and afternoon shift) then asked to fulfill the questionnaire.

- The researcher was available two days at Zagazig University hospitals. As the researcher was observing nurses' practical skills about studied procedure. The time needed to complete the checklist varies between 30-45 minutes. The time needed to

complete the checklist depended upon the time of the procedure and filled by the researcher during nurses' performance inside the department.

### **Pilot study:**

pilot study for tools of data collection was carried out in order to check and ensure the clarity, applicability, relevance and feasibility of the tools. For this study, the researcher selected five (10%) nurses random to participate in the pilot testing of the questionnaire and checklist and not excluded from the study sample because of no modifications in the tool. and also five patients.

### **Administrative and ethical considerations:**

An official permission for data collection in Zagazig University was obtained from the hospital administrative personnel by the submission of formal letter from the dean of the faculty of Nursing Zagazig University explaining the aim of the study in order to obtain permission and help. At the interview, each subject was informed about the purpose, benefits of the study, and they were informed that their participation is voluntary and they have 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. The researcher assured that the data collected will be confidential and would be used only to improve their knowledge and practice for the purpose of the study

**Ethical code :M.D.Zu.Nu.R/138/11 /4/2021**

**Statistical analysis:** analysis of data was done by using the computer software of Microsoft Excel Program and Statistical Package for Social Science (SPSS) version 25. Data were presented using descriptive



statistics in the form of frequencies and percentage for categorical data, the arithmetic mean (X) and standard deviation (SD) for quantitative data. Qualitative variables were compared using chi square test (X<sup>2</sup>). In addition, R- test were used to identify the correlation between the study variables. Reliability of the study tools was done using Cronbach's Alpha.

Degrees of significance of results were considered as follows:

- P-value > 0.05 Not significant (NS)
- P-value < 0.05 Significant (S)
- P-value < 0.01 Highly Significant (HS).

### Results:

The demographic characteristics of the nurses in the study sample Table 1:

**Table 1** showed that, two-fifth (40.0%) of the studied nurses their age ranged between 20-< 30 years, the Mean  $\pm$ SD of age was  $34.72 \pm 9.11$  years. Regarding gender and marital status, the highest percentages (80.0% & 76.0%, respectively) of studied nurses were female and married. Also, more than two thirds (68.0%) of studied nurses had  $\geq 10$  years of nursing experience. As regard to workplace, the majority (80.0%) of studied nurses working at El zagazig university hospital. In addition, less than three quarters (70.0%) of the studied nurses attended training courses as, more than three quarters (77.1%) of studied nurses attended a basic life support course.

**Table 2** showed that regarding total knowledge score, more than two thirds (68.0%) of the studied nurses had unsatisfactory level of total knowledge regarding care of cardiac catheterization..

**Table 3:** showed that regarding total practice score, more than half (56.0%) of the studied nurses had unsatisfactory

practices regarding care of cardiac catheterization.

**Table 4:** It was evident that regarding total safety score, the majority (88.0%) of the studied nurses had of practice regarding patients' safety towards patients undergoing cardiac catheterization.

**Table 5:** It was found that nearly three fifth (58.0%) of the studied patients their age ranged between 50 - 60 years, the Mean  $\pm$ SD of age was  $48.40 \pm 8.14$  years. Regarding gender and marital status, the highest percentages (76.0% & 94.0%, respectively) of the studied patients were male and married. Also, more than three quarters (78.0%) of the studied patients were employee. As regard to residence, more than half (52.0%) of the studied patients living at rural areas. In addition, the most (92.0%) of the studied patients had sufficient income. the majority (82.0%) of the studied patients were educated.

**Table 6** revealed that nearly one quarter (24.0%) of the studied patients had complications as, (57.1%) of complicated patients had bruising at puncture site during hemostasis and (71.4%) was  $<5$ CM. Moreover, three fifth (60.0%) of the complicated patients had hematoma during hemostasis as, (60.0%) was  $<5$ CM. In addition, all (100.0%) of them had small bleeding during hemostasis.

**Table 7** showed that, more than half (56.0%) of the studied patients were dissatisfied regarding care post cardiac catheterization. While, less than half (44.0%) of the the studied patients were satisfied. With Mean  $\pm$  SD=  $44.4 \pm 13.17$

**Table 8** revealed that, there was highly statistically significant positive correlation between total nurses' knowledge and their practice regarding care of patient undergoing cardiac catheterization at (p = 0.000). Also, there was a highly statistically significant positive correlation between

total patients' satisfaction score and nurses' knowledge and practice during cardiac catheterization at (p value was 0.005 and .007 respectively). In relation to total nurses practice regarding total patients' safety there was no significant correlation with nurses total knowledge and practice score while positive statistically significant correlation with total patient satisfaction outcomes with P-value 0.003

**Discussion: Regarding socio-demographic characteristics,** results of the present study revealed that, two-fifth of the studied nurses their age ranged between 20-< 30 years,as regards to gender, the current study results revealed that the majority of the study sample were female ,as regards to marital status: the current study revealed that over three quarters of the studied nurses were married ,as regards level of education the present study revealed that three-quarters of the studied nurses had nursing diploma ,Concerning the years of experience the current study showed that more than two thirds of the studied nurses had more than 10 years of experience in nursing.

**According to nurses' knowledge** the current study showed that, more than two thirds of the studied nurses had unsatisfactory level of knowledge regarding care of cardiac catheterization. According to researcher's point of view these findings reflected the lake of in -service educational programs related to cardiac catheterization care.

This finding were in harmony with **Jabr (2021)**<sup>10</sup>. The study clarified that more than three quarter of the studied nurses had un satisfactory total level of knowledge regarding cardiac catheterization, more over **Khaliel (2022)**<sup>2</sup>. revealed that more than half of the studied nurses had unsatisfactory level of total knowledge

### **According Nurses' Practices Regarding Care of Cardiac Catheterization.**

The current study presented that more than half of the studied nurses had inadequate practice regarding care of cardiac catheterization. This defect in nurses 's practice might be due to lake of refreshment of knowledge and nurses concept of self-learning due to their increased duties in life which minimize their ability to read or update their information. This study result agreed with **Mohammed et al., (2016)**<sup>11</sup>.that the studied nurses had un satisfactory level of practice about caring of patient undergoing cardiac catheterization

In contrary with **Abo El-ata, (2020)**<sup>12</sup>.&**Jabr (2021)**<sup>10</sup>. three quarters and more than two thirds respectively of studied nurses had total satisfactory level of practice regarding cardiac catheterization .

### **According to total nurses 's practice regarding patient's safety during cardiac catheterization**

The majority of the studied nurses had high level of practice concerning patient's safety before induction of anesthesia, skin incision and post procedure. According to the researcher's point of view this finding was due to increased level of nurses' awareness about the importance of the practice and it's importance regarding patient safety in operating room. the results were not in harmony with **Abd Elglil(2019)**<sup>13</sup>. &**Khalil (2022)**<sup>2</sup>. showed that nearly two thirds of total studied nurses had an unsatisfactory level of practice

### **Demographic characteristics of the studied patients.**

As regard to patient age: the current study revealed that nearly three fifth of the studied patients their age ranged between 50 - 60 years, as regard to patient gender the present study indicated that over three quarters of the studied patients were male,

in regard to patient occupation the current study showed that more than three quarters of the studied patients were employee, as regard to patient residence more than half of the studied patients living at rural areas it's due to that Zagazig university hospitals serves all surrounding rural areas, as regard to patient marital status, the most of the studied patients were married. As married patient have more stressors than single one as stress is considered one of the most aggravating factors for CAD

#### **According Medical and surgical history of the studied patients.**

Concerning co-morbidities the present study presented that, the majority of the studied patients had hypertension Concerning smoking, the present study indicated that more than half of the studied patients were previous smoker, regarding chief complain as a reason for hospitalization the current results showed that, the all of subjects had chest pain these results were in line with **De Heer .et al (2019)** <sup>14</sup>. who reported that, Coronary heart disease (CHD) Clinically, it is mainly characterized by chest pain. More over this is in agreement with **Lindahl et al. (2021)** <sup>15</sup>. which revealed that chest pain represented the majority of studied patients either Non-STEMI or STEMI

#### **According Patient functional outcomes post cardiac catheterization**

The current study revealed that nearly one quarter of the studied patients had complications as: half of complicated patients had bruising at puncture site during hemostasis and near three quarters was <5CM. Moreover, three fifth of complicated patients had hematoma during hemostasis as, three fifth was <5CM. In addition, all of complicated patients had small bleeding during hemostasis.

The result was supported with **Hassan et al., (2014)** <sup>16</sup>. found that the incidence of

femoral oozing after sheath removal using the manual compression method was one third.

#### **According Patient satisfaction for post cardiac catheterization care**

The current study proved that over half of the studied patients were dissatisfied regarding care post cardiac catheterization. While, less than half of the studied patients were satisfied. This finding was in consistent with **Laal (2013)** <sup>17</sup>. which referred that about only half of patient participated in the study had good perspective toward nurses role and quality of care provided While **Olowe and Odeyemi (2019)** <sup>18</sup>. not agreed with existing study results, they reported that majority of patients showed excellent satisfaction toward quality care and role delivered by nurses

#### **Correlation between the studied nurses' knowledge,practices,patients'satisfaction and safety regarding care of cardiac catheterization.**

The present study revealed that, there was highly statistically significant positive correlation between total nurses' knowledge and practices regarding care of cardiac catheterization at ( $p = <0.01$ ). Also, there was highly statistically significant positive correlation between total patients' satisfaction and nurses' knowledge, practices and patients' safety during cardiac catheterization at ( $p = <0.01$ ). While, there was no significant correlation between patients' safety and nurses' knowledge and practices regarding care of cardiac catheterization at ( $p = >0.05$ ).

These findings were in agreement with **Jabr (2021)** <sup>10</sup>. and **Feroze et al. (2017)** <sup>3</sup>. revealed that there was a statistical significant positive correlation between knowledge score and practice score.

In additionally **Thabet, (2019)**<sup>19</sup>. stated that inadequacy of nurses' knowledge and practice may lead to decrease of satisfaction of care from patients' perspective

These were not agreed with **AL-Rawajfah et al (2015)**<sup>20</sup>. mentioned that There was no significant statistical relationship between students' total knowledge and total practice scores

**Conclusion:**

Based on the results of the present study, **It can be concluded that**, more than two thirds of the studied nurses had unsatisfactory level of knowledge regarding care of cardiac catheterization, more than half of the studied nurses had unsatisfactory level of practices regarding care of cardiac catheterization. The majority of the studied nurses had adequate level of practice concerning patient's safety, concerning patients 'outcome more than three quarter of the studied patients free from complications and more than half of the studied patients were dissatisfied regarding care post cardiac catheterization. There was

highly statistically significant positive correlation between total nurses' knowledge and their practices regarding care of patient undergoing cardiac catheterization at (p = 0.000). Also, there was highly statistically significant positive correlation between total patients' satisfaction and nurses' knowledge and practices during cardiac catheterization at (p value was 0.005 and .007 respectively).

**Recommendations:**

According the findings of the present study the following recommendations were suggested:

- 1- Develop an educational program for cardiac catheterization unit nurses to provide the adequate knowledge needed to deal with such group of patients
- 2- It is strongly recommended that specific training courses related to care of cardiac catheterization be performed to enhance the level of practice.
- 3- Reapply this research on a larger probability sample acquired from different geographical areas in Egypt for generalization.

**Table 1: Frequency distribution of the studied nurses according to Demographic characteristics (n=50):**

Demographic characteristics	No.	%
Age (Years)		
20-<30	20	40.0
30-<40	13	26.0
40-<50	15	30.0
≥ 50	2	4.0
	Mean ± SD	34.72 ± 9.11
	Min and Max	22 -58
	Range	36
Gender		
Male	10	20.0
Female	40	80.0
Marital status		
Married	38	76.0
Not married	12	24.0
Duration of Experience		
1-<5	8	16.0
5-<10	8	16.0
≥ 10	34	68.0
	Mean ± SD	14.16 ± 9.22
	Min and max	1 - 39
	Range=	38
Work place		
El zagazig university hospital	40	80.0
El Ahrar hospital	7	14.0
El zagazig hospital	3	6.0
Attending training courses		
Yes	35	70.0



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No training courses about (n=35)*	15	30.0
Infection control	24	68.6
Basic life support	27	77.1
Quality	1	2.9

(\*) select more answer

**Table 2: Frequency Distribution of the Studied Nurses According to Total Knowledge Subscales Regarding Care of Cardiac Catheterization (N=50).**

Total Items Of Knowledge	Satisfactory $\geq 70$		Unsatisfactory $< 70$		Mean $\pm$ SD
	No.	%	No.	%	
Knowledge during preoperative phase	12	24.0	38	76.0	4.90 $\pm$ 2.23
Knowledge during intraoperative phase	20	40.0	30	60.0	1.94 $\pm$ 1.20
Knowledge during postoperative phase	18	36.0	32	64.0	5.80 $\pm$ 1.70
<b>Total Knowledge</b>	16	32.0	34	68.0	12.64 $\pm$ 4.32

**Table 3: Frequency Distribution of the Studied Nurses According to Total Practice Subscales Regarding Care of Cardiac Catheterization (N=50):**

Total Practice Items	Satisfactory $\geq 70\%$		Un Satisfactory $< 70\%$		Mean $\pm$ SD
	No.	%	No.	%	
Nurse's role before cardiac catheterization	17	34.0	33	66.0	9.20 $\pm$ 1.56
Nurse's role during cardiac catheterization	48	96.0	2	4.0	8.68 $\pm$ 0.74
Nurse's role after cardiac catheterization	20	40.0	30	60.0	4.96 $\pm$ 1.60
<b>Total Practice</b>	22	44.0	28	56.0	22.84 $\pm$ 2.72

**Table 4: Frequency Distribution of the Studied Nurses According to Total Practice Regarding Patients' Safety During Cardiac Catheterization (N=50).**

Total Practice Regarding Patients' Safety	Adequate		In Adequate		Mean $\pm$ SD
	No.	%	No.	%	
Before induction of anesthesia	44	88.0	6	12	46.50 $\pm$ 2.59
Take a break (Before skin incision)	42	84.0	8	16.0	5.94 $\pm$ 1.91
Post procedure	40	80.0	10	20.0	18.64 $\pm$ 2.67
<b>Total safety score</b>	44	88.0	6	12	71.08 $\pm$ 6.92

**Table 5: Frequency Distribution of the Studied Patients According To Patients Demographic Characteristics (n=50):**

Patients demographic characteristics	No.	%
Age (Years)		
20-< 30	2	4.0
30-<40	6	12.0
40-<50	13	26.0
50 – 60	29	58.0
Mean $\pm$ SD	48.40 $\pm$ 8.14	
Min and Max	29-60	
Range	31	
Gender		
Male	38	76.0
Female	12	24.0
Marital status		
Married	47	94.0
Not married	3	6.0
Occupation		
Employed	39	78.0
Not-employed	11	22.0
Residence		
Urban	24	48.0
Rural	26	52.0
Income		
Sufficient	46	92.0
Insufficient	4	8.0
Educational level		
Educated	41	82.0
Non educated	9	18.0

**Table 6: Frequency Distribution of the Studied Patients According to Their Functional Status (n=50).**

Patient functional outcomes post cardiac catheterization	No.	%
Site of bruising at puncture site (n=7)		
Sheath in site	2	28.6
During hemostasis	4	57.1
In Angio unit	1	14.3
Size of bruising at puncture site (n=7)		
<5CM	5	71.4
5-10CM	2	28.6
Site of hematoma (palpable mass) (n=5)		
Sheath in site	2	40.0
During hemostasis	3	60.0
Size of hematoma (palpable mass) (n=5)		
<5CM	3	60.0
5-10CM	2	40.0
Bleeding at puncture site (n=3)		
During hemostasis	3	100.0
Size of bruising at puncture site (n=3)		
Small	3	100.0
Retroperitoneal bleeding		
Yes	3	6.0
No	47	94.0
Pseudoaneurysm		
Yes	2	4.0
No	48	96.0
Total of Complications		
Yes	12	24.0

No	38	76.0
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**Table 7: Frequency Distribution of the Studied Patients According to Total Satisfaction Care Post Cardiac Catheterization (N=50).**

Total Satisfaction Items	No.	%
Satisfied $\geq 70$	22	44.0
Dissatisfied $< 70$	28	56.0
<b>Mean <math>\pm</math> SD= 44.4 <math>\pm</math> 13.17</b>		
<b>Min Max 17 -85</b>		<b>Range=68</b>

**Table 8: Correlation Between the Studied Nurses' Knowledge, Practices Total Patients' Satisfaction Score and Safety Score Regarding Care of Cardiac Catheterization. (n=50).**

Variables	Total Nurses' Practice Score		Total nurses's Practice Regarding Patients' Safety score		Total Patients' Satisfaction	
	R	p-value	R	p-value	R	p-value
Total nurses' knowledge score	0.501	0.000**	0.096	0.103	0.247	0.005**
Total nurses' practice score			0.108	0.095	0.0252	0.007**
Total patients' satisfaction outcomes			0.311	0.003**		

r= correlation coefficient test.      \*\*highly significant correlation at  $p < 0.01$ .

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