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A Study to Assess the Knowledge and Practices among Cardiac Nurses about Patient Safety after Cardiac Catheterization

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Abstract: ***Background: Cardiac catheterization is an invasive procedure which is used in the diagnosis and treatment of several cardiac diseases. It may lead to several major and minor complications which may contribute to morbidity and mortality. Early recognition of complications and proper care is logically tied to taking action to receive prompt treatment and thus minimizing further complications. Objectives: (i) To assess the knowledge level of cardiac nurses related to patient safety after cardiac catheterization. (ii) To assess the practice of cardiac nurses related to patient safety after cardiac catheterization. Method: A survey was conducted in 30 convenient samples with a pre-validated questionnaire and an observational tool was also used in assessing the quality of care provided .The total period of the study was from September 2011 to November 2011. The study population was staff nurses from cardiology medical intensive care unit and cardiology medical ward. Result: The knowledge level is higher in staff nurses who has experience more than 5 years compared to those whose years of experience is less than 5 years. On comparing these two, a significant p value of 0.015 was attained. On observing the practices; quality of care is adequate Conclusion: The study showed that the knowledge level increases with years of experience.***

Keywords: Cardiac catheterization, Cardiac nurse, Safety, Knowledge, Practice

1. Introduction

Cardiac catheterization is a valuable diagnostic procedure which does a comprehensive examination of how the heart and its blood vessels function. One or more catheters is inserted through a peripheral blood vessel in the antecubital artery or vein or femoral artery or vein with x-ray guidance. This procedure gathers information such as adequacy of blood supply through the coronary arteries, blood pressures, blood flow throughout chambers of the heart, collection of blood samples, and x rays of the heart's ventricles or arteries.

A test that can be performed on either side of the heart, cardiac catheterization checks for different functions in both the left and right sides. When testing the heart's right side, tricuspid and pulmonary valve function are evaluated, in addition to measuring pressures of and collecting blood samples from the right atrium, ventricle, and pulmonary artery. Left-sided heart catheterization is performed by way of a catheter through an artery which tests the blood flow of the coronary arteries, function of the mitral and aortic valves, and left ventricle.Some complications occurs during the transfer of patients after cardiac catheterization or delayed or inadequately provided care.

Patient safety is defined as being free from accidental harm as a result of a health care encounter. It is the responsibility of the cardiac catheterization team to make that commitment to every patient and to each other. A well-functioning unit with a culture of safety, demonstrated clinical quality outcomes, and high internal/external customer satisfaction scores can avoid the risks associated with a less reliable unit.

2. Literature Survey

[1] Studies on the nursing care and practices in patients undergone cardiac catheterization procedures:

Best, et al (2010) conducted a prospective study of early ambulation 90 minutes post left heart catheterization using a retrospective comparison group. The investigators studied on a prospective non-concurrent design with a retrospective control. Retrospective data from the APPROACH database and chart reviews were analyzed for a period of six months for the control group on the traditional three- to four-hour ambulation protocol (n = 402). Prospective data were gathered for six months for the experimental group (n = 193). The result suggested that early ambulation for selected patients at 90 minutes is safe and has the potential to increase both patient comfort and quality of care.[1]

Nasser, et al (1995) studied on peripheral vascular complications following interventional procedures. According to the investigators, peripheral vascular complications include hematomas, pseudoaneurysms, arteriovenous fistulae, acute arterial occlusions, cholesterol emboli, and infections that occur with an overall incidence of 1.5-9%. Major predictors of such complications following coronary interventional procedures include advanced age, repeat percutaneous transluminal coronary angioplasty, female gender, and peripheral vascular disease. Minor predictors include level of anticoagulation, use of thrombolytic agents, elevated creatinine levels, low platelet counts, longer periods of anticoagulation, and use of increased sheath size. Ultrasound-guided compression repair of pseudoaneurysms and arteriovenous fistulae are discussed, as are newer methods of treatment such as hemostatic

puncture closure devices. The study concluded that anticipation and early recognition of possible peripheral vascular complications in conjunction with careful attention to the optimal activated clotting time for sheath removal following coronary interventional procedures may translate into fewer vascular complications as well as into shorter and less costly hospital stays.[2]

[2] Performance evaluation of cardiac nurses:

Yan, et al (2011) conducted a study on continuous quality improvement of nursing care. The authors investigated the outcome of management participation in work to revise cardiac catheterization clinical pathway operating procedures. BNHIqualified cases for Tw-DRGs 125 payment principles were recruited as study subjects to revise the cardiac catheterization clinical pathway. Researchers compared pre- and postrevision values in terms of mean medical care fees, patient volumes, healthcare quality, and length of hospital stay, as well as financial risk. Significant differences were observed in precardiac catheterization nursing care completion rates, mean lengths of hospital stay, diagnosis numbers, surgical treatment numbers, and numbers of complications or co-morbidities. Medical utilization was also significantly lower ($p < .05$) after revision implementation.[3]

SchiksI SchoonhovenL, V et al (2007) studied on the performance evaluation of arterial femoral sheath removal by registered nurses after PCI. The aim of the investigators was to check if nurses' performance in 1999 and 2005 was in accordance with the protocol for arterial sheath removal and to compare both measurements to explore differences in performance over time. They trained registered nurses in sheath removal and observed them during sheath removal in elective uncomplicated PCI-patients. They developed and used a checklist, including 10 elements and 65 items. The result showed that both in 1999 (n=43 observations with 13 nurses) and 2005 (n=42 observations with 16 nurses) the norm of more than 90% for the total score was not achieved: they found 82% and 80%, respectively. [4]

[3] Studies on detection and management of complications after cardiac catheterization:

Duffin, et al (2001) conducted a study on femoral arterial puncture management after percutaneous coronary procedures: a comparison of clinical outcomes and patient satisfaction between manual compression and two different vascular closure devices. The investigators compared Perclose and Angio-Seal ,two devices and tested them in reference to standard MC for safety, effectiveness and patient preference. Prospective demographic, peri-procedural, and late follow-up data for 1,500 patients undergoing percutaneous coronary procedures were collected from patients receiving femoral artery closure by MC (n = 469), Perclose (n = 492), or Angio-Seal (n = 539). Peri-procedural, post-procedural, and post-hospitalization endpoints were: 1) safety of closure method; 2) efficacy of closure method; and 3) patient satisfaction. Patients treated with Angio-Seal experienced shorter times to hemostasis ($p < 0.0001$, diagnostic and interventional) and ambulation (diagnostic, $p = 0.05$; interventional, $p < 0.0001$) than those treated with Perclose. Those treated with Perclose experienced greater access site complications (Perclose vs. Angio-Seal, $p = 0.008$; Perclose vs. MC, $p = 0.06$). Patients treated with Angio-Seal reported greater overall satisfaction, better wound healing and lower discomfort (each vs. Perclose or vs. MC, all $p <$ or $= 0.0001$). For diagnostic cath only, median post-procedural length of stay was reduced by Angio-Seal (Angio-Seal vs. MC, $p < 0.0001$; Angio-Seal vs. Perclose, $p = 0.009$). The study concluded that no indifference was seen in length of stay for interventional cases.[5]

Eidt et al, (1999) conducted a study on surgical complications from hemostatic puncture closure devices. A retrospective, single-center, nonrandomized observational study was made of all vascular complications following femoral cardiac catheterization by the investigators. An immediate mechanical failure of the device was experienced in 34 (8%) patients. Surgical repair was required in 1.6% (7 of 425) of patients following Angio-Seal versus 0.3% (5 of 1662) following routine manual compression ($P = 0.004$). In 5 patients, the device caused either complete occlusion or stenosis of the femoral artery. The polymer anchor embolized in 1 patient and was retrieved with a balloon catheter at surgery. The study concluded that during the first year of utilization of a percutaneous hemostatic closure device following cardiac catheterization, we observed a marked increase in arterial occlusive complications requiring surgical repair. [6]

3. Methods

Research approach

Descriptive survey approach was used in this study.

Setting of the study

The study was conducted in cardiac medical intensive care units and cardiac medical wards of Selected hospital

Study population

Populations of the study are the staff nurses in cardiac medical ICU and cardiology wards of selected hospital, those who are caring the patients after cardiac catheterization.

Sample and sampling technique

Convenient sampling is done for this study; 30 samples collected. The pilot study was done in 5 staff nurses. The total period of study is one month from October to November 2011.

Inclusion criteria

Staff nurses who are receiving the patients after cardiac catheterization and those who are willing to participate are included in the study.

Development of the tool

Self-prepared structured questionnaire and observation tool was developed to assess the knowledge and practice of cardiac nurses who are working in cardiac medical ICU and cardiac medical ward. In Selected hospital .Several journals and textbooks helped to develop the tool and experts in Selected hospital approved it. The self-prepared questions contain 10 questions regarding several aspects of preventing complications after cardiac catheterization, after care, blood

investigations, physical activity etc. An observational tool was made to assess the practice.

Description of the tool

The tool used in this study contains the following parts:
First the questionnaire contains

- Demographic data
- Questions about the development of complications after cardiac catheterization

Second the Observation tool contains

- Demographic data
- nursing care after cardiac catheterization

Pilot study

Pilot study was conducted on the month of October 2011 after obtaining permission from the authorities of hospital management. The study was conducted in 5 cardiac nurses both male and female between the age group 26 to 55 years of age with a self-prepared questionnaire and observation tool. After pilot study assessment has been done after making necessary corrections in the questionnaire.

Data collection procedure

Formal permission obtained from the authorities for the collection of data. The period of data collection was from September to October 2011. The data was collected from the cardiac medical intensive care units and cardiac medical wards of SCTIMST Trivandrum. The investigator first introduced her and explained the need and purpose of the study, the knowledge level and practice assessed after obtaining permission from the cardiac nurses.

Plan of analysis

The investigator developed the plan of analysis after the pilot study. The data obtained from the samples was analyzed by using descriptive statistics.

4. Result Approach

4.1 Distribution of samples according to demographicdata

4.1.1 Description of samples according to observation tool

1) Section A

a) Distribution of samples according to age.

Table 1.2 (a): Shows distribution of samples according toage

Age	*Frequency*	*Percentage*
20-29	16	53.5
30-39	6	20
40-49	4	13.3
50-59	4	13.3
Total	30	100

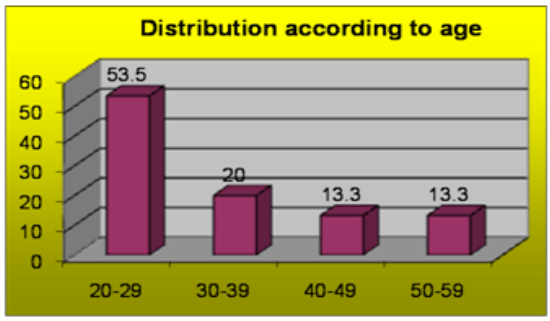

Figure 1.2(a): Shows distribution of sample according to age

Table 1.2(b): Shows distribution of samples according to sex

Sex	*Frequency*	*Percentage*
Male	4	13.3
Female	26	86.6
Total	30	100

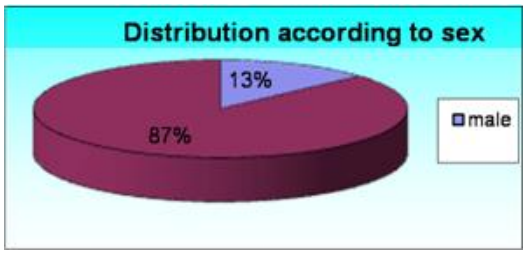

Figure 1.2 (b) Shows distribution of sample according to sex in a pie diagram

The analysis shows, the mean age of female is 7.8 and the standard deviation is 1.47 where as mean age of males is 7 and the standard deviation is 1.2.On assessing the knowledge from these two, we have got a p value of 0.11, which is not significant. From this we can infer that there is not much relation between sex and knowledge level.

Table 1.2 (c): Shows distribution of sample according to experience

Years of experience	*Frequency*	*Percentage*
1-10	23	76.7
11-20	2	6.7
21-30	5	16.6
Total	30	100

The table explains that the sample from which data collected includes 23 staff nurses having 1 to 10 years of experience,2 staff nurses of experience between 11 to 20 years, 5 of them of 21 to 30 years of experience.

Figure 1.2 (c): Shows distribution of samples according to experience in bar diagram.

On analyzing the data it is found out that samples with less than 5 years of experience have got a mean of 6.8 and a standard deviation of 1.22.The samples with age more than 5 years has got a mean of 8.8 and a standard deviation of 1.32.The p value attained on analyzing these two is 0.015,which is significant. From this we can infer that knowledge level is more in those whose experience is more than 5 years.

Above 5 year's experience: -The experience knowledge level range from 5 to 10 with a median of 8 and a mode of 9.
Below 5 years experiences: -The experience knowledge level range from 4 to 9 with a median of 7 and a mode of 7.

2) Section B
Description of samples according to observation tool.

The Observation study was done in 14 staff nurses and 30 patients

Table 1.3 (a): shows distribution of samples according to the procedure.

Name of the procedure	Frequency	Percentage
CAG	10	33.34
PTCA	12	40
EPS+RFA	6	20
PTMC	1	3.33
PCI	1	3.33
Total	30	100

The table explains that the data collected from the samples include 10 patients who had undergone CAG,12 patients who have undergone PTCA,6 of them EPS+RFA,1 PTMC,1 PCI .Thus total 30 patients who had undergone various cardiac catheterization procedures.

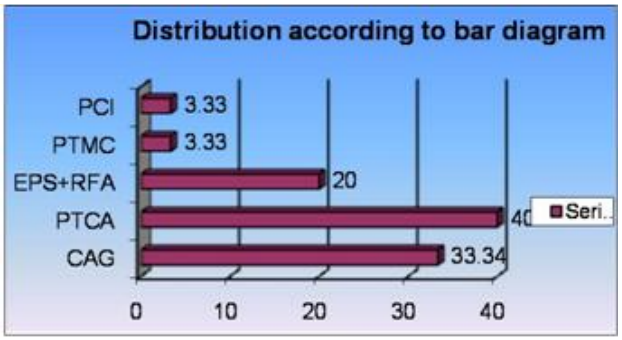

Figure 1.3 (a): Shows the distribution of samples according to the procedure in a bar diagram

Majority (40%)of the patients underwent PTCA according to the data. All the patients were transported to ward or ICU in trolley. Out of 30 patients only one patient had a radial puncture for cardiac catheterization, the remaining had femoral site.

Table 1.3 (b): Shows distribution of samples according to area.

Area	*Frequency*	*Percentage*
CMWRD	9	30
CMICU	21	70
Total	30	100

We obtained the data of 9 patients from cardiology medical ward and 21 patients from cardiology medical ICU.

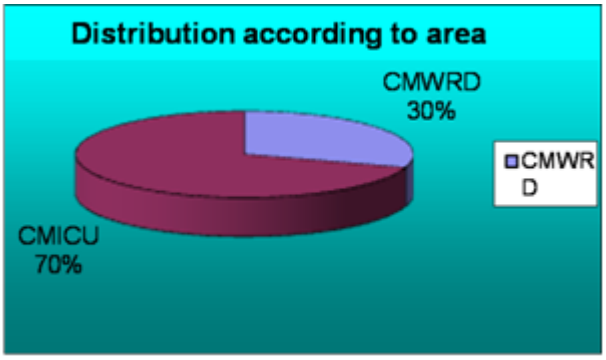

Figure 1.3 (b): shows distribution of samples according to area

Majority of the patient were shifted to CMICU (70%) after the procedure.On receiving the patient after procedure both in ICU and ward puncture site assessment and distal pulse checked to all patients. But frequency of assessing puncture site and checking distal pulse varied. This is because (1) patients with low risk are shifted to ward, (2) in ward as the staff to patient ratio is more, they are not able to assess them frequently. But it does not lead to any complications in any of the patients.

In ICU cardiac monitoring was done continuously to patients were as in ward only vital signs checked and charted. Communication with the patient was done effectively in both ward and ICU. Patients who had undergone PTCA were given I.V. fluids until sheath removal is over and for others fluid administered once they had taken orally well. No patients had any episodes of vasovagal attacks or any untoward symptoms. Two patients did not pass urine in 8 hours, for them, bladder palpations and intervention given. Both of them had adequate urine output after the nursing intervention. All patients had taken food without any untoward symptoms, intake output chart maintained, documentation done and seen by relatives .For patient who had undergone PTCA, sheath removal was done without any complication and compression given effectively until bleeding stopped. According to the observational tool, there is no development of complications due to poor nursing care both in ward as well asICU.

5. Discussion

Out of 30 subjects, a staff nurses with experiences of more than 5 years has more knowledge level than those whose experience level is less than 5 years. On assessing the practice level, there is no significant difference in giving care to the patients. On comparing with earlier studies, the development of complications in patients after cardiac catheterization depends to an extent on the basis of nursing care given.

6. Conclusion

In this study conducted among cardiac nurses at SCTIMST, the development of complications in patients after cardiac

catheterization is minimal. This is due to adequate knowledge of staff nurses and comprehensive nursingcare.

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