EFFECTIVENESS OF STRUCTURED TEACHING PROGRAMME ON KNOWLEDGE AND PRACTICE REGARDING PATIENT SAFETY AFTER CARDIAC CATHETERIZATION AMONG CARDIAC NURSES

Dissertation Submitted To

THE TAMIL NADU DR.M.G.R MEDICAL UNIVERSITY

CHENNAI

IN PARTIAL FULFILMENT OF REQUIREMENT FOR DEGREE OF

MASTER OF SCIENCE IN NURSING

OCTOBER - 2018

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INTERNAL EXAMINER	**EXTERNAL EXAMINER**
Signature:	**Signature:**
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2017-2018

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CERTIFICATE

This is to certify that, this thesis, titled, "**A STUDY TO ASSESS EFFECTIVENESS OF STRUCTURED TEACHING PROGRAMME ON KNOWLEDGE AND PRACTICE REGARDING PATIENT SAFETY AFTER CARDIAC CATHETERIZATION AMONG CARDIAC NURSES IN SELECTED HOSPITAL, ERODE'',** submitted by **301613102**, M.Sc.,(N) (2017-2018 Batch) Arvinth College of Nursing in partial fulfilment of the requirement of the Degree of Master of Science in Nursing from The Tamil Nadu Dr. M.G.R Medical University is his original work carried out under our guidance.

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"I believe if you keep your faith, you keep your trust, you keep the right attitude, if you're grateful, you'll see God open up new doors". - Joel Osteen

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ABSTRACT

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.

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.

The main objective of the study is to assess the effectiveness of structured teaching programme on knowledge and practice regarding patient safety after cardiac catheterization at Sudha Institute of Medical Sciences, Erode. One group pre test and post test design was used for this study. The independent variable in this study was structured teaching programme on patient safety after cardiac catheterization. The dependent variable in this study was knowledge and practice. The study was conducted at Sudha Institute of Medical Sciences, Erode which is a 300 bedded hospital. Sample included cardiac nurses at Sudha Institute of Medical Sciences, Erode who fulfils the inclusion criteria were selected by non probability purposive sampling technique.

The findings depicts that the pretest mean score of knowledge was 17.57±7.24 and the post test mean score was 32.23±3.37. The mean improvement score was 14.67 i.e., 36.67%. The calculated paired‘t’ test value of t = 9.376 was found to be statistically highly significant at $p<0.001$ level. The findings also depict that, the pretest mean score of practice was 8.07±3.87 and the post test mean score was 15.77±2.09. The mean improvement score was 7.70 i.e., 38.5%. The calculated paired‘t’ test value of t = 10.342 was found to be statistically highly significant at $p<0.001$ level.

From the above findings it is clearly indicated that structured teaching programme administered to cardiac nurses on knowledge and practice regarding patient safety after cardiac catheterization was found to be effective to improve the post test level of knowledge and practice among cardiac nurses.

The present study conducted by the investigator, mainly focused on the structured teaching programme to improve the knowledge and practice on patient safety after cardiac catheterization and was found effective and also the researcher insisted the cardiac nurses to follow the skills in practical set up.

CHAPTER - I

INTRODUCTION

"As long as you are breathing you still have the chance for a better and happy life."

-Walter Kirn

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.

BACKGROUND OF THE STUDY

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 (Nasser 1995).

Coronary care unit is a nursing specialty that work with patient who suffer from various cardiac diseases like acute coronary syndrome ,myocardial infarction, rheumatic heart disease ,various arrhythmias, patient who had undergone various cardiac interventional procedures like coronary angiogram, percutaneous transluminal coronary angioplasty, percutaneous transluminal mitral commissurotomy, permanent pacemaker implantation, device closures ,balloon mitral valvotomy, balloon pulmonary valvotomy etc. Cardiac nurse must assess and care for patients with cardiac problems as well as patients undergone cardiac catheterizations procedures, patient for any negative signs of a change in condition, safe transport, administering medication, help with basic personal care needs ,control of bleeding, maintenance of haemostatis .This will help in minimizing the vascular complications in patient. Increased risk for vascular complications was found in patients who were older than 70 years, were female, had renal failure, underwent percutaneous intervention. (Dumont JP 2006).

A cardiac cath provides information on how well your heart works, identifies problems and allows for procedures to open blocked arteries. For example, during cardiac cath your doctor may:

- Take X-rays using contrast dye injected through the catheter to look for narrowed or blocked coronary arteries. This is called coronary angiography or coronary arteriography.
- Perform a percutaneous coronary intervention (PCI) such as coronary angioplasty with stenting to open up narrowed or blocked segments of a coronary artery.
- Check the pressure in the four chambers of your heart.
- Take samples of blood to measure the oxygen content in the four chambers of your heart.
- Evaluate the ability of the pumping chambers to contract.

- Look for defects in the valves or chambers of your heart.
- Remove a small piece of heart tissue to examine under a microscope (biopsy).

The data collected from the cardiac unit of Sree Chitra Tirunal Institute of Medical Sciences and Technology, Trivandrum reveals that approximately 3800 cardiac catheterization procedures are done annually. Out of this, only 3% are done as emergency procedures, while others are done electively. The various interventional procedures done are percutaneous coronary intervention(PCI), percutaneous trans mitral commissurotomy (PTMC), cardiac catheterization study, atrial septal defect device closure(ASD DC), Ventricular septal defect device closure(VSD DC), electrophysiological study(EPS), radiofrequency ablation (RFablation), Permanent pacemaker insertion(PPI) etc.

Complications are usually temporary and may include minor infections, bleeding, abnormal heartbeats, and reaction to medications or dye. There is also a possibility that more serious but rare problems may develop during the procedure. These major cardiac catheterization complications include heart or lung problems, stroke, heart attack, or kidney failure. The frequency of haematoma was 1.3% (>10 cm) and 8.9% (>5 cm), which corresponds with reports from similar studies and departments. The factors found to increase the risk of haematoma development can provide background for procedural changes and increase the focus on patients at increased risk in order to minimize the development of haematomas (Anderson 2005).

Decreasing the amount of time patients are required to remain flat and supine is associated with no increase in hematoma and bleeding tendencies and is associated with a reduction in the perceptions of pain. (Fowlow B 1995).

Hemostasis and ambulation can be achieved faster with the suturing device than with manual compression, with a potential reduction in access site complications. (Gerckens U 1999).Local vascular complications may be diminished by a cautious and sensitive puncture technique with additional care in patients at higher risk for vascular complications (Heintzen M P 1998). . Requisite time in bed after percutaneous transluminal coronary angioplasty has been reduced to 4 hours at the University of Virginia Medical Center, the same time required for patients undergoing cardiac catheterization (Keeling AW 2000). Vascular access site complications may

be reduced by early sheath removal, by avoiding placement of venous sheaths and by limiting heparin dosing to avoid excessive activated clotting times. (Mandak JS 1998). Angio- Seal and Prostar obtain a fast vascular access hemostasis after interventional procedures, with a low incidence of major vascular complications.(Sesana M 2000).

NEED FOR STUDY

Patient safety in minimizing complications is increasingly recognized as essential in practice of coronary care unit. Individual have right to safe and effective quality health care. Cardiac nurses are responsible for providing patient's safety and minimizing vascular complications after cardiac catheterization procedures. They should be aware about the guidelines for providing safety for the patient. Each nurse should know the high risk patient, safe practices for handling and maintenance of homeostasis.

The rate of catheterization in the U.S. was more than 2.5 times that in Canada (71% vs. 27%, respectively, $p < 0.001$). With identical prevalences of severe CAD at catheterization (17%) in the two countries, the higher frequency of catheterization in the U.S. resulted in the identification of more than two and a half times as many cases of severe CAD compared with Canada (12 severe CAD cases identified per 100 post-MI patients in the U.S., vs. 4.6 per 100 in Canada). If considered in isolation, we estimated that these differences in severe disease detection might affect a small long-term survival advantage in favor of the U.S. strategy (estimated 5.0 lives saved per 1,000 MI patients).

More than a million cardiac catheterizations are performed each year in the United States. Several approaches to cardiac catheterization have been developed over the past 40 years. The three most widely used techniques for cardiac catheterization involve access through the femoral, radial, or brachial artery, with access to the brachial artery usually obtained by a cutdown approach and the others via a percutaneous approach.

Heart diseases are on the rise in India. It is estimated that 10 percent of urban adult population and 5 percent of rural adult population suffer from some form of heart diseases and 20-30 percent of them require specialized investigation and

treatment to prevent deaths due to heart ailments and coronary vascular diseases (CVD)1 . With the epidemiologic transition the CVD burden continues to rise in developing countries including India. The projected rise in disease burden due to CVD is expected to make it the prime contributor of total mortality and morbidity. Almost 2.6 million Indians are predicted to die due to coronary heart disease (CHD), which constitutes 54.1 percent of all CVD deaths in India by 2020.2 Additionally, CHD in Indians has been shown to occur prematurely, that is, at least a decade or two earlier than their counterparts in developed countries and this is causing an increase in the overall prevalence rates. Intervention and prevention programs are being sought to curb this rise in cardiovascular disease burden and save as many people as possible in the developing countries.

Cath-labs and coronary interventions in India are increasing exponentially, adding substantially to healthcare expenses.While cath-labs have more than doubled in the last five years, from 251 in 2010 to 630 in 2015, coronary interventions rose 51% within a year, between 2014 and 2015, a new study by a thinktank shows.Increased interventions have resulted in a higher number of stents being used in procedures. The data shows 4,75,000 stents were used in 2015 for 3,75,000 coronary interventions. The figures stand out as just 1,46,719 stents were used in 1,17,420 cardiac interventions in 2010.

Diagnostic cardiac catheterization is performed with minimal risk. Several minor complications can occur. Injury of the artery or vein in which the catheter is introduced occurs in 0.5% to 1.5% of patients; the incidence is similar with the arm and leg approach. Bruising with skin discoloration at the site of blood vessel puncture occurs in 1% to 5% of patients. Rarely, surgery on the blood vessel, blood transfusions, or an infection at the site of catheter entrance may occur. The latter is usually treated effectively with meticulous wound care and antibiotics. The injection of contrast dye causes transient nausea and vomiting in 3% to 15% of patients, itching or hives in 1% to 3%, and a life-threatening allergic reaction in approximately 0.2%. For individuals with abnormal kidney function, the administration of an excessive quantity of contrast dye may worsen kidney function. A major complication, such as death, heart attack, or stroke, during or within 24 hours of catheterization occurs in only 0.2% to 0.3% of patients. Death may be caused by perforation of the heart or

surrounding vessels, an abnormal heart rhythm, a heart attack, or a severe allergic reaction to contrast dye.

The last 5 years have seen a major growth in the number of cath labs and coronary interventions increasing from 539 cardiac catheterization labs and 177,240 coronary interventions in 2012 to about 1200 cardiac catheterization labs and 373,579 coronary interventions in 2016 (as per the NIC data presented in 2016) (Fig. 28-6). There has also been a responsive increase in the number of centres reporting their data, which has increased from 369 in 2012 to 698 in 2016. There is a wide variation in the number of procedure done in different centres (ranging from 4.9% to 32.3%) (Fig. 28-7). A total of 13.4% of high-volume centres perform more than 1000 angioplasties per year contribute to 43.9% of the interventions done in the country.

The investigators experience in coronary care unit in SIMS Hospital, Erode showed that some of the newly joined staff in cardiology department is less aware about safe practices. Hence the investigator planned to conduct a study to assess the knowledge of cardiac nurses on safety practices after cardiac catheterization procedures in cardiac unit.

STATEMENT OF THE PROBLEM

A study to assess the effectiveness of structured teaching programme on knowledge and practice regarding patient safety after cardiac catheterization among cardiac nurses in selected hospital, Erode.

OBJECTIVES

- ✓ To assess the existing knowledge and practice regarding patient safety after cardiac catheterization among cardiac Nurses.
- ✓ To assess the effectiveness of structured teaching programme regarding patient safety after cardiac catheterization among cardiac Nurses.
- ✓ To correlate post test knowledge and practice scores regarding patient safety after cardiac catheterization among cardiac Nurses.
- ✓ To associate the pre test level of knowledge and practice regarding patient safety after cardiac catheterization among cardiac nurses with their related demographic variables.

RESEARCH HYPOTHESES

- ✓ **H_1** There may be a significant improvement in the post test level of knowledge and practice regarding patient safety after cardiac catheterization among cardiac nurses.
- ✓ **H_2** There is a significant correlation between post test knowledge and practice score regarding patient safety after cardiac catheterization among cardiac nurses.
- ✓ **H_3** There is a significant association of pre test level of knowledge and practice score regarding patient safety after cardiac catheterization among cardiac nurses and their selected demographic variables.

OPERATIONAL DEFINITION

Assess:

It is an organized, systematic and continuous process of collecting data from cardiac nurses to determine the level of knowledge and practice regarding patient safety after cardiac catheterization.

Effectiveness:

It refers to the extent to which the information imparted through structured teaching programme has achieving the desired outcome as measuring by gain in post-test Knowledge and Practice score regarding patient safety after cardiac catheterization.

Structured* teaching programme*:

It refers to systematically planned and organized Structured Teaching Programme, which includes patient safety after cardiac catheterization and implemented by the investigator.

Knowledge:

It refers to correct response of the Nurses working in cardiac unit to the questions related to patient safety after cardiac catheterization, as measured by structured knowledge questionnaire.

Range	Interpretation
≤50%	Inadequate knowledge
51 – 75%	Moderately adequate knowledge
>75%	Adequate knowledge

Practice:

It refers to the psychomotor element or task carried out by the Nurses working in cardiac units towards the patient safety after cardiac catheterization as measured by checklist.

Range	Interpretation
≤50%	Inadequate practice
51 – 75%	Moderately adequate practice
>75%	Adequate practice

Cardiac Nurses:

Nurses are those people who are certified with DGNM, P.B.B.Sc (N), B.Sc (N), registered with the State Nursing Council and currently working in cardiac unit of Sudha Institute of Medical Sciences Hospital. Erode

Patient Safety:

It is the state of being secure or safe from injury, harm, or loss. In this study, cardiac nurses provide patient safety after cardiac catheterization by giving meticulous care and prevent and managing complications.

Cardiac catheterization:

It is the insertion of a catheter into a chamber or vessel of the heart. This is done for both investigational and interventional purposes. Subsets of this technique are mainly catheterization involving the catheterization of the coronary arteries, and catheterization of cardiac chambers and valves.

ASSUMPTIONS

- Nurses will have adequate knowledge and practice regarding patient safety after cardiac catheterization.
- Level of knowledge and practice of cardiac nurses regarding patient safety after cardiac catheterization will vary from individual to individual.
- A teaching programme with visual illustration imparts desired knowledge and practice among health personnel.

DELIMITATION

1. Nurses who were working in cardiac units in Sudha Institute of Medical Sciences Hospital, Erode.
2. The sample size was limited to 30
3. Data collection period was limited to 4 weeks

PROJECTED OUTCOME

- The study findings will improve the knowledge and practice of cardiac nurses regarding patient safety after cardiac catheterization.
- The study will helps to prevent and minimize the risks and complications of cardiac catheterization.
- The study will helps to share the information on patient safety after cardiac catheterization with colleagues, other health team members and care givers.

CHAPTER - II

REVIEW OF LITERATURE

"A literature review is an evaluative report of information found in the literature related to the selected area of study. The review should describe summary, evaluate and clarify this literature. It should give a theoretical base for the research and help to determine the nature of the research."

-Polit and Hungler (2008)

Review of literature is the key step in the research process. It refers to a broad, comprehensive, in-depth, systematic and critical review of scholarly publications, unpublished scholarly print materials and audio visual materials. (Basavanthappa.Y.B2001).

A review of literature is an essential activity of scientific research projects, which provides a basis for future investigation, justify feasibility of the study, indicate, constraints of data collection and helps to relate findings from one study to another with a view to establish a comprehensive body of scientific knowledge in a professional discipline from which valid and pertinent theories may be developed. (Fay.A 1979).

PART – I: REVIEW OF LITERATURE

Review of literature discussed in following headings:

- **Literature related to cardiac catheterization**
- **Studies on the nursing care and practices in patients undergone cardiac catheterization procedures.**
- **Studies on detection and management of complications after cardiac catheterization**

Literature related to cardiac catheterization:

Cardiac catheterization is a common outpatient procedure. It provides information about CAD, coronary spasm, congenital and valvular heart disease, and ventricular function. Cardiac catheterization is also used to measure intracardiac pressures and O_2 levels, as well as CO and EF. With injection of contrast media and

fluoroscopy, the coronary arteries can be seen, chambers of the heart can be outlined, and wall motion can be observed. (Lewis)

Right heart cateheterization is used to assess pulmonary artery pressure and can also be used to detect intracardiac shunts by measuring oxygen saturation in different chambers. Left heart catheterization is mainly used to assess coronary artery disease but it also used to evaluate disease of the mitral valve, aortic valve and aorta. Left ventriculography is used to determine the size and function of the left ventricle. Coronary angiography is used to detect stenoses and guide revascularization procedures such as balloon angioplasty and stenting. The procedure is usually accomplished by cannulating the heart via the femoral, brachial or radial artery. It can often be complted as a day case, and is safe, with serious complications occurring in fewer than 1 in 1000 cases.(Davidson)

Patients undergoing cardiac catheterization who have morbid conditions-including diabetes, HF, pre-existing heart disease, hypotension or dehydration or who are at risk for contrast agent-induced nephropathy. Although this form of Acute Renal Failure is usually reversible, temporary dialysis may be necessary. Preventive strategies for high risk patients include preprocedure and postprocedure hydration with IV infusions of saline or sodium bicarbonate and the antioxidant acetylcysteine. (Briguori, Airoldi et al., 2007)

The postprocedure nursing care after both types of heart catheterization is similar. These procedures generally last from 1 to 3 hours and can be tiring for the patient. Many patients prefer to rest or sleep after examination. The nurse monitor's the patients pulse and blood pressure every 15 minutes for 1 hour and then every 30 minutes for 3 hours. It is essential to check the pulses distal to the catheter insertion site to determine the patency of the cannulated artery. The amplitude of the pulse may be slightly diminished for approximately 24 hours because of arterial spasm or edema at the site. At times thrombus formation may totally obliterate the distal pulse, and surgery may be necessary to restore circulation.

A pseudoaneurysm, sometimes called a false aneurysm, occurs when a blood vessel wall is injured, and the blood is contained by the surrounding tissues. In a true aneurysm, the artery or vessel is dilated, sometimes causing a blood-filled sac to

form.Both aneurysms and pseudoaneurysms can occur within the heart. Their formation is typically related to complications after a heart attack.A pseudoaneurysm may also be a complication of cardiac catheterization, a procedure in which a thin, flexible tube (catheter) is inserted in an artery in your groin (femoral artery) and is threaded through your blood vessels to your heart. Cardiac catheterization is generally used to diagnose heart disease and to treat certain types of heart disease.

A pseudoaneurysm can result from cardiac catheterization if blood leaks and pools outside your femoral artery where it was punctured when the catheter was inserted. Pseudoaneurysms can also occur in other arteries throughout the body. These pseudoaneurysms may be related to surgery, trauma, infection or the rupture of an aneurysm.If a pseudoaneurysm of a femoral artery related to cardiac catheterization is small, it may go undetected and not cause any complications. But if a small pseudoaneurysm is detected, your doctor may recommend a watchful-waiting approach to see if it resolves on its own.However, most often when a femoral artery pseudoaneurysm is detected, your doctor will recommend one of these treatments:

At most medical centers, interventional procedures to open blocked arteries are performed after the diagnostic part of the cardiac cath is complete. Less commonly, the intervention is performed later as a separate procedure. Interventional procedures include balloon angioplasty and stent placement. Rarely, more complicated procedures, such as brachytherapy, atherectomy, rotoblation, and cutting balloon are done.

Cardiac catheterization requires the use of fluoroscopy to visualize the path of the catheter as it enters the heart or as it enters the coronary arteries. The coronary arteries are known as "epicardial vessels" as they are located in the epicardium, the outermost layer of the heart.[3] Fluoroscopy can be conceptually described as continuous x-rays. The use of fluoroscopy requires radiopaque contrast, which in rare cases can lead to contrast-induced kidney injury (see Contrast-induced nephropathy). Patients are constantly exposed to low doses of ionizing radiation during procedures.[4] Ideal table positioning between the x-ray source and receiver, and radiation monitoring via thermo luminescent dosimetry, are two main ways of reducing a person's exposure to radiation.[4] People with certain comorbidities (people who have more than one condition at the same time) have a higher risk of adverse events during the cardiac catheterization procedure.[4] These comorbidity conditions

include aortic aneurysm, aortic stenosis, extensive three-vessel coronary artery disease, diabetes, uncontrolled hypertension, obesity, renal insufficiency, and unstable angina.

The broad range of relatively rare procedures performed in pediatric cardiac catheterization laboratories has made the standardization of care and risk assessment in the field statistically quite problematic. However, with the growing number of patients who undergo cardiac catheterization, it has become imperative that the cardiology community overcomes these challenges to study patient outcomes. The Congenital Cardiac Catheterization Project on Outcomes was able to develop benchmarks, tools for measurement, and risk adjustment methods while exploring procedural efficacy. Based on the success of these efforts, the collaborative is pursuing a follow-up project, the Congenital Cardiac Catheterization Project on Outcomes-Quality Improvement, aimed at improving the outcomes for all patients undergoing catheterization for congenital heart disease by reducing radiation exposure.

Studies on the nursing care and practices in patients undergone cardiac catheterization procedures.

Ayyaz Ul Haq M et al (2018) conducted a study on accelerated patent haemostasis using a procoagulant disk; a protocol designed to minimise the risk of radial artery occlusion following cardiac catheterisation. In this single centre prospective study, 389 consecutive patients undergoing TRA for coronary angiography or angioplasty were randomised to two haemostasis protocols: use of a Helix™ compression device alone (HC) or in combination with a haemostatic pad (StatSeal® disc) and an accelerated haemostasis protocol (AC). Between May and Nov 2017, 191 patients were randomised to receive HC and 198 patients to AC. Compression time was significantly higher with HC as compared to AC. There were no significant differences in re-bleeding and RAO between groups. Incidence of haematoma was higher in AC group. The study concluded that A reduction in radial artery compression time can be achieved by using Statseal in association with an accelerated haemostasis protocol without increasing the risk of access site bleeding and RAO. The combination of reduced compression time combined with maintained

radial flow via patent haemostasis has the potential to reduce the risk of radial occlusion after transradial catheterisation.

Roberts JS et al (2017) conducted a pilot prospective study on comparison of hemostasis times with a kaolin-based hemostatic pad (quikclot radial) vs mechanical compression (tr band) following transradial access. Thirty patients undergoing TRA coronary angiography and/or percutaneous coronary intervention were randomized into three cohorts post TRA: 10 patients received mechanical compression with the TR Band, 10 patients received 30 min of compression with the QuikClot Radial pad, and 10 patients received 60 min of compression with the QuikClot Radial pad. Times to hemostasis and access-site complications were recorded. Radial artery patency was evaluated 1 hour after hemostasis by the reverse Barbeau's test. The researchers concluded that Use of the QuikClot Radial pad following TRA in this pilot trial significantly shortened hemostasis times when compared with the TR Band, with no increased complications noted.

Deuling JH et al (2016) conducted a randomized controlled study of standard versus accelerated deflation of the Terumo radial band haemostasis device after transradial diagnostic cardiac catheterisation. Of the 173 analysed patients 86 received accelerated care and 87 patients standard care. A total of 19 patients had pulsatile bleeding, which occurred similarly in the two groups (standard care 11 vs. accelerated care 8, P=0.47). The time to Terumo radial band removal was on average 129 minutes shorter for accelerated care patients compared to standard care (P<0.01). At 1 hour after Terumo radial band placement, accelerated care patients more often reported pain scores of 0 than standard care patients (89% vs. 74%, P=0.02). The study was concluded that there was no increase in local bleedings in the accelerated pressure reduction of the Terumo radial band after diagnostic cardiac catheterisation, increasing patient comfort and reducing hospital stay. These findings will further facilitate the widespread implementation of radial access.

Sekhar A et al (2016) conducted a prospective, single-center study evaluating the efficacy and cost-effectiveness of early ambulation (within 30 min) following femoral artery closure with the ProGlide® suture-mediated vascular closure device (PD) in patients undergoing diagnostic cardiac catheterization compared with manual compression. Inclusion criteria were met in 170 patients (85 PD and 85 MC patients).

Patients ambulated 20 ft. within 30 min (PD) or after the requisite 4 h recumbent time (MC) if feasible. Primary endpoint was time-to-ambulation (TTA) following device closure. We also directly compared the safety of closure, times-to-hemostasis (TTH), -ambulation (TTA) and -discharge (TTD) with MC and, using a fully allocated cost model, performed cost analysis for both strategies. The researchers concluded that ProGlide is safe and effective for femoral artery closure in patients who ambulate within 30 min after cardiac catheterization; translating into improved patient satisfaction and substantial cost savings.

Wu KL, Chen SR et al (2013) conducted a study to evaluate the effectiveness of an accessibility-enhanced multimedia informational educational programme in reducing anxiety and increasing satisfaction with the information and materials received by patients undergoing cardiac catheterisation. A randomised experimental design with three-cohort prospective comparisons.In total, 123 consecutive patients were randomly assigned to one of three groups: regular education; (group 1), accessibility-enhanced multimedia informational education (group 2) and instructional digital videodisc education (group 3). Anxiety was measured with Spielberger's State Anxiety Inventory, which was administered at four time intervals. A satisfaction questionnaire was administrated one day after cardiac catheterisation. The findings demonstrate that the accessibility-enhanced multimedia informational education was the most effective informational educational module for informing patients about their upcoming cardiac catheterisation, to reduce anxiety and improve satisfaction with the information and materials received compared with the regular education and instructional digital videodisc education.

Dathatri S et al (2013) conducted a study on informed consent for cardiac procedures: deficiencies in patient comprehension with current methods.Patients who undergo cardiac catheterization or percutaneous coronary intervention (PCI) often have a poor understanding of their disease and of related therapeutic risks, benefits, and alternatives. This pilot study was undertaken to compare the effectiveness of 2 preprocedural educational approaches to enhance patients' knowledge of standard consent elements. Patients undergoing first-time elective, outpatient cardiac catheterization and possible PCI were randomly assigned to a scripted verbal or written consent process (group I) or a web-based, audiovisual

presentation (group II). Preconsent and postconsent questionnaires were administered to evaluate changes in patients' self-reported understanding of standard consent elements. Although both scripted verbal and audiovisual informed consent improved patient comprehension, important patient misperceptions regarding PCI-related outcomes and alternatives persist, independent of informed consent approach, and considerable challenges still exist in educating patients about contemplated medical procedures. Future research appears warranted to improve patient comprehension.

Chair SY et al (2012) conducted a randomized single-blinded controlled trial. Overall, 137 participants were randomly assigned to experimental (63 participants) or control (74 participants) group according to a computer generated random list. Early ambulation (ambulate at 4 hours post-CC) and routine post-procedure care of 12 to 24 hours were used in the experimental and control groups respectively. Independent t-test, Chi-square test, multiple logistic regression and generalized estimation equation model were applied to compare various outcomes between experimental and control groups. The study enhanced health providers' understanding about the effects of early ambulation on patient outcomes. Nurses may provide more individualized and appropriate care to post-CC patients in a more competent and cost-effective way.

Turner S et al (2010) conducted a study to evaluate procedural and safety metrics of transradial (TR) versus transfemoral (TF) cardiac catheterization (CATH) and percutaneous coronary interventions (PCI) during a complete institutional transition from TF to TR as the preferred access. 4,172 consecutive CATH and PCI procedures were performed (2,665 TF; 1,507 TR) at Wake Forest Baptist Medical Center from January 2009 to November 2010. For the cath lab (all TF + TR), researchers observed small but significant increases in procedural metrics for Preferred TR (last third) compared to Preferred TF (first third). This appeared to be due to increased access times, procedure length, fluoroscopy times, and contrast use for TR versus TF (propensity score matched). Nonetheless, over the course of the study, there was a trend for a decrease in all procedural metrics with TR use. Access site complications and bleeding, both $P < 0.05$, decreased over the course of the study. Our observations support the concept that complete transition of a cath lab to a preferred TR strategy is feasible, achieves lower rates of vascular and bleeding complications but with modest increases in overall procedural metrics.

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.

Lambert P et al (2017) conducted a study on reducing acute kidney injury due to contrast material: how nurses can improve patient safety. Nurse leaders in the Northern New England Cardiovascular Disease Study Group, a 10-center quality improvement consortium in Maine, New Hampshire, and Vermont, formed a nursing task force to reduce acute kidney injury due to contrast material after cardiovascular interventional procedures. Data were prospectively collected January 1, 2007, through June 30, 2012, on consecutive nonemergent patients (n = 20 147) undergoing percutaneous coronary interventions. The study was concluded that standardization of evidence-based best practices in nursing care may reduce the incidence of acute kidney injury due to contrast material.

Conway A .Fulbrook P et al (2013) conducted a study on knowledge of current trends in nurse-administered procedural sedation and analgesia (PSA) in the cardiac catheterization laboratory (CCL) in Australia and New Zealand. A quantitative, cross-sectional, descriptive survey design was used. Data were collected using a web-based questionnaire on practice, educational standards and protocols related to nurse-administered PSA. Descriptive statistics were used to analyse data. A sample of 62 nurses, each from a different CCL, completed a questionnaire that focused on PSA practice. Over half of the estimated total number of CCLs in Australia and New Zealand was represented. The study concluded that By characterising nurse-administered PSA in Australian and New Zealand CCLs, a baseline for future studies has been established. Areas of particular importance to improve include protocols for patient monitoring and comprehensive PSA education for CCL nurses in Australia and New Zealand.

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. BNHI-qualified 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.

Sangkachand P, Sorosario B, Funk M (2011) studied on continuous ST segment monitoring, nurse's attitudes, practices and quality of patient care. The investigators conducted their study on 61 nurses and 202 patients with acute coronary syndrome in a cardiac intensive care unit. Baseline data on nurses' use of and attitude toward ischemia monitoring and quality of care were obtained. Education was then provided and ST-Map software was installed on all monitors. Follow-up data were obtained 4 months later. The percentage of nurses who had ever used ischemia monitoring was 13% before ST Map and 90% afterward ($P < .001$). The most common reason for not using ischemia monitoring before ST Map was inadequate knowledge (62%). The most common reason for liking ischemia monitoring after ST Map knew when a patient has ischemia (80%). Time to acquisition of a 12-lead electrocardiogram in response to symptoms or ST-segment changes was 5 to 15 minutes before ST Map and always less than 5 minutes afterward ($P < .001$). Time to return to the catheterization laboratory did not differ before and after ST Map. The study concluded that ST Map was associated with more frequent use of ischemia monitoring, improved attitudes of nurses toward ischemia monitoring, and shorter time to obtaining 12-lead electrocardiograms.

Rolley, et al (2010) developed a study on nursing care practices following a percutaneous coronary intervention. The authors describes the practice standards and priorities of care of cardiovascular nurses in Australia and New Zealand Item generation for the survey was informed by an integrative literature review and

existing clinical guidelines. A 116-item Web-based survey was administered to cardiovascular nurses, via electronic mail lists of professional cardiovascular nursing organizations, using a secure online data collection system. Data were collected from March 2008 to March 2009. A total of 148 respondents attempted the survey, with 110 (74.3%) completing all items. All respondents were registered nurses with an average of 12.3 (SD 7.61) years of clinical experience in the cardiovascular setting. A range of practice patterns was evident in ambulation time after percutaneous coronary intervention, methods of sheath removal, pain relief, and patient positioning. Respondents consistently rated psychosocial care a power priority than other tasks and also identified a knowledge deficit in this area. The survey identified diversity of practice patterns and a range of educational needs.

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.

Studies on detection and management of complications after cardiac catheterization

Chen G et al (2018) conducted a study aimed to prospectively evaluate the safety and efficacy of a new developed method that uses percutaneous ultrasound-guided hematoma aspiration followed by targeted localized manual compression for treatment of femoral artery pseudoaneurysm after cardiac catheterization. Under ultrasound guidance, blood within the pseudoaneurysm was aspirated percutaneously using an 18-gauge needle, while the pseudoaneurysm neck and a nearby site over the pseudoaneurysm were manually compressed for 15 min. No further recurrence or procedure related complications were observed. In this preliminary experience,

combining percutaneous ultrasound-guided hematoma aspiration and manual compression appears safe and effective in treating femoral artery pseudoaneurysms after catheterization and avoids thrombin use, long-time compression, and surgery.

Slicker K, Lane WG et al (2016) conducted a study assess daily cardiac catheterization procedural volume and complications at an academic medical center. Over 1,000,000 cardiac catheterizations (CC) are performed annually in the United States. 12,773 patients were identified who underwent 16,612 CCs on 2,118 days. The average age was 63 years (SD 12.4; range, 18-95). 61% were men. A total of 326 complications occurred in 243 patients on 233 separate days (2.0% CC complication rate). The average volume per day was 7.8 CCs. We found a low correlation between daily complications and CC volume (Spearman's rho =0.11; P<0.01) though complication rates were lowest on days with 6-11 procedures; higher rates were found on slower and busier days.The researchers observed a U-shaped association between CC volume and rates of CC complications. The lowest complication rates were found on days with 6-11 procedures a day. The highest complication rate was seen with >11 procedures a day.

Filis K,et al (2007) conducted a study on management of early and late detected vascular complications following femoral arterial puncture for cardiac catheterization. The investigators evaluated on evaluated when and whether conservative, urgent surgical, or elective surgical treatment is appropriate. A retrospective analysis was made of 45 consecutive iatrogenic vascular trauma patients, among 10,450 cardiac diagnostic or therapeutic catheterizations. Patients' demographics, type of catheterization, time from catheterization to initial diagnosis, the type of complication (thrombosis, infection, bleeding, pseudoaneurysm, etc.), time from presentation of the complication to definite treatment, diagnostic imaging and decision making, the surgical or conservative management, the length of stay and the clinical outcome were determined and analyzed. The investigators identified and treated 30 early and 15 late (after patient's discharge) arterial complications: 18 pseudoaneurysms, 6 bleedings, 9 hematomas, 5 deep vein thromboses, 3 arteriovenous fistulas, 2 arterial embolisms and 2 arterial thromboses. Eight patients underwent emergency surgical repair, three elective surgical repair and 31 were

managed conservatively. The study concluded that bleeding and acute leg ischemia were the most frequent indication for emergency surgical treatment, whereas the majority of pseudoaneurysms, fistulas and vein thrombosis were successfully treated conservatively.

Dumont CJ et al (2006) conducted a study on predictors of vascular complications post diagnostic cardiac catheterization and percutaneous coronary interventions. The investigators describes a retrospective, descriptive, and correlational study of 11,119 patients who underwent cardiac catheterization and/or percutaneous intervention, with femoral artery access, in the years 2001 to 2003. The study concluded that increased risk for vascular complications was found in patients who were older than 70 years, were female, had renal failure, underwent percutaneous intervention, and had a venous sheath.

Steffenino G et al (2006) conducted a study on vascular access complications after cardiac catheterisation: a nurse-led quality assurance program. The radial and femoral access were used in 78 (14%) and 470 (83%), respectively, of 564 procedures, and a closure device was used in 136 of the latter. A haematoma (any size) was isolated and uneventful in 9.6% of cases. More severe complications occurred in 1.2% of cases, namely: in none of the procedures with radial access, and in 0.4% and 2.4% of femoral diagnostic and interventional coronary procedures, respectively. During complicated (n=40) vs uncomplicated (n=172) transfemoral interventions, the activated coagulation time was 309+/-83 vs 271+/-71 s (p=0.004), but the use of closure devices was similar. Severe vascular access complications in our patients were fewer than in most reports, and virtually absent in radial procedures. Vigorous anticoagulation was associated with increased complications in our patients, but closure devices were not. A new policy including both the use of the radial access whenever possible, and a less aggressive anticoagulation regimen during transfemoral interventions will be tested.

PART II

CONCEPTUAL FRAMEWORK

A conceptual framework or a model is made up of concepts, which are the mental images of the phenomenon. This section deals with conceptual framework adopted for the study. A conceptual framework of model provides the guidelines to proceed to attain the objectives of the study based on a theory. It is a schematic representation of the steps, activities and outcomes of the study.

Imogene King's Goal Attainment theory is based on the personnel and interpersonal systems including interaction, perception, communication, transaction, stress, growth and development, time and action.

Nursing is defined by Imogene king as "A process of human interactions between the nurse and the client where by each perceives the other and the situation, and through communications. They set goals, explore means, and degree on means to achieve goals".

According to this theory, the people meet in same situation, perceive each other, make judgment about the other, take some mental action and react to each ones of the other. The next step in the process is interaction, and then transaction, which is dependent upon the achievement of a goal.

The investigator adapted King's Goal Attainment theory as a basis for conceptual framework, which is aimed to assess the effectiveness of structured teaching programme on knowledge and practice among cardiac nurse regarding patient safety after cardiac catheterization.

The six major concepts of the phenomenon are described as follows:

1. Perception

It refers to person's representation of reality. It is universal yet highly subjective and unique to each person. Here the investigator's perception is cardiac nurses may have lack of knowledge and practice on patient safety after cardiac catheterization.

The cardiac nurses too perceived the need to gain more knowledge and practice on patient safety after cardiac catheterization.

2. Judgment

The investigator judged that adequate knowledge and practice on patient safety after cardiac catheterization among cardiac nurses has to be improved.

3. Action

Nurse researchers plan to assess the knowledge and practice of cardiac nurses regarding patient safety after cardiac catheterization through questionnaire and checklist.

4. Reaction

The investigator and nurses reaction is to set mutual goals in developing research tool on knowledge and practice on patient safety after cardiac catheterization and to obtain adequate knowledge and practice.

5. Interaction

Hence the investigator assesses knowledge and practice on patient safety after cardiac catheterization and investigator given education on patient safety after cardiac catheterization in the selected setting.

6. Transaction

A process of transaction in which human beings communicate with the environment to achieve goals that are valued, goal directed human behaviours. Each human being perceives the world as a total person in making transaction with individual things in the world.

Inadequate knowledge and practice related to patient safety after cardiac catheterization can affects the basic structure of the system and results in disturbance. If cardiac nurses have adequate knowledge and practice on patient

safety after cardiac catheterization through this model, the cardiac nurses can attain their goal and maintain maximum level of wellbeing.

In this study the researcher and the subject come together for an interaction, a different set of perceptions to exchange. The researcher perceives the subject's need for teaching the benefits of knowledge and practice on patient safety after cardiac catheterization. The researcher mobilizes the resources and prepares the structured teaching programme regarding knowledge and practice on patient safety after cardiac catheterization. The cardiac nurses need to learn the benefits of patient safety after cardiac catheterization. It includes definition, indications, contraindications, equipments, patient preparation, procedure, prevention and management of complications. The subjects verbalize the need for learning and accept for learning through structured teaching programme and give consent.

Both mutually set of goals to improve the knowledge and practice regarding patient safety after cardiac catheterization. Pre test conducted to assess the knowledge and practice regarding patient safety after cardiac catheterization among cardiac nurses. The researcher communicates with the cardiac nurses by implementing the Structured Teaching Programme regarding knowledge and practice on patient safety after cardiac catheterization. Transaction between the subject and AV aids takes place. On 8^{th} day the subject's knowledge will be reassessed by a post test in order to find out the effectiveness of Structured Teaching Programme. The goal is said to be achieved when there is an improvement in the knowledge and practice on patient safety after cardiac catheterization.

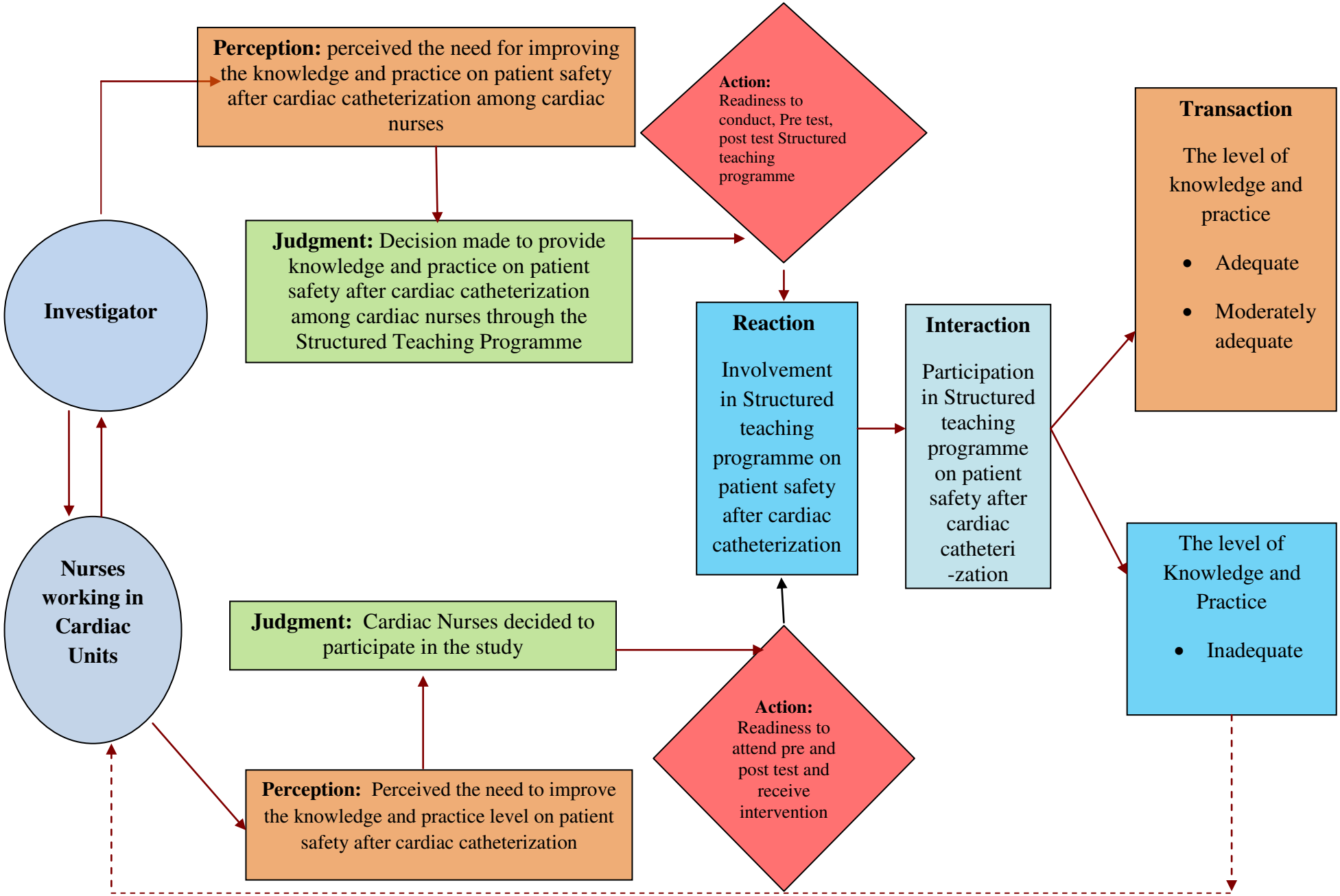

Fig.-1 Conceptual framework based on Modified King Goal Attainment Theory

CHAPTER-III

METHODOLOGY

This chapter deals with description of different steps, which has been following by the investigator to evaluate the Knowledge and Practice regarding patient safety after cardiac catheterization among cardiac Nurses.

This chapter includes the research approach, research design, and description of setting, variables, population, sampling, sampling technique, sampling size tools for data collection and data collection procedure.

RESEARCH APPROACH

Quantitative evaluative approach was adopted for this study.

RESEARCH DESIGN

One group pretest and posttest (Pre experimental) design was adopted for the present study.

$$O_1 \quad X \quad O_2$$

O_1: Pretest on Knowledge and Practice regarding patient safety after cardiac catheterization.

X: Structured teaching programme on patient safety after cardiac catheterization.

O_2: Posttest on Knowledge and Practice regarding patient safety after cardiac catheterization.

VARIABLES

Dependent Variable

The dependent variables in this study are knowledge and practice.

Independent Variable

The independent variable in this study is structured teaching programme regarding patient safety after cardiac catheterization.

Extraneous Variable

The extraneous variables in this study are age, gender, professional qualification, additional qualification, years of experience in cardiac unit, attendance of workshop or training related to cardiac catheterization, and present position in cardiac unit.

DESCRIPTION OF SETTING

The study was conducted in Sudha Institute of Medical Sciences Hospital, Erode which is 300 bedded multispecialty Hospital. There are 2 types of CCUs such as ICCU, Step-down CCU. All the Coronary Care Units are equipped with 30 beds and an average of 24-26 patients per day are under Coronary Care. Among 120 registered Nurses working in this hospital, 40 are posted in Coronary Care Units. It is about 59 kms away from Arvinth College of nursing, Namakkal.

POPULATION

According to Polit and Hungler (2010), "A population is the entire aggregation of cases in which a researcher is interested". Target population of this study was Nurses working in Cardiac Units. Accessible Nurses working in cardiac units of Sudha Institute of Medical Sciences Hospital, Erode, TamilNadu.

SAMPLE

The sample comprised of Nurses working in cardiac units and who fulfilled the inclusion criteria.

SAMPLE SIZE

The investigator was selected 30 Nurses working in cardiac units who met inclusion criteria.

SAMPLING TECHNIQUE

Non-probability purposive sampling technique was used to select the nurses working in cardiac units.

CRITERIA FOE SAMPLE SELECTION

Inclusion criteria

Those who are

- male and female nurses working in cardiac units in Sudha hospital, Erode.
- available at the time of data collection.
- diploma and degree holders in nursing.

Exclusion criteria

Those who are

- not willing to participate in this study.

DESCREPTION OF THE TOOL

This consists of 3 parts

Part 1: Assessment of Demographic variables

It consist of demographical variables such as age, sex, educational qualification, year of experience in cardiac unit, previous exposure to the topic and present position in cardiac unit. No score will be given to this section. Data of this section was used for the descriptive purpose.

Part 2: Structured Knowledge Questionnaire

This section consist of structured knowledge questionnaire which had 40 multiple choice questions regarding general information about cardiac catheterization, and patient safety after cardiac catheterization. Each correct response has been given a score of one and the score of zero has been given to wrong response. The total score of each subject was calculated, converted into percentage and interpreted as follows

- <50% : Inadequate Knowledge
- 50 - 75% : Moderately Adequate Knowledge
- ≥ 75% : Adequate Knowledge

Part 3: Checklist for practice

A checklist for practice was used to assess the patient safety after cardiac catheterization. The scale consisted of twenty items. The items were of 'Yes' or 'No' type. Correct answer carries 1 mark. The total score for the practice was 20. The score was converted into percentage and interpreted as below:

The total score of each subject was calculated, converted into percentage and interpreted as follows

- <50%: Inadequate Practice
- 50 - 75% : Moderately Adequate Practice
- ≥75%:Adequate Practice

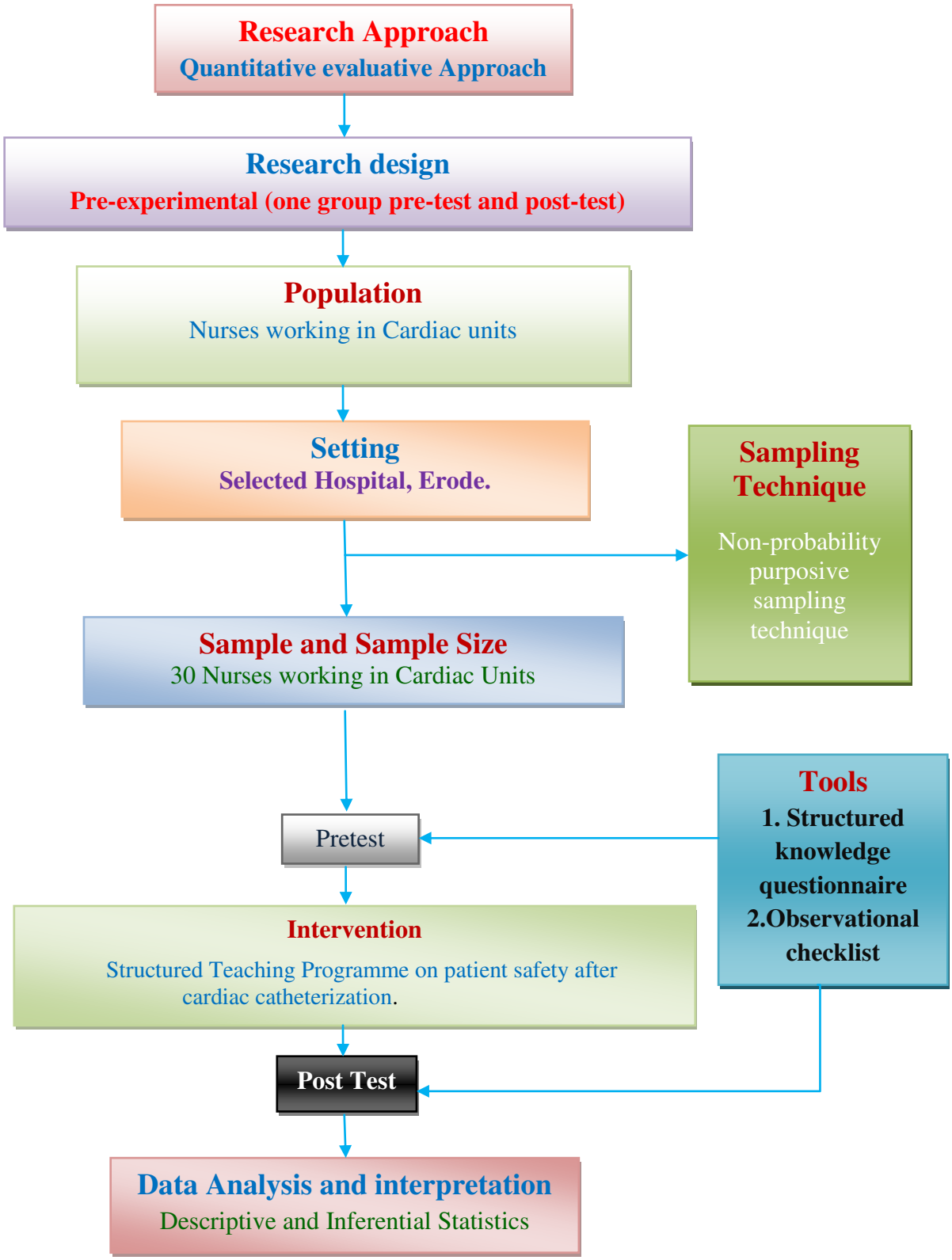

Fig. - SCHEMATIC REPRESENTATION OF RESEARCH METHODOLOGY

INTERVENTION

Structured Teaching Programme on patient safety after cardiac catheterization.

Development of Structured Teaching Programme

The Structured teaching programme was developed based on the objectives, review of literature, sample size, method of instruction and the expert opinion. It was prepared in English.

The following steps were adopted to develop the structured teaching programme.

- Preparation of content for structured teaching programme.
- Preparation of structured teaching programme according to the content.
- Validation of the structured teaching programme.
- Modification of the structured teaching programme.
- Preparation of the final draft of Power Point Presentation for structured teaching programme.

CONTENT VALIDITY OF TOOL

The structured knowledge questionnaire, checklist for practice and Structured Teaching Programme constructed by the investigator were sent along with statement of the problem, objectives, and hypothesis to experts. Validity of the tool was obtained on the basis of opinion from three nursing experts (Medical Surgical Nursing) and two medical experts (in the field of Medical Cardiology). The expert suggestions were incorporated in designing the final tool for the study in consultation with Guide.

PILOT STUDY

Pilot study is preliminary research conducted to test the elements of design before the commencement of an actual full scale study. It is a small scale version or trial run of the major study. For this study the researcher conducted pilot study in the month of January.

The pilot study conducted after the tool presentation and approval by the dissertation committee of Arvinth College of Nursing. After obtaining permission from the Managing Director, Arvinth Hospital, Namakkal, the investigator selected 3 cardiac Nurses working in Coronary Care Units and the investigator conducted pilot study from 22.01.2018 to 30.01.18 by used non-probability convenience sampling technique. The investigator administrated structured knowledge questionnaire and practice check list and

structured programme given for cardiac nurses which took approximately 1 hour 30 minutes to complete the process. Post test level of knowledge and practice was assessed on 8th day using the same knowledge and practice questionnaire.

The analysis revealed that the't' value to determine the effectiveness structured teaching programme was 5.95, which showed high statistical significance at $p<0.001$.

The pilot study helped the investigator to make modifications in the tool and proceed for the main study.

The pilot study aided the investigator to check the feasibility of conducting the main study, to determine the method of statistical analysis and to assess the time required for data collection and intervention.

RELIABILITY

The reliability of the tool was established by test retest method for knowledge questionnaire and inter-rater method to assess the practice. The reliability score was **'r' = 0.85** for knowledge **'r' = 0.89** for practice.. The 'r' value indicated the highly positive correlation, which showed that the tool is reliable, feasible and practicable to conduct the main study.

DATA COLLECTION PROCEDURE

The study was explained and formal permission was obtained from Human Resource manager of Sudha Institute of Medical Sciences Hospital in Erode. The data was collected for a period of 10 days from 03.02.2018 to 12.02.2018.

After obtaining the informed consent from the subjects, 30 samples who fulfilled the inclusion criteria were selected through non-probability purposive sampling technique on 04.02.2018. The investigator selected 30 nurses working in cardiac units from three shift duties. The data collection for each sample was started with an introduction of the investigator.

The samples were made to sit comfortably in the well ventilated room. After the brief introduction about the purpose of the study and after obtaining the informed consent the demographic detail in Section A was collected.

Duty schedule	No of sample
Morning shift	**13**
Afternoon shift	**10**
Night shift	**7**

After gaining the confidence of the nurses' knowledge was assessed using the structured knowledge questionnaire and practice was assessed using the checklist. Structured teaching programme on patient safety after cardiac catheterization was given with Power Point presentation for cardiac nurses which took approximately 1 hour 30 minutes to complete the process.

On the 8th day, post test level of knowledge and practice was assessed using the same knowledge and practice questionnaire.

ETHICAL CONSIDERATIONS

The study was conducted after the approval of dissertation committee. Permission was obtained from the authorities of Sudha Institute of Medical Sciences Hospital, Erode. Written permission has been obtained from the study subjects before data collection. Assurance was given to them that the anonymity of the information on each individual was maintained.

PLAN FOR DATA ANALYSIS

The data was analyzed using descriptive and inferential statistics.

Descriptive Statistics

1. Demographic Variables was analyzed by using frequency and percentage.
2. The knowledge and practice was analyzed by mean, median and standard deviation.
3. The relationship between knowledge and practice was analyzed using correlation coefficient.

Inferential Statistics

1. The effectiveness of structured teaching programme on knowledge and practice regarding patient safety after cardiac catheterization was assessed by Paired 't' test
2. The association of pre test level of knowledge and practice with selected demographic variables was analyzed using Chi - square test.

CHAPTER – IV

DATA ANALYSIS AND INTERPRETATION

This chapter deals with the analysis and interpretation of data collected from 30 cardiac nurses in selected hospital, Erode, to assess the structured teaching programme on knowledge and practice regarding patient safety after cardiac catheterization among cardiac nurses. The data collected for the study was grouped and analyzed as per the objectives set for the study. The findings based on the descriptive and inferential statistical analysis are presented under the following sections.

ORGANIZATION OF DATA

The findings of the study were grouped and analyzed under the following sessions.

Section A : Description of the demographic variables.

Section B : Assessment of pretest and post test level of knowledge and practice regarding patient safety after cardiac catheterization among cardiac nurses.

Section C : Effectiveness of structured teaching programme on knowledge and practice regarding patient safety after cardiac catheterization among cardiac nurses.

Section D : Relationship between post test knowledge and practice scores regarding patient safety after cardiac catheterization among cardiac nurses.

Section E : Association of pretest level of knowledge and practice regarding patient safety after cardiac catheterization among cardiac nurses with their selected demographic variables.

SECTION A: DESCRIPTION OF THE DEMOGRAPHIC VARIABLES.

Table 1: Frequency and percentage distribution of demographic variables of cardiac nurses

N = 30

Demographic Variables	No.	%
Age of the mother		
21 - 25 years	20	66.67
26 - 30 years	7	23.33
31 - 35 years	2	6.67
Above 35 years	1	3.33
Sex		
Male	2	6.67
Female	28	93.33
Professional qualification		
DGNM	11	36.67
P.B.B.Sc.(N)	5	16.67
B.Sc. Nursing	14	46.67
Do you have additional qualification?		
Yes	3	10.00
No	27	90.00
Years of experience in Cardiac unit		
<2 years	20	66.67
2 - 5 years	7	23.33
6 - 10 years	3	10.00
>10 years	0	0.00
Any workshop and training attended related to cardiac catheterization?		
Yes	13	43.33
No	17	56.67
Present position in Cardiac unit		
Unit in-charge	1	3.33
Assistance unit in-charge	2	6.67
Senior nurse	11	36.67
Junior nurse	16	53.33

The table 1 shows that with respect to age, 20(66.67%) were in the age group of 21 – 25 years, 7(23.33%) were in the age group of 26 – 30 years, 2(6.67%) were in the age group of 31 – 35 years and only one (3.33%) was above 35 years.

Regarding sex, 28(93.33%) were female and only 2(6.67%) were male.

With respect to professional qualification, 14(46.67%) were B.Sc. Nursing, 11(36.67%) were DGNM and 5(16.67%) were P.B.B.Sc.(N).

With regard to additional qualification, 27(90%) had no additional qualification and 3(10%) had additional qualification.

Regarding years of experience in cardiac unit, 20(66.67%) had <2 years of experience, 7(23.33%) had 2 – 5 years of experience and 3(10%) ahd 6 – 10 years of experience.

Considering any workshop and training attended related to patient safety cardiac catheterization, 17(56.67%) had not attended and 13(43.33%) had attended workshop and training.

With respect to present position in cardiac unit, 16(53.33%) were junior nurse, 11(36.67%) were senior nurse, 2(6.67%) were assistant unit in-charge and only one (3.33%) were unit in-charge.

SECTION B: ASSESSMENT OF PRETEST AND POST TEST LEVEL OF KNOWLEDGE AND PRACTICE REGARDING PATIENT SAFETY AFTER CARDIAC CATHETERIZATION AMONG CARDIAC NURSES.

Table 2: Frequency and percentage distribution of pretest and post test level of knowledge regarding patient safety after cardiac catheterization among cardiac nurses.

N = 30

Knowledge	Inadequate (<50%)		Moderately Adequate (50 – 75%)		Adequate (>75%)	
	No.	%	No.	%	No.	%
Pretest	12	40.0	18	60.0	0	0
Post Test	0	0	6	20.0	24	80.0

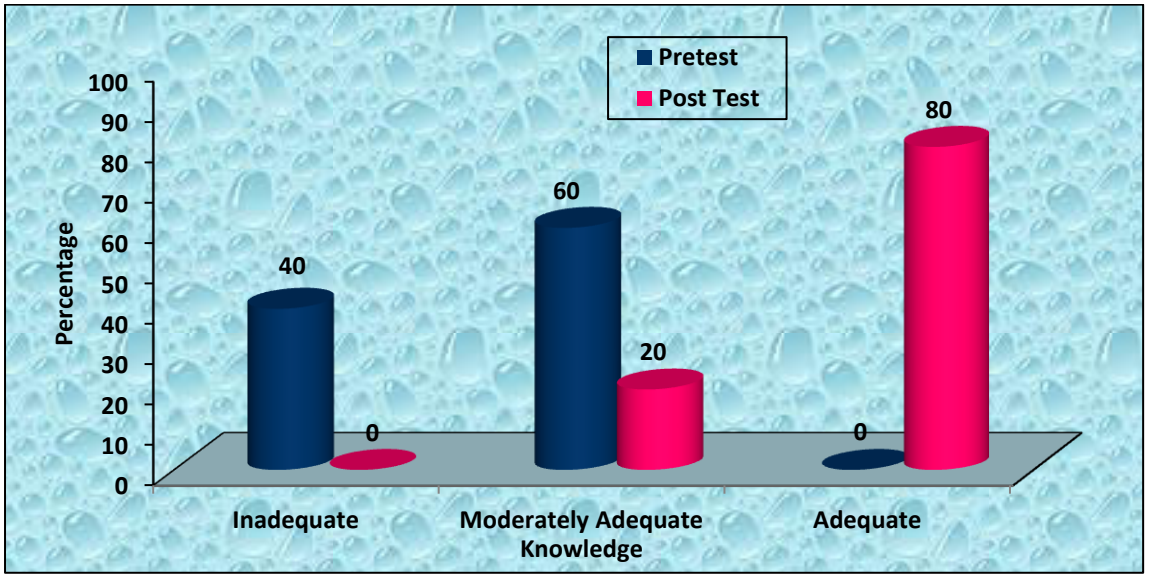

Figure: 3 Percentage distribution of pretest and post test level of knowledge regarding patient safety after cardiac catheterization among cardiac nurses

The table 2 aaaand figure 3 shows that in the pretest, 18(60%) had moderately adequate knowledge and 12(40%) had inadequate knowledge whereas in the post test after the structured teaching programme, 24(80%) had adequate knowledge and 6(20%) had moderately adequate knowledge regarding patient safety after cardiac catheterization among cardiac nurses.

Table 3: Frequency and percentage distribution of pretest and post test level of practice regarding patient safety after cardiac catheterization among cardiac nurses.

N = 30

Practice	Inadequate (≤50%)		Moderately Adequate (51 – 75%)		Adequate (>75%)	
	No.	%	No.	%	No.	%
Pretest	16	53.33	14	46.67	0	0
Post Test	0	0	5	16.67	25	83.33

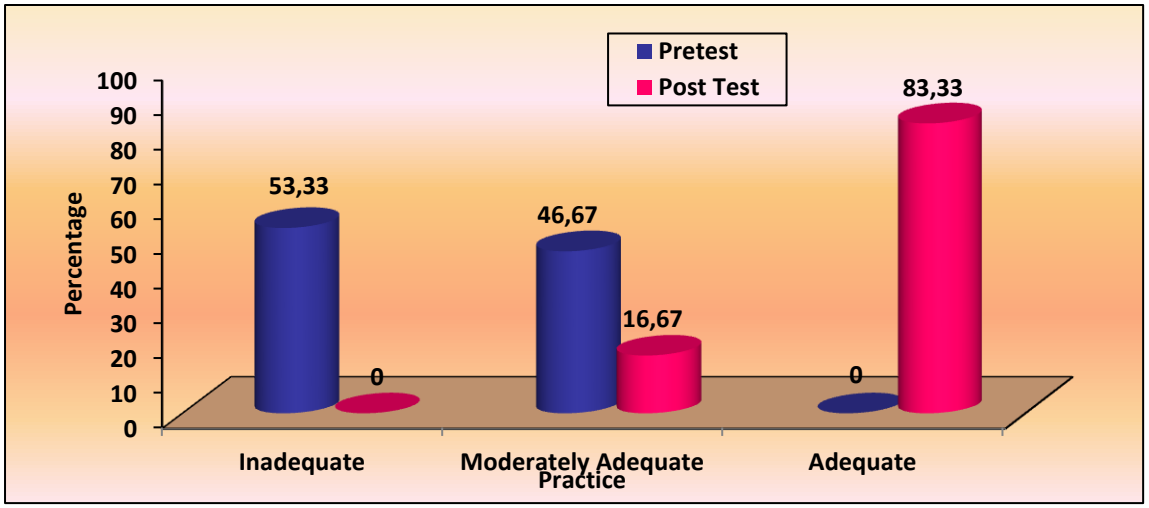

Figure:4 Percentage distribution of pretest and post test level of practice regarding patient safety after cardiac catheterization among cardiac nurses.

The table 3 and figure 4 shows that in the pretest, 16(53.33%) had inadequate practice and 14(46.67%) had moderately adequate practice whereas in the post test after the structured teaching programme, 25(83.33%) had adequate practice and 5(16.67%) had moderately adequate practice regarding patient safety after cardiac catheterization among cardiac nurses.

SECTION C: EFFECTIVENESS OF STRUCTURED TEACHING PROGRAMME ON KNOWLEDGE AND PRACTICE REGARDING PATIENT SAFETY AFTER CARDIAC CATHETERIZATION AMONG CARDIAC NURSES.

Table 4: Comparison of pretest and post test scores of knowledge and practice regarding patient safety after cardiac catheterization among cardiac nurses.

N = 30

Variables	Pretest		Post Test		Mean Improvement Score & %	Paired 't' test Value
	Mean	S.D	Mean	S.D		
Knowledge	17.57	7.24	32.23	3.37	14.67 (36.67%)	**t = 9.376 p = 0.0001, S*****
Practice	8.07	3.87	15.77	2.09	7.70 (38.5%)	**t = 10.342 p = 0.0001, S*****

***0<0.001, S – Significant

The table 4 depicts that the pretest mean score of knowledge was 17.57±7.24 and the post test mean score was 32.23±3.37. The mean improvement score was 14.67 i.e., 36.67%. The calculated pairted 't' test value of t = 9.376 was found to be statistically highly significant at p<0.001 level.

The table also depicts that, the pretest mean score of practice was 8.07±3.87 and the post test mean score was 15.77±2.09. The mean improvement score was 7.70 i.e., 38.5%. The calculated pairted 't' test value of t = 10.342 was found to be statistically highly significant at p<0.001 level.

From the above findings it is clearly indicated that structured teaching programme administered to cardiac nurses on knowledge and practice regarding patient safety after cardiac catheterization was found to be effective to improve the post test level of knowledge and practice among cardiac nurses.

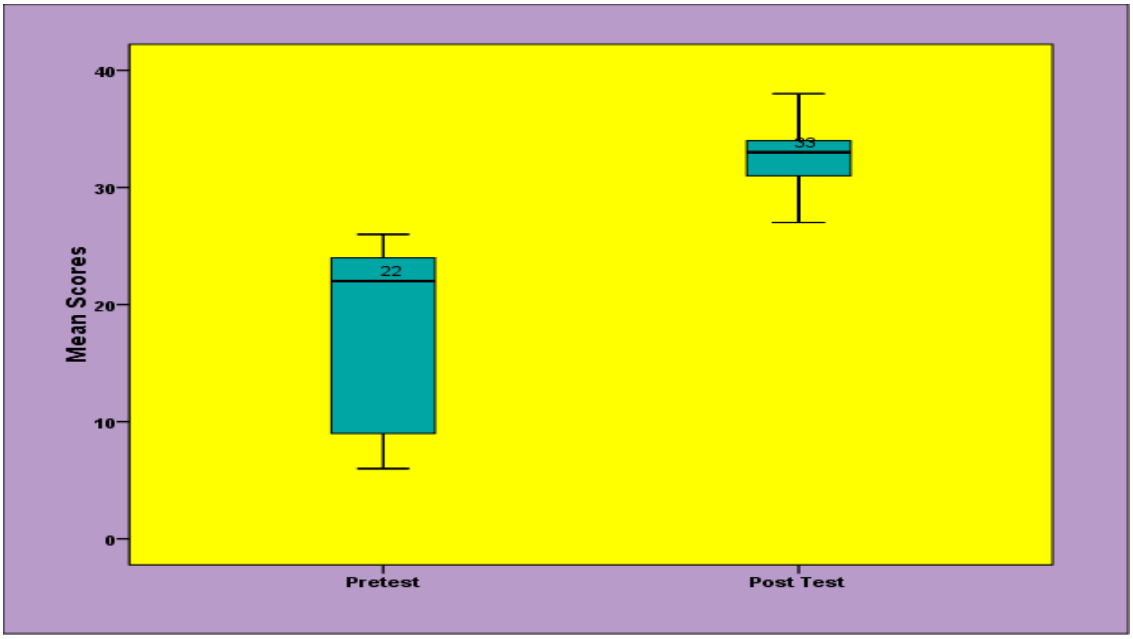

Figure: 5 Boxplot showing the comparison of pretest and post test scores of knowledge regarding patient safety after cardiac catheterization among cardiac nurses

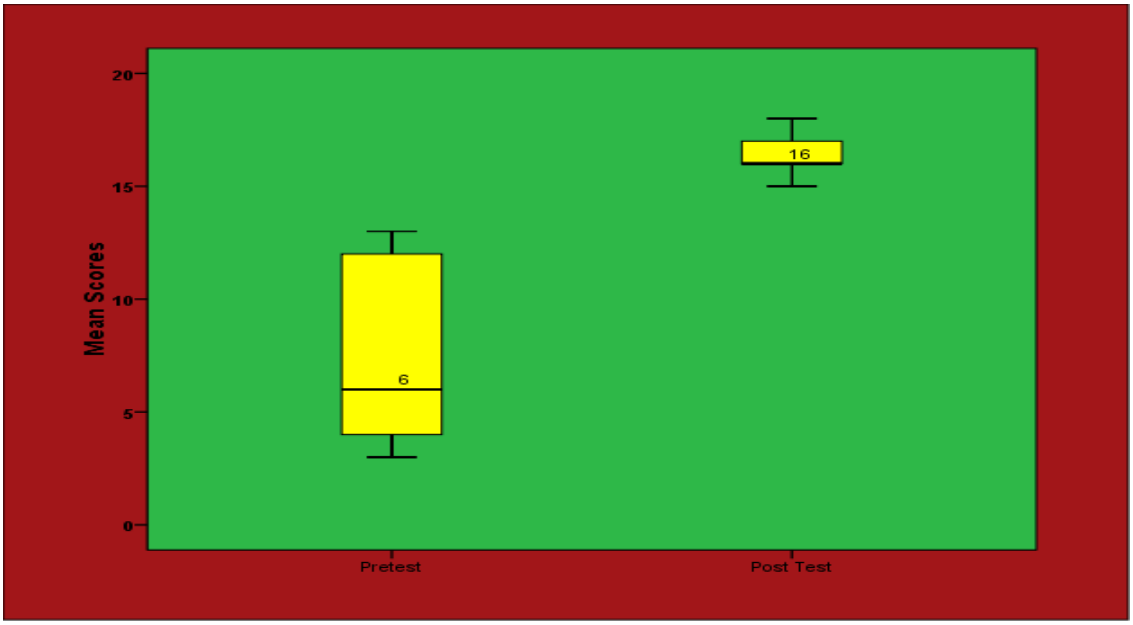

Figure: 6 Boxplot showing the comparison of pretest and post test scores of practice regarding patient safety after cardiac catheterization among cardiac nurses

SECTION D: RELATIONSHIP BETWEEN POST TEST KNOWLEDGE AND PRACTICE SCORES REGARDING PATIENT SAFETY AFTER CARDIAC CATHETERIZATION AMONG CARDIAC NURSES.

Table 5: Correlation between post test knowledge and practice scores regarding patient safety after cardiac catheterization among cardiac nurses.

N = 30

Test	Knowledge		Practice		'r' Value
	Mean	S.D	Mean	S.D	
Post Test	32.23	3.37	15.77	2.09	**r =0.599** **p = 0.0001, S*****

***p<0.001, S – Significant

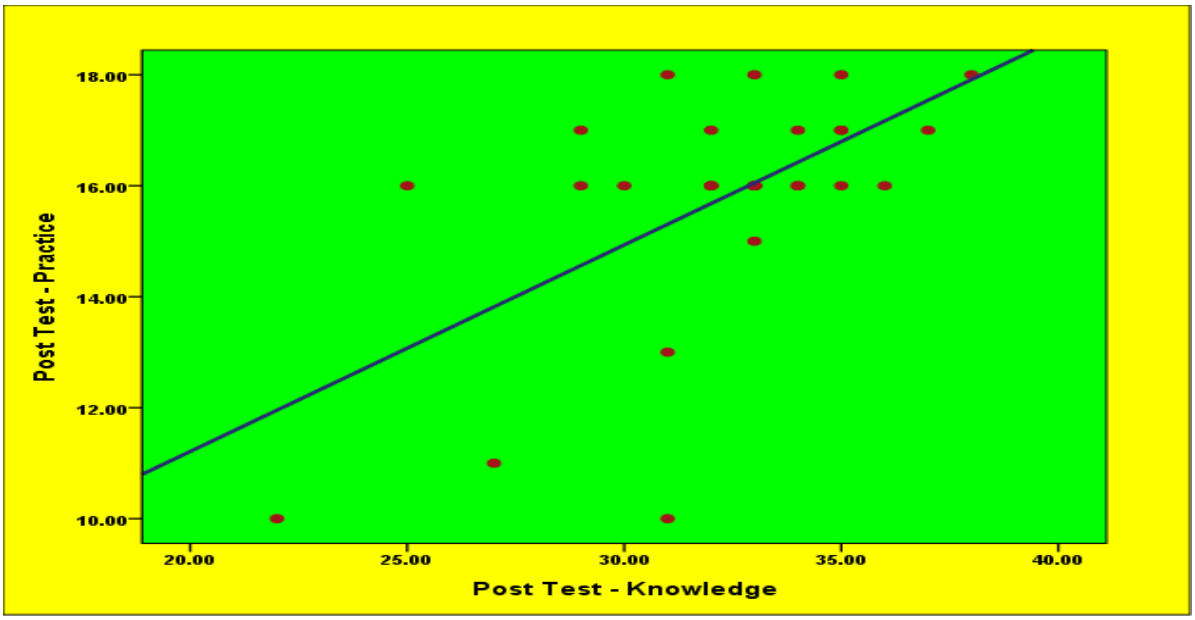

Figure: 7 Scatter Dot showing the correlation between post test knowledge and practice scores regarding patient safety after cardiac catheterization among cardiac nurses

The table portrays that the post test mean score of knowledge was 32.23±3.37 and the post test mean score of practice was 15.77±2.09. Tht calculated Karl Pearson's Correlation 'r' value of r = 0.599 shows a positive correlation and was found to be statistically highly significant at p<0.001 level. This clearly indicates that when the knowledge regarding regarding patient safety after cardiac catheterization among cardiac nurses increases their practice level also increases.

SECTION E: ASSOCIATION OF PRETEST LEVEL OF KNOWLEDGE AND PRACTICE REGARDING PATIENT SAFETY AFTER CARDIAC CATHETERIZATION AMONG CARDIAC NURSES WITH THEIR SELECTED DEMOGRAPHIC VARIABLES.

Table 6: Association of pretest level of knowledge regarding patient safety after cardiac catheterization among cardiac nurses with their selected demographic variables. **N = 30**

Demographic Variables	Inadequate (<50%)		Moderately Adequate (50 – 75%)		Chi-Square value
	No.	%	No.	%	
Age of the mother					χ^2=0.774 d.f=3 p = 0.856 N.S
21 - 25 years	8	26.7	12	40.0	
26 - 30 years	3	10.0	4	13.3	
31 - 35 years	1	3.3	1	3.3	
Above 35 years	0	0	1	3.3	
Sex					χ^2=1.429 d.f=1 p = 0.232 N.S
Male	0	0	2	6.7	
Female	12	40.0	16	53.3	
Professional qualification					χ^2=1.326 d.f=2 p = 0.515 N.S
DGNM	3	10.0	8	26.7	
P.B.B.Sc.(N)	2	6.7	3	10.0	
B.Sc. Nursing	7	23.3	7	23.3	
Do you have additional qualification?					χ^2=0.988 d.f=1 p = 0.320 N.S
Yes	2	6.7	1	3.3	
No	10	33.3	17	56.7	
Years of experience in Cardiac unit					χ^2=0.079 d.f=2 p = 0.961 N.S
<2 years	8	26.7	12	40.0	
2 - 5 years	3	10.0	4	13.3	
6 - 10 years	1	3.3	2	6.7	
>10 years	-	-	-	-	
Any workshop and training attended related to cardiac catheterization?					**χ^2=5.792 d.f=1 p = 0.016 S***
Yes	2	6.7	11	36.7	
No	10	33.3	7	23.3	
Present position in Cardiac unit					χ^2=0.928 d.f=3 p = 0.819 N.S
Unit in-charge	0	0	1	3.3	
Assistance unit in-charge	1	3.3	1	3.3	
Senior nurse	5	16.7	6	20.0	
Junior nurse	6	20.0	10	33.3	

*p<0.05, S – Significant, N.S – Not Significant

The table 6 depicts that the demographic variable “Any workshop and training attended related to patient safety cardiac catheterization?” had shown statistically significant association with pretest level of knowledge regarding patient safety after cardiac catheterization among cardiac nurses at $p<0.05$ level and the other demographic variables had not shown statistically significant association with pretest level of knowledge regarding patient safety after cardiac catheterization among cardiac nurses.

Table 7: Association of pretest level of practice regarding patient safety after cardiac catheterization among cardiac nurses with their selected demographic variables.

N = 30

Demographic Variables	Inadequate (<50%)		Moderately Adequate (50 – 75%)		Chi-Square value
	No.	%	No.	%	
Age of the mother					χ^2=4.372 d.f=3 p = 0.224 N.S
21 - 25 years	11	36.7	9	30.0	
26 - 30 years	5	16.7	2	6.7	
31 - 35 years	0	0	2	6.7	
Above 35 years	0	0	1	3.3	
Sex					χ^2=0.010 d.f=1 p = 0.922 N.S
Male	1	3.3	1	3.3	
Female	15	50.0	13	43.3	
Professional qualification					χ^2=2.052 d.f=2 p = 0.358 N.S
DGNM	6	20.0	5	16.7	
P.B.B.Sc.(N)	4	13.3	1	3.3	
B.Sc. Nursing	6	20.0	8	26.7	
Do you have additional qualification?					χ^2=0.536 d.f=1 p = 0.464 N.S
Yes	1	3.3	2	6.7	
No	15	50.0	12	40.0	
Years of experience in Cardiac unit					χ^2=0.344 d.f=2 p = 0.842 N.S
<2 years	10	33.3	10	33.3	
2 - 5 years	4	13.3	3	10.0	
6 - 10 years	2	6.7	1	3.3	
>10 years	-	-	-	-	
Any workshop and training attended related to cardiac catheterization?					χ^2=0.475 d.f=1 p = 0.491 N.S
Yes	6	20.0	7	23.3	
No	10	33.4	7	23.3	
Present position in cardiac unit					**χ^2=11.440 d.f=3 p = 0.010 S****
Unit in-charge	0	0	1	3.3	
Assistance unit in-charge	0	0	2	6.7	
Senior nurse	3	10.0	8	26.7	
Junior nurse	13	43.3	3	10.0	

**p<0.01, S – Significant, N.S – Not Significant

The table 7 depicts that the demographic variable present position in cardiac unit had shown statistically significant association with pretest level of practice regarding patient safety after cardiac catheterization among cardiac nurses at $p<0.01$ level and the other demographic variables had not shown statistically significant association with pretest level of practice regarding patient safety after cardiac catheterization among cardiac nurses.

CHAPTER – V

DISCUSSION

A detailed discussion based on what the study found, is interpreted by statistical analysis, is discussed in this chapter. The findings are discussed in relation to the objectives, need for the study, related literature and conceptual framework.

The present study was executed to assess the effectiveness of structured teaching programme on knowledge and practice regarding patient safety after cardiac catheterization among cardiac nurses in selected hospital, Erode. There was a significant improvement in the levels of knowledge and practice after the administration of structured teaching programme was found in this study. The findings are discussed objective wise and presented below

Description of demographic variables

With regard to the demographic variables, majority 20(66.67%) were in the age group of 21 – 25 years, 7(23.33%) were in the age group of 26 – 30 years, 2(6.67%) were in the age group of 31 – 35 years and only one (3.33%) was above 35 years.

Regarding sex, 28(93.33%) were female and only 2(6.67%) were male.

With respect to professional qualification, 14(46.67%) were B.Sc. Nursing, 11(36.67%) were DGNM and 5(16.67%) were P.B.B.Sc.(N).

With regard to additional qualification, 27(90%) had no additional qualification and 3(10%) had additional qualification.

Regarding years of experience in cardiac unit, 20(66.67%) had <2 years of experience, 7(23.33%) had 2 – 5 years of experience and 3(10%) had 6 – 10 years of experience.

Considering any workshop and training attended related to cardiac catheterization, 17(56.67%) had not attended and 13(43.33%) had attended workshop and training.

With respect to present position in cardiac unit, 16(53.33%) were junior nurse, 11(36.67%) were senior nurse, 2(6.67%) were assistant unit in-charge and only one (3.33%) were unit in-charge.

The first objective was to assess the knowledge and practice regarding patient safety after cardiac catheterization among cardiac Nurses.

The findings revealed that in the pretest, 18(60%) had moderately adequate knowledge and 12(40%) had inadequate knowledge whereas in the post test after the structured teaching programme, 24(80%) had adequate knowledge and 6(20%) had moderately adequate knowledge regarding patient safety after cardiac catheterization among cardiac nurses.

The analysis revealed that in the pretest, 16(53.33%) had inadequate practice and 14(46.67%) had moderately adequate practice whereas in the post test after the structured teaching programme, 25(83.33%) had adequate practice and 5(16.67%) had moderately adequate practice regarding patient safety after cardiac catheterization among cardiac nurses.

The above findings were found to be consistent with the study conducted by Conway A .Fulbrook P et al (2013) on knowledge of current trends in nurse-administered procedural sedation and analgesia (PSA) in the cardiac catheterization laboratory (CCL) in Australia and New Zealand. A quantitative, cross-sectional, descriptive survey design was used. Data were collected using a web-based questionnaire on practice, educational standards and protocols related to nurse-administered PSA. Descriptive statistics were used to analyse data. A sample of 62 nurses, each from a different CCL, completed a questionnaire that focused on PSA practice. Over half of the estimated total number of CCLs in Australia and New Zealand was represented. The study concluded that By characterising nurse-administered PSA in Australian and New Zealand CCLs, a baseline for future studies has been established. Areas of particular importance to improve include protocols for patient monitoring and comprehensive PSA education for CCL nurses in Australia and New Zealand.

The second objective was to evaluate the effectiveness of Structured Teaching Programme on Knowledge and Practice regarding patient safety after cardiac catheterization among Cardiac Nurses working in Cardiac units.

The analysis clearly indicates that the pretest mean score of knowledge was 17.57±7.24 and the post test mean score was 32.23±3.37. The mean improvement score was 14.67 i.e., 36.67%. The calculated paired't' test value of t = 9.376 was found to be statistically highly significant at $p<0.001$ level.

The analysis also portrays that, the pretest mean score of practice was 8.07±3.87 and the post test mean score was 15.77±2.09. The mean improvement score was 7.70 i.e., 38.5%. The calculated paired't' test value of t = 10.342 was found to be statistically highly significant at $p<0.001$ level.

From the above findings it is clearly indicated that structured teaching programme administered to cardiac nurses on knowledge and practice regarding patient safety after cardiac catheterization was found to be effective to improve the post test level of knowledge and practice among cardiac nurses.

Therefore, the hypothesis H_1 stated earlier, **"There is a significant difference between the pretest and posttest mean Knowledge and Practice scores regarding patient safety after cardiac catheterization among cardiac nurses working in Cardiac Units at $p<0.05$ level"** was accepted.

The third objective was to correlate the post test knowledge and practice scores regarding patient safety after cardiac catheterization among cardiac Nurses.

The table portrays that the post test mean score of knowledge was 32.23±3.37 and the post test mean score of practice was 15.77±2.09. The calculated Karl Pearson's Correlation 'r' value of r = 0.599 shows a positive correlation and was found to be statistically highly significant at $p<0.001$ level.

This clearly indicates that when the knowledge regarding patient safety after cardiac catheterization among cardiac nurses increases their practice level also increases.

Therefore, the hypothesis H_2 stated earlier, **"There is significant correlation between post test knowledge and practice score regarding patient safety after cardiac catheterization among cardiac Nurses at p<0.05 level"** was accepted.

The fourth objective was to associate the pretest level of Knowledge and Practice regarding patient safety after cardiac catheterization among cardiac Nurses working in Cardiac Units with their selected demographic variables.

The analysis showed that the demographic variable "Any workshop and training attended related to patient safety cardiac catheterization?" had shown statistically significant association with pretest level of knowledge regarding patient safety after cardiac catheterization among cardiac nurses at p<0.05 level and the other demographic variables had not shown statistically significant association with pretest level of knowledge regarding patient safety after cardiac catheterization among cardiac nurses.

Therefore, the hypothesis H_3 stated earlier, **"There is a significant association between pretest level of knowledge regarding patient safety after cardiac catheterization and the selected demographic variables of Cardiac Nurses working in Cardiac Units at p<0.05 level"** was accepted for the demographic variable "Any workshop and training attended related to patient safety cardiac catheterization? and rejected for other demographic variables.

The analysis further revealed that the demographic variable present position in Cardiac unit had shown statistically significant association with pretest level of practice regarding patient safety after cardiac catheterization among cardiac nurses at p<0.01 level and the other demographic variables had not shown statistically significant association with pretest level of practice regarding patient safety after cardiac catheterization among cardiac nurses.

Therefore, the hypothesis H_3 stated earlier, **"There is a significant association between pretest level of practice regarding patient safety after cardiac catheterization and the selected demographic variables of Cardiac Nurses working in Cardiac Units at p<0.05 level"** was accepted for the demographic variable present position in cardiac unit and rejected for other demographic variables.

CHAPTER – VI

SUMMARY, CONCLUSION, IMPLICATION, RECOMMENDATION AND LIMITATION

This chapter deals with summary, conclusion, implication, recommendation and limitation.

SUMMARY

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.

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.

The structured teaching programme focuses on enhancing the knowledge and practice of cardiac nurses regarding patient safety after cardiac catheterization.

The statement of the problem was **"A study to assess the effectiveness of structured teaching programme on knowledge and practice regarding patient safety after cardiac catheterization among cardiac nurses in selected hospital, Erode."**

The objectives of the study were:

1. To assess the existing knowledge and practice regarding patient safety after cardiac catheterization among cardiac nurses.
2. To evaluate the effectiveness of Structured Teaching Programme on Knowledge and Practice regarding patient safety after cardiac catheterization among cardiac nurses working in cardiac units.
3. To correlate the post test knowledge and practice scores regarding patient safety after cardiac catheterization among cardiac nurses.
4. To associate the pretest level of Knowledge and Practice regarding patient safety after cardiac catheterization among cardiac nurses working in cardiac units with their selected demographic variables.

The research hypotheses formulated were:

H_1 There may be a significant difference between the pretest and post test mean Knowledge and Practice scores regarding patient safety after cardiac catheterization among cardiac nurses working in cardiac units at $P < 0.05$ level.

H_2 There is a significant correlation between the posttest Knowledge and Practice scores regarding patient safety after cardiac catheterization among cardiac nurses working in cardiac units at $P < 0.05$ level.

H_3 There is a significant association between pretest level of knowledge and practice regarding patient safety after cardiac catheterization and the selected demographic variables of cardiac nurses working in cardiac units at $P < 0.05$ level

The assumption of the study were

1. Nurses will have adequate knowledge and practice regarding patient safety after cardiac catheterization.
2. Level of knowledge and practice of cardiac nurses regarding patient safety after cardiac catheterization will vary from individual to individual.
3. A teaching programme with visual illustration imparts desired knowledge and practice among health personnel.

An extensive review of literature was done on several aspects cardiac catheterization including knowledge, practice and complications. The conceptual framework was developed based on Imogene King's Goal Attainment Theory.

The research methodology of the study was:

The research approach used in the study was quantitative – evaluative research approach using pre-experimental one group pre-test and post-test research design. Thirty samples were selected based on sample selection criteria using non probability purposive sampling technique. The study was conducted in Sudha Institute of Medical Sciences Hospital, Erode. The pilot study was conducted in Arvinth Hospital, Namakkal, after obtaining ethical clearance from the ethical committee of the institution with three cardiac nurses working in cardiac unit. The tools used for data collection was a structured questionnaire to assess the knowledge level and an practice check list to assess the practice level of cardiac nurses on patient safety after cardiac catheterization.

After gaining the confidence of the nurses' knowledge was assessed using the structured knowledge questionnaire and practice was assessed using the checklist. Structured teaching programme on patient safety after cardiac catheterization was given with Power Point presentation for cardiac nurses which took approximately 1 hour 30 minutes to complete the process. On the 8^{th} day, post test level of knowledge and practice was assessed using the same knowledge and practice questionnaire.

The major findings of the study were:

The findings related to demographic variables revealed that majority 20(66.67%) were in the age group of 21 – 25 years, 28(93.33%) were female, 14(46.67%) were B.Sc. Nursing, 27(90%) had no additional qualification, 20(66.67%) had <2 years of experience, 17(56.67%) had not attended workshop and training and 16(53.33%) were junior nurse,

The pre-test level of knowledge revealed that, 18(60%) had moderately adequate knowledge and 12(40%) had inadequate knowledge whereas in the post test after the structured teaching programme, 24(80%) had adequate knowledge and

6(20%) had moderately adequate knowledge regarding patient safety after cardiac catheterization among cardiac nurses.

The pre-test level of practice revealed that 16(53.33%) had inadequate practice and 14(46.67%) had moderately adequate practice whereas in the post test after the structured teaching programme, 25(83.33%) had adequate practice and 5(16.67%) had moderately adequate practice regarding patient safety after cardiac catheterization among cardiac nurses.

The findings also revealed that the pretest mean score of knowledge was 17.57±7.24 and the post test mean score was 32.23±3.37. The mean improvement score was 14.67 i.e., 36.67%. The calculated paired 't' test value of t = 9.376 was found to be statistically highly significant at $p<0.001$ level. The findings also depict that, the pretest mean score of practice was 8.07±3.87 and the post test mean score was 15.77±2.09. The mean improvement score was 7.70 i.e., 38.5%. The calculated paired 't' test value of t = 10.342 was found to be statistically highly significant at $p<0.001$ level.

The findings revealed that the post test mean score of knowledge was 32.23±3.37 and the post test mean score of practice was 15.77±2.09. The calculated Karl Pearson's Correlation 'r' value of r = 0.599 shows a positive correlation and was found to be statistically highly significant at $p<0.001$ level.

The findings revealed that demographic variable "Any workshop and training attended related to patient safety cardiac catheterization?" had shown statistically significant association with pretest level of knowledge regarding patient safety after cardiac catheterization among cardiac nurses at $p<0.05$ level and the other demographic variables had not shown statistically significant association with pretest level of knowledge regarding patient safety after cardiac catheterization among cardiac nurses.

The analysis revealed that the demographic variable present position in cardiac unit had shown statistically significant association with pretest level of practice regarding patient safety after cardiac catheterization among cardiac nurses at $p<0.01$ level and the other demographic variables had not shown statistically significant association with pretest level of practice regarding patient safety after cardiac catheterization among cardiac nurses.

CONCLUSION

The study concluded that the structured teaching programme was effective in improving the knowledge and practice of cardiac nurses on patient after cardiac catheterization. It helps them to be more confident in their duty and to omit errors.

NURSING IMPLICATION

The implication of the study can be seen in the area of nursing practice, nursing service and nursing research.

Nursing Practice

1. The study improves the follow-up and collaborative services of both hospital and community health team.
2. Cardiac Nurses can able to perform their duty without any errors.
3. Cardiac Nurses can impart knowledge to the patients regarding their safety after cardiac catheterization.
4. The practical skills of the cardiac nurses can be assessed using the checklist.

Nursing Education

1. This study will help the student nurses to understand the importance of patient safety after cardiac catheterization.
2. The practical skills regarding the care of patients undergoing cardiac catheterization can be improved.
3. The knowledge of student nurses regarding patient safety after cardiac catheterization can be enhanced.

Nursing Research

1. The present study will help the future nursing researcher to carry out further study on patient safety in cardiac units.
2. This study motivates other investigator to conduct further study on patient unsafe after cardiac catheterization in different settings.

Nursing Administration

1. These findings will help the administrator to publish the protocol in cardiac wards.
2. It helps them to create adequate learning materials for the cardiac nurses.
3. This helps to assess the practical skill of the staff nurses working in cardiac unit.
4. The nurse administrator can arrange continuing nursing education on patient safety after cardiac catheterization.

RECOMMENDATIONS

1. The study can be replicated with larger sample.
2. The effect of the educational program can be evaluated on a long term basis.
3. The study can be conducted even in the ICU settings
4. A comparative study can be conducted between cardiac nurses working in Private Hospital and Government Hospital.

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INTERNET RESOURCES

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http://www oecd org

http://emc.medicines.org.uk/medicine/

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http://www.smd.qmul.ac.uk/gp

http://www.rcplondon.ac.uk/college/ceeu/ceeu_copd_home.htm

http://www.sign.ac.uk/guidelines/fulltext/50/

http://www statistics gov uk/ http://www.statistics.gov.uk/

APPENDIX I

LETTER SEEKING PERMISSION TO CONDUCT STUDY

From

Mr. Rajesh.B
II Year M.Sc.,(N),
Arvinth College of Nursing,
Namakkal.

Forwarded through

Prof. Mrs.V.Kavitha M.Sc.,(N)
Principal,
Arvinth College Of Nursing,
Namakkal

To

The Administrator,
Sudha Institute of Medical Sciences Hospital,
Erode.

Respected Sir/Madam,

Subject: Requesting permission to conduct research in the hospital

As a part of M.Sc., Nursing requirement under the fulfilment of The Tamil Nadu Dr. M.G.R Medical University, I am conducting a research on **"A study to assess the effectiveness of structured teaching programme on knowledge and practice regarding patient safety after cardiac catheterization among cardiac nurses in selected hospital, Erode".** Kindly grant me permission to conduct research in your esteemed hospital.

Thanking you

Yours Faithfully

(Mr. Rajesh.B)

APPENDIX II

LETTER SEEKING EXPERTS OPINION FOR CONTENT VALIDITY

From

Mr. Rajesh.B

II Year M.Sc., (N),

Arvinth College of Nursing,

Namakkal.

To

Respected Madam/ Sir,

Sub: Requisition for expert opinion on suggestion for content validity of the tool.

I am **Mr. Rajesh.B** doing my M.Sc., Nursing II year specializing in Medical Surgical Nursing at Arvinth College of Nursing. As a part of my research project to be submitted to the Tamil Nadu Dr M.G.R Medical University requirement for the award of M.Sc.,(N) degree, I am conducting **"A study to assess the effectiveness of structured teaching programme on knowledge and practice regarding patient safety after cardiac catheterization among cardiac nurses in selected hospital, Erode"**

I have enclosed my data collection tool and intervention tool for your expert guidance and validation. Kindly do the needful.

Thanking you

Yours faith fully

(Mr. Rajesh.B)

Enclosures:

1. Research proposal
2. Data collection tool
3. Intervention tool
4. Content validity form
5. Certificate for content validity

APPENDIX III

LIST OF EXPERTS FOR CONTENT VALIDITY

1. **Mrs. NATRAMIZH, M.Sc., (Nursing),**
   Associate Professor,
   Medical Surgical Nursing,
   Sri Arbindo College of Nursing,
   Karur.

2. **Mrs. JULIET NIRMALA., M.Sc.,(Nursing)**
   Professor,
   Medical Surgical Nursing,
   Dharmarathnakara Dr. Mahalingam Institute of Para Medical College of Nursing.
   Erode.

3. **Mrs.D. SHANKARI., M.Sc.,(Nursing)**
   Assistant Professor,
   Medical Surgical Nursing,
   Narayani college of Nursing,
   Andra Pradesh.

4. **Dr.P. PATCHIYAPPAN MD.,**
   Cardiologist,
   Salem.

5. **Dr.R. RANGANATHAN MD.,**
   Interventional Cardiologist,
   Salem

APPENDIX IV

FORMAT FOR CONTENT VALIDITY

Name of the Expert:

Address:

Total content of the tool: Adequate /Inadequate

Kindly validate each tool and tick if it applicable

S. No.	No. of tool/section	Agree	Disagree	Remarks

Signature of the expert with date

CRITERIA CHECKLIST FOR VALIDATION OF TOOL

Instruction

Kindly go through the items regarding accuracy, relevancy and appropriateness of the content. There are two response columns in the checklist namely agree, and disagree. Place a tick mark against the specific column. If you disagree, to any of the item, write your remarks and suggestion in given column.

PART- I DEMOGRAPHIC PERFORMA

S. No.	Agree	Disagree	Remarks And Suggestion
1			
2			
3			
4			
5			
6			
7			

PART II
STRUCTURED KNOWLEDGE QUESTIONNAIRE ON PATIENT SAFETY AFTER CARDIAC CATHETERIZATION AMONG CARDIAC NURSES.

S. No.	Agree	Disagree	Remarks and Suggestions
1			
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SCORE KEY FOR STRUCTURED KNOWLEDGE QUESTIONNAIRE

QUESTION NO.	ANSWER	SCORE
1	a	1
2	c	1
3	a	1
4	d	1
5	b	1
6	c	1
7	a	1
8	b	1
9	d	1
10	c	1
11	a	1
12	a	1
13	c	1
14	b	1
15	d	1
16	a	1
17	b	1
18	a	1
19	b	1
20	a	1
21	c	1
22	c	1
23	a	1
24	c	1
25	a	1
26	d	1
27	b	1
28	a	1
29	a	1
30	c	1
31	a	1
32	a	1
33	c	1

34	b	1
35	d	1
36	c	1
37	d	1
38	c	1
39	d	1
40	c	1

Total Score: 40

PART III

CHECK LIST TO ASSESS THE PRACTICE ON PATIENT SAFETY AFTER CARDIAC CATHETERIZATION AMONG CARDIAC NURSES.

S. No.	Question No	Agree	Disagree	Remarks and Suggestions
1	1			
2	2			
3	3			
4	4			
5	5			
6	6			
7	7			
8	8			
9	9			
10	10			
11	11			
12	12			
13	13			
14	14			
15	15			
16	16			
17	17			
18	18			
19	19			
20	20			

SCORE KEY FOR PRACTICE CHECK LIST

QUESTION NO.	ANSWER	SCORE
1	YES	1
2	YES	1
3	YES	1
4	YES	1
5	NO	1
6	YES	1
7	YES	1
8	YES	1
9	YES	1
10	YES	1
11	YES	1
12	YES	1
13	YES	1
14	YES	1
15	NO	1
16	NO	1
17	YES	1
18	YES	1
19	YES	1
20	YES	1

TOTAL: 20

APPENDIX V

INFORMED CONSENT FORM

I am **Mr. Rajesh.B** M.Sc., (N), II Year student at Arvinth college of Nursing, Namakkal, as a part of my research study on **"A study to assess the effectiveness of structured teaching programme on knowledge and practice regarding patient safety after cardiac catheterization among cardiac nurses in selected hospital, Erode",** is selected to be conducted. The findings of the study will be helpful in gaining knowledge on patient safety after cardiac catheterization.

I hereby ask you consent and cooperation to participate in the study. The information collected will be confident and anonymity will be maintained.

Signature of investigator

I ----------, here by consent to participate and undergo the study.

Place:

Date: **Signature of the participant**

APPENDIX VI

CERTIFICATE FOR CONTENT VALIDITY

This is to certify that the tool developed by **Mr. Rajesh.B** M.Sc.,(N) II Year student of Arvinth College of Nursing for his study, **"A study to assess the effectiveness of structured teaching programme on knowledge and practice regarding patient safety after cardiac catheterization among cardiac nurses in selected hospital, Erode",** is validated by the undersigned and he can proceed with this tool to conduct the main study.

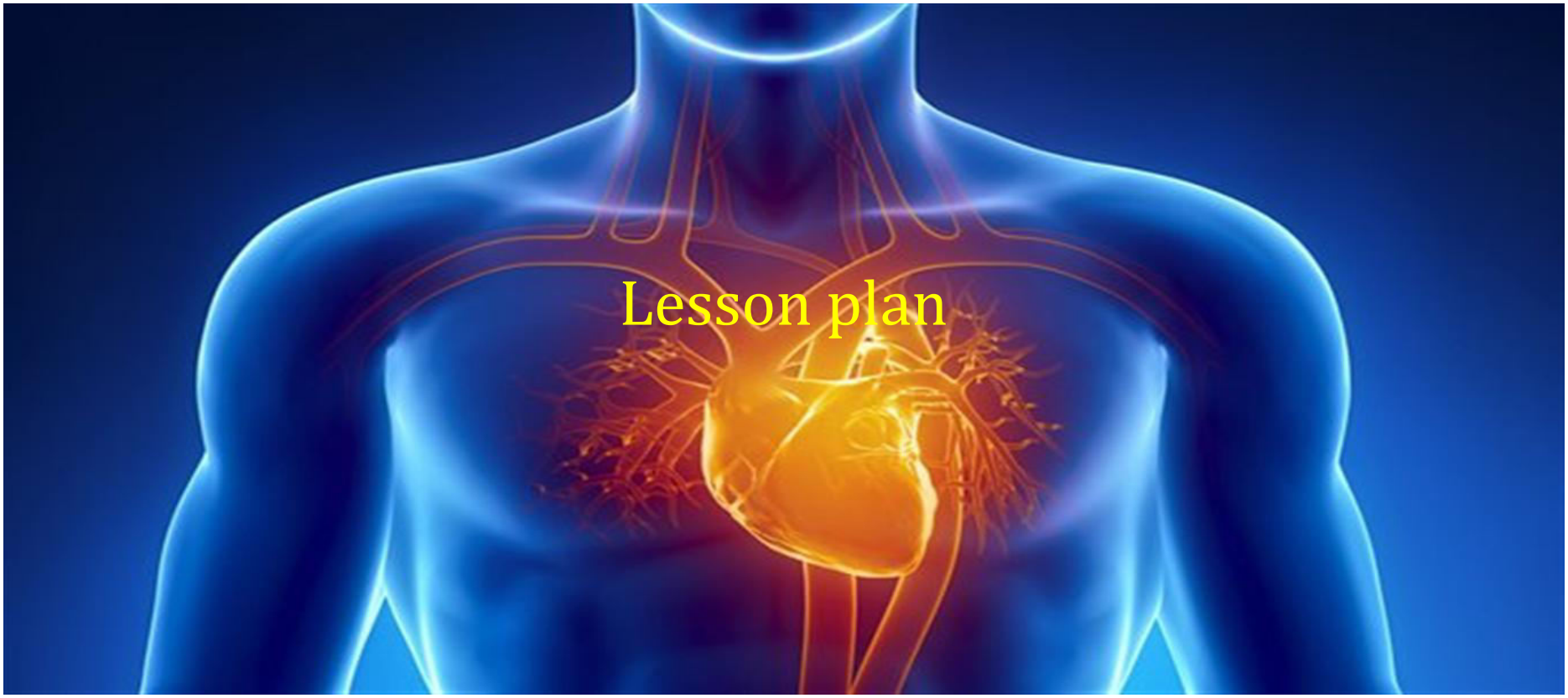
Seal: **Signature with Date**

APPENDIX VII

CERTIFICATE OF ENGLISH EDITING

This is to certify that the dissertation work **"A study to assess the effectiveness of structured teaching programme on knowledge and practice regarding patient safety after cardiac catheterization among cardiac nurses in selected hospital, Erode",** done by **Mr.Rajesh.B,** II year M.Sc., Nursing student of Arvinth college of Nursing, Namakkal, is edited for English language appropriateness.

Seal with Date: **Signature**


Lesson plan

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APPENDIX – VIII

INTERVENTION TOOL

LESSON PLAN ON PATIENT SAFETY AFTER CARDIAC CATHETERIZATION

Topic	:	Patient safety after Cardiac Catheterization
Group	:	Nurses Working in Cardiac Units
Venue	:	Conference Hall at Sudha Institute of Medical Sciences Hospital, Erode
Number of participations	:	30
Hours	:	1 Hour.
Method of Teaching	:	Lecture Cum Discussion
A.V. Aids	:	Power point presentation

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General Objective

At the end of the Planned Teaching Programme the cardiac nurses will gain in depth knowledge, develop desirable attitude and applying the skills in practice while giving care of patient after cardiac catheterization.

Specific objectives:

At the end of the Structured Teaching Programme the cardiac nurses will be able to

- define cardiac catheterization
- describe the Indications for catheterization procedure
- state the investigative techniques used with coronary catheterization
- mention contraindications of cardiac catheterization
- list down the equipment for cardiac catheterization
- know the approach considerations
- follow the patient preparation for cardiac catheterization
- explain the procedure for cardiac catheterization
- understand the monitoring & follow-up for cardiac catheterization
- describe the prevention and management of complications for cardiac catheterization
- enumerate the patient education about self care after cardiac catheterization

`

S.NO	TIME	SPECIFIC OBJECTIVES	CONTENT	A.V AIDS	Teacher Activity	Student Activity	EVALUATON
1		Give introduction about Cardiac catheterization	**INTRODUCTION:** Cardiac catheterization provides definitive confirmation of narrowing in the coronary arteries and may also exclude the presence of coronary artery disease before heart valve surgery or other major surgery. If significant coronary blockages are present, angioplasty, or stenting (also known as percutaneous coronary intervention) can be performed, often during the same procedure, to improve blood flow to the heart muscle and help to relieve symptoms. This procedure may also be performed emergently for persons with suspected heart attack to identify blood clots in the coronary arteries and rapidly restore blood flow to the heart muscle.	LCD projector	Introducing the topic	Listening	
2	3 mins	Define Cardiac Catheterization	**DEFINITION:** Cardiac catheterization is a test during which flexible tubes called catheters are inserted into the heart via an artery or vein under x-ray guidance to diagnose and sometimes treat certain heart conditions. During right heart catheterization, a vein from the neck, arm, or leg is used to enter the right side of the heart to measure pressures and oxygen content. During left heart catheterization, an artery	LCD projector	Defining Cardiac Catheterization	Taking notes and asking doubts	What is meant by Cardiac Catheterization ?

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3	4 mins	describe the Indications for catheterization procedure	from the wrist, arm, or leg is used to enter the left side of the heart, usually to perform coronary angiography, which refers to the injection of contrast dye into the coronary arteries to determine the amount of blockage from atherosclerotic plaque. **INDICATIONS:** Patients without cardiac symptoms or high-risk markers for a heart problem should not have a coronary catheterization to screen for problems. Indications for cardiac catheterization include the following: • Heart Attack (includes ST elevation MI, Non-ST Elevation MI, Unstable Angina) • Abnormal Stress Test • New-onset unexplained heart failure • Survival of sudden cardiac death or dangerous cardiac arrhythmia • Persistent chest pain despite optimal medical therapy • Workup of suspected Prinzmetal Angina	LCD projector	Indications Cardiac Catheterization	Taking notes and asking doubts	What is meant by Cardiac Catheterization Indication?

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4	5 mins	state the investigative techniques used with coronary catheterization	**INVESTIGATIVE TECHNIQUES USED WITH CORONARY CATHETERIZATION:** • to measure intracardiac and intravascular blood pressures • to take tissue samples for biopsy • to inject various agents for measuring blood flow in the heart; also to detect and quantify the presence of an intracardiac shunt • to inject contrast agents in order to study the shape of the heart vessels and chambers and how they change as the heart beats	LCD projector	describing the Indications for catheterization procedure	Taking notes	Explain about Indications for catheterization procedure?
5	5 mins	Mention the contraindications of cardiac catheterization	**CONTRAINDICATIONS:** • Severe uncontrolled hypertension • Ventricular arrhythmias • Acute stroke • Severe anemia • Active gastrointestinal bleeding • Allergy to radiographic contrast • Acute renal failure	LCD projector, Models	State the cardiac catheterization Contraindications	Taking notes	What are all the types of cardiac catheterization Contraindications?

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			• Uncompensated congestive failure (so that the patient cannot lie flat) • Unexplained febrile illness or untreated active infection • Electrolyte abnormalities (eg, hypokalemia) • Severe coagulopathy				
6	5 mins	List down the Equipments for Cardiac Catheterization	**EQUIPMENT FOR CARDIAC CATHETERIZATION:** ➢ Various instruments are available for arterial access for cardiac catheterization. The basic components include a needle, wire, and sheath. The most common sheath sizes for radial intervention are 5F-7F. The sheath may be 10 or 21 cm in length. Some cardiologists prefer the longer sheaths to minimize artery spasms. A sheath with a sidearm is preferable since it permits delivery of heparin and vasodilators. ➢ Regardless of the artery used, it should ideally be entered during the first needle stick. Repeat attempts induce trauma and spasms. Prior to needle entry, the pulse should be palpated and the	LCD projector	Listing out the Equipments for Cardiac Catheterization	Asking doubts and taking notes	Mention the Equipments for Cardiac Catheterization ?

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			site of entry marked. The needle entry site should be about 2 cm proximal to the radial styloid, as this will avoid radial artery bifurcation. ➢ Lidocaine (1-2%) should be injected superficially around the artery. It may be combined with a tiny amount of nitroglycerin to help promote arterial vasodilatation. Arterial puncture is usually performed with a 21- or 22-gauge needle. Once blood flow is seen in the needle, it should be advanced a few millimeters. The plastic cannula is then advanced over the needle into the artery, and the needle is withdrawn. ➢ Next, a small-caliber wire (0.018 to 0.025-inch diameter) is advanced through the cannula into the artery, and the cannula is removed so that a sheath with a tapered tip can be inserted over the wire.Common causes of wire resistance include abnormal anatomy, tortuosity of the vessels, and spasm. If resistance occurs, the wire must be threaded under fluoroscopic guidance.				

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			Catheter selection • Specific catheters for left and right radial approaches are available, although femoral or universal catheters can usually be used in the radial approach without difficulty. In some cases, a short JL curve and/or longer JR curve may be needed for procedures performed from the right radial artery. • Success rates associated with current universal catheters for diagnostic coronary angiography range from 96%-98%. **Accessories** After the procedure in the groin, a heavy pressure dressing is applied. For the wrist, most cardiologists recommend immobilizing the wrist with a splint for the first 24 hours. This helps prevent excessive wrist motion and bleeding. The splint should be worn for the first night, as people tend to move the wrist spontaneously. The splint also helps protect the site of needle puncture.	LCD projector	Describe the Catheter selections	Taking notes	Explain about the Catheter selections

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			Like the FemoStop devices used for the groin, a number of wristbands can be used to obtain hemostasis in the wrist. These 2- to 3-inch–wide bands are applied after the procedure is over and provide firm compression to the puncture site. Once the band is placed, the fingers are assessed for capillary refill and color to ensure that the band is not too tight. The band offers security from external trauma and can be adjusted by the patient. It is worn for the first 12 hours. **Sheaths** Several sheaths are available for use in the radial/femoral artery. Because of the tendency of the radial artery to spasm when manipulated, longer sheaths are often used. Some of these sheaths are available in a single- or double-dilator setup. The major advantage of the double-dilator setup is the presence of a tapered atraumatic tip, which is less likely to lacerate the artery.				

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7	5 min	Know the approach consideration for cardiac catheterization	**APPROACH CONSIDERATIONS:** **<u>Femoral artery approach</u>** The percutaneous femoral approach for cardiac catheterization has been widely used and is clearly well established. Unlike the brachial artery approach, the femoral artery approach does not require an arterial cutdown or repair. In addition, the technique can be performed repeatedly in the same patient after a suitable interval. Advantages: • Long history of use and predictably • Technically easy to access • Enables use of larger sheaths and other equipment • Complications are well known • User experience is extensive Disadvantages • Prolonged bedrest that may range from 4-8 hours; the larger the sheath, the longer the period of bedrest	LCD projector	explaining	listening	What is femoral artery approach?

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			• Associated with adverse effects such as urinary retention, femoral nerve neuropathy, and back discomfort • Vascular complications such as bleeding, femoral artery pseudoaneurysm, and arteriovenous fistula • Damage, dissection, or occlusion of the femoral artery • Cholesterol emboli **<u>Radial artery approach</u>** The technique was successful in most patients, but pulse loss was evident in some patients at the end of the procedure. Advantages • Dual blood supply to the hand, which minimizes the potential for hand ischemia • Access for patients with aortoiliac disease or aortic aneurysm • Does not require prolonged bedrest postprocedure, which is desirable in the patient with congestive heart failure, dyspnea, or back pain				

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			• Easy to compress and achieve hemostasis • Fewer vascular complications compared with the femoral approach • Patient preference and acceptability Disadvantages: • The radial artery is much smaller in diameter (averaging about 2-3 mm) than the femoral artery (5-10 mm) • Cannulating the radial artery involves a steeper learning curve than the femoral approach • A smaller sheath and catheter (4F-6F) can be accommodated than in the femoral approach • Vessel spasm is common • Guide insertion can be difficult and requires time and patience • Many cardiologists and radiologists are not completely familiar with the equipment and radial artery anatomy and, thus, are often reluctant to try a new approach • Increased procedure time and radiation exposure to the patient and cardiologist compared with the femoral approach				

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8	20 mins	Follow the patient preparation for cardiac catheterization	**PATIENT PREPARATION:** - Patients need to fast after midnight, but some laboratories allow the patient to have a light liquid breakfast. - Vital signs are obtained once the patient arrives to the laboratory. - The patient's entire hand and arm up to the shoulder is prepared and draped in the usual sterile fashion. In addition, one of the groin areas (usually the right groin) should also be prepared and draped in case the radial artery access fails or there is an urgent need for placement of a transvenous pacemaker or an intra-aortic balloon pump. - A suitable sized intravenous line should be placed in the contralateral arm, and the blood pressure cuff is usually placed on the leg. If the intravenous line is to be inserted in the same arm as the radial artery cannulation, it needs to be inserted proximal to the wrist or preferably just below the elbow. - The wrist should be slightly hyperextended with a	LCD projector	explaining	listening	How to prepare the patient for cardiac catheterization ?

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			rolled towel underneath the joint for support. A pulse oximeter is placed on the ipsilateral index finger or thumb. Extension tubing can be used between the catheter and the injection manifold so that the operator can move farther from the x-ray source. - Clothing (other than hospital gown), jewelry, bracelets, and rings should be removed prior to the procedure. These items must be documented and stored securely. **Premedication of the patient:** ✓ The procedure must be explained to the patient and an informed consent must be obtained. Most cardiologists do not administer prophylactic antibiotics prior to the procedure. ✓ Routine premedication is often used, but some laboratories prefer to administer sedatives during the procedure. ✓ Sedation is required when performing transradial catheterization. The introduction of the dilator				

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			and sheath is often painful. Conscious sedation is often the choice of anesthesia, with a dedicated nurse to monitor the patient. ✓ Since the radial artery is subject to rather intense spasm, which can be painful to the patient and makes sheath and catheter movement difficult, several drugs may be administered to prevent or relieve the vasospasm. Medications and doses used during cardiac catheterizations are as follows: • Nitroglycerin 200 µg/mL (administered via the radial and brachial artery) • Verapamil 500 µg/mL (administered via the radial artery) • Lidocaine 2% 20-mg aliquots (administered via the radial artery) • Papaverine wipe on (radial) • Heparin 5,000-10,000 units • Fentanyl 25-50 µg IV prn every 30-45 minutes (transradially, 5 mg IV PRN every 5-15 minutes) • Midazolam 0.5-2 mg/mL IV prn every 15-30 minutes				

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9	15 mins	Explain the procedure for cardiac catheterization	**Positioning:** For both radial and femoral artery catheterization, patients are placed supine. The arms are tucked at the side of the bed for femoral artery access. For radial artery access, the nondominant arm is used and is usually abducted to about 45° to allow for access. **PROCEDURE:** ➢ Cardiologist will numb the area on the arm, groin (upper thigh), or neck where the catheter will enter patient's blood vessel. Then, a needle will be used to make a small hole in the blood vessel. Doctor will put a tapered tube called a sheath through the hole. ➢ Next, cardiologist will put a thin, flexible guide wire through the sheath and into patient blood vessel. He or she will thread the wire through blood vessel to heart. ➢ Cardiologist will use the guide wire to correctly place the catheter. He or she will put the catheter	LCD projector, pamphlets	explaining	Taking notes	What are the steps in cardiac catheterization procedure?

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10	10 min	Understand the monitoring and followup for cardiac catheterization	through the sheath and slide it over the guide wire and into the coronary arteries. ➢ Special x-ray movies will be taken of the guide wire and the catheter as they're moved into the heart. The movies will help the doctor see where to put the tip of the catheter. ➢ When the catheter reaches the right spot, the doctor will use it to do tests or treatments on patient's heart. **MONITORING & FOLLOW-UP:** ❖ Once the procedure is complete, most cardiologists remove the intra-arterial lines without confirming anticoagulation parameters. Even in patients in whom GPIIb/IIIa inhibitors and/or thrombolytics have been administered, sheaths can be removed and hemostasis obtained with manual compression or a hemostatic device. ❖ For both radial and femoral artery access, the hand or feet are assessed for perfusion and capillary refill. ❖ In most cases of radial artery cannulation, the	LCD projector	explaining	listening	

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			patient can ambulate 1-2 hours after sheath removal or whenever the sedation has worn off. ❖ Patients who undergo femoral artery access are asked to remain on bedrest for a minimum of 6-8 hours. ❖ After discharge, all patients are asked to avoid excessive use of the involved hand for 24 hours or to refrain from walking until the following morning. Any activity that causes excessive flexion or extension of the wrist/hip is not recommended. The bruising that is common after the procedure usually disappears within 7-10 days. **OTHER CONSIDERATIONS:** *Difficult guidewire entry:* After successful arterial access is achieved with the needle, it is sometimes difficult to advance the guidewire. This may be related to the following: • Tortuosity • Vessel spasm				

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			• Radial artery stenosis or occlusion • Guidewire may be in a side branch • Abnormal radial artery takeoff from brachial artery • Wire abutting the wall In such scenarios, the following may be attempted: • The use of fluoroscopy for guidance • Rotation of the needle to change bevel angle • Use a smaller diameter hydrophilic wire • Administer a vasodilators intra-arterially through the needle and then attempt to advance the wire ***Difficulty removing sheath:*** This is rare but can occur in small patients, especially women, and often results from intense spasm. If this occurs, the following may be tried: • Administer vasodilators prior to removal • Administer pain medication • Gently rotate the sheath during removal while applying distal skin traction				

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			Sheath removal: Sheath removal is not a problem from the femoral artery. However, the sheath should not be removed from the radial artery without preparation. In many cases, when the sheath is removed, the radial artery goes into spasm. Thus, vasodilators, lidocaine, and sedatives should be available. ***Hemostasis:*** Prior to the availability of hemostatic devices, the cardiologist or nurse had to apply manual pressure to the groin for 30-45 minutes to obtain hemostasis postprocedure. Now, there are several methods of obtaining hemostasis at the catheter insertion site. The choice of method to obtain hemostasis is strictly personal preference of the cardiologist. ***Difficulties of transradial intervention:*** Unlike the femoral artery, which is large and easily palpated, the radial artery is small, and the pulsations are not strong. The first needle stick is done with care because a miss usually results in vessel spasm. In such cases, there are several options, as follows:				

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			• Delay the procedure for 2-30 minutes to allow the spasm to resolve • Attempt cannulation at a proximal site • Administer nitroglycerin (sublingually, intravenously, or topically on the hand) • Ask the patient to open and close hands for a few minutes • Use the brachial artery, contralateral radial artery, or femoral artery **Radiation exposure:** Radiation exposure is unavoidable regardless of the access route selected. There is evidence that using the radial artery to perform coronary interventions often results in more radiation exposure than the femoral artery approach, and this is greater when using the right arm than the left. Radiation exposure generally decreases as operator experience increases.				

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11	15 mins	Describe the prevention and management of complications for cardiac catheterization	**COMPLICATIONS:** It rarely causes serious problems. However, complications can include: Bleeding, infection, and pain at the catheter insertion site. Damage to blood vessels. Rarely, the catheter may scrape or poke a hole in a blood vessel as it's threaded to the heart. An allergic reaction to the dye that's used during coronary angiography. Other, less common complications include: Arrhythmias (irregular heartbeats). These irregular heartbeats often go away on their own. However, your doctor may recommend treatment if they persist. Kidney damage caused by the dye used during coronary angiography. Blood clots that can trigger a stroke, heart attack, or other serious problems. Low blood pressure. A build-up of blood or fluid in the sac that	LCD projector, Leaflets	explaining the complications	listening	What are all the Complications of cardiac catheterization ?

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12	5 min	Enumerate the patient education about self care after cardiac catheterization	surrounds the heart. This fluid can prevent the heart from beating properly. As with any procedure involving the heart, complications sometimes can be fatal. However, this is rare with cardiac catheterization. The risks of cardiac catheterization are higher in people who are older and in those who have certain diseases or conditions (such as chronic kidney disease and diabetes). **PATIENT EDUCATION ABOUT SELF CARE** In general, people who have angioplasty can walk around within 6 hours after the procedure. Complete recovery takes a week or less. Keep the area where the catheter was inserted dry for 24 to 48 hours. If the catheter was inserted into your arm, recovery is often faster. If the doctor put the catheter in through your groin: Walking short distances on a flat surface is OK. Limit going up and downstairs to around twice a	LCD projector	explaining	listening	What patient education given about self care?

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			day for the first 2 to 3 days. DO NOT do hard work, drive, squat lift heavy objects, or play sports for at least 2 days, or until your health care provider tells you it is OK. If the doctor put the catheter in your arm: DO NOT lift anything heavier than 10 pounds (4.5 kilograms). (This is a little more than a gallon of milk). DO NOT do any heavy pushing, pulling, or twisting. For a catheter in your groin or arm: Avoid sexual activity for 2 to 5 days. Ask your doctor when it will be OK to start again. You should be able to return to work in 2 to 3 days if you DO NOT do heavy work. DO NOT take a bath or swim for the first week. You may take showers, but make sure the area where the catheter was inserted does not get wet for the first 24 to 48 hours.				

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			You will need to take care of your incision. Your provider will tell you how often to change your dressing. If your incision bleeds, lie down and put pressure on it for 30 minutes. Take the medicines exactly as your provider tells you. DO NOT stop taking them without talking to your provider. You should eat a heart-healthy diet, exercise, and follow a healthy lifestyle. Your provider can refer you to other health experts who can help you learn about exercise and healthy foods that will fit into your lifestyle.				

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SUMMARY:-

Till now we have learnt about Introduction, Definition, and Indication for Catheterization procedure, contra indication, equipment, approach consideration, Cardiac Catheterization procedure, Patient Preparation, monitoring and follow up, Complications, and patient education about self care.

CONCLUSION:-

Through this lesson I hope you (Cardiac Nurses) have gained more Knowledge and Practical skills about patient safety after cardiac catheterization. So that, you can apply this knowledge and skills in your practice area for providing best care to those in need.

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APPENDIX - IX

PART-I: DEMOGRAPHIC VARIABLES

Structured questionnaire regarding demographic data from the cardiac nurses:

Sample No : ☐☐☐

Date :

INSTRUCTION:

Kindly put (✓) mark in the appropriate boxes against each indicator of baseline data in the space provided. The information collected from you will be kept confidentially.

DEMOGRAPHIC VARIABLES:

1. Age in years

   a) 21 to 25 ☐
   b) 26 to 30 ☐
   c) 31 to 35 ☐
   d) Above 35 ☐

2. Sex

   a) Male ☐
   b) Female ☐

3. Professional qualification

   a) DGNM ☐
   b) P.B.B.Sc.,(N) ☐
   c) B.Sc., Nursing ☐

4. Do you have any additional qualification?

   a) Yes ☐
   b) No ☐

5. Years of experience in cardiac unit.

a) < 2 Years ☐
b) 2-5 Years ☐
c) 6-10 Years ☐
d) > 10 Years ☐

6. Any workshop and training attended related to Cardiac catheterization?

a) Yes ☐
b) No ☐

7. Present position in cardiac unit.

a) Unit In-charge ☐
b) Assistant unit in-charge ☐
c) Senior nurse ☐
d) Junior nurse ☐

PART-II

STRUCTURED KNOWLEDGE QUESTIONNAIRE REGARDING PATIENT SAFETY AFTER CARDIAC CATHETERIZATION AMONG CARDIAC NURSES:

Sample No: ☐☐☐

Date :

INSTRUCTION:

- ✓ Read carefully each item and answer the questions.
- ✓ Each question carries one mark and there is no negative mark for wrong answer.
- ✓ Select the best answer from given four items (a, b, c, d) by placing a tick (✓) mark in the appropriate boxes.
- ✓ Data will be used only for research purpose and will be kept in confidential.

1. What is cardiac catheterization?
   a) Flexible tube introduced into heart via an artery or vein. ☐
   b) Tube introduced into lungs to visualize lung fields. ☐
   c) By using electrodes, stimulate the electrical impulses of heart. ☐
   d) It is a machine helps to improve cardiac contractility. ☐

2. Which is an indication for cardiac catheterization?
   a) Uncontrolled hypertension. ☐
   b) Severe anemia. ☐
   c) Heart attack. ☐
   d) Severe coagulopathy. ☐

3. Which is the contra indication of cardiac catheterization?
   a) Ventricular arrhythmias. ☐
   b) Abnormal stress test. ☐
   c) Persistent chest pain. ☐
   d) New onset of unexplained heart failure. ☐

4. What are the basic equipments used for cardiac catheterization?
   a) Sheath, scissor, plaster. ☐
   b) Scissor, compressive device. ☐
   c) Pulse oximeter, ECG machine. ☐
   d) Needle, wire, sheath. ☐

5. What is the common sheath size for radial intervention?
   a) 7 – 8 F. ☐
   b) 5 – 7 F. ☐
   c) 8 – 10 F. ☐
   d) 10 – 12 F. ☐

6. What medicine should be injected superficially around the artery ?
   a) Heparin. ☐
   b) Urokinase. ☐
   c) Lidocaine. ☐
   d) Tetanus toxoid. ☐

7. What is the diameter of the small caliber wire?
   a) 0.018 to 0.025 inches. ☐
   b) 0.001 to 0.002 inches. ☐
   c) 0.1 – 0.2 inches. ☐
   d) 0.4 – 0.6 inches. ☐

8. Which important mechanical device can be used to obtain hemostasis in radial puncture?
   a) Adhesive plaster. ☐
   b) Wrist band / splint. ☐
   c) Bandage. ☐
   d) Topical medicine. ☐

9. Why should we use longer sheath for radial artery approach?
   a) To prevent hematoma. ☐
   b) To get easy access. ☐
   c) To minimize bleeding. ☐
   d) To prevent spasm. ☐

10. Which of the following approach needs cut down?
   a) Femoral artery approach. ☐
   b) Radial artery approach. ☐
   c) Brachial artery approach. ☐
   d) Ulnar artery approach. ☐

11. What diet can be given before catheterization?
   a) Nil per oral from midnight / light liquid breakfast. ☐
   b) Normal diet. ☐
   c) Semi solid diet. ☐
   d) Heavy liquid diet. ☐

12. What premedication given to the patient for cardiac catheterization?
   a) Lidocaine, Nitroglycerin, Heparin, Midazolam. ☐
   b) Diazipam, Insulin. ☐
   c) Cefotaxime, Paracetamol. ☐
   d) Tetanus toxoid, Conticosteroid, Lasix. ☐

13. Why some cardiologists will prefer to give sedation during radial artery puncture?

a) To relieve spasm. ☐
b) To induce sleep. ☐
c) Painful to the patient and makes sheath & catheter movement difficult. ☐
d) To reduce patient anxiety. ☐

14. What is the use of nitroglycerin?

a) Improve cardiac contractility. ☐
b) Vasodilation ☐
c) Anticoagulant. ☐
d) Painkiller. ☐

15. How can we maintain hemostasis after sheath removal?

a) Topical application of medicine. ☐
b) Closing the area with suture. ☐
c) Application of plaster. ☐
d) Manual / mechanical compression. ☐

16. What position will you provide for head end of the patient after procedure?

a) Elevate 30 degree. ☐
b) Elevate 90 degree. ☐
c) Elevate 60 degree. ☐
d) Flat lying position. ☐

17. What will you assess in the extremity used for access?

a) Lesion and swelling. ☐
b) Temperature, color, pulses and discomfort. ☐
c) Motor and sensory activity. ☐
d) Reflexes and nerve function. ☐

18. What is the use of guide wire in cardiac catheterization?

a) To correctly place the catheter. ☐
b) To prevent spasm. ☐
c) To measure the length of an artery. ☐
d) To improve vascular dilation. ☐

19. How long the patient has to remain on bed rest for femoral artery access?

a) 1 – 2 hrs. ☐
b) 6 – 8 hrs. ☐
c) 2- 3 hrs. ☐
d) 10- 12 hrs. ☐

20. What is the main difficulty, the cardiologist has during guide wire insertion?

a) Tortuosity of the blood vessel. ☐
b) Radiation exposure. ☐
c) Difficulty to pass through sheath. ☐
d) Coiling of guide wire. ☐

21. What measure can be taken to relieve vessel spasm?

a) Don't stop & continue the procedure . ☐
b) Provide psychological support. ☐
c) Administer vasodilator intra arterially. ☐
d) Catheter size can be changed. ☐

22. In which approach, the patient is having more radiation exposure?

a) Femoral artery approach. ☐
b) Brachial artery approach. ☐
c) Radial artery approach. ☐
d) Popliteal artery approach. ☐

23. What measure will you do, when the patient gets spasm after first needle stick?

a) Delay the procedure for 20- 30 minutes. ☐
b) Immediately next prick and continue. ☐
c) Postpone the procedure next day. ☐
d) Give more amounts of IV fluids. ☐

24. What are the important complications of cardiac catheterization?

a) Cramping pain, numbness, tingling. ☐
b) scalds, purpura, eczema. ☐
c) Hematoma, bleeding, infection at access site. ☐
d) Nausea, vomiting, headache. ☐

25. What may be the cause for getting renal complication during coronary angiography?

a) Injection of dye. ☐
b) Vascular compromise and poor renal blood supply. ☐
c) Use of premedication. ☐
d) Use of manual compression over the access site. ☐

26. What is the cause of pseudoaneurysm?

a) Due to premedication. ☐
b) Due to prolonged manual compression. ☐
c) Repeated pricks in access site. ☐
d) Damage to the blood vessel. ☐

27. How many days the patient has to avoid sexual activity?

a) one month. ☐
b) 2 – 5 days. ☐
c) 10 days. ☐
d) 2 months. ☐

28. What will you educate the patient with radial approach at discharge?

a) Don't lift anything heavier than 10 pounds. ☐
b) Take bed rest for a month. ☐
c) Limit fluid intake. ☐
d) Take liquid diet for one week. ☐

29. What the patient has to do if the incision bleeds at home ?

a) Lie down and put pressure on it for 30 minutes & seek medical help. ☐
b) Put bandage and do activity. ☐
c) Give compression for 5 minutes. ☐
d) Clean it and take bed rest. ☐

30. What is hematoma?

a) Localized swelling filled with fluid and pus. ☐
b) Presence of tumor inside vascular region. ☐
c) A localized swelling filled with blood. ☐
d) Presence of tumor outside the vascular compartment. ☐

31. What preventive method can be used to minimize the risk of stroke?

a) Minimize the dwell time of guide wire in aortic root. ☐
b) Give thrombolytic medicine ☐
c) Elevate head end of the bed. ☐
d) Administer more amounts of IV fluids. ☐

32. How can we manage femoral artery laceration?

a) Reverse anticoagulation, remove sheath, and compress for 30-60 minutes. ☐
b) Use contra lateral artery. ☐
c) Change the size of the sheath. ☐
d) Change the size of the catheter. ☐

33. How can we prevent hematoma after cardiac catheterization?

a) Application of plaster over the access area. ☐
b) Application of thrombolytic. ☐
c) By accurate puncture and puncture site compression. ☐
d) By lowering the extremity. ☐

34. What is retroperitoneal hematoma?

a) Puncture occur below the inguinal ligament and forms hematoma. ☐
b) Puncture occurs above the inguinal ligament and forms hematoma. ☐
c) Puncture occurs at superior peritoneal cavity. ☐
d) Puncture occurs at urinary bladder and forms leakage. ☐

35. What is the management for arterial thrombosis?

a) Topical medicine. ☐
b) Removal of an artery. ☐
c) Administration of vasopressin. ☐
d) Thrombectomy. ☐

36. What is arrhythmia?

a) Decreased cardiac output. ☐
b) Irregular respiration. ☐
c) Irregular heart beat. ☐
d) Decreased blood pressure. ☐

37. What manifestations can be seen in vasovagal response?

a) Abdominal bloating, belching. ☐
b) Hypertension, head ache. ☐
c) Constipation, nausea. ☐
d) Bradycardia, hypotension, sweating. ☐

38. What medicine will you give if the patient develops anaphylactic reaction due to dye injection?

a) Antibiotic. ☐
b) Norepinephrine. ☐
c) Epinephrine. ☐
d) Cetrizine. ☐

39. What management will you do for pericardial effusion?

a) Paracentesis. ☐
b) Administering diuretics. ☐
c) Thoracentesis. ☐
d) Pericardiocentesis. ☐

40. How can we prevent infection at access site?

a) Clean the area with antiseptic solution. ☐
b) Provide privacy for the client. ☐
c) Follow universal precaution throughout procedure. ☐
d) Provide dressing over the area. ☐

PART-III

CHECK LIST TO ASSESS THE LEVEL OF PRACTICE REGARDING PATIENT SAFETY AFTER CARDIAC CATHETERIZATION AMONG CARDIAC NURSES

Sample No: ☐☐☐

Date :

Instructions:

The following questions seek information about practice on providing safety to patients after cardiac catheterization among cardiac nurses. Place a tick mark (✓) in corresponding column according to your response.

S.NO	QUESTIONS	YES	NO
1.	Do you check vital signs before cardiac catheterization?		
2.	Do you check contraindications before procedure?		
3.	Are you getting informed consent from patient/relatives?		
4.	Are you maintaining IV access in other extremity before cardiac catheterization?		
5.	Are you administering prophylactic antibiotic before procedure?		
6.	Are you administering premedication to prevent or relieve vasospasm?		
7.	Are you preparing the extremity in sterile fashion?		
8.	Are you giving injection lidocaine around the artery before procedure?		
9.	Do you assess hand and feet for perfusion and capillary refill after access?		
10.	Do you remove the sheath without preparation?		
11.	Do you apply manual/mechanical compression after sheath removal?		
12.	Are you applying manual pressure for 30-45 minutes after sheath removal?		

13.	Do you assess the temperature, pulse and color of the extremity used for access?		
14.	Are you elevating head end of the patient for 30 degree?		
15.	Do you practice early ambulation immediately after procedure?		
16.	Are you advising the patient to use the involved extremity within 24 hours after procedure?		
17.	Do you educate about sexual activity after procedure?		
18.	Do you assess for a bruit in the access area?		
19.	Do you observe complications after procedure?		
20.	Are you reversing anticoagulation if severe bleeding is there?		

PART-II: SCORE KEY FOR STRUCTURED KNOWLEDGE QUESTIONNAIRE

QUESTION NO.	ANSWER	SCORE
1	a	1
2	c	1
3	a	1
4	d	1
5	b	1
6	c	1
7	a	1
8	b	1
9	d	1
10	c	1
11	a	1
12	a	1
13	c	1
14	b	1
15	d	1
16	a	1
17	b	1
18	a	1
19	b	1
20	a	1
21	c	1
22	c	1
23	a	1
24	c	1
25	a	1
26	d	1
27	b	1
28	a	1
29	a	1
30	c	1
31	a	1

32	a	1
33	c	1
34	b	1
35	d	1
36	c	1
37	d	1
38	c	1
39	d	1
40	c	1

Total Score: 40

PART - III

SCORE KEY FOR PRACTICE CHECK LIST

QUESTION NO.	ANSWER	SCORE
1	YES	1
2	YES	1
3	YES	1
4	YES	1
5	NO	1
6	YES	1
7	YES	1
8	YES	1
9	YES	1
10	YES	1
11	YES	1
12	YES	1
13	YES	1
14	YES	1
15	NO	1
16	NO	1
17	YES	1
18	YES	1
19	YES	1
20	YES	1

Total score: 20