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ÇANKIRI KARATEKIN UNIVERSITY
INSTITUTE OF HEALTH SCIENCES
DEPARTMENT OF NURSING

EVALUATION OF NURSES' KNOWLEDGE ABOUT PATIENT SAFETY AFTER DIAGNOSTIC CARDIAC CATHETERIZATION IN IRAQ

Master's Thesis

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EVALUATION OF NURSES' KNOWLEDGE ABOUT PATIENT SAFETY AFTER DIAGNOSTIC CARDIAC CATHETERIZATION IN IRAQ

By

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The Institute of Health Sciences

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ACCEPTANCE AND APPROVAL

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ETHICS STATEMENT

The thesis entitled “Evaluation of Nurses' Knowledge about Patient Safety After Diagnostic Cardiac Catheterization in Iraq” was prepared and presented as a thesis and was written by myself and followed the scientific, academic rules and code of ethical conduct. The idea/hypothesis of my thesis solely belongs to my supervisor and me. I conducted the study about the thesis, and therefore, all of the used sentences and interpretations within the study belong to me. I declare that the issues above are correct.

Signature:

Date: 21 / 06 / 2023

Hussein Alaa Mohsen MOHSEN

PREFACE AND ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to Asst. Prof. Dr. Müjgan ONARICI, thank them for their beautiful patience and the hard bearing in my direction and guidance to prepare this work Humble.

I would also like to thank everyone who taught me letters in this mortal world, to my father and mother for dedicating this fruit of my labor to the two most precious and precious persons in my life. The life that enlightened my path by advising my dear heart, my brothers, sisters, and classmates, we wish them success to all the people we love and appreciate and ask God to make them happy and a beacon for every student.

Hussein Alaa Mohsin MOHSIN

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ABBREVIATIONS AND SYMBOLS

AHA	American Heart Association
ASD	Atrial Septal Defect
CHS	Congenital Heart Surgery
CT	Computed Tomography
CVD	Cardiovascular Diseases
ECG	Electrocardiogram
EP	Electrophysiological
N	Frequency or Number
PCI	Percutaneous
SD	Standard Deviation
SPSS	Statistical Package for Social Sciences
TAVR	Transcatheter Aortic Valve Replacement
WHO	World Health Organization
%	Percentage
±	Plus minus

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ABSTRACT

EVALUATION OF NURSES' KNOWLEDGE ABOUT PATIENT SAFETY AFTER DIAGNOSTIC CARDIAC CATHETERIZATION IN IRAQ

MOHSIN, Hussein Alaa Mohsin. Evaluation of Nurses' Knowledge about Patient Safety after Diagnostic Cardiac Catheterization in Iraq, (Master of Science), Çankırı, 2023.

Background: There will be 17.9 million deaths worldwide due to cardiovascular disease in 2022, and the death rate by age in Iraq is two hundred twenty-seven and twenty-six per hundred thousand inhabitants, and it ranks 23rd in the world. Cardiac catheterization is the most common type of heart procedure. There is a possibility that the surgery may be accompanied by some complications related to the patient. These problems have been dramatically reduced due to significant technological advances in cardiac catheterization, improvements in operator proficiency levels, and the implementation of new methods. In some cases, cardiac catheterization applies to either right or left heart catheterization or both. Nurses caring for cardiac catheterization patients must also be aware of vascular problems such as hematomas, retroperitoneal bleeding, pseudoaneurysm, arteriovenous fistula, compression, and embolism. Atherosclerosis, after the procedure, nurses must design a standard and safe protocol for patient care or care, and coronary connective tissue intervention can be enhanced as a result of patient outcomes if more or better medical assistance is available.

Objectives: This study evaluated nurses' patient safety knowledge after diagnostic catheterization.

Methodology: A descriptive cross-sectional study was conducted between May-August 2022 at the Nasiriyah Heart Center in Nasiriyah, Iraq. The study population consisted of nurses100 in the cardiac catheterization department, 50 in the cardiac care unit, 50 in the intensive care unit, 34 in the operating department, and 50 in cardiology. Clinics, 50 in the department of Men's surgery and 50 in the department of women's surgery. Inclusion criteria were determined as follows; being 18 or over in these specific units, nurses and night shift workers are included during the morning and evening shifts. As nurses who did not work in these units are excluded, inpatients and patients outside these hospitals are also included. Face-to-face data were collected using a questionnaire to identify nurses' sociodemographic factors and a questionnaire of nurses' knowledge regarding patient safety after diagnostic cardiac catheterization to collect data. The data were analyzed using SPSS version 26 (Statistical Package for Social Sciences) through statistical data analysis methods to determine whether the study's objectives were achieved. Descriptive statistics were used: frequencies, percentages, mean, standard deviation, one-way analysis of variance (ANOVA), two-sample t-test, and the significance level to be determined in data evaluation is $P \leq 0.05$.

Result: The study showed that the majority of the study sample was female at a rate of 53.4% and that 45.3% were between the ages of 26-35 years, 57.0% were married, 50.8% were nursing diplomas, and 51.3% were male. It was determined that the total knowledge scores of the participants showed a statistically significant difference according to the nurse's education ($p < 0.05$). Accordingly, the sum of knowledge scores for the undergraduate group is higher than the other groups, and it

was also determined that the sum of knowledge scores showed a statistically significant difference according to the participants' experience ($p < 0.05$). According to the results, it was observed that the group with one year of age or less had a total knowledge score of 6 to 10, higher than the groups with 11 or more years of age. The 3-year-olds had higher total knowledge scores than the 4- to 7-year-old group. In addition, it was determined that the total knowledge scores of the participants showed a statistically significant difference according to the training date ($p < 0.05$). Accordingly, the total knowledge scores for the group that did not take a particular education course were higher than for the other groups. Multiple comparison tests were performed to determine which group the difference arose from. According to the results, it was observed that the total cognitive scores of the group that did not take a unique course were higher than those obtained by the groups that received it six months ago and one year ago.

Conclusions: As a result of the study, nurses' knowledge level about patient safety after cardiac catheterization was found to be moderate.

Key Words: Assessment, Nursing knowledge, Cardiology, Diagnostic cardiac catheterization

ÖZET

IRAK'TA HEMŞİRELERİN TANISAL KALP KATETERİZASYONU SONRASI HASTA GÜVENLİĞİ KONUSUNDA BİLGİLERİNİN DEĞERLENDİRİLMESİ

MOHSIN, Hüseyin Alaa Mohsin. Irak'ta Tanısal Kardiyak Kateterizasyon Sonrası Hemşirelerin Hasta Güvenliği Konusunda Bilgilerinin Değerlendirilmesi, (Master of Science), Çankırı, 2023.

Arka plan: 2022'de dünya çapında kardiyovasküler hastalık nedeniyle 17,9 milyon ölüm vakası meydana gelecek, Irak'taki insanların yaşına göre ölüm oranı yüz bin kişide iki yüz yirmi yedi ile yirmi altı arasında olup dünyada çapında 23. sırada yer almaktadır. Kardiyak kateterizasyon en yaygın tanı yöntemlerinden biridir. Kateterizasyon işlemi sırası ve sonrası hastaya bağlı bazı komplikasyonlar görülebilir . Kardiyak kateterizasyonundaki önemli teknolojik gelişmeler, operatör yeterlilik seviyelerindeki iyileştirmeler ve yeni yöntemlerin uygulanması sayesinde bu sorunlar önemli ölçüde azalmıştır. Kardiyak kateterizasyon hastalarına bakım veren hemşireler hematom, retroperitoneal kanama, psödoanevrizma, arteriyovenöz fistül, kompresyon ve emboli gibi vasküler problemleri hakkında bilgiye sahip olmalıdır. Kardiyak kateterizasyon sonrası, hemşireler hasta bakımı için standart ve güvenli bir protokol tasarlamalıdır.

Metodoloji: Mayıs-Ağustos 2022 tarihleri arasında Irak'ın Nasiriye kentindeki Nasiriye Kalp Merkezi'nde tanımlayıcı kesitsel bir çalışma yapılmıştır. Çalışma örneklemi koroner anjiografi bölümünde 100, kalp bakım ünitesinde 50, yoğun bakım ünitesinde 50, ameliyathanede 34, kardiyoloji kliniklerinde 50, erkek cerrahisi servisinde 50 ve kadın cerrahisi servisinde 50 olmak üzere toplam 384 hemşireden oluşuyordu. Dahil edilme kriterleri şu şekilde belirlenmiştir; Bu birimlerde 18 yaş ve üstü olmak üzere sabah ve akşam vardiyalarında hemşire ve gece vardiyalı çalışanlar dahil edilmektedir. Bu birimlerde çalışmayan hemşireler hariç tutulduğundan, yatan hastalar ve bu hastaneler dışındaki hastalar da dahil edilmiştir. Yüz yüze veriler, hemşirelerin sosyodemografik faktörlerini belirlemek için bir anket ve veri toplamak için tanısal kalp kateterizasyonu sonrası hasta güvenliğine ilişkin hemşirelerin bilgi anketi kullanılarak toplanmıştır. Veriler, SPSS (Sosyal Bilimler İstatistik Paketi) sürüm 26 kullanılarak istatistiksel veri analizi yöntemler ile çalışmanın amaçlarına ulaşılıp ulaşılmadığını belirlemek için analiz edilmiştir. Frekanslar, yüzdeler, ortalamalar, standart sapmalar, tek yönlü varyans analizi (ANOVA), iki örneklemli t-testi olmak üzere tanımlayıcı istatistikler kullanılmış ve veri değerlendirmesinde belirlenecek anlamlılık düzeyi $P \leq 0,05$'tir.

Bulgular: Araştırmada örneklemin çoğunluğunun %53,4 oranında kadın olduğu, %45,3'ünün 26-35 yaş aralığında, %57,0'ının evli, %50,8'inin hemşirelik mezunu, %51,3'ünün erkek olduğu gösterilmiştir. Katılımcıların toplam bilgi puanlarının hemşirenin eğitimine göre istatistiksel olarak anlamlı farklılık gösterdiği belirlenmiştir ($p < 0,05$). Buna göre lisans grubu için bilgi puanları toplamının diğer gruplara göre daha yüksek olduğu ve ayrıca bilgi puanları toplamının katılımcıların

deneyimlerine göre istatistiksel olarak anlamlı bir farklılık gösterdiği belirlenmiştir ($p < 0,05$). Elde edilen sonuçlara göre Çalışma yılı ve altındaki grubun toplam bilgi puanının 6-10 arasında olduğu, 11 yıl klinik deneyimi ve üzeri gruplara göre daha yüksek olduğu gözlenmiştir. 3 yıl klinik deneyimi, 4-7 yaş grubundan daha yüksek toplam bilgi puanlarına sahipti. Ayrıca katılımcıların toplam bilgi puanlarının eğitim tarihine göre istatistiksel olarak anlamlı farklılık gösterdiği belirlenmiştir ($p < 0,05$). Buna göre özel eğitim dersi almayan grubun toplam bilgi puanları diğer gruplara göre daha yüksekti. Farkın hangi gruptan kaynaklandığını bulmak için çoklu karşılaştırma testi yapıldı. Elde edilen sonuçlara göre, özel bir ders almayan grubun toplam bilişsel puanlarının, 6 ay önce ve bir yıl önce alan grupların elde ettiği puanlardan daha yüksek olduğu gözlen miştir.

Sonuç: Çalışma sonucunda hemşirelerin kardiyak kateterizasyon sonrası hasta güvenliğine ilişkin bilgi düzeyleri orta bulunmuştur.

Anahtar Kelimeler: Değerlendirme, Hemşirelik bilgisi, Kardiyoloji, Tanısal kalp kateterizasyonu.

1. INTRODUCTION

There will be 17.9 million fatalities worldwide due to cardiovascular diseases (CVD) in 2022, according to estimations made by the World Health Organization (WHO). These deaths will be caused by conditions such as coronary heart disease, cerebrovascular disease, rheumatic heart disease, and other ailments. More than four out of every five deaths from cardiovascular disease are caused by heart attacks and strokes, with those under the age of seventy accounting for one-third of these fatalities (WHO, 2022). According to the most recent statistics from the WHO in 2020, cardiovascular disease (CVD) was the cause of death for sixty-three thousand five hundred ninety-four individuals in Iraq. This figure accounts for 27% of the country's overall death (WHO, 2020). According to age in Iraq, the death rate is two hundred twenty-seven and twenty-six per hundred thousand people, and it ranks twenty-three in the world (WHO, 2020; WHO, 2022).

Cardiovascular disease is at the top of the list (Sultana, Petpichetchian, and Kritpracha, 2015; Nuraeni, Mirwanti, and Anna, 2018). Atherosclerosis or thrombosis may contribute to the development of myocardial infarction, reducing the amount of blood that flows through the coronary artery. Ischemia leads to infarction, which happens when coronary blood flow is reduced, myocardial oxygenation is disturbed due to its total blockage, and infarction develops due to ischemia. Ischemia also causes necrosis to begin developing in cardiomyocytes within approximately 15 minutes. Ischemia is the cause of chest discomfort, which is often the initial symptom of myocardial infarction. Pain in the chest may radiate to other parts of the body, including the neck, jaw, teeth, back, left arm, and fingers. Numbness may sometimes be experienced in conjunction with chest discomfort in some cases. Patients often complain of chest discomfort due to pressure (Eti, 2017; Doğan, 2018), as shown in Figure 1.1.

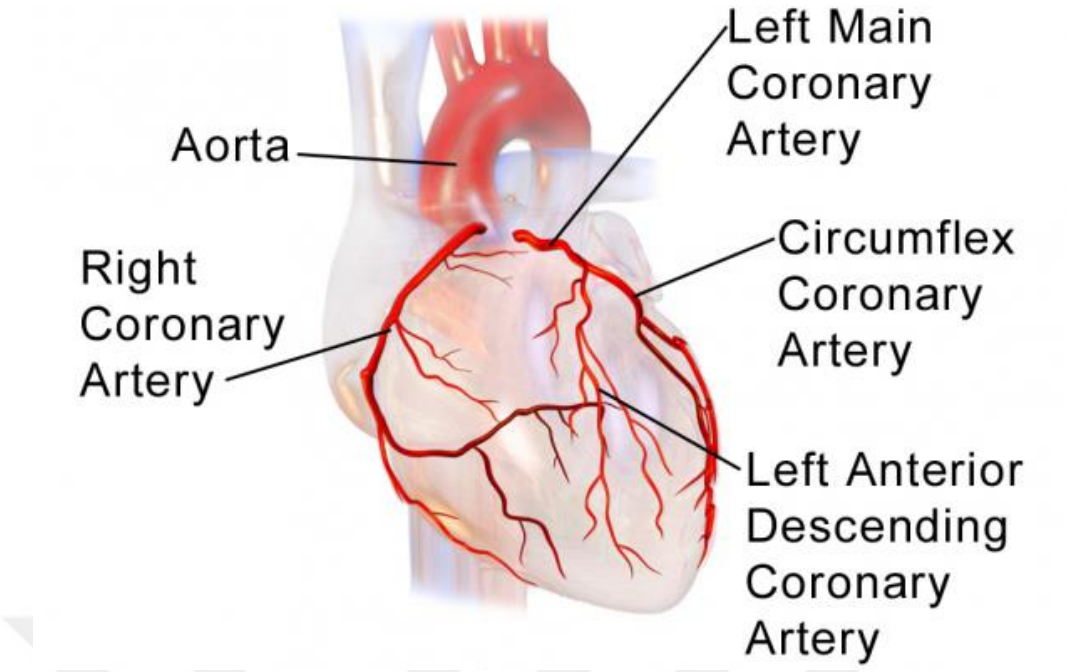

Figure 1.1: Cardiovascular diseases (The Society of Thoracic Surgeons, 2022).

Myocardial infarction at diagnosis, patient history, cardiac enzymes (troponin and myocardial creatine kinase range = CK-MB), electrocardiogram (ECG), and some imaging methods are used (Sevinç, 2017).

The term "cardiac catheterization" refers to one of the most popular types of cardiac operations. Interventional cardiologists can perform a wide variety of operations depending on the individual patient's requirements (Manda and Baradhi, 2022). There is a possibility that certain patient-related complications will accompany the surgery. The occurrence of these issues has significantly reduced due to significant technological developments in cardiac catheterization, improvements in the level of operator competence, and the implementation of new methods. Sometimes, "cardiac catheterization" may apply to right or left heart catheterization.

Nurses who care for cardiac catheterization patients should be aware of vascular problems such as hematomas, retroperitoneal hemorrhage, pseudoaneurysm, arteriovenous fistula, neurological compression, and atherosclerotic embolism (Shoulders-Odom, 2008). Following the procedure, nurses must design a standard and safe protocol for patient care or care, and coronary connective tissue intervention can be enhanced as a consequence of patient outcomes if there is more or better medical aid (Ahmed, 2015). Nurses' expertise is critical in minimizing client anxiety and tension. Informing patients about the process allows them to trust it and helps to prevent difficulties after the operation (Sharif, Salih, Salih, and Salim, 2018).

1.1. Objectives

To evaluate nurses' knowledge of patient safety after diagnostic catheterization.

1.2. Research Questions

- What degrees of knowledge about diagnostic catheters do the participants possess?
- Do participants' demographics influence their knowledge scores?

1.3. Limitations

This study has two limitations: First, the researcher had difficulty building relationships with healthcare professionals working in pulmonary resuscitation centers for patients with COVID-19. Second, the result may not be generalizable to all Iraqi heart patients due to the number of patients identified in only one hospital.

2. GENERAL INFORMATION

2.1. Heart Disease and Cardiac Catheterization

Heart disease is the top cause of mortality worldwide, ubiquitous in nations considered part of the third world. In medicine, the technique known as cardiac catheterization may be found a good deal of the time. About one million cardiac catheterization procedures are performed annually in the United States (Abd, Abd, and Raman, 2019; Manda and Baradhi, 2022; Mozaffarian et al., 2016). According to the results of research conducted at a cardiology facility in Nasiriyah city, which is situated in the Dhi Qar Governorate of Iraq, in 2017, heart disease was responsible for 18.50% of all fatalities in Iraq. This information was gleaned from a study carried out in 2017 (Abd et al., 2019).

2.1.1. Cardiac catheterization definition

The World Health Organization defines cardiovascular disease (CVD) as a wide range of conditions. These conditions include heart disease, stroke, peripheral artery disease, rheumatic heart disease, congenital heart defect, deep vein thrombosis, and pulmonary embolism. Morbidity and mortality rate are key concerns regarding public health in industrialized countries (WHO, 2020). According to projections made by the World Health Organization, the number of deaths caused by cardiovascular disease and stroke would rise to 85 percent of all fatalities worldwide by 2030 from 17.9 million in 2006. By the year 2050, it is anticipated that these diseases will be responsible for the deaths of 23.6 million people every year. Over 4.5 million people per year are lost to cardiovascular disease in Europe, making it the leading cause of death in that region (WHO, 2020). This prevalence is linked to heart shock for patients, linked to lifestyle and bad habits, whether smoking cigarettes or others. Therefore, lifestyle modification is beneficial in reducing heart disease (Brinks, Fowler, Franklin, and Dulai, 2017).

Over three million persons under sixty have died from cardiovascular disease worldwide. The percentage of premature deaths that may be attributed to cardiovascular disease varied from 4% to 42% in countries with meager and very high per capita incomes. Ischemic heart disease accounts for a percentage of deaths in the cardiovascular disease field that is less than half the total. The most frequent

kind of heart illness is coronary artery disease, the leading cause of mortality in the United States for both men and women. The disease atherosclerosis, more often referred to as plaque, is a condition that causes the arteries to grow thinner and, ultimately, clogged. The accumulation of inflammatory chemicals, cholesterol, and calcium bring on this condition. This condition is referred to by its medical term, atherosclerosis. The existence of these plaques results in a decrease in cardiac output, which is defined as the quantity of blood that is pumped out by the heart. This is because they induce a blockage in the artery or arteriole that supplies the affected heart region, reducing the amount of blood that flows to that region. When plaque develops in the arteries and inhibits blood flow, oxygen and nutrients necessary for the heart to function correctly are denied. This may lead to heart failure.

As a consequence of this, the normal functioning of the heart is interfered with. Ischemia of the heart is linked to angina, which is a pain or pressure that is felt in the chest. If a coronary artery becomes blocked or its blood flow is limited, the heart muscle dependent on that particular artery for its life is at risk of passing away. Myocardial infarction is the term used by those trained in medicine to describe this kind of emergency. Scar tissue will eventually form in the location of the injured heart muscle, leaving the organ incapable of performing its normal functions over time (Rich, Mensah, and Price**,** 2010; The Society of Thoracic Surgeons, 2022).

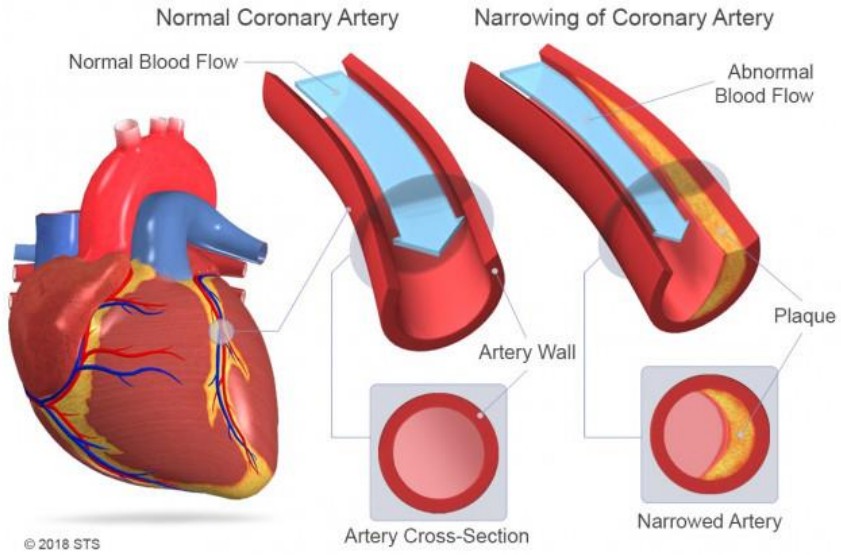

Figure 2.1: Coronary Artery Disease (The Society of Thoracic Surgeons, 2022).

2.1.2. Need for a cardiac catheterization

Scientists report that several additional symptoms may cause heart problems, including coronary artery disease, heart valve disease, and aortic disease. If obstruction is present, a stent should be inserted. Atherosclerosis occurs when fatty particles and other substances that flow into the bloodstream gradually narrow the arteries. Cardiomyopathy: Thickening of the heart muscle or loss of heart muscle strength may lead to an enlarged heart. However, the most common cause of cardiac enlargement is an increase in the thickness of the heart muscle. Congenital heart defects are those that are present from birth forward. Congenital heart defects are caused by abnormalities in cardiac development that occur during gestation and pregnancy. Congenital cardiac abnormalities may take the form of ventricular septal defects, in which a hole in the wall typically separates the two lower chambers of the heart. These defects can be present from birth. This might result in irregular blood flow through the heart, eventually leading to heart failure. Congestion (swelling) in the blood vessels and lungs and edema (fluid retention) in the lower limbs may occur when the weaker heart muscle cannot pump blood effectively, leading to these conditions. This is because the illness causes an accumulation of fluid inside the blood vessels, which is the source of this symptom (CDC, 2021).

2.1.3. Cardiac catheterization steps

Cardiac catheterization is a diagnostic technique that assesses your heart is condition. This operation is also commonly called a heart cath or cardiac cath. A catheter is a thin, hollow tube put into a main blood artery that goes to the heart (for an illustration of this technique, see Figure 2.2). Catheters are used to perform various diagnostic and therapeutic procedures (American Heart Association, 2022).

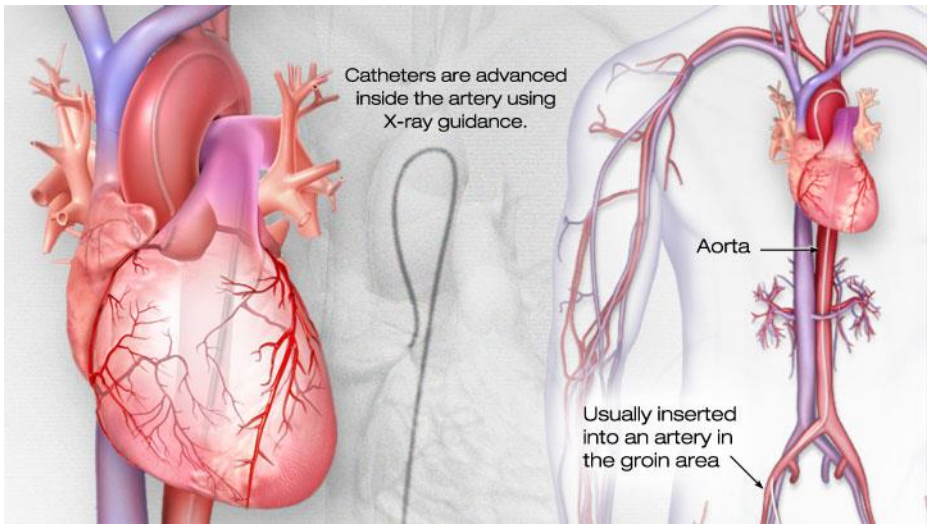

Figure 2.2: Cardiac catheterization (American Heart Association, 2022).

Coronary angioplasty can potentially reduce the risk of myocardial infarction. In contrast to what is commonly believed, the vast majority of patients who undergo these treatments (those who are asymptomatic or who have stable coronary disease) do not benefit from them in terms of a decreased risk of myocardial infarction or an enhanced chance of survival. The only patients who can benefit from angioplasties and stents in terms of survival may be those undergoing an acute myocardial infarction or unstable angina. Only in the acute setting can angioplasty and stenting be beneficial because this is when they can alleviate chest pain (Devries, 2018).

The vast majority of cardiologists agree that angioplasty and stents are the most successful treatments now available to them. Researchers used to believe that manually opening a coronary artery that was extremely stenotic could reduce the likelihood of coronary occlusion, which would then lead to a myocardial infarction. This theory has now been disproven. However, the majority of patients treated with these therapies—patients who are asymptomatic or patients whose coronary disease is stable—do not experience a reduction in the risk of myocardial infarction or a prolongation of life due to the treatment. It would appear that the only patients who could benefit from angioplasties and stents in terms of their survival are those who are undergoing an acute myocardial infarction or an episode of unstable angina. The benefit can only be described as reduced chest discomfort when applied in a chronic setting (Evers and Marziniak, 2012).

In many instances, angioplasty is ineffective since there is a considerable risk of the condition returning after it has been treated. Even though surgical repair using a "no-suture approach" might be successful initially, stent relief might still be

essential if angioplasty is performed regularly. Even after a stent has been placed, restenosis may develop. There is an increasing body of evidence suggesting that drug-eluting stents can prevent or delay restenosis. It has been suggested that balloons cut in half could be used in angioplasty. If there is no PFO or atrial septal defect (ASD) present, a transseptal puncture will be necessary to transfer the medication to the lateral atrium (LA). After pulmonary vein stenting ventricular pump failure is not a typical complication after pulmonary vein stenting since the conduction system does not have to pass through a valve to create regurgitation. As a result, pulmonary vein stenting can cause regurgitation without a valve. Thromboembolic events and symptomatic hypoxia are two of the most common problems that arise during surgical procedures and require attention. However, if the patient has bilateral pulmonary venous stenosis, significant pulmonary hypertension, and RV failure, the patient may be in an impoverished state of health due to the curving of the interventricular septum to the left. This results in a 'pancake' of the left ventricle and left heart failure (Ing, Sullivan, and Takao, 2018).

2.2. Procedures Using Cardiac Catheterization

In order to get the patient ready for the test, the nurse will go through the patient's eating habits over the previous twenty-four hours. Before a catheterization, it is common practice to tell the patient to abstain from food and drink for a period ranging from six to eight hours. Before the catheterization procedure, the nurse will also typically clean and shave the area where the doctor will operate. She will then place an intravenous tube (in the IV) into a vein in the patient's arm so that he can receive medication (a sedative) to help him relax. While inserting the catheter into the patient's body, in addition to giving the patient a local anesthetic to numb the area where the needle was punctured, additional instruments may be fastened to the tip of the catheter. In this category are devices for obtaining blood pressure readings from each of the chambers of the heart as well as from the arteries leading to and from the heart, for inspecting the heart's arteries, extracting blood from various locations within the heart, and for performing a biopsy of heart tissue. Angiography is a diagnostic procedure involving using a catheter to inject a dye that may be visualized via X-rays. After the catheterization procedure, the patient is sent to the recovery room, where their vital signs (heart rate, pulse rate, blood pressure, etc.) will be

monitored for several hours. If she has chest pain, she is sure to inform the nurse of the precise area of the pain and any associated symptoms, such as a rash, an increase in size, or bleeding (American Heart Association, 2023).

2.2.1. The risks of cardiac catheterization

Cardiac catheterization usually is highly safe, according to the American Heart Association (AHA) Trusted Source (American Heart Association, 2022).

During a left heart catheterization (LHC) procedure, patients are occasionally advised that there is a 1 in 1000 chance of encountering a significant problem. This statistic refers to the likelihood of the patient experiencing a problem during the procedure. These studies relied on information gathered during the early days of coronary angiography, which may not reflect the difficulties seen during current cardiac catheterization. Coronary angiograms are occasionally conducted in conjunction with other procedures (such as right heart catheterization) that can increase the risk to the patient. This is because the level of difficulty of LHC testing has increased in recent years. The contrast between the higher risk, older population with multimorbidity referred for LHC and improvements in technology, such as reduced sheath size, radial access, and improved imaging equipment, all of which contribute to an increase in the chance of difficulties from such invasive operations, is illustrated by the fact that the population referred for LHC is both older and higher risk. Even the most recent data from the National Cardiovascular Data Registry (NCDR) reveals that diagnostic LHC bears a risk of less than one percent for stroke, salvage or emergency coronary artery bypass, or in-hospital mortality. This is the case even when looking at the most recent statistics. However, because the adverse events they suffered were not examined, it is unclear whether or not the catheterization was responsible for causing them (Al-Hijji et al., 2019).

2.2.2. Cardiac catheterization application process

Procedures such as coronary angiography and catheterization of the heart are included among the interventions. You are not allowed to consume any food or drink in the hours leading up to this event (medications, on the other hand, can be taken with very little water). Shaving the inguinal area of a patient's body before bringing them into the catheterization laboratory is essential in maintaining the maximum level of sterility possible during the procedure. In order to ease pain, analgesics are

often given on an as-needed basis. In order to gain access to the blood vessel located in the arm or groin, a cannula is first put into an artery in those areas. The afflicted region will be rendered numb before the beginning of the surgical procedure. A catheter, a tiny tube made of a material equivalent to plastic, is inserted into a particular chamber of the heart so that the pressure inside that chamber can be measured. This procedure is carried out to discover how much pressure there is. During this technique, a contrast substance is injected into the coronary arteries, and at the same time, pictures are captured on film. This operation is done in conjunction with a coronary angiogram. The time needed to finish this treatment is around 20 to 30 minutes. After the treatment, the cannula placed in the groin will be withdrawn, and the patient will be instructed on how to apply pressure to the afflicted region for fifteen to twenty minutes. This will be done following the directions that will be provided to them. A compression bandage will be applied to the wound once confirmed that there will be no more blood loss. However, if it is discovered that the cannula that was inserted in the groin of the patient needs to remain there for an extended amount of time in order for the patient to maintain their health, then this method may be modified. After twenty-four hours have elapsed after the conclusion of the treatment, the individual who was treated can, with very few exceptions, continue his usual activities. This is because the therapy is no longer active in their bodies (Hamid, 2014).

2.3. Before Cardiac Catheterization

Before undergoing cardiac catheterization and angiography, the patient must abstain from food and drink for four to twelve hours (medications may be taken with minimal water). In order to improve the level of sterilization in the catheter laboratory, the inguinal region of the patient should be shaved before they are brought in. When it is deemed essential, a sedative will be given. Anesthesia is administered to the region of the groin or arm used for the procedure, and then a cannula is placed into the artery in this region (the access route is opened). The pressure is measured by inserting a catheter, a tiny tube made of a material similar to plastic, into one of the heart's chambers. While the catheter is in place, contrast material is injected into the coronary arteries, and film records are produced (Türk Kardioloji Derneği, 2022).

2.3.1. Cardiac catheterization time

Patients with ST-segment elevation myocardial infarction (STEMI) have a clear correlation between the speed with which coronary blood flow is restored and their higher likelihood of surviving after the event. Delays in primary percutaneous coronary intervention (PCI) are common in patients who need to be transferred between hospitals and who get reperfusion treatment repeatedly after the suggested time limits of 120 minutes have passed (Dauerman et al., 2015; Zeitouni et al., 2020).

The time it takes to get from one hospital to another is insufficient to explain why reperfusion was not achieved within the allotted time. Delays in collecting an ECG and delayed first hospital discharge durations were connected with a delay in initial PCI. These delays are associated with a greater likelihood of inpatient fatalities, and the ECG and discharge time delays were associated with a delay in initial PCI. The following activities were related to the task in the STEMI Accelerator-2 project, which was carried out in a total of twelve areas across the United States: Patients who were transferred directly to PCI hospitals by EMS benefited from a lifeline intervention that centered on the paramedic catheterization lab (Cath Lab), which resulted in more suitable treatment and a decreased fatality rate. However, initiatives focusing on door-in-door-out time for patients requiring interhospital transfers found no meaningful association with treatment times or outcomes (Jollis et al., 2018; Zeitouni et al., 2020).

2.3.2. After cardiac catheterization

During the postoperative period that follows congenital heart surgery (CHS), there is a possibility that clinical or circulatory complications will manifest. These problems might result in substantial morbidity and mortality effects, including reduced cardiac output, postoperative arrhythmias, and pulmonary hypertensive crisis, among other concerns. Resid abnormalities and other illnesses may play a crucial part in developing this complication or worsening its severity. To manage these issues, one may opt for either medical treatment or surgical intervention (Pan, Lin, and Chang, 2016; Güzeltaş et al., 2017; Kasar et al., 2018).

Echocardiography, CT angiography, and other imaging technologies all play critical roles in assessing congenital heart disease, and they do so even in the early postoperative period. Echocardiography, computed tomography (CT), and magnetic

resonance imaging are noninvasive diagnostic procedures; nevertheless, these approaches may not be sufficient to diagnose the underlying ailment. If echocardiography or CT angiography did not reveal the presence of a residual lesion or an underlying ailment, or if a percutaneous intervention was going to be performed, cardiac catheterization and vascular evaluations would be the best alternative (Nicholson et al., 2014; Kasar et al., 2018).

2.3.3. Catheter ablation without surgery

The medical procedure known as ablation, which can also be performed by catheter ablation, is used to treat certain forms of irregular heart rhythms by blocking the electrical channels in the heart. For the purpose of treating the region of the heart that is responsible for arrhythmia (or a rapid heartbeat), either heat (radiofrequency ablation) or freezing (cry ablation) is utilized. Due to this treatment, scar tissue will develop (British Heart Foundation, 2022).

- It disrupts abnormal heart circuits.
- It destroys heart muscle areas that cause arrhythmias.
- Resection begins with the same electrophysiological (EP) study technique and is frequently performed concurrently.
- An EP study can determine whether your heart has additional electrical pathways causing an abnormal heart rhythm (British Heart Foundation, 2022).

Incorrect electrical signals are one potential source of the underlying problem that causes irregular cardiac beats. The term "cardiac ablation" refers to a technique that may scar or remove tissue from the heart, depending on the desired outcome. A diagnostic catheter is inserted into a blood artery and then directed to the heart to record the electrical activity of the heart. This procedure must be repeated in order to get accurate results. In order to do catheter ablation, several flexible catheters are inserted into the patient's blood vessels through the internal jugular vein, the subclavian vein, or the femoral vein. These veins are located on the patient's neck and run down the front of the chest. These veins are situated on the patient's chest at their respective locations. After that, a guided method is used to put the catheters into the patient's heart.

The arrhythmia is produced through electrical impulses, and the aberrant tissue that is the root of the problem is ablated (destroyed) with localized heat or cold. Historically, a direct current impulse was used to create lesions in the intra-cardiac conduction system. Despite this, there was never a broad acceptance of the technology because of the high incidence of challenges. Removing damaged or dying tissue is now feasible due to the development of new methods, which may contribute to reducing the risk of arrhythmia. Electrophysiologists are cardiologists who have obtained additional training in order to become electrophysiologists. Electrophysiologists are the most prevalent medical practitioners that do catheter ablation. This operation might occur in either electrophysiology or a catheterization laboratory (abbreviated as cath lab and EP lab, respectively) (Baghel, 2020).

The most prevalent cause of morbidity and death linked to arrhythmias is atrial fibrillation, often known as AF. This condition may be abbreviated as AF. Patients with atrial fibrillation who have already tried and been unsuccessful with at least one antiarrhythmic drug may be candidates for radiofrequency catheter ablation, which has developed as a popular second-line therapy option in recent years. Because of the procedure's track record of success, catheter ablation is gaining popularity as a primary therapy option, at least for certain patients. This is because the treatment is effective. A growing body of evidence shows sinus rhythm may be maintained more successfully using catheter ablation as opposed to antiarrhythmic medication treatment. This provides more evidence favoring the concept that catheter ablation should be considered an effective treatment option for atrial fibrillation. Arrhythmia-free survival rates one year after ablation vary from 50-75%, but arrhythmia-free survival rates after using anti-arrhythmic medicines range from 10%-30%, as shown by the results of several clinical studies. Ablation is one of the most common treatments for arrhythmias. Recent research has emphasized clinical and subclinical consequences by adopting enhanced monitoring and more extended follow-up periods. This was done in order to understand the relationship between the two better. Catheter ablation seemed to have poorer results than drugs that caused early excitement (Cosedis et al., 2012; Morillo et al., 2014). These findings were published in two separate studies. These results were reported in two different investigations that were conducted independently. Recent studies have looked at the efficacy of catheter ablation in individuals who have not yet been treated with antiarrhythmic medications. These studies were published very recently. Recently,

we were able to establish that there is a significant effect on arrhythmia-free survival rates when there is a delay between the first diagnosis of arrhythmia and the catheter ablation operation. This finding was made possible by the fact that we were able to determine that there is a significant influence on arrhythmia-free survival rates (Jared and Cutler, 2015).

2.3.4. Nursing care for cardiac catheterization heart

Patients with heart disease are in a position that places considerable risk on their lives due to various factors. These factors include reduced cardiac output, poor myocardial perfusion, an irregular heart rhythm, and extensive valve damage. Each of these factors contributes to a situation in which the patient's life is at an increased danger. Because of the severity of their problems, this patient needs medical treatment and monitoring at all hours of the day and night (Morton and Fontaine, 2012). After cardiac catheterization, the patient's stability condition should be the central focus of attention for the medical staff. This evaluation will include a non-invasive examination of the patient's urinary system and measures of the patient's heart rate, blood oxygen level, breathing rate, pulmonary function, gastrointestinal status, and lung function. In addition, this evaluation will determine the patient's lung function. If a patient has returned from the cardiac catheterization laboratory with the sheath still in place, it is conceivable that an ACT may need to be used to do a clotting time check on the patient before the sheath can be removed from the patient. This check is performed on the patient to determine whether or not the sheath should be removed. Every fifteen minutes, four times a day, every thirty minutes, twice a day, every hour, twice a day, and then as needed, the cardiac nurse should thoroughly examine the patient. This evaluation should be performed in the order listed above. If the patient has any change in their neurovascular condition, the attending physician needs to be notified as soon as possible (Henedy and El-Sayad, 2020)

A nurse must show that she complies with the nursing care standards while providing care for a patient. These standards, which are shown by the nurse as part of her professional nursing duties and are characterized as "the standard of achievement based on the required level of excellence," It assesses these norms through the lens of the standard of nursing excellence, describes the practical level of nursing care, and goes through all norms of practice as a guide to the knowledge, skills, judgment, and attitudes that are essential for safe practice. This analysis will serve as a guide to the

information that is required for secure procedures (Smeltzer, Bare, Hinkle, and Cheever, 2014).

The capacity to provide care for patients undergoing cardiac catheterization calls for the skills of an experienced nurse who is aware of the risks associated with the procedure and can evaluate the circumstances appropriately. The nurses combine their expertise and abilities both before and after the procedure in order to provide a safe and accurate cardiac catheterization while also boosting the patient's physical and mental health (Kieft, Anneke, and Diana, 2014; Suzanne, 2016; Fleishman, Kamsky, and Sundborg, 2019).

A large amount of change has occurred in the healthcare system due to demographic trends such as an older population and declining birth rates. As a direct consequence, the infrastructure supporting healthcare and caregiving is changing. For example, if a patient comes into the hospital with a life-threatening condition, the hospital has to provide high-caliber care as quickly as possible. After treatment has been completed, the patient should receive care in the comfort of their home to be accorded respect and dignity until the end of their lives. Therefore, it is the responsibility of nurses to provide comprehensive care that meets their patients' numerous and frequently intricate requirements. It does not matter where a nurse works; they all need to be able to compile information from various sources, analyze it, and then apply their findings to their day-to-day job and decisions. As part of their job, nurses are continuously challenged to develop innovative ways to improve patients' lives. Their professional responsibilities include the ongoing provision of direct care, the protection of human lives, and the facilitation of day-to-day life activities (Fukada, 2018).

2.4. Patient Safety

2.4.1. Patient safety definition

Patient safety is a discipline that focuses on safety in health care through the prevention, reduction, reporting, and analysis of errors and other types of unnecessary harm that often result in adverse patient events. The frequency and magnitude of avoidable adverse events, often known as patient safety incidents, experienced by patients were not well known until the 1990s, when several countries reported large numbers of patients injured and killed by medical errors (Philip et al., 2019) eAcknowledged by

the World Health Organization that healthcare errors affect 1 in 10 patients worldwide, patient safety is an endemic concern. In fact, patient safety has emerged as a distinct healthcare system underpinned by an immature but evolving scientific framework. There is a large interdisciplinary body of theoretical and research literature informing the science of patient safety with mobile health applications as a growing area of research (Yu et al., 2022).

Patient safety is a global health priority, and can be understood as a framework for activities that create patient safety cultures and processes in healthcare that reduce risks and reduce the incidence of preventable harm and adverse events (WHO, 2021). In Sweden, safe care has been identified as one of the six core competencies in health care (Svensk sjuksköterskeförening et al., 2016). In the Swedish Action Plan to Increase Patient Safety, the importance of a culture of patient safety and teamwork is emphasized (National Health and Welfare Board, 2020a).

In the 1990s, it was found that patient safety in healthcare was similar to security in other high-risk organizations. The frequency of adverse events among hospitalized patients was significant, but it was a recognized rarity. Human factors have been identified to contribute to adverse events (Hooker, Etman, Westra and Van der Kam, 2019) and to be relied upon by healthcare professionals working in complex and error-prone healthcare systems (Mannion and Braithwaite, 2017). Strong patient safety culture is mentioned as an important aspect of patient safety in healthcare organizations (WHO, 2021). A culture of patient safety includes a commitment to leadership, open communication, effective teamwork, and learning from mistakes and best practices (Waterson, 2014). Effective teamwork is a key component of patient safety and can positively affect clinical performance (Hughes et al., 2016).

2.4.2. Practices related to patient safety

Nursing practices can reduce the burden of practice errors on patients, their family members, so Patients want ones, and the healthcare system as a whole can all benefit from the implementation of patient safety principles focused on prevention measures and quality improvement in nursing practises (Rodziewicz & Hipskind, 2020). The goal of patient safety principles is to create a health care system that is both safe and effective, with fewer adverse events and faster healing times for patients. Risk management, infection control, medication management, a safe

environment and equipment (Sibal, Uberoi, and Malani, 2016), patient education and participation in their care, pressure ulcer prevention, nutritional improvement, leadership, teamwork, and knowledge development through Research, a sense of responsibility and accountability, and reporting errors of practise are all examples of these principles (Kanerva, Kivinen, and Lammintakanen, 2017)

In both acute and chronic care settings, nurses must ensure the wellbeing of their patients at all times. Through evaluation, care planning, monitoring and observation activities, double-checking, providing help, and interacting with other healthcare providers, nurses are expected to adhere to organisational measures to identify harm and risk. Nurses' adherence to patient safety principles is crucial to the success of interventions aimed at preventing malpractice and achieving safer, sustainable healthcare systems. Other factors that contribute to the success of these interventions include clear policy and leadership, research-driven safety initiatives, healthcare staff training, and patient engagement (Sermeus, 2016; Lin et al., 2020).

Personal motivation, cultural factors, economic and social contexts, and expertise all have a role in whether or not people follow recommendations and standards. Contrarily, noncompliance runs counter to the values, standards, and norms that characterise the healthcare provider's profession (Vaismoradi, Tella, Logan, Khakurel, & Vizcaya-Moreno, 2020).

Surgical hand rubbing, disinfection of hands, and the use of disposable gloves and aprons when exposed to patient fluids are all examples of infection control practises that nurses did not always follow. Inappropriate intravenous dosing rates, improper drug preparation, administration at inappropriate times, incorrect labelling of flushing syringes and administration of intravenous antibiotics without rinsing, patients not receiving the full dose of medication, and improper mixing of drugs with the diluent are all examples of drug administration principles gone wrong (Alsulami, Choonara, & Conroy, 2014). Inconsistent monitoring could put patient safety at risk due to incorrect placement of cardiac electrodes and/or skin preparation prior to the procedure (Flun et al., 2020), which demonstrated a lack of knowledge and skills regarding cardiac monitoring and monitoring parameters (Fålun et al., 2020)

The researchers also discovered a connection between nurses' dedication to patient safety and the broader goal of the nursing profession as a whole. The

'independent' drug delivery occupations that had the lowest rates of adherence were the ones that involved the calculation of doses, the pacing at which intravenous bolus drugs are supplied, and the labelling of flow syringes. On the other hand, it has been discovered that "collaborative" occupations that involve additional intricacy, such as double-checking prescriptions before they are actually administered to a patient, have a higher proportion of adherence (Alsulami et al., 2014). Similarly, a better incidence of adherence to infection control precautions such as disposing of sharps in designated boxes, covering one's mouth and nose, and washing one's hands after removing gloves was linked to an increase in the number of nurses working and coordinating together on the ward (Lim, Ahn,and Son, 2019).

Collaboration and nursing leadership are both essential in order to inspire nurses to maintain patient safety standards. For instance, after getting feedback from nursing supervisors, members of the staff were more likely to adhere to the principles of surgical hand rubbing. These principles include drying hands after using alcohol-based hand rubbing, cleansing with soap and water, and utilising alcohol-based hand rubbing up to the elbows (Rintal, Laurikainen, Kaarto and Routamaa and 2014) Regular practical feedback methods, opportunities for engagement, monitoring by peers and senior colleagues, and other variables serve as motivation for daily inspections of the peripheral venous catheter site and the usage of disposable gloves while handling peripheral venous catheter insertion sites. We were able to boost cardiac nurses' adherence to patient safety recommendations by offering feedback and training ICU nurses on the types of nursing treatments used in situations of severe dysrhythmias. This allowed us to improve the quality of care that patients received (Fålun et al., 2020)

2.4.3. Patient safety in cardiac catheterization

When it comes to the care provided to patients who have heart problems or who have received treatments that include cardiac catheterization, nurses play a vital role in the process and are involved in all aspects of the care provided. The nurse is also responsible for assessing the patient to search for any warning signs of a deterioration in their condition, ensuring that the patient is transported securely, providing medication, assisting the patient with basic needs related to personal care, preventing bleeding, and maintaining hemostasis. These responsibilities are in addition to the fact that the nurse is responsible for ensuring that the patient is

transported securely. If patients employ a treatment plan that has been evaluated and given the go-ahead, they will be better able to cope with their sickness and have a lower risk of experiencing vascular issues. Patients will also encounter fewer difficulties related to their blood vessels. This strategy must be established based on the various educational prerequisites for registered nurses and should also consider any other relevant factors (Ali, Youssef, Mohamed, and Hussein, 2015).

It is the responsibility of the team doing the cardiac catheterization on the patient to ensure that the patient will not suffer any unanticipated consequences as a direct result of the medical intervention they will be undergoing. Increasing patient safety is vital in policy and practice as a direct result. Patient safety awareness and skillfulness influence the risk to patient safety, but this is especially true when healthcare staff lack the safety knowledge and skillfulness essential to offer safe treatment for their patients. Because of this, the skills possessed by cardiac nurses are of the highest significance in today's healthcare system. In order to offer appropriate treatment for patients who have had cardiac catheterization, it is vital to know about the complications that might arise during the operation and the associated variables. In addition, nurses must have the skills necessary to prepare patients for surgery and provide post-operative care, which includes providing careful observation, continual monitoring, and hemodynamic stability to the patient. It is vital to have a well-functioning unit with a culture of safety, proven clinical quality outcomes, and high client satisfaction ratings both internally and externally to limit the risks associated with having a less trustworthy unit. This is because a less trustworthy unit may endanger patients (Ali et al., 2015; WHO, 2023).

Nevertheless, the nurse has to be capable of identifying and appropriately interpreting serious post-catheterization concerns, regardless of whether these issues are likely to occur or are currently taking place. After surgery, the quality of nursing care that the patient receives will significantly impact whether or not the test is successful. Because every invasive operation includes potential problems, the nursing team needs to undertake prompt and accurate evaluation and reaction to minimize the likelihood of adverse outcomes (Henedy and El-Sayad, 2020).

After a patient has had a cardiac catheterization procedure, cardiac nurses must maintain the patient's safety and minimize the possibility of vascular complications to the greatest extent feasible. They are obligated to have awareness of

the guidelines that have been established to ensure the patients' safety. Every nurse has to be aware of the correct techniques to handle high-risk patients and the most effective strategies to help their patients maintain their balance. In addition, nurses need to develop a method that is both standardized and free of danger in order to perform coronary intervention after cardiac percutaneous catheterization has been performed. Nurses should be the ones to design these procedures, which need to be based on research and evidence of some kind. Consequently, patient outcomes may be improved if there is either a higher quantity of nursing care or a higher quality of nursing care (Keshk and Elgazzar, 2018).

Ensuring that the patient is adequately hydrated, promoting patient comfort, and making the patient psychologically prepared for the treatment are the objectives of nursing care maintenance before the procedure. The nursing protocols that were followed prior to the treatment included an assessment of the patient's physical and mental health, as well as the identification of any conditions that the patient may have, the establishment of procedural risks, the establishment of a baseline ECG, and the taking of a blood sample for laboratory testing. In addition, the nursing protocols included the establishment of procedural risks. Patients about to undergo medical operations should have oral antiplatelet drugs given to them before, during, and after the procedures to reduce the risk of thrombotic complications. The nurse should also deliver intravenous fluids to the patient while leading him to the neck region, where the surgery will take place as quickly as possible after the stroke of midnight on the previous day (Abd El-Aty, Abozead, Ahmed, and Abd ElAll, 2018).

2.5. Nursing Care for Patient Safety after Cardiac Catheterization

The majority of cardiac nurses are tasked with a wide variety of duties connected to diagnosing and treating patients. The nurse has two primary functions in the care of the patient: the first is to educate the patient before, during, and after a medical operation; the second is to disseminate information to the patient; both of these functions are related to providing care (Mustafaa, Al-Tameemib, Al-Hchaimc, and Al-Metbaid, 2020). As a direct result of the operation, it is now anticipated that there will be a fatal outcome for around 0.08% of the patients who undergo surgery. However, the danger of passing away increases with age, and those over 60 have a greater mortality rate after catheterization than younger people. This is because older

people tend to have weaker immune systems. Patients with valve disease who also have other conditions that raise their risk of dying, such as heart disease, renal insufficiency, insulin-dependent diabetes, peripheral vascular disease, cerebrovascular illness, or pulmonary insufficiency, have a higher mortality rate than patients with valve disease who do not have any of these other conditions. These additional conditions include pulmonary insufficiency, peripheral vascular disease, cerebrovascular illness, and peripheral vascular disease. Patients diagnosed with valve disease who do not suffer from any of the other disorders listed above have a mortality rate comparable to those diagnosed with valve disease who do not suffer from any of the other conditions listed above (Black and Jacobs, 2014). Patients with an acute coronary syndrome, myocardial infarction, rheumatic heart diseases, various arrhythmias, patients who have undergone various interventional cardiac procedures such as coronary angiography, percutaneous coronary angioplasty, percutaneous mitral commissurotomy, permanent pacemaker implantation, device closure, mitral balloon valvulotomy, balloon pulmonary valvulotomy, and so on are the focus of the work performed by the specialized nurses. The cardiac nurse is tasked with evaluating and caring for patients with heart difficulties and those who have undergone cardiac catheterization procedures. This obligation falls under the purview of the cardiac nurse. This involves monitoring the patient for any terrible condition and symptoms of change in condition, ensuring the patient's safe transit, providing medications, aiding with basic personal care needs, and controlling bleeding. In addition, this includes monitoring the patient for any adverse condition and signals of change in condition. Registered nurses who work in cardiovascular units must display a high degree of responsibility and skill to satisfy the duties that come with their employment. Hospitals that use nurses to provide patient care (Mustafaa et al., 2020).

Additionally, cardiovascular units must ensure that their assigned nurses have the necessary skills (Dumont, Keeling, Bourguignon, Sarembock, and Turner, 2010). Nurses have a specific role to perform when it comes to providing patients undergoing cardiac catheterization with nursing care. This care is administered throughout three shifts, beginning pre-catheterization and continuing post-catheterization. It is essential to have a registered nurse present throughout this treatment to reduce the likelihood of any issues and limit any dangers that may be linked with catheterization (Feroze, Afzal, Sarwar, Galani, and Afshan, 2017).

Nursing care for cardiac catheterization patients calls for an experienced nurse familiar with the many issues that might arise and the evaluation skills necessary to recognize them. During the time leading up to and after a cardiac catheterization, a mix of nursing knowledge and skills is used to enhance the patient's physical and mental health and ensure the procedure's safety and precision (Folami and Odeyemi., 2019). It is the nurse's responsibility to inform the patient of the cardiac catheterization process and answer any concerns that the patient may have before the actual procedure. The method is the first responsibility during the provision of catheterization services, as the nurse asks the patients and their companions to watch a video clip of the operation that will be performed. In addition to patient education, the nurse's responsible for caring for the patient before, during, and after a cardiac catheterization procedure to reduce the risk of problems (Mustafaa et al., 2020). Those employed in the nursing profession must recognize the significance of it because it is connected to results such as fulfilling a patient's expectations. It is possible to recover with the support of licensed nurses (Laal, 2013).

3. MATERIALS AND METHOD

This section includes information about the methodology, design, data collection tools, sample, setting, and data collection process of the study as well as statistical analysis of the study data.

3.1. Aim of The Study

To evaluate nurses' knowledge of patient safety after diagnostic catheterization.

3.2. Design of The Study

A quantitative descriptive study was conducted to assess nurses' knowledge of patient safety after diagnostic catheterization

3.3. Setting of The Study

The study was conducted in the Nasiriyah Heart Center in Nasiriyah, located in the city of Nasiriyah, and data were collected from nurses working in this hospital between May-August 2022.

3.4. Sample of The Study

A non-probability sample was selected from a total of 384 nurses working in the following hospital units: 100 in the cardiac catheterization department, 50 in the cardiac care unit, 50 in the intensive care unit, 34 in the operations department, 50 in cardiac clinics, 50 in the men’s surgery department, and 50 in the women’s surgery department. One hundred sixty-nine of the participants were male, and 205 were female. Inclusion criteria were defined as follows; being over the age of 18 or older in these specific units, nurses are included during the morning, evening shift, and night shifts workers. Nurses who did not work in these units were also excluded.

3.5. Data Collection Tool

Data were collected using a questionnaire to determine the Socio-demographic of nurses and a questionnaire of nurses' knowledge regarding patient safety after diagnostic cardiac catheterization (Appendix 1).

Socio-demographic (Part One): This part includes the social and demographic characteristics of nurses, this form was prepared by the researcher in the form that the researcher filled out during personal interviews with the participants, and the socio-demographic information contains five items, as age, gender, educational level, years of experience and training session included in cardiac catheterization by reviewing the related literature (Sameen, 2018).

The second part of the questionnaire was used: nurses' knowledge regarding patients' safety after diagnostic cardiac catheterization (Sameen, 2018). The questionnaire consists of 17 items (4 questions about complications and 13 questions about symptoms and factors after cardiac catheterization multiple choice questions). To record the questionnaire results, each correctly answered item has a score of (1). Points (0) were assigned to incorrectly answered items; total scores were collected and ranged from (0 to 17). Higher scores indicate higher knowledge while lower scores indicate lower knowledge (Appendix 2).

3.6. Data Collection

The researcher collected the data using the questionnaire method and a face-to-face interview with the nursing staff during the morning shift, evening shift, and night shift and it took 20 to 30 minutes to fill out the questionnaire between May-August 2022. The researcher collected data after receiving training and guidance from the advisor.

3.7. Data Analysis

The data was analyzed using SPSS version 26 (Statistical Package for Social Sciences) through statistical data analysis methods to determine whether the study's objectives were achieved. Descriptive statistics were used: frequencies, percentages, mean, standard deviation, one-way analysis of variance (ANOVA), independent

sample t-test, and the significance level to be determined in evaluating the data is $P \leq 0.05$.

3.8. The Ethical Considerations

This part is considered necessary in the thesis because I have dealt with the foundations and ethics of scientific research since the sample was selected, as shown below:

- Ethical approval was obtained from the Committee of the Çankırı Karatekin University No. 25 on 21.04.2022 (Appendix 3). Iraq Ethical approval No. 2022142/Thi Qar, obtained from the Ministry of Health, Thi Qar Health Department and Human Development Center in Iraq On April 27, 2022 (Appendix 4).Permission from the hospital for data collection on May 08, 2022 (Appendix 5). The author's permission to use the questionnaire was obtained via e-mail (Appendix 6). Confidentiality or anonymity was ensured by not obtaining the identity of the nurses. All nurses were informed that the results of this questionnaire would be used only for scientific research purposes, and their consent was obtained verbally to participate in the research according to the system followed in Iraq to participate in scientific research, most of which is done through the participants' verbal consent. The nurses were informed that they had the right to refuse to participate.

4. RESULTS

This study assesses the nurses' patient safety knowledge after diagnostic catheterization. The research results are discussed in two parts, the first is the descriptive characteristics of the research group, and the second is to assess the nurses' knowledge of patient safety after diagnostic catheterization.

Table 4.1: Socio-demographic and clinical features.

Variables		**n**	**%**
Gender	Male	179	46.6
	Female	205	53.4
Age	18-25	163	42.4
	26-35	174	45.3
	36 and above	47	12.3
Marital status	Single	165	43.0
	Married	219	57.0
Nursing Education	Nursing school	95	24.7
	Diploma	195	50.8
	Bachelor's	94	24.5
Experience in the nursing profession	Less than 1 year	40	10.4
	1-5 years	197	51.3
	6-10 years	88	22.9
	11 years or more	59	15.4
Working period in the unit	Less than 1 year	97	25.3
	1-3 years	154	40.1
	4-7 years	93	24.2
	8 years or more	40	10.4
Training session in cardiac catheterization	Yes	140	36.5
	No	244	63.5

Table 4.1: (Cont…): Socio-demographic and clinical features.

Duration of the last training received (when it was taken)	Training session start of recruitment	87	22.7
	6 months ago	109	28.4
	1 year ago	90	23.4
	I did not take a particular training course	98	25.5
Total		384	100

In table 4.1 the study showed that the majority of the study sample were females, which constituted 53.4%, and 45.3% were aged between 26-35 years, 57.0% were married, 50.8% were diplomat graduates, and 51.3% had experience ranging between 1-5 years, and 40.1% of the study sample worked for a period ranging from 1-3 years, and 36.5% had a training session in cardiac catheterization. Finally, 28.4% was the duration of the last training received (when it was taken) for 6 months ago.

Table 4.2: Frequencies and percentages distribution of correct and incorrect answers of nursing knowledge.

Nurses' Knowledge questionnaire		**Incorrect Answer**		**Correct Answer**	
		n	**%**	**n**	**%**
Q1	What are the complications that occur locally in patients after cardiac catheterization?	28	7.3	356	92.7
Q2	How can you detect that pseudoaneurysm occurs after cardiac catheterization?	178	46.4	206	53.6
Q3	When should you check the serum creatine level of patients after catheterization	222	57.8	162	42.2
Q4	What is the complication of removing a late sheath?	139	36.2	245	63.8
Q5	When does the development of contrast-related nephropathy occur?	154	40.1	230	59.9
Q6	Who has a risk of renal failure after cardiac catheterization?	141	36.7	243	63.3
Q7	How to understand the symptom of thrombus formation after cardiac catheterization?	119	31.0	265	69.0

Table 4.2: (Cont…): Frequencies and percentages distribution of correct and incorrect answers of nursing knowledge

Q8	How many hours should the affected extremity of the patient be immobile after catheterization?	173	45.1	211	54.9
Q9	Whatever happens, after cardiac catheterization develops pulmonary edema.	199	51.8	185	48.2
Q10	What to do when you detect a hematoma in the puncture site after cardiac catheterization.	312	81.3	72	18.8
Q11	After cardiac catheterization involving the femoral artery, which of the following actions of the licensed Nurse needs the intervention of the head nurse?	338	88.0	46	12.0
Q12	After cardiac catheterization, which of the following findings should the nurse report to the physician?	199	51.8	185	48.2
Q13	A client with chest pain is admitted to the emergency department. He states that his chest pain was not relieved after taking 3 nitroglycerine tablets at home. Which of the following is the best initial nursing action?	234	60.9	150	39.1
Q14	An adult has just returned following left heart catheterization. What is it essential for the nurse to do?	73	19.0	311	81.0
Q15	The client asks the nurse if she will be asleep during the cardiac catheterization. What is the best answer for the nurse to give?	80	20.8	304	79.2
Q16	Cardiac Catheter common insertion site is?	9	2.3	375	97.7
Q17	Cardiac catheterization provides information	6	1.6	378	98.4

Frequencies and percentages distribution of correct and incorrect answers of nursing knowledge are detailed in Table 4.2. It was seen that the participants gave the correct answer to the question "Q17: Cardiac catheterization provides information" (98.4%). The least correct answer of the participants was "Q11: After

cardiac catheterization involving the femoral artery, which of the following actions of the licensed Nurse needs the intervention of the head nurse?" It was seen that he answered the question (12.0%).

Table 4.3: Distribution of mean knowledge level

	Min	**Max**	$\overline{X}$	**SS**	**Median**
Total Knowledge score	3	17	10.22	2.97	10.00

Table 4.3. was used, test skewness and kurtosis performed using It were found to be subject to a normal distribution. It was determined that the total knowledge score average of the nurses was 10.22.

Table 4.4: Distribution of total knowledge score by nurses' characteristics

Variables		**Total Knowledge Score**			
		$\overline{X}$	**SS**	**Test value**	**p**
Gender	Male	10.26	2.82	t= 0.270	0.787
	Female	10.18	3.10		
Age	18-25	10.25	2.97	F=0.912	0.403
	26-35	10.33	2.77		
	36 and above	9.68	3.59		
Marital status	Single	10.23	2.87	t=0.066	0.947
	Married	10.21	3.04		
Nursing Education	Nursing school	9.46	2.98	F=45.863	0.000*
	Diploma	9.48	2.75		
	Bachelor's	12.51	2.10		
Experience in the nursing profession	Less than 1 year	11.03	2.81	F=2.672	0.047*
	1-5 years	10.42	2.78		
	6-10 years	9.70	3.20		
	11 years or more	9.76	3.20		
Working period in the unit	Less than 1 year	10.75	3.28	F=2.741	0.043*
	1-3 years	10.34	2.52		
	4-7 years	9.58	2.86		
	8 years or more	9.93	3.73		
Training session in cardiac catheterization	Yes	9.95	2.94	t=-1.346	0.179
	No	10.37	2.98		
Duration of the last training received (when it was taken)	Training session start of recruitment	10.48	2.58	F=3.763	0.011*
	6 months ago	9.83	3.33		
	1 year ago	9.68	2.97		
	I did not take a particular training course	10.92	2.72		

*p<0.05; t: independent sample t test; F: ANOVA (F) testi

It was determined that the total knowledge scores of the participants showed a statistically significant difference according to the nurse's education (p <0.05). Accordingly, the total knowledge scores of the bachelor's group are higher than the other groups, and it was also determined that the total knowledge scores showed a

statistically significant difference according to the participants' experience ($p < 0.05$). According to the results, it was observed that the group with one year of age or less had an overall knowledge score of 6 to 10, higher than the groups with 11 years or more. It was also observed that groups with one or fewer years and 1-3 years had higher overall knowledge scores than those with 4-7 years. In addition, it was determined that the total knowledge scores of the participants showed a statistically significant difference according to the training date ($p < 0.05$). Accordingly, the total knowledge scores of the group that did not take a particular education course were higher than those of other groups. A multiple comparison test was performed to see which group the difference arose. According to the results, it was noted that the total knowledge scores of the group that did not take a particular course were higher than those obtained by the groups that had obtained six months ago, one year ago.

5. DISCUSSION

This section will explain the results of the current research in light of the study's main objectives, which aim to assess nurses' knowledge of patient safety after diagnostic cardiac catheterization in Iraq.

Part One. Discuss the socio-demographic characteristics of nurses.

The study results showed that most of the study sample were female nurses. This result is consistent with a study in Iraq, which found that most of the study sample was female (Sameen, 2018). This result is consistent with a study conducted in Egypt, which found that most of the study sample was female (Jabr, Mohamed, and Metwally, 2022). The possible reason for this result is that females predominate in each study, as it was explained that females need to work in cardiac catheterization units, where they can perform jobs that require hard work due to the increase in the number of patients in those units in Iraq.

This study indicated that the most significant number of nurses in this study ranged between the ages of 26 and 35. This result is consistent with another study stating that most of the study sample were between 20-29 years old (Arathy, 2011). This result is consistent with another study stating that most of their study sample is less than 40 years old (Aziz and Azize, 2022). The possible reason for this result is that nurses working in the cardiac catheterization unit need more nurses between the ages of 26 to 35 years than nurses because they are more mature than other age groups.

Our study discovered that the majority of the participants were married. This result is consistent with what was found in a study conducted in Iraq in the city of Mosul (Mahmood, Ibrahim, Hassan, and Abdulgani, 2021). This result is also consistent with what was found in another study conducted in Egypt, where most of the study sample was married (Ali and Ali,2019). The reason for this result is that what indicates that these nurses who work in the cardiac catheterization department have family stability and are married.

Concerning the educational level, the study showed nurses graduated from diplomat graduates in nursing.This is consistent with a study (Ali and Ali, 2019) that found that most of their study sample were nursing diploma graduates. It also corresponds to another study, where the most significant number of their study sample were nursing diploma graduates (Sameen 2018). It is also consistent with a study conducted in Egypt (Ali et al., 2015), a study conducted by (Feroze et al., 2017), and another study conducted by (Keshk and Elgazzar, 2018), which was approved, stated that more than half of the nurses hold a diploma nursing because the majority of nursing workers in Iraq have a diploma from the Nursing Institute.

This study found that they have experience ranging from 1. to -5 years. This result is consistent with Sameen (2018) and compatible with whose study sample mostly had five years because the nurses in the college in Iraq are primarily fresh graduates and young people (Mahmood et al., 2021).

The second part: discusses the distribution of the study sample of the nurses' knowledge of patient safety after diagnostic catheterization.

It was noted that the participants provided the correct answer to the question. The results of the study showed that the majority of nurses have available information about cardiac catheterization Information is available. This result is consistent with a study conducted in Rania in Iraqi Kurdistan (Sharif et al., 2018). also, this result consists of a study in Iraq (Sameen, 2018) that stated that the majority of nurses answered correctly about the availability of information about cardiac catheterization.

In this study, the nurses had the least correct answer for "After cardiac catheterization involving the femoral artery, which of the following procedures for the licensed nurse requires the intervention of the lead nurse?" The possible reason for this result is that the nurse doctor in Iraq who works in the catheterization department often follows the doctor's instructions and has no specific practice after catheterization. This result is consistent with (Sharif et al., 2018; Sameen, 2018). Those with the lowest response rate to nursing information about cardiac catheterization and procedures require the nurse to intervene.

This study showed a significant effect between nursing education for nurses in the cardiac catheterization department and the level of knowledge. This result is consistent with (Aziz and Azize, 2021), who found it in their study. This result is

consistent with a study conducted by Mohammed, Mohammed, and Al-Araby (2016), who concluded that the results show statistically significant differences between nurses' knowledge of post-cardiac catheterization and educational level. These results are supported by the study by Mahmood et al. (2021). which stated that the level of knowledge of the nurse and the practice of cardiac catheterization regarding increasing the safety of patients with job experience showed that there are statistically significant differences between the study Nurses' practice and education level, the possible reason for this result is that the educational level significantly affects the knowledge and practice of nurses in general.

This study showed a significant effect between experience in the nursing profession for nurses working in the cardiac catheterization department and the level of knowledge. This result consists of a study conducted by Aziz and Azize (2021), who found that there is a relationship between work experience and nursing knowledge in the cardiac catheterization department; also this result consists of another study which found there is a significant effect between experience in the nursing profession for nurses working in the cardiac catheterization department (Mahmood et al., 2021). This conclusion is supported by the study done in Rania city, Kirkuk, and Khartoum city (Sharif et al., 2018; Sameen, 2018; Aziz and Lafi, 2011). This result is because work experience significantly affects knowledge, as it is considered a kind of practical practice that increases knowledge.

The results of this study showed that nurses with experience in the nursing profession in a period of less than a year have higher knowledge than the rest of the groups. This result is consistent with many previous studies (Panicker, Cherian, and Thomas 2022).Those who found that those with less than 10 years of experience had higher knowledge than the rest of the groups with higher experience. A study conducted among Vietnamese nurses also found that those with less than 5 years of experience had more experience than the rest of the more experienced groups (Yaqoob, Barolia, Noor, and Nazar, 2019) This result is consistent with (Nguyen, and Le, 2021; El Sayed Khaliel, Said Mohamed, and Elsayed Ghonaem, 2022). Who found that those with experienced nurses had higher knowledge than the rest of the groups with higher educational experience. Perhaps the reason for this result was because the nurses had a bachelor's degree or higher, so science had a great impact on knowledge, regardless of experience.

The results of this study showed a significant effect between the duration of the last training received (when it was taken) for nurses working in the cardiac catheterization department and the level of knowledge. Who found that there was a significant effect between taking a training course in cardiology catheters to enhance their knowledge (Hassan and Aburaghif, 2016). It is also consistent with another study that found that training is one of the few options available to help promote intentional professional development (Mohamed, Mohamed, Ibraheim and Elsisi, 2018) and a study in Egypt that found that if nurses undergo a training program, nurses can increase their knowledge (Yassin, 2014). This result is because practical training and receiving training programs significantly increase the experience and knowledge of nurses through practice.

6. CONCLUSION AND RECOMMENDATIONS

6.1. Conclusion

- The average degree of nursing knowledge of patient safety in the cardiac catheterization department was found to be 10.22 ± 2.97.
- The age groups 26-35 years were higher, and the quality of life for females was higher than for males
- Most nurses provided the correct answer to the available information about cardiac catheterization.
- The nurses had the least correct answer about nursing procedures after cardiac catheterization involving the femoral artery
- Graduates of the College of Nursing enjoyed a higher level of knowledge than others with other levels of education.
- There is a significant effect between experience in the nursing profession and the level of nursing knowledge, as it was higher for those with 6-10 years of experience and 11 years or more.
- There is a significant effect between the working period in the unit and nursing knowledge, as it was higher than eight years or more for nurses with other work periods.

6.2. Recommendations

- Update the knowledge and practice of nurses in the cardiac catheterization department by continuing educational programs regarding complications and risk factors for patients undergoing cardiac catheterization.
- Continuous assessment of nurses' knowledge and practice to determine nurses' needs.

- Encouraging and assisting nurses to attend national and international conferences, workshops, and training courses related to nursing care for cardiac catheterization patients.
- Conduct an educational program on patient safety for nurses in the catheterization unit. Improve knowledge about patient safety and avoid complications after cardiac catheterization
- The study must be repeated on a large sample for the results to be generalizable

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APPENDICES

APPENDIX 1. Data collection forms

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APPENDIX 3. Ethics Committee In Çankiri Karatekin University Approval

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